

# City of Golden Community Roadmap for Electrified Transportation



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# Executive Summary

The City of Golden developed this Community Roadmap for Electrified Transportation to identify actionable steps to decrease the carbon footprint associated with transportation in our community. This plan is based on the strategies previously adopted in 2020 by Golden City Council in [Resolution No. 2771](#). Resolution No. 2771 declared Golden a “GoEV City” and made a pledge to transition municipal and citywide transportation systems to 100% electric vehicles by 2050.

Building upon the strategic areas identified in Resolution No. 2771, this plan contains the following focus areas: Infrastructure, Readiness, Equity, Schools, RTD, Shared Fleets, and Micromobility. Each focus area includes action items, along with an estimated timeline to initiate the effort and required resources. This plan is in support of Golden’s sustainability goals and is aligned with similar utility, county, state and national transportation electrification efforts intended to reduce greenhouse gas emissions and improve air quality.

Key priorities in the roadmap include:

1. Develop public charging infrastructure and adopt municipal code amendments that support growth of charging infrastructure in residential and commercial areas in order to remove barriers to electric vehicle adoption.
2. Aggressively seek grant opportunities to maximize electrification benefits to the Golden community and businesses.
3. Cultivate partnerships with Jefferson County, RTD, schools and shared fleet organizations to advocate for rapid progress toward transportation decarbonization.
4. Work with Xcel Energy to identify grid infrastructure gaps to ensure electrification readiness for the Golden area.
5. Prioritize equity and disability access across all policy initiatives and with emphasis on access to affordable charging and improving outdoor air quality.
6. Support and expand access to electric micromobility transportation options such as e-bikes, e-scooters and other alternatives to car ownership such as electric carshare services.
7. Collaborate with other City initiatives and boards to integrate electrification policies into their actions and plans.

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# Introduction

The City of Golden supports its sustainability goals through the electrification of municipal, community and regional transportation. Adopted in 2019, the most recent sustainable transportation goals were adopted by Golden City Council through Resolution No. 2656:

- *To achieve a 20% fossil fuel-free transportation sector by 2030*
- *To achieve a 100% fossil fuel-free transportation sector by 2050.*

These transportation goals go hand in hand with the City's commitment to align greenhouse gas emission reductions with the Paris Accord by 2050.

The City's goals dovetail with those of the State of Colorado. The 2023 [State of Colorado EV Plan](#) envisions the large-scale transition of Colorado's transportation system to zero emission vehicles. Colorado's plan establishes a goal of having 940,000 light-duty EVs on the road by 2030, which is approximately 20%, and a long-term vision of 100% by 2050. This goal is on-track, with 11.2% of new vehicles registered in Colorado in the first three quarters of 2023 being fully-electric models, up from 7.3% in 2022 (Denver Post, [November 2, 2023](#)). The State also seeks to transition 100% of medium- and heavy-duty vehicles to zero emissions vehicles, expand adoption of electric micromobility and shared transportation options and will expand access to all Coloradans and businesses, especially those in disproportionately impacted and rural communities.

The City's goals also dovetail with those of our utility Xcel Energy. Xcel Energy's [transportation vision](#) is for their generating and grid delivery capacity to enable 20% electric vehicles by 2030 and to deliver zero-carbon fuel for 100% of vehicles by 2050. Xcel Energy estimates that their 2030 goal will save customers one billion dollars annually in fuel cost savings, with electric charge estimated to cost the equivalent of \$1 per gallon.

Golden's transportation goals are not fully within its sphere of influence. Golden is a small city interconnected to a larger metropolitan area. Even within city limits, the City does not control many key transportation decisions including individual vehicle purchases and school, county and regional fleet strategies. Within its control, the City is progressing towards electrifying its municipal fleet according to its 2022 [Municipal Fleet Electric Vehicle and Equipment Master Plan](#). Decarbonizing the rest of the City's transportation sector is a responsibility the City shares with residents, visitors, businesses, and other governments. Our success partially relies on policy outside of the city and remaining adaptable to continued progress in technology.

This document identifies a number of initiatives that the City can undertake with its sphere of influence to support progress towards cleaner transportation systems. The City plans to support decarbonized transportation primarily by making a variety of non-emitting travel easy, safe and accessible.

## Why Electric?

The focus of this document is on decarbonizing our transportation systems through electrification. The City also supports non-motorized transport such as walking and cycling, which are strong values within our community and which received focus in Golden's 2020 [Transportation Master Plan](#). However, motorized transit accounts for the vast majority of vehicle miles traveled annually in our community, and electrified transportation is currently the best-available technology to reduce emissions for trips where public transit, cycling, and walking cannot be used.

## Lower Greenhouse Gas Emissions

Across the U.S. the transportation sector is responsible for 29% of all greenhouse gas (GHG) emissions, more than any other U.S. sector. Approximately 60% of these emissions come from passenger vehicles. Similarly, the [State of Colorado GHG Pollution Reduction Roadmap](#) cites transportation as the largest single source of GHG emissions in Colorado. In Golden, transportation emissions make up more than 33% of Golden's total GHG emissions and are second only to emissions from buildings, according to the City's [2007 Greenhouse Gas Emissions Inventory](#) and [2019 Greenhouse Gas Emission Inventory](#). Passenger (41%) and light duty vehicles (49.8%) make up nearly all of these transportation emissions. The Business-As-Usual model shown in Golden's 2019 inventory predicts that transportation emissions will become the predominant source of emissions by 2050 if no actions are taken.

Battery electric vehicles (BEVs) run with zero tailpipe emissions, while plug-in hybrid electric vehicles (PHEVs) produce emissions when they operate on gasoline but significantly less than comparable conventional vehicles. Furthermore, charging electric batteries using our electrical grid is increasingly clean, and Xcel Energy has received approval from the Public Utility Commission for [its plan](#) to generate 80% of its electricity with renewable energy, mostly wind, by 2030, on its way to 100% renewable by 2050. Even when accounting for the emissions produced during vehicle manufacturing and charging from the electrical grid, research studies including as [Woody et al. 2022](#) demonstrate that lifecycle emissions from electric vehicles of all types are significantly lower than conventional internal combustion engine vehicles.

## Improved Air Quality

Tailpipe emissions from ICE vehicles (internal combustion engines) are a primary source of the pollutants that react with sunlight to form ozone. High levels of ground level ozone impose a significant health burden on our population, especially causing respiratory problems for at-risk populations such as children and the elderly.

