



Electric Vehicle Action Plan for the City of Centennial

December 2020



PARTNERS IN ENERGY
An Xcel Energy Community Collaboration

ACKNOWLEDGEMENTS

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City of Centennial Electric Vehicle Action Plan

About this Plan

This Electric Vehicle (EV) Action Plan is a roadmap to strategically guide Centennial action in a manner that supports increased use of EVs throughout the city, with a focus on private adoption, municipal fleet, public charging, and code updates. The EV goals and strategies outlined in this plan were developed collaboratively with a stakeholder team, including representatives from the City of Centennial, Colorado State University Extension, Intermountain Rural Electric Association, Denver South Economic Development Partnership, and Jacobs Engineering.

Our Electric Vehicle Vision & Goal

Vision: Centennial will use innovative, collaborative, and cost-effective solutions to become a leader in EV adoption and infrastructure deployment.

Goal: Increase the number of registered EVs in Centennial zip codes to 18,000 by 2030, increasing from 2,000 in 2020.

Our Roadmap for Achieving this Vision & Goal

To achieve this vision, the Centennial EV Action Plan is divided into four focus areas:

1. **Private Adoption:** Encourage residents to purchase EVs for private use through education and outreach as well as EV-friendly policies.
2. **Municipal Fleet Electrification:** Lead the way for the community by electrifying City-owned and contracted fleet vehicles.
3. **Public Stations:** Increase access to public charging for Centennial residents and visitors across the City to show support and to spur EV adoption.
4. **EV-Ready Development:** Explore ways to incorporate EVs into codes, standards, and processes to encourage EV infrastructure and private adoption.

Why EVs?

Compared to conventional, gas-powered vehicles, EVs provide improved air quality, health, climate, and economic benefits. Studies from the Colorado Energy Office forecast significant economic and environmental benefits with increased EV adoption including driver savings, reduced pressure on electric rates, reductions in greenhouse gas emissions.¹

¹Colorado Energy Office <https://bit.ly/3qEF10m>



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Our Strategies

Private Adoption

- » PA-1 Conduct education and outreach to de-mystify EVs and promote incentives.
- » PA-2 Explore financing mechanisms to incentivize purchase of EV and chargers.

Municipal Fleet Electrification

- » MF-1 Develop vehicle replacement plans and budgets.
- » MF-2 Develop fleet charging infrastructure implementation plan.
- » MF-3 Explore EV funding opportunities.

Public Stations

- » PC-1 Promote existing charging stations and study use patterns.
- » PC-2 Conduct EV charging siting analysis to understand infrastructure capabilities and needs.
- » PC-3 Explore options for additional public charging stations, including at public facilities, community gathering spaces, and workplaces.

EV-Ready Development

- » ERD-1 Update development codes to include EV infrastructure requirements.
- » ERD-2 Incentivize EV-ready development.

By Reaching Our Goal We Will...



Increase the number of registered electric vehicles in Centennial zip codes to **18,000 by 2030**, increasing from 2,000 in 2020.



Electrify 20% of the City's light duty fleet by 2030.



Achieve a ratio of **8 public charging stations per 1,000 households** by 2030.



Adopt EV-ready development codes by 2022.



Issue **700 permits** for new public and commercial EV charging stations by 2030.



How affordable are EVs?

While purchasing an EV may be out of reach for some, prices continue to fall every year due to improving technology and increasing production. It is estimated that for passenger cars, EVs will be the less expensive option by 2025.²

When looking at the total cost of ownership (financing, fuel, insurance, maintenance, registration, depreciation), EVs are already cost competitive. According to the US Department of Energy, it costs about half as much to drive an EV than a conventional gas-powered vehicle.



How soon will EVs be on the road?

EVs are already here! In Colorado, EVs contribute to 3.7% of vehicle sales.³ As of November 2020, more than 30,000 EVs were registered in Colorado, up from nearly 23,000 vehicles in 2019. In Centennial zip codes, more than 2,000 EVs were registered - a 30% increase from 2019.⁴

Growth is expected to continue, with Colorado expected to outpace the national rate of EV adoption. Under a medium scenario, more than 800,000 EVs are expected to be on the road by 2030 in Colorado, representing 12% of vehicles on the road.⁵

²Inside Climate News <https://bit.ly/3gkAwKC>

³Auto Alliance <https://bit.ly/33RYqYO>

⁴Colorado Energy Office <https://bit.ly/3qBrOfv>

⁵Colorado Energy Office <https://bit.ly/3gmyQQJ>



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INTRODUCTION



The content of this plan was derived from a series of planning workshops hosted by Xcel Energy’s Partners in Energy. Partners in Energy is a two-year collaboration to develop and implement a community’s energy goals, including 18 months of plan implementation in the form of marketing and communications, data tracking and analysis, program expertise, and project management.

In 2019, Partners in Energy expanded their products to include an Electric Vehicle (EV)-specific planning process for communities to develop targeted plans to meet their electric vehicle adoption related goals, aligned with their overall energy planning efforts. For more information about the planning workshops, see Appendix A: Xcel Energy’s Partners in Energy EV Planning Process. Centennial continued their collaboration with Partners in Energy to develop this EV Action Plan, building on their Energy Action Plan developed in 2018.

Throughout this process, community facilitators worked closely with City staff and Xcel Energy staff to identify available Xcel Energy programs or rebates that could be leveraged to support community initiatives. For more information about Xcel Energy EV programs, see Appendix B: Available Resources.

What Is an EV Action Plan?

This Electric Vehicle Action Plan is a roadmap to strategically guide Centennial action in a manner that supports increased use of EVs throughout the city, with a focus on private adoption, municipal fleet, and code updates.

The EV goals and strategies outlined in this plan were developed collaboratively with a stakeholder team, through two planning workshops conducted in October and November of 2020. Since successful deployment of many EV strategies relies on collaboration between the City, Xcel Energy, Intermountain Rural Electric Association (IREA), and community partners; representatives from a variety of organizations were included. The City of Centennial team included the Mayor Pro Tem, and representatives from Facilities, Economic Development, Community Development, Communications, and the City Manager's Office. The Xcel Energy team included experts in electrical infrastructure, EV fleet advisory programs, and community communications. The IREA team included public affairs and power supply representatives. Community partners included representatives from Jacobs Engineering, Denver South Economic Development Partnership, and Colorado State University Arapahoe County extension office. The team coordinated throughout the process to share information and identify potential opportunities for partnership during implementation.

The components of Centennial's EV Plan are detailed below:

Introduction A look at Centennial's motivations for developing an EV Action Plan, and the relevant characteristics of the Centennial community.

Where are We Going? Describes Centennial's EV vision and goals through a planning horizon of 2030.

How are We Going to Get There? Identifies focus areas and strategies to achieve the defined goals, along with targets and metrics that quantify success in each focus area.

How Will We Stay on Course? Outlines how the City will track progress toward targets, goals, and vision, and how it will adapt to a changing landscape during the coming 18-month implementation period and beyond.

Appendices Provide additional information about the planning process, next steps, EV basics, and current Xcel Energy Programs.

Appendix A: Xcel Energy's Partners in Energy EV Planning Process

Appendix B: Available Resources

Appendix C: Implementation Memorandum of Understanding

Appendix D: Electric Vehicles 101

Appendix E: Glossary of Terms

Why an EV Action Plan?

Centennial's Strategic Framework

In 2019, the City of Centennial adopted a strategic framework vision, mission, core values, and goals to guide the City in its operations, plans, policies, and activities. There are six major goals and strategies, three of which inform the EV Action Plan. Key aspects from each of these goals are indicated in bold text (City of Centennial, 2019).



ECONOMIC VITALITY – Centennial’s access to an educated workforce, **superior infrastructure**, and predictable policies provide an environment where businesses flourish.



FUTURE READY CITY GOVERNMENT – Our City government is attentive to the community’s current needs while anticipating change. Centennial is **innovative and prepared to leverage technology** and resources to benefit our community.



TRANSPORTATION & MOBILITY – Centennial’s transportation network **provides alternatives** for the safe, **efficient, and reliable** movement of people, goods, and services.

Smart Cities

Centennial defines a smart city as “using new technology, data, and processes to meet the needs of our residents, businesses, and visitors. These initiatives help Centennial become more adaptive, efficient, connected, and enjoyable.” Electric vehicles certainly help connect our community and can make a neighborhood more enjoyable by reducing noise and vehicle emissions. In the longer-term, electric vehicles can increase the efficiency of our electric grid, storing electricity during periods of high generation and releasing that energy during periods of high demand. Centennial NEXT, the City’s comprehensive plan, expects electric vehicle charging is one required step to “ensure Centennial’s built environment supports technological changes in transportation.”

Centennial is a founding member of the Colorado Smart Cities Alliance, focused on the development of intelligent, 21st century infrastructure throughout the City and state (Wittern, 2017). Electric vehicles directly support smart city goals by providing autonomous, electric, and shared vehicles; integrated infrastructure; provide additional benefits for the electric grid and energy storage via chargers; and offer a quieter pedestrian experience.

Air Quality

The transportation sector is a major contributor of air pollutants such as particulate matter (PM), Nitrous Oxides (NOx), Carbon Monoxide (CO), and Volatile Organic Compounds (VOCs). Pollutants like NOx and VOCs contribute to ground-level ozone which, in addition to PM and CO, are harmful to respiratory health. In 2019, the Denver metro area (which includes Centennial) was upgraded by the EPA from “Moderate” to “Serious” nonattainment for the 2008 ozone 8-hour National Ambient Air Quality Standard (EPA, 2019). The Denver metro area falls into the “Serious” nonattainment for CO (EPA, 2020) category. Hybrid Electric Vehicles (HEVs) produce fewer tailpipe pollutants as compared to their internal combustion engine (ICE) counterparts; and in Battery Electric Vehicles (BEVs) these emissions are eliminated completely (Office of Energy Efficiency & Renewable Energy, 2020). Air pollutants are produced as a byproduct of electricity generation using fossil fuels and will vary based on the generation mix, emissions factors, etc. As Xcel Energy works toward its carbon-free goal and more renewable energy sources are added to the generation mix, the magnitude of air quality benefits associated with electrifying transportation will continue to increase.

