



CITY OF ASPEN

Fleet Zero Emissions Roadmap (FZER)



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FZER Introduction

The Fleet Zero Emissions Roadmap (FZER), developed by a multi-department stakeholder group, charts a path for the City of Aspen to transition its municipal fleet away from fossil fuels and towards 100% electric and zero emissions vehicles and equipment by 2050. As part of the city's goal to reduce emissions in the transportation sector, the FZER lists the actions necessary to support increased fleet vehicle and equipment electrification. By focusing on fleet vehicles and equipment, the FZER expands upon previous electric vehicle (EV) adoption strategies outlined in the [Aspen Community Electric Vehicle Readiness Plan](#), and the [City of Aspen Electric Vehicle Public Charging Masterplan](#).

As a result of increasingly strong carbon reduction commitments made by the state and federal government, including the recent passage of the Inflation Reduction Act of 2022, and from original equipment manufacturers (OEM) themselves - internal combustion engine (ICE) vehicles are on the way out. The FZER begins a process of important and planned restructuring so that the city is prepared for future zero emission mandates, funding opportunities, and technologies. This plan should be used as a working guide to equip staff with an understanding of the steps needed to incorporate electric and zero emissions vehicles and equipment into the municipal fleet. By strategically addressing barriers, the city can take full advantage of the investment in the transformation of its fleet with limited disruptions to services. The transition to an all-electric and zero emission fleet is going to take years to complete. The FZER is intended to be frequently checked-in on, and staff can add to and update it regularly. If any changes are put forward that require a strong policy shift, the decision will be brought to Council for consideration.



Background:

EVs are an easily observed and recognized metric of the city's efforts to reduce its emissions footprint. According to the 2020 City of Aspen Municipal GHG Inventory, fleet fuel use was the second largest source (23%) of emissions in 2019, and the largest source (24%) in 2020 for municipal operations. As these emissions are directly within the city's span of control, efforts to decarbonize the municipal fleet represents one of the most direct opportunities for GHG reductions among city owned assets. By setting a strong example for the community to follow, the FZER helps move the city closer towards achieving its science-based targets intended to keep global temperatures below 1.5°C.

FZER Process:

The FZER brings together stakeholder recommendations from 25 department heads and staff across 13 city departments (see page 14 of the Appendix for a list of stakeholder participants). Four stakeholder meetings were held in the summer of 2023 which involved in-depth discussions around the challenges, opportunities, scope, and goals for fleet electrification and charging. By design, the stakeholder meetings were the beginning of an ongoing and collaborative process that leaves the door open for updates as new developments and opportunities arise.

Initial Stakeholder Survey:

Based on a survey sent to the stakeholder group intended to gain an understanding of how individual department's see electric and zero emission vehicles and equipment in the fleet, there is strong agreement that the city needs to electrify to achieve its climate goals. The survey results acknowledged current EV trends in that most respondents expect to electrify existing models of their cars, light duty trucks, and shuttles in the next five years. However, with less use cases to draw from, respondents indicated less enthusiasm to adopt medium/heavy class vehicles within that timeframe. The survey also asked participants about their pain points to greater electrification, the top five answers being:

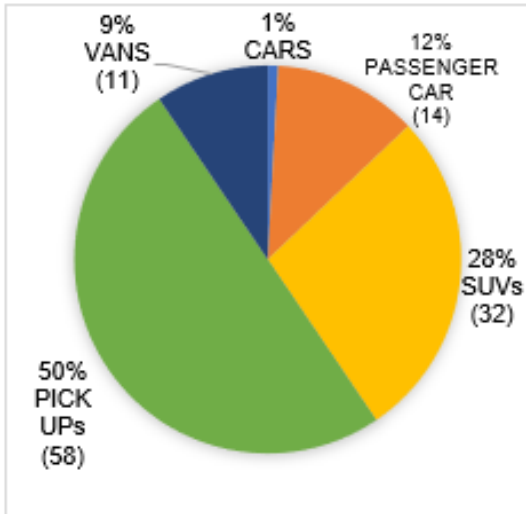
1. Uncertainty about replacement parts/vehicle maintenance
2. Insufficient budget to cover upfront costs
3. Limited vehicle options to meet required function/vehicle types untested
4. Too many unknowns.
5. Cost/complexity of electrical system upgrades
5. Vehicle duty cycle not suitable for electrification

This FZER addresses these barriers, suggests ways the city should continue to evaluate them, and provides recommendations to work through them.