In 2023, Jefferson County received an ["F" grade](#) from the American Lung Association for high ozone days. In 2022, the EPA downgraded the [air quality of the Denver region](#) to "severe" status, after years of documenting [non-attainment status](#) of EPA standards. According to the American Lung Association, transitioning to a nationwide electric transportation system by 2050

would save approximately 6,300 lives every year and avoid 93,000 asthma attacks and 416,000 lost workdays annually.

## Less Noise Pollution

Urban areas have an average background noise level of 60 decibels, with regular spikes up to 85 decibels or more as shown by City noise studies performed in the areas near Highways 93, 58 and US 6. [Various studies](#) have linked noise exposure to significant health risks including increased risk for insomnia, high stress levels, cognitive impairment, cardiovascular diseases and strokes. In urban areas such as Golden, most vehicle noise is created by combustion engines from gasoline-powered vehicles. EVs and e-mobility vehicles offer the community health benefits by reducing general noise pollution. Reduced noise from vehicle electrification has the potential additional benefits of allowing extended commercial work hours near residential areas and reduced noise level risk for workers on job sites.

## The City of Golden's GoEV Commitment

In the past several years, the City of Golden has taken a series of steps towards a future where transportation systems are decarbonized. The original 2007 Sustainability Goals established targets for reducing vehicle miles traveled (VMT). The 2019 Sustainability Goals established a target to decarbonize 20% of our transportation by 2030 on the way to full decarbonization of all transportation by 2050. In support of these goals, the Golden City Council adopted the GoEV campaign ([Resolution No. 2771](#)) in 2020, which pledges to implement policies and programs to help transition municipal and citywide transportation systems to 100% electric vehicles by 2050.

These nine City Council-adopted GoEV objectives are:

- **Infrastructure:** Support the electric vehicle charging station infrastructure needed to accommodate the transition to electric vehicles considering the availability and sustainability of resources, council priorities and budget constraints.
- **Readiness:** Work with the community on programs, policies, incentives and regulatory approaches to transition 20% of all vehicles within the city to zero emissions by 2030, and 100% of all vehicles by 2050.
- **Equity:** Improve transportation and social equity and extend the benefits of transportation electrification to low-income households and communities disproportionately affected by the harmful effects of air pollution.
- **Schools:** Work with the Jefferson County School District and the Colorado School of Mines to develop a roadmap to zero-emissions electrification of all new transit and school buses by 2025.
- **RTD:** Advocate for having the Regional Transportation District transition all bus routes within the city to zero-emission by 2030.

- **Shared Fleets:** Work with other municipal partners and with shared fleets such as taxis, rideshare, and carshare companies to transition these shared fleet vehicles to full electric fleets by 2030.
- **Micromobility:** Develop partnerships with micro-mobility companies to promote the use of fossil fuel-free alternative transportation options such as electric bikes and bicycles.
- **Municipal Fleet Electrification Plan:** Create a municipal fleet electrification plan by 2021 to include a phased approach to meet 100% of the City’s fleet for electrification by 2030 and adopt an “EV First” philosophy for new vehicles with electrifying other vehicles as expeditiously as practicable.
- **Municipal Fleet Transition Commitment:** Transition to medium and heavy duty zero emission vehicles and off-road equipment as these vehicles become available in Colorado if they can fully support the needs of the departments operations and departmental budgets can accommodate both vehicle acquisition and the associated charging infrastructure.

The purpose of this Community Roadmap for Electrified Transportation is to build upon the previously endorsed GoEV strategies with action items associated with each strategy. The following sections detail action items associated with each pledge element. These action items will be developed to include detailed implementation plans identifying critical steps, assigned roles/responsibilities, funding, resource needs and solicitation for public input when appropriate. Successful execution will be dependent on approval of adequate funding and resources.

## Action Item Recommendations

### Infrastructure

*GoEV Strategy: Support the electric vehicle charging station infrastructure needed to accommodate the transition to electric vehicles considering the availability and sustainability of resources, council priorities and budget constraints.*

One of the most impactful steps the City can take to help move away from fossil-fuel based transportation is to develop charging infrastructure. The federal [Joint Office of Energy and Transportation](#) has set the vision for a national charging network that is “convenient, affordable, reliable, and equitable to enable a future where everyone can ride and drive electric.” The City of Golden intends to support this vision within its scope of operations. This scope includes expansion of a public charging network and building codes and other actions to facilitate growth of at-home and at-work charging capabilities.

In the last few years, Colorado has experienced significant growth in access to electric vehicle charging, often referred to as electric vehicle supply equipment or EVSEs. There are currently over **3,250 public and private charging stations** across the Front Range, a significant increase over 550 that existed in all of Colorado in 2017. Golden currently has 87 charging ports



accessible to the public, located in and around the city limits. Beside the 16 city-owned ports, chargers that are privately-owned but available to the public include locations at Spyderco, the Gateway Trailhead at Clear Creek Canyon Park, Colorado School of Mines, Natural Grocers, the former Golden Real Estate, Centura Health, Jefferson County, Holiday Inn, Kohls, and Aurum Golden.

The National Renewable Energy Laboratory (NREL) and industry research ([Wood et al., 2023](#)) document that most electric vehicle owners choose to install their own Level 2 (240-volt) EVSEs (charging systems) and charge their vehicles at home overnight due to lower electricity costs and higher convenience. Level 1 charging (plugging in to a 120-volt normal outlet) at home is slower but able to provide adequate overnight charge for most resident's commute distances. When available, EV owners also prefer to charge in dedicated parking spaces at their workplace. However, public charging networks are a critical third charging alternative that can remove barriers to EV adoption and use, particularly for the many residents who do not have access to EVSEs at home or work. Although the City has limited influence on private vehicle purchasing decisions, the City emphasizes that strategic investments in EV charging infrastructure will help residents and visitors feel comfortable adopting EVs as quickly as possible.

Using the federal Alternative Fuels Data Center's Electric Vehicle Infrastructure Projection Tool ([EVI-Pro](#)) Lite and estimating that Golden's households will follow the national average of 2 vehicles per household, Golden could need something on the order of 2,400 Level 2 and Level 3 charging ports by 2030 and 11,700 Level 2 and 3 charging ports by 2050, distributed across all types of residential and commercial land uses. Because early EV adoption has been dominated by residents in single family homes, the EVI Projection Tool results suggest for 2030 that Golden's overall charging infrastructure may look like:

- 2,210 single family Level 2 charging ports
- 34 multi-unit dwelling shared Level 2 charging ports
- 41 private workplace Level 2 charging ports
- 113 Level 2 public charging ports, including curbside within neighborhoods, at community centers, schools, rec centers, and retail centers.
- 13 DC current ports (also known as Level 3, generally the fastest charging)

The estimates generated by the tool for the number of chargers that will be needed for multi-family residential areas appears to be inadequate for Golden's population, so the City should seek to gain a greater understanding of multi-family needs to achieve equity across all user sectors.