Greenhouse Gas Emissions

The State of Colorado has established greenhouse gas emissions reduction goals of reducing emissions by 26% by 2026, 50% by 2030, and 90% by 2050 from 2005 levels (H.B. 19-1261, (CO 2019)). As of 2015, transportation emissions make up 22% of the state’s greenhouse gas emissions, but as the electricity supply transitions to more renewable energy sources, such as wind and solar, transportation emissions make up a larger percentage of emissions (Heald, 2019). Transitioning from internal combustion engine vehicles to electric vehicles will be critical to reducing emissions. Although Centennial does not have a greenhouse gas inventory to understand the breakdown of emissions, it is safe to assume that transportation emissions are significant in Centennial and will be a significant contributor to reducing emissions statewide.

Transportation Costs

As a community with many inter-city commuters, reducing transportation expenses could yield significant savings for Centennial’s community members. In 2019, the average household transportation costs in the City were \$13,622, accounting for 20 percent of household income (Center for Neighborhood Technology, 2019).

Over its lifetime, an EV tends to cost 50% less to own and operate as compared to its ICE counterpart (US DOE, 2019). Though upfront costs of EVs are still

Transportation Cost Savings

EVs provide cost savings primarily through fuel and maintenance savings. For instance, a 2019 Honda Civic may require approximately \$900 in fuel and \$3000 in annual operating and maintenance costs. A 2019 Chevrolet Bolt with the same driving patterns only requires \$400 in fuel and \$2,500 in operating and maintenance costs. The lifetime cost of the Civic exceeds that of the Bolt in year six of ownership, when tax credits are applied. (AFDC, 2020)

greater than ICE vehicles, this gap is expected to decrease as technology matures, production scales, and batteries become more efficient and cost effective to manufacture.

Community Characteristics

This section describes the basic community characteristics used to better understand the opportunities for transportation electrification in Centennial. Factors such as population growth, demographics, housing, and industry employers help contextualize current and future opportunities for targeted outreach and partnerships. EV-specific baseline data, such as EV ownership and infrastructure, is presented in each subsequent relevant focus area.

Geography

The City of Centennial is located in the southern portion of the Denver-metro area and spans 29.69 square miles in Arapahoe County. Most of the City resides on the west side of Interstate 25 and north of Highway C-470, with the remainder located east of Interstate 25 and north of Highway E-470. Cities surrounding Centennial are Greenwood Village, Aurora, and Denver to the north; Lone Tree and Highlands Ranch to the south; Littleton to the west. There are four City Council districts in the City of Centennial with eight City Council members comprised of two representatives from each district (Figure 1) (City of Centennial, 2020). The Mayor represents the community at large.

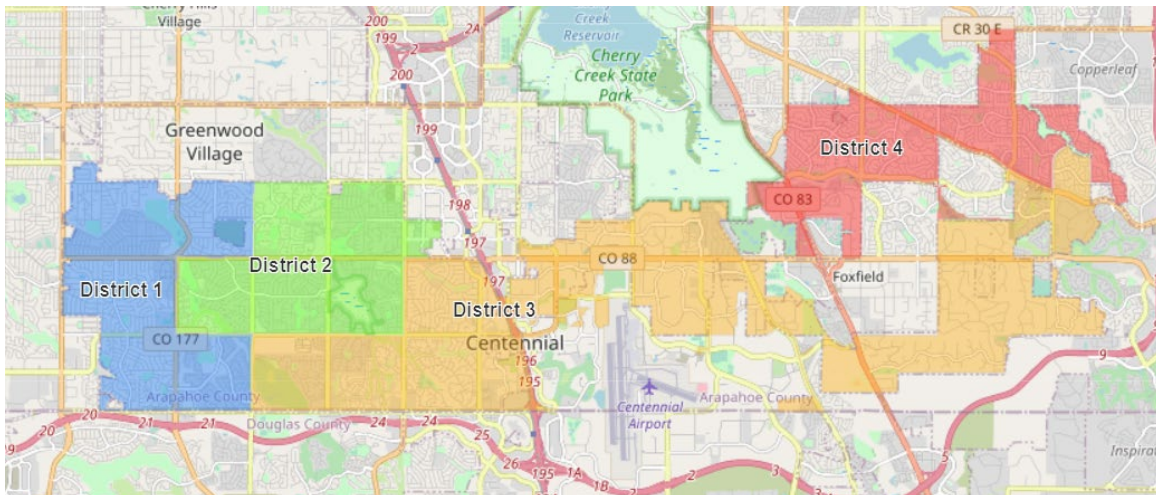


Figure 1. City of Centennial Council Districts

Population

According to the Colorado State Demography Office, Centennial is the 10th most populous city in Colorado, with an estimated population of 111,096 in 2019 (Colorado Dept. of Local Affairs, 2020). Centennial has been growing by about 1% annually since 2010 and is expected to continue growing, indicating an opportunity to invest in and transition to more sustainable infrastructure. Adding EV charging options to existing and new infrastructure is an excellent opportunity for the City to strengthen and adapt its transportation system.

The median household income in Centennial is \$110,443, significantly above the state average of \$71,953 (US Census Bureau, 2019), indicating potential for increased EV adoption, as households with higher incomes are more likely to try new technologies and are more likely to own more than one vehicle (Maxwell, LeBlanc, & Cooper, 2020).

Housing Characteristics

Two major housing factors facilitate a resident's ability to convert their personal vehicle to an EV: home ownership and residence type. Data shows that 80% of current charging takes place at home as opposed to using commercial or public infrastructure (Office of Energy Efficiency & Renewable Energy, 2020). Homeowners experience fewer barriers to installing EV charging infrastructure because they do not need to seek permission of the property owner to do so, and the investment in infrastructure will likely increase the value of their property. Alternatively, renters may not have permission from the homeowner to install charging infrastructure and/or may be reluctant to invest in improving property they do not own. Single-family residences are more likely to have personal garage space or carports to facilitate installation of charging stations rather than relying on street parking or shared parking facilities.

In Centennial, 85% of homes are owner-occupied, single-family homes (US Census Bureau, 2019). This suggests there are significant opportunities for residents to adopt EVs using at-home charging infrastructure as their primary charging location. Nearly 90% of homes are more than 20 years old, which may increase the cost of installing home charging stations, as panels may need to be upgraded to accommodate the installation of new circuit breakers for charging equipment (Gaton, 2018). Though many homes in Centennial are both single family and owner occupied, there still exists opportunity to support the adoption of EVs and EV charging infrastructure in both multi-family and rental properties - to support broader EV adoption across demographics.

Commuting Characteristics

Centennial is a heavy commuter city. In 2017, over 87% of residents were employed outside of the City. Similarly, of those employed within Centennial, 90% of them live outside of the City (U.S. Census Bureau, 2017). Most of these commuters are driving alone an average of 26 miles (CNT, 2017).

Although this has likely changed with more people working from home due to the COVID-19 pandemic in 2020 and early 2021, there will continue to be a need for converting these miles from ICE vehicles to EVs to improve air quality, traffic congestion, and greenhouse gas emissions.

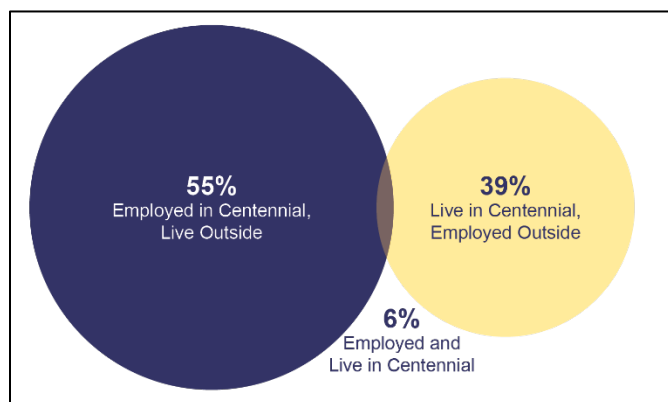


Figure 2: Inflow/Outflow Characteristics in Centennial, 2017 (U.S. Census Bureau, 2017)

WHERE ARE WE GOING?



While the previous chapter explores the City of Centennial’s motivations for developing an EV Action Plan and the community characteristics important in thinking about EV planning and adoption, this chapter begins to look forward to explore what the City of Centennial values and the City and the community want to be with regard to EV adoption in the next ten years. The vision statement created during this planning effort serves as the overarching framework to guide this effort; while the goal helps interpret what success could and should look like. The focus areas prioritized below identify the areas in which the City will leverage specific strategies to make progress toward the vision and goal.

Our Vision Statement

City of Centennial’s Electric Vehicle (EV) Action Plan Vision

Centennial will use innovative, collaborative, and cost-effective solutions to become a leader in electric vehicle adoption and infrastructure deployment.

EV Action Plan Goal

City of Centennial’s Electric Vehicle (EV) Action Plan Goal

Increase the number of registered electric vehicles in Centennial zip codes to 18,000 by 2030, increasing from 2,000 in 2020.

Focus Areas

To start building a community-wide commitment to transportation electrification, stakeholders identified the following focus areas to prioritize strategies and resources. These focus areas were chosen to align with priorities in the community plan as well as focus on areas of opportunity that stakeholders can influence directly.

- **Private Adoption.** Encourage residents to purchase EVs for private use through education and outreach as well as EV-friendly policies.
- **Municipal Fleet Electrification.** Lead the way for the community by converting City-owned and contracted ICE fleet vehicles to EVs and provide the requisite infrastructure and support to make this transition seamless for vehicle users.
- **Public Stations.** Increase access to public charging for Centennial residents and visitors across the City to show support and to spur EV adoption.
- **EV-Ready Development.** Explore ways to incorporate EVs into codes, standards, and processes to encourage EV infrastructure and private adoption.

These focus areas were chosen to provide an overarching approach to vehicle transportation electrification within Centennial, with the focus on increasing private adoption.

Strategies

Listed below are the identified strategies for each focus area outlined above. More details on each strategy can be found in the How are We Going to Get There? section of this plan.

Private Adoption

- PA-1 Conduct education and outreach to de-mystify EVs and promote incentives.
- PA-2 Explore financing mechanisms to incentivize purchase of EV and chargers.

Municipal Fleet Electrification

- MF-1 Develop vehicle replacement plans and budgets.
- MF-2 Develop fleet charging infrastructure implementation plan.
- MF-3 Explore EV funding opportunities.