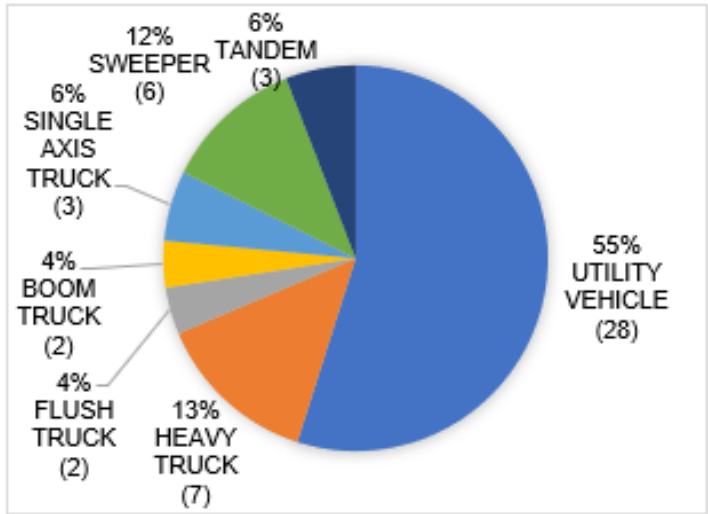
City of Aspen Fleet Inventory: August 2022:

As of August 2022, the City of Aspen municipal fleet consists of 229 fleet assets across 19 departments, with 11 Battery-Electric Vehicles, 3 Plug-in Electric Hybrids Vehicles (PHEVs), and 9 Hybrid Vehicles in use at the city. The total number of vehicles and equipment by department is listed in the Appendix on page 19. Looking at the total number of vehicles and equipment relative to the size of the city fleet, there are multiple opportunities to build on recent successes of incorporating EVs into the fleet if the appropriate conditions for the replacement vehicle are met:

Vehicles – 116 total

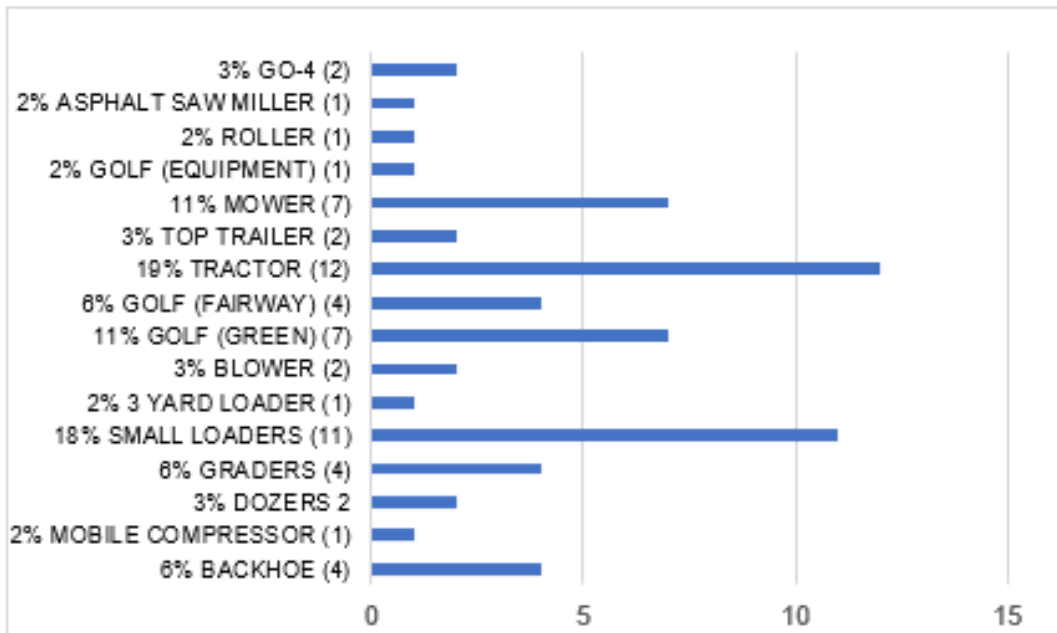


Vehicles/Equipment – 51 total



Included in the municipal fleet are units of mobile/stationary equipment as seen below.

Equipment - 62 total



Guiding Principles:

These are the values driving the implementation of the plan:

- The FZER starts a **process** for incorporating additional EVs and zero emission equipment into the municipal fleet. As new technologies and information become available, the process can and will be updated.