### Level 2 Public Charging Network

Since 2015, the City has received four grants to install public charging stations, totaling \$289,000. From this funding, the City currently has 8 dual-port Level 2 (240V) EVSEs and is installing 10 additional ones in 2023-2024. Earlier grants required that the City offered free charging for a minimum of three years, and the City has currently chosen to maintain this free

charging policy across all public chargers. In 2024, City Council will further consider a Community Sustainability Advisory Board recommendation to begin cost recovery by charging on a per kilowatt hour basis.

Continued growth of our Level 2 public charging network is important to support our City's transportation goals, goals which closely mirror Xcel, Jefferson County, the State of Colorado, and federal transportation objectives. The City will use its budget and continue to leverage available grant funding in order to expand its Level 2 charging infrastructure according to the best-available research and monitoring the City's usage data. This infrastructure will include charging stations near low-income and multi-family housing, which are less likely to have at-home charging capabilities and instead rely on street parking. Optimal locations are at city-owned facilities and right-of-way spaces near where people live or where people remain for at least several hours such as near work and commercial spaces.

In multi-family areas or denser residential areas such as downtown Golden, people rely more often on on-street or lot parking. Street parking makes personal vehicle charging more difficult than in lower density areas where homes have garages. The City should evaluate opportunities for public and private charging at the curb in public rights-of-way with consideration for equity for users to access charging, access for City maintenance projects, connections to streetlight power poles, and potential future complete street redesigns. Because installing curbside EV charging stations may preclude future street designs such as transit-only lanes or protected bike lanes, the City should align any potential curbside policy with public space and multimodal strategies. If the City moves forward with curbside charging, various strategies should be considered for promotion including grant programs, technical assistance, streamlined permitting, and engagement with local employers.



## Geographic Study

Finding good locations for public EVSEs requires identifying a combination of City-controlled space availability, electrical grid tie-in access and capacity, and accessibility to EV drivers. In order to maximize beneficial community impact, right-size the number of public EVSEs and take the guesswork out of EVSE placement, a geographic study will be commissioned to identify optimal locations for a build out of our public network including consideration for curbside charging.

## Cost Model

As the City continues to develop public infrastructure for electric vehicle charging, an annual review of city owned EVSE uptime, usage, and operational costs should be conducted. This review will help inform community charging needs as EV adoption increases, identify operational reliability issues, and support decisions related to the city's cost recovery model. Annual operating expenses include the cost of electricity, maintenance contracts, and licensing fees. The city targets uptime of 95+% and intends to add expectations to EVSE contracts with financial impact to the vendor, currently ChargePoint, for failure to meet these expectations.

## Municipal Building Code for New Construction

EV owners strongly prefer to charge at home or at-work instead of public networks. The 2023 NREL charging infrastructure study ([Wood et al, 2023](#)) emphasized that at-home and at-work charging infrastructure will need to become pervasively accessible to achieve transportation decarbonization goals. Prorated by Golden's population, the NREL study suggests that a minimum of 1,500 to 2,000 Level 2 home and workplace charging ports will have to be installed in new and existing buildings in Golden by 2030. In preparation for this, one of Golden's transportation priorities should be to amend the municipal building codes for new single family and multi-family housing and commercial buildings to require at least electrical wiring and panel capacity for EVSEs.

Currently, the City's municipal code requires some EVSEs in all new multi-family and commercial developments. One Level 2 EVSE is required per 15 required parking spaces and EV-ready conduits for 15% of the total required parking spaces is also required. Significantly more charging access will have to be added to new construction to prepare for the expected increase in EV usage. The electric systems for EV charging at home are currently being considered in Golden's municipal building codes including updated requirements for single-family, multi-family and commercial buildings. EV-related code should be revisited every 3 years when municipal codes are regularly updated.

## Existing multi-family housing

Approximately one third of Golden's housing units are in multi-family areas. Historically, residents in multi-family areas have higher logistical and financial hurdles around EV investment. The costs for retrofitting existing residential buildings to include EV charging are typically higher than when included in the design of new construction and retrofits of even larger multi-family buildings can be significantly higher than for single family residences. Currently, there is very little access to EV charging in Golden's existing multi-family residences, so the City

should create an outreach program to offer grant-writing and logistical assistance for existing multi-family housing to help leverage existing EVSE incentives from Xcel and the State of Colorado. The City should provide opportunities to building owners to learn about, prepare for and finance EVSE infrastructure upgrades and connect owners with regional resources (green loans, grant opportunities, technical design assistance from Xcel).

### Direct Current (Level 3) charging

Level 1 (120 volts) and Level 2 (240 volts) charging provides the standard and recommended charging rate for every-day local EV use. However, longer-distance trips require more rapid charging, which can be accessed using direct current (DC) charging stations, also known as Level 3 or direct current fast charging (DCFC). Because Golden is 'the last stop before the mountains' for many travelers, the City should consider opportunities to add at least one DC charging center within city limits, with [the NREL transportation study](#) suggesting at least 10 DC ports by 2030. Complementarity with the Electrify American DC charging hub already at Colorado Mills should be considered. Access to DC charging stations can encourage use of EVs for longer trips and would help reduce emissions in the City.

Opportunities to add a commercially operated or publicly-funded DC plaza should be reviewed. The USDOT Federal Highway Administration's (FHWA) Alternative Fuel Corridor (AFC) program may offer future potential for grant funding for DCFC Level 3 chargers. The AFC program shows that, in 2023, several Golden highways (State highways 93 and 58 and US highway 6) are listed as a potential expansion area for AFC designation and that funding has already been allocated for one fast-charger station at the public parking lots at the Morrison Road exit on I-70. The City should remain engaged and evaluate future opportunities to apply for this [Fast-Charging Plaza Program](#).

### Delivery Vehicle Charging Depot

Many medium- and heavy-duty delivery vehicles operate in the City, including the postal service, package delivery vans, and grocery and hardware delivery trucks. While the City does not have jurisdiction over these vehicles, it can encourage and incentivize their electrification, which would reduce emissions in the City. Similar to above, a DC charging depot for delivery vehicles could facilitate the adoption and prioritize the use of electrified medium- and heavy-duty delivery vehicles within the city, at a time when these vehicles are becoming more readily available.