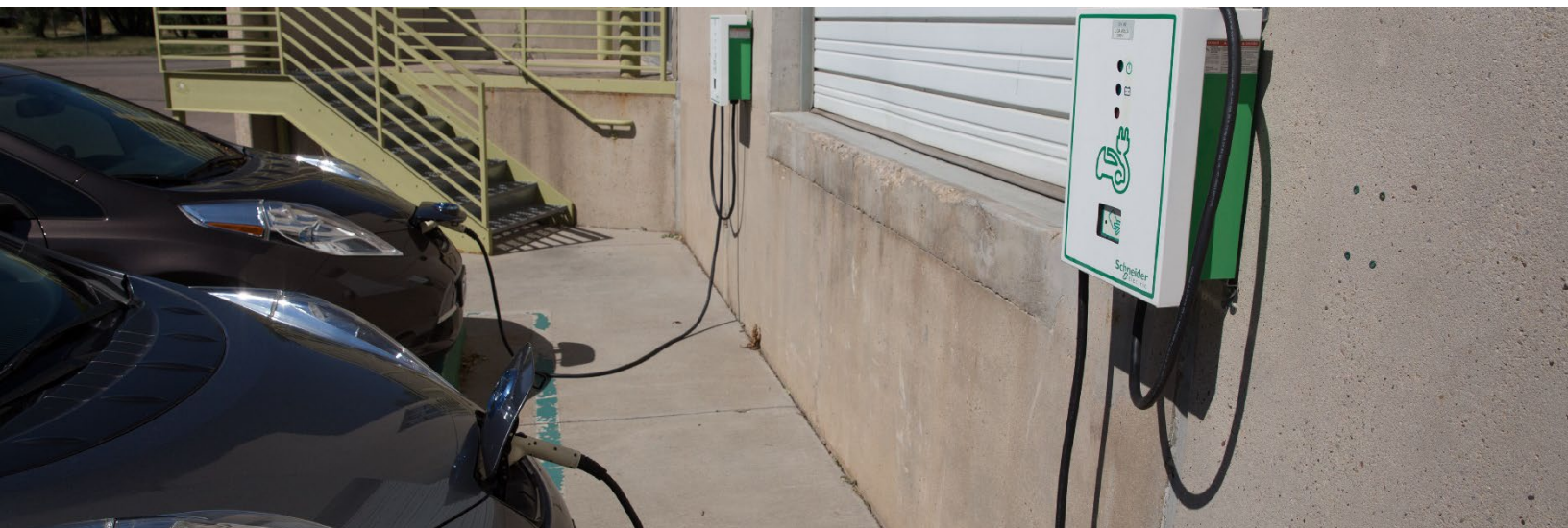
Public Charging

- PC-1 Promote existing charging stations and study use patterns.
- PC-2 Conduct EV charging siting analysis to understand infrastructure capabilities and needs.
- PC-3 Explore options for additional public charging stations, including at public facilities, community gathering spaces, and workplaces.

EV-Ready Development

- ERD-1 Update development codes to include EV infrastructure requirements.
- ERD-2 Incentivize EV-ready development.

HOW ARE WE GOING TO GET THERE?



For each identified focus area, a thorough analysis of baseline conditions was completed to inform target setting and strategy development. Based on this analysis, the EV Action Team identified targets and metrics to help evaluate progress and success in achieving focus area objectives. The team then identified potential barriers to success in achieving focus area objectives and developed strategies to help overcome those barriers.

The following sections detail the baseline data, identified targets, and strategies selected to achieve those targets for each focus area. Collectively, each focus area serves as a work plan of actionable steps to achieve Centennial's EV Action Plan overarching vision.

Focus Area: Public Adoption

Strategies in this focus area are aimed at encouraging residents of Centennial to adopt EVs. While other focus areas will build on these efforts, these strategies specifically based on connecting residents with information and resources. This includes education and outreach about EVs, chargers, and available incentives, along with exploring financing mechanisms to reduce the cost of EVs and chargers.

Background

Some of the most common barriers to adoption of privately-owned EVs include lack of familiarity with products and technology, lack of knowledge of available incentives, higher up-front cost of electric vehicles, and range anxiety (National Renewable Energy Laboratory, 2017). Throughout their Energy Action Plan implementation, the City has hosted multiple educational workshops about electric vehicles with over 150 attendees. The City also regularly leverages its communications channels to let residents know about Ride and Drive events and available incentives.

Targets and Metrics

To track progress toward public adoption, and based on the analysis above, the Planning Team established the following focus area level target:

Increase the number of registered electric vehicles in Centennial zip codes to 18,000 by 2030, increasing from 2,000 in 2020.

Baseline:

- 2,000 vehicles registered in Centennial zip codes

Data Required:

- Number of EVs in Centennial zip codes (80015, 80016, 80111, 80112, 80121, 80122)³

Data Source:

- Colorado Energy Office, EVs in Colorado (Colorado Energy Office, 2020)

Responsible Department: Office of Strategic Initiatives

Frequency of Update: Annual

Additional Metrics:

- If available, data from the County Department of Motor Vehicles registrations specific to Centennial would provide a more accurate count.

PA-1 Conduct education and outreach to de-mystify EVs and promote incentives.

Some of the biggest barriers to public EV adoption is a lack of knowledge or the spread of misinformation and the lack of understanding the ease of charging at home (Maxwell, LeBlanc, & Cooper, 2020). Sharing out the facts and benefits of EV ownership, ease of charging, and available incentives can break down these barriers. Outreach events like Ride and Drives can also be an especially powerful education tool as community members who have had a direct experience with an EV are more likely to purchase an EV. One study found that 71% of participants expressed interest in purchasing an EV after a test drive (Jin & Slowik, 2017). Outreach and education should be done in coordination with regional partners in order to leverage resources and align messaging.

Implementation Summary

Timeline: Tier 1 (begin immediately)

Lead: Office of Strategic Initiatives; CSU Extension

Support: Partners in Energy

Key Activities

1. Develop online EV resource page for residents and update on a quarterly basis.
 - Leverage existing resources, including through the State of Colorado, Xcel Energy, and IREA.

³ Note that these zip codes also cover neighboring jurisdictions but were chosen due to the lack of Centennial-specific data as the next best available data source. If Centennial-specific data becomes available, the data source can be adjusted as needed.

- Provide information on individual ownership through webpages, social media, video trainings, and other online outlets. Information may include in-home charging, available incentives, total cost of ownership, range anxiety, charging station locations, and rebates and programs from Xcel Energy and IREA.
 - Provide updates on state infrastructure and technology changes and improvements.
2. Organize EV demonstrations.
- Explore engaging ways to frame the demonstrations such as and EV car show or EV dream cruise (parade of electric vehicles).
 - Organize an EV ride and drive with Denver Metro Clean Cities.
 - Explore ways to enhance the event with speed demonstrations or mountain adventures.
 - Get the Mayor or other elected officials involved.
 - Explore virtual ride and drive options.
 - Work with private sector to organize demonstrations for employees.
 - Work with Colorado Smart Cities Alliance to expand event reach.
3. Provide a step-by-step guide for how to buy an EV, including a checklist of steps and considerations for EV ownership and charger installation.
- Leverage existing resources, including [Xcel Energy's EV comparison tool](#).
4. Provide outreach and training to auto dealers
- Partner with dealers to advertise EV incentives and other resources available to buyers.
 - Connect sales staff to EV training, including best practices for selling EVs, market updates, and home charging resources.
 - Explore options to encourage dealers to offer EV rental or leasing options.

Roles and Responsibilities

- Office of Strategic Initiatives and CSU Extension (Tim Aston) to **lead** outreach efforts.
- Partners in Energy to **support** outreach collateral and event planning.
- Communications department to **support** outreach collateral and event planning.

Funding Considerations and Available Resources

Outreach and education activities can occur within current staffing roles, and therefore would not require a budget request. Leveraging Partners in Energy support and partnering with local organizations, such as [Denver Metro Clean Cities](#) and [Colorado Smart Cities Alliance](#) can significantly enhance total outreach capacity.

Xcel Energy Programs and other Resources

- [Xcel Energy EV website](#) provides information on EVs, including an EV comparison tool, qualified dealers, available incentives, and supportive Xcel Energy programs.

- [IREA EV website](#) provides information on EVs, including vehicle cost calculator, tax credits, and EV etiquette.
- [Xcel Energy EV Trade Partner Resource Center](#) provides resources for auto dealers.
- [PlugStar](#) offers EV training for auto dealers.
- Colorado Energy Office can provide information on regional and state efforts to support leveraging existing resources.

PA-2 Explore financing mechanisms to incentivize purchase of EV and chargers.

Promote existing financing mechanisms and explore opportunities to create new financing mechanisms, such as tax credits, group buys, loans, and grants. To maximize impact, this strategy should occur after the City has conducted significant public outreach to increase the public's familiarity with EVs (e.g., Ride and Drives) and educate the public on the benefits of EVs.

Implementation Summary

Timeline: Tier 2 (18-month implementation period)

Lead: Office of Strategic Initiatives

Support: Economic Development; Xcel Energy

Key Activities

- Stay up to date on state and federal led programs and efforts and leverage as possible.
- Work with auto dealers and Denver Metro Clean Cities to organize group buys at discounted prices.
- Explore opportunities to create new financing mechanisms for purchase of electric vehicles and charging equipment.
 - Convene internal and external stakeholders to discuss potential financing mechanisms.
 - Collaborate with organizations who have provided incentives or financing mechanisms (e.g. CPACE banks, energy-focused lenders, RENU loans) previously.
- Explore the feasibility of dedicating a certain percent of annual auto use tax revenue to a grant or rebate program to install home electric vehicle charging equipment.

Roles and Responsibilities

- Office of Strategic Initiatives to **lead** exploration of financing mechanisms.
- Economic Development Department to **support** exploration of financing mechanisms.
- Xcel Energy to **support** exploration of financing mechanisms, including resources related to low- and middle-income households, community charging hubs, ride-sharing services, and municipal utility districts.

Funding Considerations and Available Resources

Exploration of new financing mechanisms can occur within current staffing roles, and therefore would not require a budget request. Additional staffing capacity for organizing group buys may be provided by [Denver Metro Clean Cities](#). The City may identify funding needs as a result of this strategy's findings.

Xcel Energy Programs and other Resources

- Xcel Energy offers EV programs and rebates for residential customers.
 - Additional offerings are anticipated with approval of Transportation Electrification Plan in 2021.
- [Colorado Energy Office](#) provides information on available tax credits.
- Insurance companies may offer discounts for EV owners.