- The FZER draws from the combined skills, knowledge, and experience of 25 department heads and staff. The recommendations contained in the FZER can only be achieved through ongoing **collaboration** across city departments and with external partners.
- The FZER understands that the operational needs of the city come first. By strategically addressing how to include EVs and zero emission equipment, each department is afforded a great deal of **flexibility** in how they individually pursue electrification. The FZER will be regularly checked-in on by staff to ensure that it stays up to date.

FZER Stakeholder Recommendations:

The recommendations contained in the FZER are organized into six topic areas:

1. Fleet and Equipment Inventory
2. Fleet Replacement Process
3. Budget Considerations
4. EV Charging Infrastructure
5. EV Fleet Maintenance
6. Internal and External Education

Each topic area features key section takeaways and a list of associated action items, as recommended by the stakeholder group, to be accomplished by lead departments over the next several years.

Fleet and Equipment Inventory

Key Takeaways:

Supply chain issues: All vehicles, including EVs, are in increased demand due to supply chain disruptions from the COVID-19 pandemic, and strong competition for fewer vehicles has resulted in higher prices and long wait times. As new vehicle and equipment models enter the market, the city should know how these options fit into existing needs and be prepared to act quickly to secure their benefits.

Updated fleet and equipment inventory: As departments reflect on long-term operational needs, further analysis on the city’s fleet and equipment inventory, including details on small gas-powered tools is a vital step in preparing for the transition.

Aspen’s unique needs: To account for factors specific to Aspen, including its rural geography and climate, the FZER recommends that staff act as a clearing house to assess the suitability of all incoming EV and zero emission opportunities.

Fleet and Equipment Inventory	Lead Depts.	Timeline
- Align work deliverables with finance procurement windows.	All depts.	2023/ Annually

- Send a list of suitable EV and electric equipment replacements and identify near and long-term deployment opportunities to departments.	EHS	2023/ Annually in March
- Assess and improve format and accessibility of fleet inventory data.	EHS Finance Streets	2023
- Develop a plan to inventory all equipment assets including small gas-powered tools (e.g. chainsaws, snow blowers).	EHS	2023-2024

Fleet Replacement Process

Key Takeaways:

Fleet replacement schedule policy: The fleet replacement schedule is administered by the Streets department and calls for departments to consider updating their fleet vehicles on a 7-year or 80,000 miles timeline. This means that every internal combustion engine (ICE) vehicle purchased instead of an electric or zero emission model could represent a 7-year delay on the city securing its emissions reduction targets. The FZER does not direct departments to replace ICE vehicles and equipment ahead of the fleet replacement schedule – its purpose is to streamline processes needed for departments to opt for an electric or zero emission vehicle or equipment at the time of replacement.

EV decision-making matrix: In order to align the operational needs of the city with the need to electrify fleet vehicles faster, the FZER introduces an EV Decision-Making Matrix (outlined in the Appendix on page 19) that helps departments determine whether an electric or zero emissions vehicle replacement is appropriate. The EV Decision-Making Matrix is meant to standardize the decision-making process and ensure that the replacement is a right fit to avoid stranded assets. The criteria include a total cost of ownership analysis for each vehicle, life-cycle greenhouse gas emissions, embodied carbon, proximity to local/regional dealerships for support, ability to achieve the city’s climate goals and a proven track record of the vehicles ability to perform.

Plug-in electric hybrid vehicles (PHEVs): EVs and zero emission equipment should be introduced to the municipal fleet incrementally to maintain strong service standards. The FZER stakeholder group recommends that PHEVs and to a lesser-extent, low emission Hybrids vehicles continue to be used in the near term as city operations transition to accommodate a larger percentage of zero emissions vehicles.

Carpool vehicles: Carpool vehicles (including shuttles), some of which travel over 100+ miles to Silt each day, are a special use case at the city. The long-distance travel patterns of these vehicles are much different to the in-town driving that most other city owned vehicles are required to do. As a result, the requirements for an electric or zero emissions carpool vehicle replacement will need to be tailored to meet specific needs.

Medium/heavy duty vehicles: The FZER stakeholder group recommends that medium/heavy duty EVs and zero emissions equipment be the subject of a controlled pilot before being considered a viable replacement for the fleet.

Electric equipment: The city should continue to explore opportunities to mitigate air pollution and noise from construction through electric equipment alternatives.