The following table summarizes the recommended infrastructure action items:

Infrastructure Action Items	Timing	Support Type
Level 2 public charging network: Dedicate consistent funding to add Level 2 charging stations to public spaces following recommendations from the geographic study	2024-2030	CIP budget
Geographic study: Conduct a geographic study that optimizes public charging type, locations and density	2024-2025	General funds or grant for consultant
Cost model: Annually review public charging fee policies and adjust as necessary to minimize city costs while maximizing usage	end 2024	ChargePoint usage data analysis
Municipal building code: Update municipal building code to increase requirements for EVSEs in new construction including single-family residential, multi-family and commercial buildings	2024 and every 3 years	Proposed municipal code review and recommendation by Planning Commission
Existing multi-family housing: Offer assistance for existing multi-family housing leveraging EVSE incentives from Xcel and state	2025	Staff time and research
Level 3 charging: Research opportunities for a Level 3 charging center including commercial networks and Colorado Energy Office Direct Current Fast-Charging (DCFC) Plazas program	2025	Grant application possible in 2024
Delivery vehicle charging depot: Understand how the City might support establishing a charging depot for future commercial electric trucks making deliveries in the city.	2026	Grant

## Readiness

*GoEV Strategy: Work with the community on programs, policies, incentives and regulatory approaches to transition 20% of all vehicles within the city to zero emissions by 2030, and 100% of all vehicles by 2050.*

### Grant Opportunities

The City of Golden is a small piece of a much larger government effort to transition away from internal combustion engine (ICE) vehicles. Currently, these larger efforts have resulted in a significant influx of potential grant funding and financing opportunities. It is a priority for our City

to aggressively seek all available transportation grant funding as it aligns with our local objectives.

Potential sources of grant funding are numerous and will not be fully delineated in this document. They include the federal Bipartisan Infrastructure Law, which provided \$7.5 billion for EVSEs and electric mobility-related initiatives. Additionally, the federal Inflation Reduction Act included tax credits for EV purchases and charging infrastructure. FHWA's [Congestion Mitigation and Air Quality Improvement](#) (CMAQ) program allocates funding to the Colorado Department of Transportation for projects that improve air quality and provide relief from congestion. The City should evaluate this program for electric vehicle projects, fleet conversions and charging infrastructure. The State of Colorado also operates the [ReCharge Colorado](#) program, which provides guidance to consumers, local governments, workplaces and multi-family housing to identify funds, grants and other opportunities to deploy EVs and charging infrastructure. The Colorado Energy Office's [Charge Ahead Colorado](#) program provides a potential source of grant funding for public Level 2 and DC charging stations, and CDOT's [Innovative Mobility Grants](#) seek to enable innovative electric mobility solutions including micromobility programs around the state.

### Jefferson County Partnership

Because Golden is also the county seat for Jefferson County, their transportation emissions directly impact Golden's air quality and greenhouse gas emissions. Golden has a valued and ongoing partnership with Jefferson County. The City will continue to work with and assist the county in areas of mutual interest related to transportation. These areas include the ongoing electrification of the county fleet, development of a shared electric infrastructure roadmap and identification of grid upgrade needs, the integration of appropriate EV requirements into building code, policies and regulations around e-micromobility, and regional e-bikes and e-scooters programs.

### Workplace Best Practices

The city encourages businesses to consider adding charging infrastructure in employee parking areas. Although adding EVSEs with a basic level of functionality is generally not expensive or technical, the logistics and costs may be unfamiliar and therefore daunting to some business owners. As part of an education outreach program, the City proposes to develop a short readiness guide for Golden businesses with typical workplace charging policies, best practices and cost estimates. Additionally, city staff can act in an advisory role to help connect interested businesses with additional information or to provide guidance on grant writing opportunities.

### Grid Readiness Study

The increased use of EVs is expected to create higher demand for additional electric grid capacity. Scenario modeling from [NREL's Electrification Futures study](#) suggests broadly that grid capacity may have to increase by almost 40% by 2050 to meet the increased demand of a high-case electrification scenario. NREL models suggest that this anticipated need for increased grid capacity is almost entirely due to the demands of vehicle electrification. To meet the demands of increased numbers and faster charging stations, upgrades to the electrical service

wiring running to facilities and to Xcel Energy’s power distribution infrastructure will be necessary and should be assessed and understood.

Xcel Energy shows that the Golden area is comparatively limited for [future hosting capacity](#) for solar photovoltaic systems relative to other communities in the Front Range. These limitations are concerning since the expectation is that electrification will increase grid demand. Golden currently does not have complete information from Xcel about grid resiliency and capacity within our community. To address this risk, the City should engage Xcel and commission a study to predict future local demand for public and private charging and identify energy consumption and infrastructure needs and vulnerabilities. These results will allow the City to knowledgeably communicate and advocate for Golden’s needs with Xcel, the Public Utilities Commission and at the State legislative level.

### Community Data

The City regularly conducts a community transportation survey to inform policy decisions. Additional questions related to electric vehicle use will be added to upcoming surveys to better understand how the City can support its growing number of electric vehicle users. Additionally, such data will improve the City’s metrics data about the number of electric vehicles, vehicle miles traveled, and barriers to EV and e-mobility uptake.

### EV-only Zones

Zero Emission Zones are areas that have a ban on internal combustion engines in order to reduce air pollution and greenhouse gas emissions ([Energy 5, 2023](#)). There are currently a number of cities around the world including some in California that have adopted such zones. The City will monitor lessons learned from early adopters of EV-only zones and evaluate their feasibility for specific locations and specific times in our community in the future. For example, EV-only zones may become an effective approach to reducing health risks on Jeffco air quality alert days.