Focus Area: Municipal Fleet Electrification

This focus area contains strategies aimed at converting City-owned and contracted fleet vehicles to EVs. This includes ongoing identification of funding sources, installing charging infrastructure and making any necessary adjustments to budgeting or other City processes in order to facilitate vehicle purchase and operation.

Background

The City of Centennial owns eight fleet vehicles and contracts 24 fleet vehicles through Jacobs Engineering. Vehicle types include pickup trucks, SUVs, a passenger van, and a passenger car. The City does not operate a police fleet, which is operated by Arapahoe County Sheriff's Office. Current EV technology provides excellent options for passenger cars, and some options for SUVs and passenger vans. Pickup truck options are currently limited; however, several automakers, including Ford, Tesla, General Motors, and Rivian have announced electric truck models to be rolled out over 2021 and 2022. In order to best determine vehicle priorities and optimal paybacks, using telematics data to analyze usage patterns, duty cycles, and parking locations will be essential to providing a more accurate assessment of which vehicles are ideal for electrification as well as determining EV models that might be appropriate replacements.

Targets and Metrics

To track progress toward municipal vehicle electrification, and based on the analysis above, the Planning Team established the following focus area level target:

Electrify 20% of the City's light duty fleet by 2030.

Baseline:

- 0 electric fleet vehicles in 2020
- 32 total fleet vehicles in 2020, including contracted vehicles through Jacobs

Data Required:

- Total number of light duty fleet vehicles
- Number of EVs purchased annually

Data Source: Internal Tracking

Responsible Department: Facilities Department

Frequency of Update: Annual

Additional Metrics:

- Operations and maintenance cost savings

MF-1 Develop vehicle replacement plans and budgets.

Vehicle replacement plans for both City-owned and contracted vehicles should include vehicles identified for replacement, timeline, targeted EV models to be purchased, and any available rebates, grants, or other incentives. The plan should be informed by telematics data collection to understand which vehicles are best suited for electrification based on use patterns, as well as life cycle analysis to understand total cost of ownership. The plan should also outline the procurement process, including budgeting and any additional steps needed to take advantage of EV purchasing programs.

Implementation Summary

Timeline: Tier 1 (begin immediately)

Lead: Office of Strategic Initiatives; Facilities; Jacobs Engineering

Support: Finance; Partners in Energy

Key Activities

1. Complete lease purchase of one EV budgeted for 2021.
2. Use telematics data and life cycle analysis to develop and execute a vehicle replacement plan for City-owned vehicles.
 - Participate in Xcel Energy's Fleet Electrification Advisory Program (FEAP) to conduct a fleet evaluation using telematics for City-owned vehicles.
 - Incorporate life-cycle cost considerations of vehicles into budgeting process, including annual fuel and maintenance costs.
 - Consider re-allocating maintenance budget of fleet vehicles to cover cost of purchasing EVs.
 - Identify vehicles to be replaced with EVs.
 - Determine timeline for vehicle replacement and timing of necessary budget requests.
 - Purchase EVs as outlined in the plan.
3. Work with contractors to incorporate EVs into their vehicle replacement plan.
 - Continue working with Jacobs Engineering to use their telematics data to identify opportunities to electrify their City-serving fleet.
 - Work with Jacobs Engineering to coordinate fuel agreement for EVs.
 - Reach out to other City contractors, including HSPPR and SafeBuilt, to discuss opportunities to electrify their City-serving fleet.

Roles and Responsibilities

- City Facilities Department to **lead** the development and implementation of City-owned vehicle replacement plan.
- Office of Strategic Initiatives to **support** development of City-owned vehicle replacement plan.
- City Finance Department to **support** life cycle cost analysis
- Partners in Energy to **support** development of vehicle replacement plan and coordinate FEAP participation.
- Jacobs Engineering to **lead** incorporation of EVs into replacement plan for City-contracted vehicles.

Funding Considerations and Available Resources

This procurement plan can be developed by in-house staff with no additional budget requests; but, as with all vehicle purchases, budget requests will be necessary for vehicle procurement. Be sure to leverage cost considerations to inform budgeting.

Xcel Energy Programs and other Resources

- [Xcel Energy's Fleet Electrification Advisory Program](#) provides free telematics data collection and analysis for program participants. Total cost of ownership is part of the data analysis provided.
 - Additional fleet EV offerings are anticipated with approval of Transportation Electrification Plan in 2021.
- The [Climate Mayor's EV Purchasing Collaborative](#) provides group-buy discounts for light-duty municipal fleet vehicles.
- [Denver Metro Clean Cities](#) (DMCC) may help facilitate a group buy for fleet EVs.

MF-2 Develop fleet charging infrastructure implementation plan.

Create an implementation plan that details specific steps that will be taken to install EV charging stations and infrastructure for the municipal EV fleet. The plan should cover siting considerations and decisions, equipment choices, grid infrastructure needs, metering, contractor selection, and a timeline aligned with the demand driven by the vehicle replacement plan. This plan will consider current and planned EV charging needs by location and will use the telematics data gathered in **MF-1** to inform charging infrastructure placement. Additional infrastructure considerations might include metering analysis to determine submetering and rate requirements, necessary electrical service upgrades, and site limitations for infrastructure installation.

Implementation Summary

Timeline: Tier 2 (18-month implementation period)

Lead: City Facilities; Office of Strategic Initiatives

Support: Xcel Energy; Partners in Energy

Key Activities

1. Continue to rely on existing charging infrastructure for 2021.
2. Identify potential sites for new charging stations using telematics data, prioritizing sites at Public Works Facility and Civic Center.
3. Explore funding options for charging infrastructure. See MF-3 for more information on funding options.
4. Contract with local installer to provide high level estimates of installation at each site.
5. Determine whether the fleet charging needs to be sub-metered or if the charging stations will be powered by existing building electrical service. Work with the City's Xcel Energy representative to understand the expected costs for each option.
6. Determine timeline for installation that meets the needs of expected vehicle purchases.
7. Contract with local contractor for installations. Ensure signage, parking, and security considerations are addressed.
8. Coordinate necessary charging controls and maintenance considerations. Work with Jacobs to ensure contracted vehicles have access to charging stations.
9. Reevaluate charging infrastructure plan after Xcel Energy Transportation Electrification Plan is approved.

Roles and Responsibilities

- City Facilities Department and Office of Strategic Initiatives to **lead** charging station identification and installation
- Partners in Energy to **support** identification of potential charging station locations and coordinate participation in Xcel Energy programs.
- Xcel Energy to **support** site analysis.

Funding Considerations and Available Resources

This plan can be developed by in-house staff with no additional budget requests. Implementing the plan will require budget requests to contract with an electrician to provide costing estimates and complete installations.

Xcel Energy Programs and other Resources

- [Xcel Energy's Fleet Electrification Advisory Program](#) provides free telematics data collection and analysis for program participants. Results can be used to identify ideal charging locations.
 - Additional fleet EV offerings are anticipated with approval of Transportation Electrification Plan in 2021.
- The City's Xcel Energy account representative can help the City initiate new service for EV infrastructure.
- The [Climate Mayor's EV Purchasing Collaborative](#) provides group-buy discounts for EV charging infrastructure from various manufacturers.
- [Charge Ahead Colorado](#) provides grant funding for installation of fleet EV charging stations.

MF-3 Explore EV funding opportunities.

Maintain an inventory of municipal EV fleet funding resources, including grants, rebates, bulk pricing, and public-private partnerships, in order to keep track of resources that are rapidly being added and changing in the EV landscape.

Implementation Summary

Timeline: Tier 1 (begin immediately)

Lead: Office of Strategic Initiatives

Support: Finance; Jacobs Engineering; Partners in Energy

Key Activities

1. Inventory potential funding opportunities.
2. Apply for grant funding for fleet EVs and EV charging.
3. Explore opportunities for bulk purchase pricing (e.g. purchasing collaboratives, group buys).
4. Reach out to auto manufacturers to establish competitive EV pricing.
5. Leverage existing energy performance contract to explore EV funding options.
6. Coordinate with Jacobs for funding partnership opportunities.

Roles and Responsibilities

- Office of Strategic Initiatives to **lead** selection and pursuit of funding options
- Partners in Energy to **support** identification of funding options
- City Finance Department to **support** pursuit of funding options
- Jacobs Engineering to **support** exploration of funding partnership opportunities

Funding Considerations and Available Resources

Exploration of fleet EV and EV charging funding opportunities can occur within current staffing roles, and therefore would not require a budget request.

Xcel Energy Programs and other Resources

- Xcel Energy fleet EV offerings are anticipated with approval of Transportation Electrification Plan in 2021.
- [Climate Mayor's EV Purchasing Collaborative](#) provides group-buy discounts for light-duty municipal fleet vehicles and EV charging infrastructure from various manufacturers.
- [Denver Metro Clean Cities](#) (DMCC) may help facilitate a group buy for fleet EVs.
- [Charge Ahead Colorado](#) provides grant funding for installation of fleet EV charging stations.
- Energy performance contracting can support upfront EV purchases that are paid back through annual savings.

Focus Area: Public Charging

This focus area aims to increase the number of publicly available charging stations throughout Centennial, including at workplaces, community spaces, and other gathering spots. Strategies include promoting existing stations, completing a siting analysis to understand potential locations, and working with potential locations to install charging stations.

Background

Although most EV owners tend to rely heavily on their home as their primary charging location, multifamily residents are more likely to use public charging stations. Further, the National Renewable Energy Lab in a 2017 study showed that survey respondents who were more aware of charging stations were more likely to consider buying an EV as their next vehicle (National Renewable Energy Laboratory, 2017). Public charging stations play an important role in helping residents feel confident that the required infrastructure is available to support their purchase. As the number of electric vehicles increases in Centennial, the number of public charging stations will also need to increase.

Figure 3 shows the locations of currently available public charging stations in and around Centennial. At some stations there is more than one charging connector. Currently there are nine Level 2 public charging stations and two DC Fast Charging public charging stations. The City operates two charging stations, one at the Civic Center and one at the Public Works facility. Most public charging stations are located around the I-25 corridor, leaving other parts of the City without public charging access.