Fleet and Equipment Replacement Process	Lead Depts.	Timeline
<ul style="list-style-type: none"> - Introduce battery electric, hybrid, plug-in electric hybrid, and hydrogen fuel cell vehicles to the fleet incrementally and after applying lessons learned from EV pilots. - Replace existing vehicles and equipment with EVs only when the asset has reached its end of duty life cycle. 	All depts.	2023/ Annually, in March
<ul style="list-style-type: none"> - Incorporate additional flexibility in the 7/years and/or 80,000 miles vehicle replacement schedule to support the transition or retirement of select vehicles. 	EHS Finance Streets	2023-2025
<ul style="list-style-type: none"> - Adopt an EV decision-making matrix to evaluate, document, and share fleet decisions on how each new vehicle purchase is made. The matrix is to be used in conjunction with the vehicle replacement schedule. See the EV Decision-Making Matrix listed in the Appendix for an example of the criteria to be used. 	EHS Streets	Annually, in March
<ul style="list-style-type: none"> - Each department to publish planned replacements annually. Review and update the EV decision-making matrix as needed. 	EHS Streets	Annually, in March
<ul style="list-style-type: none"> - Pursue EV pilot opportunities for light trucks, carpool vehicles, medium/heavy-duty vehicles, and off-road equipment. - Incorporate progressively heavier class vehicles into the fleet on a timeline specified by climate goals. 	All depts.	Annually
<ul style="list-style-type: none"> - Continue to install and monitor telematics on new EV purchases on an opt-in basis. - Formalize processes for departments to share EV transition insights and best practices. 	EHS	Annually

Budget Considerations

Key Takeaways:

High upfront costs: The high upfront costs associated with EVs and the infrastructure needed to charge them is one of the key barriers to electrification. The combined total of these costs are still much higher than their ICE vehicle counterparts. The FZER recommends additional research into different purchasing strategies, including leasing, to offset the high costs of EVs and equipment.

Total cost of ownership (TCO): Despite high upfront costs, the total cost of ownership (TCO) of EVs which includes insurance, maintenance, repairs, and cost of charging are expected to save departments money over the lifetime of the vehicle. ¹

Internal budgeting processes: Internal accounting/budgeting practices currently prevent the TCO of electric and zero emission vehicles from being properly understood. This is especially true where vehicles are purchased through one departments capital budget, meanwhile the charging, and maintenance costs, are paid through multiple departments operating budgets. The opportunity for EVs, is that the return on the investment is realized through savings in the operations budget. The FZER acknowledges the TCO of charging equipment, and the final resale value of the EV still need to be assessed. The FZER calls for stakeholders to begin working to address the budget measures needed to support the operational paradigm shift from ICE vehicles to electric and zero emissions vehicles.

Budget Considerations	Lead Depts.	Timeline
- Review state and federal EV and charging station funding opportunities to offset costs.	EHS	2023/ Annually
- Establish an EV fleet finance team to address the high upfront costs of new EV and charging station purchases and account/budget for the transition from gas/diesel expenses to a utility bill expense.	EHS Finance Streets	2023-2024
- Continue to review and refine total cost of ownership and emissions estimates for EVs with respect to updates to electric rates and policies.	EHS Finance Utilities	Annually
- Explore the use of incentives for internal fleet purchasing. Encourage fleet efficiency, and right sizing decisions at the end of each vehicle duty lifecycle.	EHS Finance	2023-2025

¹ “Electric Vehicle Benefits and Considerations.” *Alternative Fuels Data Center: Electric Vehicle Benefits and Considerations*, https://afdc.energy.gov/fuels/electricity_benefits.html.

Charging Infrastructure Needs

Key Takeaways:

Charging infrastructure: EV charging infrastructure was consistently pointed to as the topic that needed the most staff attention and resources throughout the FZER stakeholder process. As of November 2022, most electric vehicles within the municipal fleet still utilize chargers that can also be accessed by the public. The city is already applying the lessons learned from the implementation of the *City of Aspen Electric Vehicle Public Charging Masterplan* but fleet charging infrastructure will need to be distinct from what is made available to the public. This recognizes that the existing amount of charging infrastructure does not adequately serve the needs of current and future fleet vehicles, and effectively caps the number of new EV purchases the city can make.