The following table summarizes the recommended readiness action items:

Readiness Action Items	Timing	Support Type
Grant opportunities: Aggressively pursue all grant opportunities related to transportation electrification and readiness to maximize benefit to the Golden community.	2023-2030	Staff research
Jefferson County partnership: Participate in Jefferson County Climate Action Plan efforts of potential mutual opportunities including transition of county fleet, electric infrastructure roadmap and upgrades, and EV requirements for building code, policies and regulations around e-micromobility, e-bikes and e-scooters	2023 and ongoing	Staff participation in Jefferson County EV planning

programs.		
Workplace best practices: Research workplace charging policies, best practices and cost estimates to share as a readiness guide with Golden businesses.	2024	Staff research
Grid readiness study: Engage Xcel and commission a study to predict future demand for public and private charging and identify grid needs to meet the 100% transportation electrification goals.	2025-2026	Municipal full-electrification plans, Xcel Energy assessment
Community data: Add EV data collection to City transportation community survey to help refine strategies and improve metrics data.	2025	Staff research
EV-only zones: Evaluate feasibility of EV-only zones at specific locations and times within the City, possibly linked to air quality alert days.	2028	Staff research, CSAB recommendation

## Equity

*GoEV Strategy: Improve transportation and social equity and extend the benefits of transportation electrification to low-income households and communities disproportionately affected by the harmful effects of air pollution.*

Access to safe, reliable and affordable transportation is critical for all of Golden’s residents so that they can access their workplaces, health services, shopping, community programs, and social networks. However, it is well established nationally that high transportation costs and limited public transportation access can disproportionately impact people of color, low-income households and people with disabilities. Additionally, exposure to unhealthy air, including that caused by transportation emissions, is also shown to be more likely for these populations ([EPA, 2021](#)).

The U.S. Bureau of Transportation Statistics reports that in 2022 households with the lowest quintile incomes spent an average of 30.2% of their income on transportation, significantly



higher than the 11.6% of highest quintile earners ([DOT, 2023](#)). Local Jefferson County data (Jefferson County Economic Development Corporation and the [H&T affordability index](#)) are consistent with national numbers, showing that the average household spends \$12,696 annually for transportation. This equates to roughly 18% of average household income in Jefferson County annually. Many residents understandably struggle with these high costs associated with their day-to-day transportation needs.

Similarly, numerous studies have documented that people of color and low-income households are disproportionately impacted by proximity to low air quality ([EPA, 2021](#)). Jefferson County and the entire Denver Metro area is subject to poor air quality, frequently caused by high ground-level ozone. In 2022, the American Lung Association “State of the Air” report ranked Denver as the 7th worst city in the country for air pollution and all counties in the Metro area including Jefferson County earned failing grades.

As our community moves towards transportation electrification, an ongoing focus will be required in support of an equitable energy transition that extends the benefits of electrification to all residents. Accordingly, the following guiding principles are considered applicable to all the action items recommended in this document:

- Equity: Assess equity issues in all policy initiatives and integrate into procedures related to electrification of transportation
- Disability Access: Evaluate disability accessibility issues in all policy initiatives and integrate into procedures related to electrification of transportation.

Placement decisions for city-owned and subsidized charging infrastructure will consider equitable access. In addition to these overarching principles, the following specific equity action items are identified:

Equity Action Items	Timing	Support Type
Public charging incentives: Consider incentive programs to reduce fees at public charging stations for low income and disproportionately impacted communities.	end 2024	ChargePoint usage data analysis, Thriving Communities
Air quality: Support regional efforts to monitor and improve air quality by seeking increased local air quality monitoring and reducing emissions from transportation	2023 & Ongoing	CDPHE regional air quality counsel, Jeffco Love My Air program, CC4CA, CDOT's Congestion Mitigation Air Quality Program

## Schools

*GoEV Strategy: Work with the Jefferson County School District and the Colorado School of Mines to develop a roadmap to zero-emissions electrification of all new transit and school buses by 2025.*

### Ore Cart Shuttle

The City will continue to collaborate with Colorado School of Mines in transportation projects that jointly benefit the Golden community and students. The Ore Cart is a free shuttle service for all riders launched in collaboration with the City in 2023. Mines previously explored electric options for the shuttles but found the current range did not meet the needs of the service. As this or other shuttle options become established with ongoing funding, the City should continue to pursue the conversion of these shuttles into electric options to meet joint goals of reduced traffic congestion, increased mobility, and lower greenhouse gas emissions.



### Colorado School of Mines

In addition to electrification of shared shuttle services such as OreCart, the City will seek to identify and pursue other collaboration opportunities with the Colorado School of Mines (CSM) related to Golden's transportation decarbonization goals. This would begin with a request to review CSM transportation electrification status and future plans including EVSEs and school vehicle purchases as well as sharing the City's objectives, status, and future plans.

### Jefferson County R-1 Schools

While the City does not have direct control over providing electrified bus options to the Golden schools, the City should establish regular meetings with Jefferson County R-1 schools administration and Jeffco-focused community organizations to look for opportunities to support school initiatives to decarbonize school fleets. Opportunities may include helping add charging infrastructure for plug-in or wireless inductive battery electric buses and adding electric vehicle and e-mobility charging options at the local schools for students and staff. The City should also evaluate and provide grant writing support if the school district becomes interested in the EPA's [Clean School Bus program](#) rebates currently provided under the Bipartisan Infrastructure Law.

The following table summarizes the recommended schools action items:

Schools Action Items	Timing	Support Type
Ore Cart: Advocate to electrify the local OreCart bus service	2024	Planning Department
Colorado School of Mines: Request review of CSM transportation electrification status and future plans including EVSEs and school vehicle purchases. Identify and pursue collaboration opportunities	annual	Planning Department
Jeffco: Meet with Jeffco school administration and community organizations to identify opportunities for City support based on the Jeffco R1 fleet decarbonization plans such as facilitating local bus charging infrastructure	2024-2026	Staff led meetings

## Regional Transit Authority (RTD)

*GoEV Strategy: Advocate for having the Regional Transportation District transition all bus routes within the city to zero-emission by 2030.*

Low carbon buses and trains are a key way to decarbonize longer distance travel by both Golden residents and visitors. Increased use of buses and trains also provides an opportunity to reduce Golden’s traffic congestion and can be an important component of equitable transportation access. The 2023 [State of Colorado EV Plan](#) outlines a target of transitioning 1,000 public transit vehicles to zero-emissions by 2030, with the full fleet transition occurring by 2050. In support of these goals, the Regional Transportation District (RTD)’s West Line, which stops in Golden at the Jefferson County Government Center, already uses electric light rail vehicles. RTD’s ad-hoc Zero Emission Vehicle Committee has also initiated a [Bus Transition Feasibility study](#). Golden should continue to advocate for RTD bus electrification efforts through local representatives and legislative support. Additionally, Golden should actively work with RTD to promote the extension of the G-line light rail from Wheat Ridge to Golden with stops at CoorsTek, the train museum, and ending at the Heart of Golden.