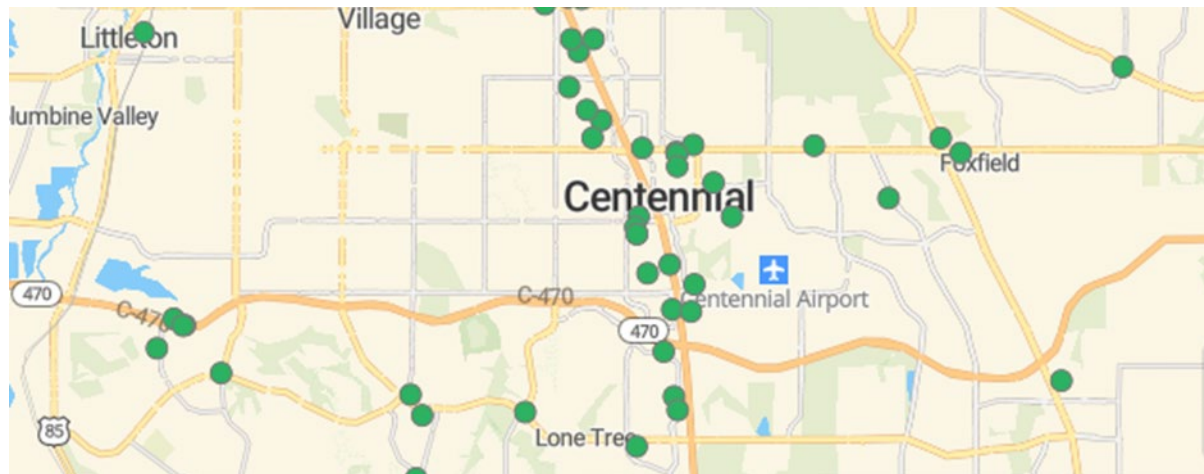


Figure 3: Map of Public Charging Locations in and around Centennial (U.S. DOE Alternative Fuels Data Center, 2020)

Related to workplace charging, studies have shown that employees of workplaces with EV charging are six times more likely to own an electric vehicle than those at workplaces without EV charging. Though most of EV charging occurs at home, supporting the adoption of EV charging at commercial facilities is an important strategy to bolster EV adoption overall. (U.S. DOE, 2016).

Targets and Metrics

To track progress toward public charging infrastructure, and based on the information above, the Planning Team established the following focus area level target, based on the overall plan goal of 18,000 EVs by 2030:

Achieve a ratio of 8 public charging stations per 1,000 households by 2030.

Baseline: 0.88 chargers per 1,000 households in 2020

Data Required:

- Number of public charging stations
- Number of households

Data Source:

- [Alternative Fueling Station Locator](#)
- U.S. Census Bureau demographics data

Responsible Department: Office of Strategic Initiatives

Frequency of Update: Annual

Additional Metrics:

- N/A

PC-1 Promote existing charging stations and study use patterns.

Range anxiety is a frequently cited obstacle to widespread EV adoption. Though most charging for privately-owned vehicles occurs at home, studies have shown that the presence of public charging stations can decrease range anxiety. The City can address this barrier by publicizing existing publicly available charging stations, improving wayfinding signage, and studying use pattern to inform potential sites for new charging stations.

Key Activities

1. Promote existing charging station locator tools and apps through print and digital communication channels.
2. Develop common charging station signage and work with charging station locations to install.
3. Monitor use of charging stations through interviews with people on site, surveys of residents, and data collection through check-ins on apps and usage data for City-owned charging stations.

Roles and Responsibilities

- Office of Strategic Initiatives to **lead** promotion and study use patterns
- Communications department to **support** promotion of existing stations
- Partners in Energy to **support** identification of sites and promotion collateral

Implementation Summary

Timeline: Tier 1 (begin immediately)

Lead: Office of Strategic Initiatives

Support: Communications; Partners in Energy; Denver Metro Clean Cities

Funding Considerations and Available Resources

Publicizing and monitoring existing publicly available infrastructure can occur within current operating budget. Comprehensive signage and wayfinding may require additional budget requests.

Xcel Energy Programs and other Resources

- [PlugShare](#) maintains an online map of available charging stations.
- The [City EV website](#) lists City-owned charging station locations and instructions for use.

PC-2 Conduct EV charging siting analysis to understand infrastructure capabilities and needs.

Develop a City facility inventory to gauge the best places to locate public stations at each site, and work with Xcel Energy representative to understand the electrical upgrades required at each site, if any, as well as optimal rate structure with expected use patterns. Note: There may be opportunity to combine fleet infrastructure with public infrastructure at the Civic Center building.

Implementation Summary

Timeline: Tier 2-3 (18-month implementation period and beyond)

Lead: Office of Strategic Initiatives

Support: City GIS Division, Traffic Engineering Services; Community Development

Key Activities

1. Map potential public charging station sites by understanding traffic patterns, length of stay, EV registrations in zip codes, existing charging stations, and destination attractions. Explore options to use GIS and cell phone data.
2. Reach out to property owners at high priority sites (e.g., multifamily properties) to gauge interest, understand available infrastructure, and support installation.

Roles and Responsibilities

- Office of Strategic Initiatives will **lead** strategy and coordination with other departments
- City GIS Division, Traffic Engineering Services will **support** mapping and analysis of available data to understand use patterns
- Community Development will **support** outreach to potential sites

Funding Considerations and Available Resources

The City may need to contract with an electrician to estimate the cost of installing charging stations. Outreach efforts can occur within current staffing roles.

Xcel Energy Programs and other Resources

- Xcel Energy or IREA account representative for individual properties can help identify service needs for EV infrastructure.
- Charge Ahead Colorado Residential and Workplace [Electric Vehicle Charging Survey](#) provides a template that property owners can use to inform charging station needs.
- Denver Metro Clean Cities can provide technical support to property owners interested in installing charging stations.

PC-3 Explore options for additional public charging stations, including at public facilities, community gathering spaces, and workplaces.

Develop an inventory of potential locations for public charging stations on public and private property, working closely with property owners to secure funding, understand any necessary electrical upgrades, and create operating plans that ensure long-term success.

Key Activities

1. Identify and prioritize sites by category. Consider locations including Streets at Southglenn, community recreation centers, libraries, and maker spaces.
2. Conduct outreach to large employers for Regional Air Quality Council compliance with upcoming single occupancy vehicle rule.
3. Inventory potential funding sources including state grants, utility programs, public-private partnerships, energy performance contracting, and City budget.
4. Understand electrical infrastructure capacity at prioritized sites.
5. Support creation of operating plans for stations.

Roles and Responsibilities

- Office of Strategic Initiatives (Melanie Ward) to **lead** coordination with RAQC and large employers.
- Community Development to **support** outreach to potential sites and large employers.
- Partners in Energy to **support** outreach collateral development for large employers.

Funding Considerations and Available Resources

Exploration potential station locations can occur within current staffing roles with support of Xcel Energy and IREA to understand electrical capacity.

Implementation Summary

Timeline: Tier 1 (begin immediately)

Lead: Office of Strategic Initiatives

Support: Community Development; Partners in Energy

Xcel Energy Programs and Other Resources

- Xcel Energy or IREA account representative for individual properties can help identify service needs for EV infrastructure.
- Xcel Energy EV infrastructure offerings are anticipated with approval of Transportation Electrification Plan in 2021.
- [Charge Ahead Colorado](#) provides grant funding for installation of public EV charging stations.
- [Denver Metro Clean Cities](#) can provide support for applying for charging infrastructure funding opportunities.

Focus Area: EV-Ready Development

Strategies in this Focus Area address actions the City can take to support new construction and redevelopment that accommodate EV market trends. This includes establishing codes and standards that require EV infrastructure as part of development projects, as well as guidelines and incentives that encourage developers to enhance EV infrastructure.

Background

Insufficient EV infrastructure is one of top barriers to public adoption of EVs. However, when property owners start exploring opportunities to install EV charging stations, they may find retrofitting costs (e.g., trenching, expanding electrical capacity) to be prohibitive. Adopting EV-ready development codes that require EV infrastructure to be included as part of the project design and construction, is one of the most effective and low-cost strategies for local governments to expand the community's EV infrastructure. Studies have shown building EV-ready infrastructure during construction can be nearly a third of the cost of a building retrofit (Pike, Steuben, & Kamei, 2016). The City of Centennial does not currently regulate EV infrastructure.

Targets and Metrics

To track progress toward EV-ready development, the Planning Team established the following focus area targets:

Adopt EV-ready development codes by 2022.

Baseline: The City has no EV-ready development codes

Data Required: N/A

Data Source: N/A

Responsible Department: Community Development Department

Frequency of Update: Once, as part of 2022 development code updates.

Additional Metrics: N/A

Issue 700 permits for new public and commercial EV charging stations by 2030

Baseline: 0 permits (The City doesn't currently issue EV charging station permits.)

Data Required: Total number of EV charging station permits

Data Source: Community Development Department Permitting System

Responsible Department: Community Development Department

Frequency of Update: Annual

Additional Metrics: N/A

ERD-1 Update development codes to include EV infrastructure requirements.

Develop code recommendations for requiring EV infrastructure in new development in order to avoid expensive retrofits and prepare Centennial for the future. EV infrastructure requirements may include requiring EV charging stations, EV parking spaces, and EV-ready construction (e.g., conduit). Recommendations should be developed in collaboration with the development community and informed by best practices from other municipalities.

Implementation Summary

Timeline: Tier 2 (18-month implementation period)

Lead: Community Development

Support: Office of Strategic Initiatives; Partners in Energy

Key Activities

1. Research other municipalities' adoption of EV-related codes and guidelines.
2. Develop list of potential EV-related requirements for all development types, including requirements related to parking, installation, accessibility, and signage.
3. Work with development community to develop recommendations that incorporate EV-related requirements into Centennial's Land Development Code.
4. Present recommendations to Planning and Zoning Commission and City Council for adoption.
5. After the codes have been adopted, develop complementary guidelines to inform design, signage, and other considerations.

Roles and Responsibilities

- Community Development to **lead** identification, recommendation, and presentation of potential EV-requirements
- Office of Strategic Initiatives to **support** research and stakeholder engagement
- Partners in Energy to **support** research and stakeholder engagement

Funding Considerations and Available Resources

Development of code recommendations can occur within current staffing roles. Enforcing code changes may require budget requests for additional staffing.

Xcel Energy Programs and other Resources

- The [Southwest Energy Efficiency Project \(SWEET\)](#) and [Regional Air Quality Council \(RAQC\)](#) host resources pages that compile local EV policy examples.
- The International Energy Conservation Code 2021 has requirements for installing EV supply infrastructure.
- The U.S. Department of Energy Clean Cities Coalition developed [Siting and Design Guidelines for Electric Vehicle Supply Equipment](#).