The following table summarizes the recommended RTD action items:

RTD Action Items	Timing	Support Type
Fleet electrification: Provide legislative advocacy support to RTD for electrification of buses, local FlexRide, and Access-a-Ride lines and communicate urgency to achieve 2030 city electrification objective.	2024-2030	MTAB
G-Line extension: Advocate for an extension of the G-line light rail from Wheat Ridge to Golden with stops at CoorsTek, train museum, ending at the Heart of Golden.	2024-2030	MTAB

## Shared Fleets

*GoEV Strategy: Work with other municipal partners and with shared fleets such as taxis, rideshare, and carshare companies to transition these shared fleet vehicles to full electric fleets by 2030.*

Shared fleet vehicles are another type of transportation that Golden must engage in order to achieve our sustainability goals. Shared fleets include carshare programs such as Zipcar and Colorado Carshare, rideshare companies such as Uber and Lyft, and service fleets including Republic Waste, the US Postal Service fleet, and delivery carriers such as Amazon and UPS among others. Some shared fleets are dominated by light-duty vehicles which are already amenable to electrification, while others consist of medium- to heavy-duty vehicles with a potentially longer electrification timeframe. Golden will engage shared fleet operators to ensure they are aware of Golden’s electrification goals and offer our support for being an early usage area for their electrified fleet. The City seeks to raise awareness of businesses working in Golden of the [Colorado Clean Diesel Program](#) which makes grants to businesses to help offset

the costs of all-electric construction equipment, backhoes, excavators, tractors, bucket trucks and transportation refrigeration units.

The following table summarizes the recommended action items related to shared fleets operating within Golden:

Shared Fleets Action Items	Timing	Support Type
City contracts: Add selection criteria to City contract template to prioritize vendors who agree to use electric vehicles in City services.	2024 and ongoing	Staff research; Legal and Finance departments
Carshare: Research options for an electric vehicle carshare program such as ZipCar and seek to incentivize best alternative	annual evaluation	Planning Department
Service fleets: Write a short policy statement that can be distributed to service fleets such as garbage haulers, USPS, delivery carriers, rideshare companies and other service fleets working in our community that electrification will be expected within the City.	2024	Staff project

## Micromobility

*GoEV Strategy: Develop partnerships with micro-mobility companies to promote the use of fossil fuel-free alternative transportation options such as electric bikes and bicycles.*

Micromobility refers to motorized and non-motorized lightweight transportation alternatives to car and truck travel. These alternatives include e-bikes, e-scooters and single-wheel devices. The term micromobility also encompasses short-term e-scooter or e-bike rental programs that can facilitate quick movement around a city. Micro-transportation has significantly lower emissions per mile than driving and provides health and recreational benefits. While e-bikes, e-cargo bikes, e-scooters, and single-wheel devices may not replace all car trips, their flexibility and market share continue to increase. The NREL-funded [Can Do Colorado e-bike pilot study](#) identified e-bikes as an affordable transportation alternative to increase mobility while decreasing transportation energy use and emissions.

The use of electric bikes has continued to grow in Golden for several years, and electrified micromobility continues to be a significant opportunity in Golden, in part due to their ease in climbing our steeper hills. Golden would like to make non-car travel as easy and safe as possible. The city’s 2020 [Transportation Master Plan \(TMP\)](#) identified barriers for these modes and priorities for addressing them. The City emphasizes that non-car transportation promotes sustainability, a community value beyond those that the TMP process explicitly identified.

## Micromobility Incentive Program

In 2024, the Community Sustainability Advisory Board will research and recommend whether an e-bike rebate program should be added to [Golden's sustainability rebate program](#), which currently focuses on building efficiency and electrification. As a local analog, Denver has run a popular [e-bike and cargo e-bike rebate program](#) for several years where the rebate is awarded at the point-of-sale from approved vendors using a voucher system. Rebates are larger for income-qualified residents and those with adaptive needs. The City of Boulder piloted a similar [e-bike rebate program](#) in 2023, as has [Lafayette](#) and other neighboring municipalities. The State of Colorado Energy Office has also initiated a similar [electric bicycle rebate program](#) for income-qualified state residents.

## Technology Expo

In order to help our residents and businesses become more familiar with micromobility options and benefits, the City should provide one or two “tech expos” annually where people can test and evaluate different models and micromobility types, talk to experts, and hear best practices from local community members. Such events could be organized in conjunction with popular city events such as the farmer’s market, Buffalo Bill days, or even Community Pride Days.

## Shared Micromobility Programs

Micromobility providers that own, manage and operate shared micromobility fleets may offer partnerships that may no longer require significant commitments by the City. New technologies including interoperable or universal charging solutions for micromobility devices, including centralized lockers or offsite charging may be deployed in partnership with private site hosts. The City recognizes there are some challenges of shared mobility programs, such as the City’s past experience with Ofo bicycles (inappropriately blocking sidewalks), so any future program would need to ensure that past problems are addressed.

## Micromobility Charging

Lastly, as public investment in micromobility expands, the City should consider how to facilitate low-voltage charging opportunities. The City could consider adding equipment at existing EV charging stations, light poles, parking structures, and bike parking areas to encourage personal micromobility use.

## Shared Trails and Roads

As the number of users increase on shared trails or within the right of way, electric micromobility users (along with other users) are considered “vulnerable” and face potential conflict with other road users and increased safety risks when using unprotected or discontinuous bike and pedestrian infrastructure. The City should consider electric micromobility users during the road design, including expanding the bike transportation network, and keep in mind that because of their lower speeds, not all micromobility devices may be appropriate or authorized on all roadways.