ERD-2 Incentivize EV-ready development.

Promote existing incentives and explore opportunities to create new incentives that encourage EV infrastructure, including EV charging stations, parking spaces, and EV-ready construction (e.g., conduit). New incentives should be developed in collaboration with the development community and informed by best practices from other municipalities.

Key Activities

1. Promote incentives from Xcel Energy, State of Colorado, and other sources.
2. Research other municipalities' EV-related incentives.
3. Develop list of potential EV-related incentives, including grants, tax rebates, density-bonuses, and expedited permitting processes.
4. Work with development community to develop recommendations for EV-related incentives.
5. Present recommendations to Planning and Zoning Commission and City Council.

Implementation Summary

Timeline: Tier 3 (beyond 18-month implementation period)

Lead: Office of Strategic Initiatives

Support: Economic Development; Community Development; Partners in Energy

Roles and Responsibilities

- Office of Strategic Initiatives to **lead** identification of potential incentives.
- Economic Development to **support** identification of incentives.
- Partners in Energy to **support** with collateral development to promote incentives.
- Partners in Energy to **support** identification of potential and existing incentives.

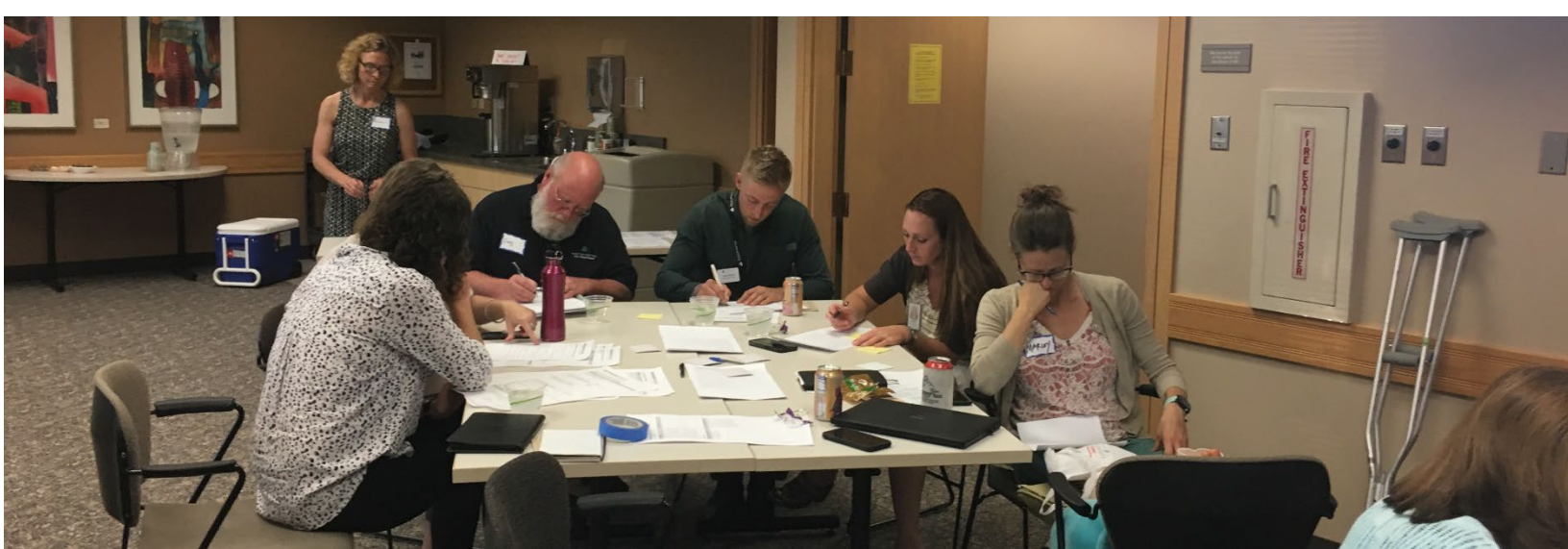
Funding Considerations and Available Resources

Promotion of existing incentives and development of incentive recommendations can occur within current staffing roles.

Xcel Energy Programs and other Resources

- Xcel Energy EV infrastructure offerings are anticipated with approval of Transportation Electrification Plan in 2021.
- [Charge Ahead Colorado](#) provides grant funding for installation of fleet EV charging stations.
- [Colorado Energy Office \(CEO\) DC Fast-Charging Plaza Grant Program](#) could help fund a bank of chargers at a private location.
- [Denver Metro Clean Cities](#) (DMCC) can help provide support and connect the City with new funding opportunities as they become available.

HOW WILL WE STAY ON COURSE?



This EV planning effort yielded ambitious yet achievable goals that align with the City’s strategic framework and EV vision. To achieve the targets and EV goals outlined in this plan, the City of Centennial and its partners identified in the strategies above will work to maintain consistent and clear communication among themselves and with the community at large. Each focus area will have sub-teams that will communicate regularly to work out the details of strategy implementation, follow through with identified actions, and share progress and results. As these teams work to implement the strategies outlined in this plan, additional resources to support community EV transition are available at xcelenergycommunities.com/evtoolkit. The most up-to-date information about Xcel Energy’s EV programs and offerings, as well as basic information to help support EV adoption, can be found at XcelEnergy.com/EV.

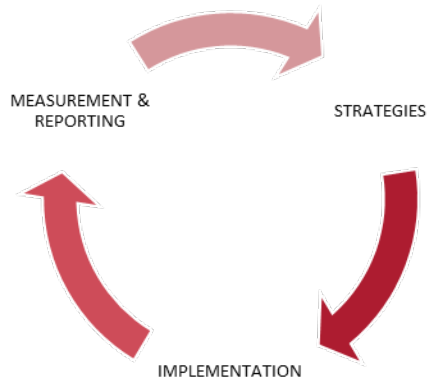


Figure 4. Actions and Tracking

Tracking Progress and Adjusting Course

To ensure this plan remains on track, the EV Team will track metrics by the focus areas outlined in Table 1 to review progress toward stated focus area targets and plan goals, (on an annual basis) to assess if the efforts are on track to reach the goals.

The EV Team will meet twice monthly, with each session discussing two focus areas. Additional team members will be brought in as relevant to provide updates. These meetings will discuss strategy tactics and progress, review relevant metrics, discuss roadblocks, and determine if new approaches may be necessary. The [Xcel Energy EV Toolkit](#) can be a good resource for identifying new strategies to address unexpected barriers that may come up. Any adjustments will be documented and shared with the broader group and community as they occur.

It will be important to let the wider community know how things are progressing and to recognize the collaborative efforts of those involved in hitting the plan targets. At critical milestones, the City of Centennial will publish updates on progress, share successes, and congratulate participants and partners through various communication channels.

Table 1: Focus Area Tracking Summary

Focus Area	Public Adoption	Municipal Fleet Electrification	Public Adoption	EV Ready Development
Target (by 2030 unless noted)	18,000 EVs in Centennial zip codes	Electrify 20% of light duty fleet	Achieve ratio of 8 public charging stations per 1,000 households	(1) Adopt EV-ready development codes by 2022 (2) Issue 700 permits for charging stations
Metric	Number of EVs in Centennial zip codes	Number of light-duty EVs in fleet	(1) Number of public charging stations (2) Number of households	Number of charging station permits issued
Data Source	EVs in Colorado (CEO)	Fleet vehicle inventory	(1) Alternative Fueling Station Locator (2) U.S. Census Bureau demographics data	Community Development permitting system

Adapting to a Changing Landscape

Even though this plan outlines strategies to promote EV adoption over the next 10 years, an effective plan is cyclical in nature (see Figure 4). In addition, the nature of implementation requires staging, flexibility, and course adjustment when necessary, to be successful and to sustain progress.

Furthermore, the focus area work plans reflect the current situation for a rapidly evolving technology. It will be important that strategies are evaluated and updated throughout implementation, reflecting advancements and new offerings from the automotive and transportation industry and Xcel Energy. Throughout the planning process, we worked to build relationships between City staff and Xcel Energy staff that will foster the collaboration and cooperation required to successfully navigate the changing EV landscape.

Beyond the Plan Horizon

It is recommended that the City reassess the EV goals and successes achieved over the implementation period. Based on lessons learned over the ten-year implementation period, the City will update this EV Action Plan - focusing on increasing City-owned and private EV adoption to improve air quality, reduce greenhouse gas emissions, and lower the cost of transportation for all of Centennial. Additional updates to this plan will be necessary as goals are achieved and new opportunities and technologies emerge. For example, the City could continue to shape its Public Adoption strategies as additional rebates and programs from Xcel Energy and IREA are released.

APPENDIX A: XCEL ENERGY'S PARTNERS IN ENERGY EV PLANNING PROCESS



About Xcel Energy's Partners in Energy

Xcel Energy is an electric and natural gas utility that provides the energy that powers millions of homes and businesses across eight Western and Midwestern states. Each community Xcel Energy serves has its own unique priorities and vision for energy. Energy is a dynamic topic, and it is changing rapidly with new ways to save, the growth of renewables, EVs, and changing regulations. With these competing priorities and stretched resources, creating and maintaining an energy-conscious culture within your community can be a missed opportunity in meeting energy and sustainability goals. In the summer of 2014, Xcel Energy launched Partners in Energy as a collaborative solution for communities to reach their energy goals. In 2019, Partners in Energy launched an EV-specific planning process to help communities develop plans to meet their EV goals.



Figure 5: Partners in Energy Process for Success

Plan Development Process

The content of this plan was developed through two workshops with stakeholders from the City, Jacobs Engineering, and other area partners. All engagement was conducted online due to the ongoing COVID-19 pandemic.

A kickoff meeting was held virtually in September 2020 to provide an overview of the planning process and to help identify the City’s preliminary priorities to inform plan development. During this kickoff meeting, the roles and responsibilities of the planning team were confirmed. The planning team included Partners in Energy facilitators, Xcel Energy representatives, and City of Centennial representatives.

Workshop 1 was held in October 2020. During Workshop 1, stakeholders were provided baseline information about EVs, including fleet information, market share, and public charging infrastructure. The planning team used this information to draft a preliminary vision for the EV Action Plan, to confirm focus areas, and to draft preliminary targets for each focus area.