The following table summarizes the recommended action items related to micromobility options within Golden:

Micromobility Action Items	Timing	Support Type
Micromobility incentive program: Evaluate e-bike and e-micromobility incentive programs and grant opportunities for residents and business delivery services and launch if appropriate.	2024	Staff research, CSAB recommendation
Tech expo: Create an annual program for residents and business owners to try out e-bike, e-scooter, and other micromobility models to support greater adoption.	2024	Staff project
Shared micromobility programs: Research options for electric micromobility programs such as e-scooters and e-bikes and promote appropriate alternatives	Ongoing	Planning Department

Micromobility charging: promote charging access by developing public micromobility charging at mobility and delivery hubs	2025	Planning Department
Shared Trails and Roads: Support MTAB and the implementation of the bike transportation plan. Periodically review the City's standards for allocating right-of-way for different road users, including micromobility, to maximize public safety.	2025	Staff research and Board recommendation

## Municipal Fleet Electrification Plan and Transition Commitment

*GoEV strategy: Create a municipal fleet electrification plan by 2021 to include a phased approach to meet 100% of the City's fleet for electrification by 2030 and adopt an "EV First" philosophy for new vehicles with electrifying other vehicles as expeditiously as practicable.*

*GoEV strategy: Transition to medium and heavy duty zero emission vehicles and off-road equipment as these vehicles become available in Colorado if they can fully support the needs of the departments operations and departmental budgets can accommodate both vehicle acquisition and the associated charging infrastructure.*

The final two GoEV strategies, adopted in [Resolution No. 2771](#), relate to the City of Golden's commitment to electrify its own municipal fleet. These two strategies were separately addressed in 2022 when the City adopted its first [Municipal Fleet Electric Vehicle and Equipment Master Plan](#) (Resolution No. 2871). This municipal plan reiterated the GoEV commitment of electrifying 100% of municipal vehicles for which electric alternatives were reasonably available by 2030 and developed a specific framework and action items. Additionally, the plan incorporated strategies to implement the GoEV municipal fleet transition commitment for medium- and heavy-duty vehicles as these become increasingly available and affordable.

Specific action items associated with electrification of the municipal fleet can be found in the [Municipal Fleet Electric Vehicle and Equipment Master Plan](#) and are not repeated here.

## Conclusion

The City of Golden continues to advance its plans for a future where transportation is decarbonized, in alignment with federal, state and utility objectives and consistent with local, national and even international trends towards electrification. The City seeks to be a proactive part of this transition and has identified numerous action items that will support this effort over the coming years. By providing strong infrastructure, policies, grant funding, and programs, the City intends to help our community smoothly transition towards decarbonized transportation and healthier air.



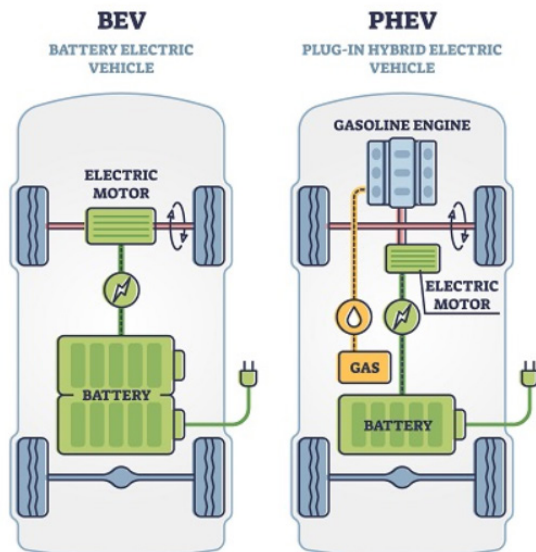
# Appendix 1: Electric Vehicles and Mobility 101

Electric mobility includes light-, medium-, and heavy-duty electric vehicles, electric micromobility devices and transit vehicles.

Electric micromobility devices include any small, low-speed, electric powered transportation, including electric-assist bicycles (e-bikes), electric scooters (e-scooters) and others. E-micromobility devices can travel up to 30 miles per hour and serve a wide range of user needs, from commuting to freight delivery.

Electric Vehicle Type	Power Source	Electric Travel Range
Battery Electric Vehicle (BEV)	Electric Motor	80-450 miles
Plug-In Hybrid Electric Vehicle (PHEV)	Electric Motor + Gasoline Engine	20-50 miles
Electric Micromobility (e-bikes, e-scooters, etc.)	Electric motor	12-100 miles


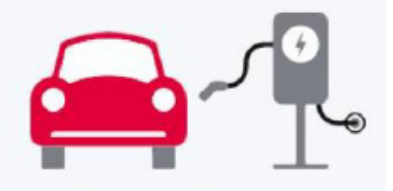

Source: [Electric Vehicle Types | US Department of Transportation](#); [Electric Vehicles | Alternative Fuels Data Center](#)



Both BEVs and PHEVs can be recharged from external sources and are capable of operating with zero tailpipe emissions.  
(VectorMine/stock.adobe.com)

Many factors influence EV charging speed, including the battery's current charge, use of power while charging, temperature, power level of EV charging equipment and battery deterioration.

The slowest Level 1 equipment provides charging through a common residential 120-volt (120V) alternating current (AC) outlet. Level 1 chargers can take 40-50 hours to charge a light-duty BEV from empty, 5-8 hours to charge an electric motorcycle and 5-6 hours to charge a PHEV. Level 2 equipment offers charging through 240V (residential) or 208V (commercial) settings. Level 2 chargers can charge a light-duty BEV from empty in 4-10 hours, an electric motorcycle in 1-4 hours and a PHEV in 1-2 hours. The fastest speed, direct current fast charging (DCFC) equipment, enables rapid charging along heavy traffic corridors or for heavy-duty vehicles. DCFC equipment can charge a light-duty BEV to 80 percent in 20 minutes to 1 hour. Most PHEVs currently on the market are not capable of using DCFCs.

		
Level 1 Charger	Level 2 Charger	Level 3 Charger
Basic, slower home charging	Convenient, faster home charging	Fast charging on the road
Included with ever new plug-in EV	Not always included with EV, may need to be purchased separately	Used for public charging
Has a cord that plugs into a standard 120-volt wall outlet	Needs a dedicated 240-volt circuit (like an electric clothes dryer)	Typical requires 480-volt service
May not require an electrician for wiring and installation	An electrician and permit are required for wiring and installation, including any panel upgrades.	An electrician and permit are required for wiring and installation
Can provide 4-6 miles of range for every hour of charging*	Can provide 25-40 miles of range for every hour of charging*	Can provide up to 40 miles of range for every 10 minutes of charging*
		Combined Charging System (CCS) connector
*range depends on vehicle, speed, weight and other factors.		

## Appendix 2: Community Characteristics

Using Jefferson County data from the [Jefferson County Economic Development Corporation](#) and CNT's 2022 [Housing and Transportation Affordability Index](#), Golden is characterized by:

- 20,950+ residents
- 56% owner-occupied homes
- \$70,092 median household income.
  - This is 13% less than Jefferson County overall and 1% above the state.
- 5,250+ homes are single-family.
- 22 minutes average commute travel time
- The average household spends \$12,696 annually for transportation including fuel costs, maintenance, and loan payments.
- This equates to approximately 18% of household income spent on transportation.

Funded by the Colorado Energy Office, [EValueCO](#) provides transportation and electric vehicle data. Within the 80401 and 80403 zip codes in Jefferson County, including the Golden community, that database shows:

- 1.91 vehicles per household
- 62% drove alone.
- 88% travel less than 24 miles to work.
- 17,545 average household vehicle miles traveled per year.
- 1,416 battery-operated vehicles (BEVs) on the road
- 454 plug-in hybrid electric vehicles (PHEVs) on the road
- 29.58 EVs per 1,000 people. This equates to about 600 EVs currently registered in Golden.
- 8.70 EVs per public Level 2 port
- 238 total charging ports (215 Level 2 and 23 Level 3)
- More than 40 public charging stations in Golden

## Appendix 3: Combined Action Item List

Infrastructure Action Items	Timing	Support Type
Level 2 public charging network: Dedicate regular funding to add Level 2 charging stations to public spaces following recommendations from the geographic study	2023-2030	CIP budget
Geographic study: Conduct a geographic study that optimizes public charging type, locations and density	2024-2025	General funds or grant for consultant
Cost model: Annually review public charging fee policies and adjust as necessary to minimize city costs while maximizing usage	end 2024	ChargePoint usage data analysis
Municipal building code: Update municipal building code to increase requirements for EVSEs in new construction including single-family residential, multi-family and commercial buildings	2024 and every 3 years	Proposed municipal code review and recommendation by Planning Commission
Existing multi-family housing: Offer assistance for existing multi-family housing leveraging EVSE incentives from Xcel and state	2025	Staff time and research
Level 3 charging: Research opportunities for a Level 3 charging center including commercial networks and Colorado Energy Office Direct Current Fast-Charging (DCFC) Plazas program	2025	Grant application possible in 2024
Delivery vehicle charging depot: Understand how the City might support establishing a charging depot for future commercial electric trucks making deliveries in the city.	2026	Grant
Readiness Action Items	Timing	Support Type
Grant opportunities: Aggressively pursue all grant opportunities related to transportation electrification and readiness to maximize benefit to the Golden community.	2023-2030	Staff research
Jefferson County partnership: Participate in Jefferson County Climate Action Plan efforts of potential mutual opportunities including transition of county fleet, electric infrastructure roadmap and upgrades, and EV requirements for building code, policies and regulations around e-micromobility, e-bikes and e-	2023 and ongoing	Staff participation in Jefferson County EV planning

scooters programs.		
Workplace best practices: Research workplace charging policies, best practices and cost estimates to share as a readiness guide with Golden businesses.	2024	Staff research
Grid readiness study: Engage Xcel and commission a study to predict future demand for public and private charging and identify grid needs to meet the 100% transportation electrification goals.	2025-2026	Municipal full-electrification plans, Xcel Energy assessment
Community data: Add EV data collection to City transportation community survey to help refine strategies and improve metrics data.	2025	Staff research
EV-only zones: Evaluate feasibility of EV-only zones at specific locations and times within the City, possibly linked to air quality alert days.	2028	Staff research, CSAB recommendation
<b>Equity Action Items</b>	<b>Timing</b>	<b>Support Type</b>
Equity Guiding Principle: Assess equity issues in all policy initiatives and integrate into procedures related to electrification of transportation	ongoing	All
Disability Access Guiding Principle: Evaluate disability accessibility issues in all policy initiatives and integrate into procedures related to electrification of transportation	ongoing	All
Public charging incentives: Consider incentive programs to reduce fees at public charging stations for low income and disproportionately impacted communities.	end 2024	ChargePoint usage data analysis, Thriving Communities
Air quality: Support regional efforts to monitor and improve air quality by seeking increased local air quality monitoring and reducing emissions from transportation	2023 & Ongoing	CDPHE regional air quality counsel, Jeffco Love My Air program, CC4CA, CDOT's Congestion Mitigation Air Quality Program
<b>Schools Action Items</b>	<b>Timing</b>	<b>Support Type</b>
Ore Cart: Advocate to electrify the local OreCart bus service	2024	Planning Department
Colorado School of Mines: Request review of CSM transportation electrification status and future plans including EVSEs and school vehicle purchases. Identify and pursue collaboration opportunities	annual	Planning Department

Jeffco: Meet with Jeffco school administration and community organizations to identify opportunities for City support based on the Jeffco R1 fleet decarbonization plans such as facilitating local bus charging infrastructure	2024-2026	Staff led meetings
<b>RTD Action Items</b>	<b>Timing</b>	<b>Support Type</b>
Fleet electrification: Provide legislative advocacy support to RTD for electrification of buses, local FlexRide, and Access-a-Ride lines and communicate urgency to achieve 2030 city electrification objective.	2024-2030	MTAB
G-Line extension: Advocate for an extension of the G-line light rail from Wheat Ridge to Golden with stops at CoorsTek, train museum, ending at the Heart of Golden.	2024-2030	MTAB
<b>Shared Fleets Action Items</b>	<b>Timing</b>	<b>Support Type</b>
City contracts: Add selection criteria to City contract template to prioritize vendors who agree to use electric vehicles in City services.	2024 and ongoing	Staff research; Legal and Finance departments
Carshare: Research options for an electric vehicle carshare program such as ZipCar and seek to incentivize best alternative	annual evaluation	Planning Department
Service fleets: Write a short policy statement that can be distributed to service fleets such as garbage haulers, USPS, delivery carriers, rideshare companies and other service fleets working in our community that electrification will be expected within the City.	2024	Staff project
<b>Micromobility Action Items</b>	<b>Timing</b>	<b>Support Type</b>
Micromobility incentive program: Evaluate e-bike and e-micromobility incentive programs and grant opportunities for residents and business delivery services and launch if appropriate.	2024	Staff research, CSAB recommendation
Tech expo: Create an annual program for residents and business owners to try out e-bike, e-scooter, and other micromobility models to support greater adoption.	2024	Staff project
Shared micromobility programs: Research options for electric micromobility programs such as e-scooters and e-bikes and promote appropriate alternatives	Ongoing	Planning Department

<p>Micromobility charging: promote charging access by developing public micromobility charging at mobility and delivery hubs</p>	<p>2025</p>	<p>Planning Department</p>
<p>Shared Trails and Roads: Support MTAB and the implementation of the bike transportation plan. Periodically review the City's standards for allocating right-of-way for different road users, including micromobility, to maximize public safety.</p>	<p>2025</p>	<p>Staff research and Board recommendation</p>