Following Workshop 1, the planning team participated in a survey to identify potential barriers to achieving draft targets as well as to brainstorm strategies to overcome these barriers. During Workshop 2, the planning team prioritized the strategies identified in the survey and drafted key details for the top strategies in each focus area. This EV Action Plan was developed using the information identified during the two workshops and was then reviewed and refined by City Staff and the stakeholder team.

Plan Implementation

Partners in Energy provides 18 months of support for implementation of an EV action plan. This support is designed to supplement both technical analysis and support that is available through Xcel Energy’s other EV offerings. Services offered through the Partners in Energy team are shown in Appendix B: Available Resources. Throughout the plan, strategies that will be supported by Partners in Energy staff are identified, and the memorandum of understanding for this support is shown in Appendix C: Implementation Memorandum of Understanding.



Figure 6: Resources from Xcel Energy for Implementation

APPENDIX B: AVAILABLE RESOURCES



The rapidly evolving fabric of electric vehicles (EVs) can make identifying resources challenging. In part, the short horizon of this EV action plan is to facilitate frequent updates as data and resources evolve to support EV adoption. Below is a list and description of resources available at the time this plan was developed. Links may break over time.

Xcel Energy Resources

In 2020, Xcel Energy submitted their Transportation Electrification Plan (TEP) to the Colorado Public Utilities Commission (PUC) for approval. The TEP outlines several programs and services intended to support communities and the State in their progress toward transportation electrification. At the writing of this plan, the TEP had not been adopted. If approved, the offerings presented in the TEP will be evaluated and used to support the strategies outlined in this plan as applicable. Please visit xcelenergy.com/EV for the most up-to-date information and offerings from Xcel Energy.

Fleet Electrification Advisory Program (FEAP)

Xcel Energy's Fleet Electrification Advisory Program begins with an analysis to help determine the best course of action for fleet electrification. In partnership with Sawatch Labs, participating in FEAP allows fleet operators to assess individual vehicles - to determine if the vehicle owner's driving needs could be met with an electric vehicle (EV). Additionally, FEAP assesses charging site suitability and estimates the cost of infrastructure installation. Finally, FEAP helps advise on rate plans, and pilot programs to lower costs. For more information visit: xcelenergy.com/EV or contact [Stacey Simms](#).

Select Manufacturer Rebates

Xcel Energy periodically partners with car manufacturers to offer customers vehicle-specific rebates. Sign up to receive the latest information on Xcel Energy's offerings through its EV Network: xcelenergy.com/EV

Account Representative

The City's Xcel Energy account representative, [Kynn timer](#), can help the City navigate specific questions about rate structures as well as questions about how the new electrical loads might affect utility costs.

Federal Resources

Qualified Plug-In Electric Vehicle (PEV) Tax Credit

The Federal government offers an EV tax credit of up to \$7,500 and is based on the vehicle's traction battery capacity and the gross vehicle weight rating. Tax credits are administered through the Internal Revenue Service (IRS).

For more information, visit the IRS website: www.irs.gov/businesses/plug-in-electric-vehicle-credit-irc-30-and-irc-30d

Periodic Charging Station Manufacturer Rebates

EV charger manufacturers such as ChargePoint may periodically offer rebates or discounts. For instance, a federal tax credit gives individuals 30% off a ChargePoint Home Flex electric vehicle charging station plus installation costs (up to \$1,000). Charging stations must be purchased and installed by December 31, 2020. Additionally, businesses can receive a 30% tax credit of up to \$30,000 to purchase and install a ChargePoint EV Charging station by December 31, 2020.

For more information on the ChargePoint opportunity used as an example, visit their website: www.chargepoint.com/

Insurance Company Discounts

Insurance companies may offer discounts for EV owners. Check with your insurance provider for more information.

Federal Database of EV incentives

For other programs not included here visit the U.S. Department of Energy's database of EV tax credits and other incentives, from across the country, that include federal programs, state laws and regulations, and utility/private incentives.

For more information visit: afdc.energy.gov/laws/search

State Resources

Colorado Plug-In Electric Vehicle (PEV) Tax Credit

The State of Colorado offers an EV tax credit at the point of sale. The total amount available will decrease from \$4,000 for light-duty EVs or PHEVs in 2020 to \$2,000 in 2026.

For more information visit: www.colorado.gov/pacific/sites/default/files/Income69.pdf

Charge Ahead Colorado

Colorado Energy Office (CEO) and Regional Air Quality Council (RAQC) fund the Charge Ahead Colorado program that supports installing Level 2 and Level 3 public chargers,

based on various criteria and the ALT Fuels Colorado program that improves air quality, by incentivizing fleet vehicle upgrades. Public and private entities are encouraged to apply. An entity can apply multiple times, as long as each application is for a new charging station. Charge Ahead Colorado can pay up to 80% of the charging station cost, up to \$6,000 for fleet chargers, up to \$9,000 for Level 2 multiport chargers, and up to \$30,000 for Level 3 multiport chargers. Funds may also be applied to EV procurement for organizations excluded from the State PEV Tax Credit but can only be applied to leased vehicles.

For more information visit: cleanairfleets.org/programs/charge-ahead-colorado

Other Resources

Climate Mayors Electric Vehicle Purchasing Collaborative

The Collaborative represents unprecedented cooperation, among Climate Mayors cities across the country, to leverage collective buying power and accelerate the conversion of public fleets to EVs—sending a powerful signal to the global auto market and helping the United States maintain its commitment to the Paris Climate Agreement. The Collaborative offers a turnkey, one-stop, online procurement portal providing U.S. cities, counties, state governments, and public universities equal access to competitively-bid EVs and charging infrastructure, innovative financing options, and best practices and other forms of expertise.

For more information visit driveevfleets.org/

Denver Metro Clean Cities Coalition

Denver Metro Clean Cities Coalition (DMCC) works with Denver metro area stakeholders, including cities, businesses, and consumers, to support clean transportation and efficient mobility choices. The organization supports communities through education and outreach, providing connections to funding sources, supporting fleet electrification, and providing a local and regional network for sustainability leaders to share information and build connections that promote clean transportation.

For more information visit denvermetrocleancities.org

APPENDIX C: ELECTRIC VEHICLES 101



Since electric vehicles (EVs) are an emerging technology that is rapidly changing, it is important to ensure that everyone has a common understanding of the technology and terminology involved. This section explains the basics of currently available types of vehicles and charging stations and the associated uses, barriers, and benefits. Note, while electric options are available for medium- and heavy-duty vehicles, the descriptions provided in this section apply primarily to light-duty vehicles, which make up most of the EV market today.

EV Basics

EVs refer to any vehicle that uses an electric motor. An EV can have a fully electric motor or can contain an internal combustion engine (ICE) that supports the electric motor. The travel range of each type is outlined in Table 3 and described in more detail in the following sections.

Battery Electric Vehicle (BEV)

A BEV is an all-electric vehicle that does not require gasoline and, thus, has no tailpipe emissions. BEVs are fueled by plugging into charging stations. Energy is stored in the battery - to be used when the car is running. Distances a BEV can travel on a single charge range from 80 to 345 miles, with longer distances promised in the future through continual advancements in battery technology. Recharging can take between 30 minutes to 12 hours, depending on the type of charger, size of battery, and level of depletion in the battery (Drive Change. Drive Electric., 2019).

Table 2: Comparison of Types of EVs

Electric Vehicle Type	Power Source	Travel Range
Battery Electric Vehicle (BEV)	Electric Motor	80 – 345 miles
Plug-in Hybrid Electric Vehicle (PHEV)	Electric Motor & Gasoline Engine	350 – 600 miles
Hybrid Electric Vehicle (HEV)	Electric Motor & Gasoline Engine	350 – 600 miles

Plug-In Hybrid Electric Vehicle (PHEV)

A PHEV provides a combination of both an electric motor and a gasoline engine, and produces less tailpipe emissions than a traditional ICE. PHEVs use energy from the electric motor until the battery charge is fully depleted, which can occur between 15 and 50 miles; at this point, the gasoline engine takes over. The distance a PHEV can travel on a single charge and full tank of gasoline ranges between 350 and 600 miles. The battery is charged similarly to the BEV (through a plug), and the fuel tank is filled by traditional gasoline (at a station) (Drive Change. Drive Electric., 2019).

Hybrid Electric Vehicle (HEV)

Like PHEVs, HEVs have both an electric motor and a gasoline engine. In an HEV, the gasoline engine is used to power a generator, which powers the electric motor. The benefit of this configuration is that the ICE can run at a constant speed and greatly increase the vehicle's fuel efficiency (compared to traditional ICE vehicles). However, the battery cannot be charged by an external electricity source, which means the vehicle always relies on the gasoline engine.

Charging Stations

EV charging stations are separated into three categories, based on the speed at which the vehicle is charged: Levels 1, 2, and 3. Level 3 chargers are also known as DC fast chargers. The sections below detail the appropriate application for each charger type.

Residential Charging Stations

Residents have two options for charging at home. Level 1 chargers use standard 120-volt AC outlets and can take 8 to 12 hours to fully charge a depleted battery. Level 2 chargers require a 240-volt AC outlet and can fully charge a depleted battery in 4 to 6 hours. Residents can charge during off-peak hours to reduce the impact on the grid. Table 4 provides a brief explanation, along with the pros and cons of both types. All currently available EVs can use either charger type.

Table 3. Residential EV Charging Types

	LEVEL 1	LEVEL 2
Electric Current (AC)	120 volts; 20 amps	208/240 volt; 30 amps
Charging Rate (miles range per hour of charging)	2 to 5	10 to 20
Benefits	<ul style="list-style-type: none"> • Uses standard residential wall outlet • Little to no investment in infrastructure required 	<ul style="list-style-type: none"> • Quicker charging • Some models have available Wi-Fi controls to allow residents to take advantage of time-of-day electric rates • In the case of multifamily housing, the controls could be managed by a property manager.
Drawbacks	<ul style="list-style-type: none"> • Slower charging rate, but usually sufficient for residents who charge overnight 	<ul style="list-style-type: none"> • Requires 240 Volt outlet or hardwired charger • Electrician likely required for installation • Higher infrastructure cost investment
Estimated Costs	Low to no cost	\$500 to \$2,000 (US DOE, 2019)

Commercial Charging Stations

Commercial Level 2 and Level 3 chargers are most appropriate for commercial applications since the EVs are generally parked for shorter periods of time than in residential applications. Level 2 chargers are the same as residential chargers and often have the option to include two charging ports at one station. Level 3, or DC fast chargers require an industrial DC outlet of 480 volts and can charge batteries in 20 to 30 minutes. Many commercial chargers also come equipped with software that allows the user to control when vehicles are charging and may facilitate payment in public applications. Table 5 shows the advantages and disadvantages of Level 2 and Level 3 chargers.

Table 4. Levels 2 and 3 Charging Infrastructure

	LEVEL 2	LEVEL 3 (DC Fast Charger)
Electric Current	208/240 volt; 30 amps (AC)	480 volts DC
Charging Rate (miles range per hour of charging)	10 to 25	Up to 180
Benefits	<ul style="list-style-type: none"> • More economical than Level 3 • Safe for long-term use 	<ul style="list-style-type: none"> • The fastest charging option available
Drawbacks	<ul style="list-style-type: none"> • Slower charging 	<ul style="list-style-type: none"> • Expensive to purchase and install • Can cause degradation to EV batteries with frequent use
Estimated Costs	\$500 to \$5,000 (US DOE, 2019)	As high as \$50,000

Benefits of EVs

Benefits of EVs are both environmental and economic. By replacing ICE vehicles with EVs, transportation-related GHG emissions are significantly reduced and air quality is improved. As the need for imported petroleum to support transportation is decreased through the integration of EVs, domestically available fuel sources can shift into focus, resulting in energy independence and domestically regulated fuel prices. Furthermore, the individual consumer will experience lower fuel and maintenance costs with the transition to EVs and through continued advancements in battery and charging technologies. The sections below provide additional details regarding the benefits of EVs.

Reduce GHG Emissions

EVs can significantly decrease GHG emissions associated with on-road transportation, which overtook electricity generation as the largest source of GHG emissions in the US in 2017 (Environmental Protection Agency, 2019). The amount of emissions reduction depends on the electricity generation fuel mix of the local electricity grid. National trends suggest that electric utilities are improving the emissions from electricity generation at a faster rate than fuel economy is improving in ICE vehicles. EV charging can be paired with residential roof-top solar, commercial solar parking structures, and community solar to further reduce associated GHG emissions. Xcel Energy has goals to reduce carbon emissions 80% by 2030 and to be carbon free by 2050 (Xcel Energy, 2019). By transitioning to cleaner energy sources, Xcel Energy is supporting its customers in reaching their own community goals of achieving carbon neutrality.

Air Quality

Use of traditional ICE vehicles contribute to Ozone and fine particulate (PM_{2.5}) air pollutants, especially along heavily traveled routes. These pollutants have been linked to respiratory problems such as asthma, cardiopulmonary disease, and premature death for people with chronic exposure. These pollutants are significantly reduced in the case of HEVs and PHEVs, and eliminated in BEVs. A study of the Houston area found that moderate to complete vehicle electrification would reduce Ozone by 1 to 4 parts per billion (ppb) and PM_{2.5} by 0.5 to 2 micrograms per cubic meter (µgm⁻³). This change was estimated to prevent 114 to 246 premature deaths annually, significantly reduce asthma exacerbation by 7,500 cases, and reduce school loss days by 5,500 (Pan, et al., 2019).

Energy Independence and Cost Stability

More than 65% of the petroleum imported to the US in 2018 was used for transportation fuel. Transitioning to EVs shifts the fuel source to more domestically available sources such as coal, nuclear, natural gas, and renewable energy. Integration of EVs is an important strategy for reducing dependence on fuel imports, and isolates transportation costs from the volatile petroleum market (Office of Energy Efficiency and Renewable Energy, 2018). Figure 11 illustrates the fluctuations in gasoline and diesel prices, compared to electricity prices, from 2000 to 2019.

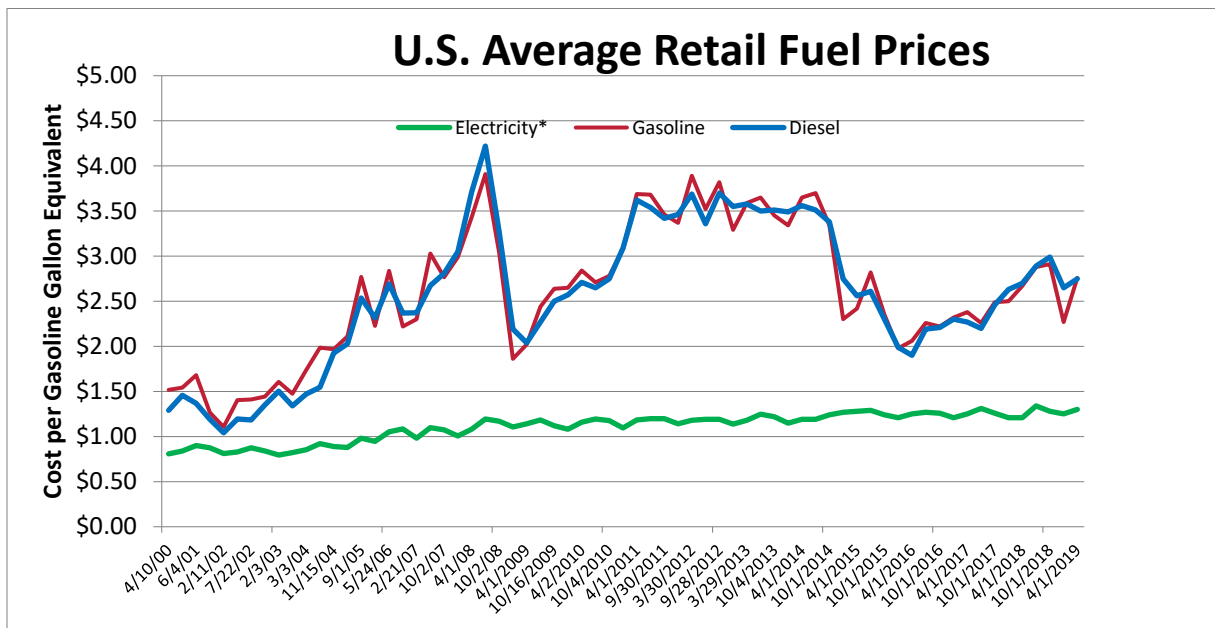


Figure 7. US Average Retail Fuel Prices. Adapted from: (Office of Energy Efficiency and Renewable Energy, 2019)

Lower Fuel & Maintenance Costs

While cost savings vary based on vehicle type, driving patterns, and geographic region, the average driver spends about half as much money in fuel and maintenance costs by driving an EV compared to a traditional ICE (Office of Energy Efficiency and Renewable Energy, 2019). The average US household spends about 13% of their annual income on transportation costs, while low-income households spend an average of 29% of their annual income on transportation costs (Institute for Transportation And Development Policy, 2019). The transition to EVs would result in significant savings for the individual consumer.

APPENDIX D: GLOSSARY OF TERMS



Term	Definition
Alternating current (AC)	The most common form of electricity used in homes and businesses uses alternating current where the current periodically changes direction. Batteries require DC electricity to charge, so EV chargers must convert the supplied AC electricity to DC power.
Amps	The measurement of the amount of electrical energy “flowing” through a charger. This is determined by the electrical load required by the equipment and can vary over time.
Battery Electric Vehicle (BEV)	An all-electric vehicle, fueled by plugging into an external charger, that has no tailpipe emissions. Requires low maintenance costs.
Direct current (DC)	The form of electricity where the current only flows in one direction. This is the type of electricity that batteries supply and require to charge. EV chargers must convert the supplied AC electricity to DC power.
Electricity consumption	Measured in kilowatt-hours (kWh) and represents the amount of electricity that has been consumed over a certain time period.
Electric demand	Measured in kilowatts (kW) and represents the rate at which electricity is consumed. Most commercial energy rates incorporate a charge for electric demand as well as electric consumption.
Electric vehicle (EV)	A vehicle that uses an electric engine for all or part of its propulsion.
Electric vehicle supply equipment (EVSE)	Infrastructure required to support EVs such as chargers, electrical supplies, etc.
Heavy-duty vehicles	Commercial vehicles over a minimum Gross Vehicle Weight Rating (GVRW) of 8,500 lbs.
Hybrid Electric Vehicle (HEV)	Contains both an electric motor and a gasoline engine. The gasoline engine powers a generator that charges the electric motor. No

Term	Definition
	external battery charger is used. Runs at a constant speed, which increases fuel efficiency.
Internal combustion engine (ICE)	Traditional vehicle engine that uses the direct combustion of gasoline, diesel, or other fuels.
Kilowatt-hour (kWh)	The amount of electricity being sent to the EV battery from the charger in one hour. This is calculated by volts times amps divided by 1,000.
Level 1 charging station	Uses a standard 120-volt AC outlet and can take 8 to 12 hours to fully charge a depleted battery; intended for residential use only.
Level 2 charging station	Uses a 220-volt or 240-volt AC outlet and can fully charge a depleted battery in 4 to 6 hours; can be used in both residential and commercial settings.
Level 3/DC Fast charging station	Uses an industrial 480-volt DC outlet and can charge a battery to 80% in 20 to 30 minutes; used in commercial settings where the anticipated charge time is limited (e.g., supermarket, gas station, etc.); will be used on Alternative Fuel Corridors – a national network of major thoroughfares supporting EVs and other alternative fuels.
Light-duty vehicles	Passenger cars with a maximum Gross Vehicle Weight Rating (GVRW) of 8,500 lbs.
Plug-in Hybrid Electric Vehicle (PHEV/PEV)	Contains both an electric motor and a gasoline engine. An external plug is used to fuel the electric motor. The electric motor is used until the battery is depleted, at this point the gasoline engine takes over. Lower tailpipe emissions than traditional ICE and longer ranges than most BEVs.
Range Anxiety	Fear of running out of power in an EV before reaching a charging station or desired destination.
Range per hour (RPH)	A measurement of the miles an EV can travel on one hour of charge. This is generally applied to EV charging stations and expressed in terms of typical EV efficiency.
Vehicle miles traveled (VMT)	A way of measuring integration of EVs and associated reduction in GHG emissions by considering electric miles that replace traditional vehicle miles.
Volts	A measurement of the force pushing the flow of energy through a charger. This measurement is determined by electricity supply. Standard household outlets provide 120 volts; outlets for dryers or other high-powered household equipment supply 240 volts.

APPENDIX E: REFERENCES

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