Fleet and facilities analysis: The FZER stakeholder group recommends that the city perform a comprehensive fleet and facilities infrastructure analysis to determine the following:

- Fleet charging needs to reach the goal of 100% electric and zero emissions vehicles and equipment by 2050.
- Costs associated with purchasing and selecting the appropriate charging equipment to meet individual departments' operating needs.
- The city will need to continue to assess the impacts of new energy demands and how to best manage additional load on the grid, which according to a recent [study](#) could produce an additional 41% increase in energy use statewide by 2050.

Norms and policies around charging: As the city expands its fleet charging infrastructure, there is a need to develop specific policies and standard operating procedures that outline department responsibilities, maintenance schedules, and responsibilities, and expectations around charging.

GIS Fleet Parking Locations: The location, dwell time, and times of charging are critical to understanding charging needs. The FZER stakeholder group with help from the city's GIS department created a *Fleet Parking Distances to Transformers* map (see the Appendix on page 21) which offers a first glance into the availability of charging at current parking locations. The map is only intended to show the proximate location of nearby electrical resources with respect to where fleet vehicles are currently parked. A full fleet and facilities infrastructure analysis is needed to determine availability and suitability of these transformers.

Charging Infrastructure Needs	Lead Depts.	Timeline
- Create policies and standard operating procedures for the charging infrastructure use, maintenance, and funding contributions.	EHS Finance Streets	2024/ Annually

- Perform a comprehensive fleet and facilities infrastructure analysis to understand fleet operational and future EV charging needs, building and transformer capacity, evaluate costs and decide on appropriate charging equipment, and to assess new charging demands and anticipate grid impacts.	Assets EHS Finance Streets Utilities	2023/ Annually
- Explore on-site solar or managed charging and storage to reduce impacts on the electric grid.	EHS Utilities	2023-2025
- Develop a fleet EV charger maintenance schedule to report problems, and ensure funds for ongoing maintenance, support and connectivity, and warranty costs.	EHS Finance Streets	2023-2024
- Develop policies that prioritize city fleet vehicle charging over public charging including specific rates and time of use charges.	EHS	2023
- Consider opportunities to equip approved staff with the ability to charge city vehicles at home.	EHS Human Resources Streets	2023
- Evaluate public private partnership opportunities for internal EV charging management on a revolving basis.	EHS Finance	Annually

EV Fleet Maintenance

Key Takeaways:

EVs are still a relatively new technology: It is still difficult to estimate the ongoing maintenance costs or what is needed in terms of repairs as many EVs have not yet reached their end of use period. The FZER stakeholder group named uncertainty about replacement parts/vehicle maintenance as the top barrier to electric vehicle implementation. This has been true where inadequate local supply chains and parts on backorder have meant that several city owned fleet vehicles have experienced substantial vehicle downtime. It is becoming more commonplace to see OEMs and dealerships offer an 8-10 year/100k mile warranty on EV batteries, thus most maintenance and repairs have occurred outside of the city’s Streets department. The city should start a process to keep track of ongoing maintenance issues.

Workforce development and training: New electric and zero emission vehicles require staff that know how to operate them. It is essential that the city supports internal workforce development to ensure departments and staff are up to date on opportunities and prepared to take on maintenance requirements as required.

EV Fleet Maintenance	Lead Depts.	Timeline
<ul style="list-style-type: none"> - Continue to review EV training and skill building opportunities for fleet technicians and enroll staff on an as needed basis. 	EHS Streets	Annually
<ul style="list-style-type: none"> - As vehicle and equipment warranty should cover most maintenance needs, there is additional need for clarity behind what fleet technicians should work on. - Assess capacity and needs for additional full-time technicians. 	Streets	Annually
<ul style="list-style-type: none"> - Develop partnerships to ensure the city is up to date on best practices for EV fleet maintenance. - Where possible, utilize local/regional vendors to perform warranty services. 	EHS Streets	Annually

Internal and External Education

Key Takeaways:

Driver education: All drivers should be aware of the systems in place, the value of distributed resources in batteries, and how to charge EVs. The stakeholder group supports the development of an internal communications plan to demonstrate best practices for operating EVs. This plan would provide the basis for the city to start more extensive community outreach to share lessons learned from the FZER process.

Community outreach: An essential step to support the fleet transition is by improving messaging and education on how to acquire and operate EVs. As the city deploys more electric and zero emissions vehicles and equipment, best practices should be shared with the broader community.

Safety and emergency response protocols: As EVs become more commonplace, emergency response management protocols that have been designed around conventional vehicles will need to be updated.

Internal and External Education	Lead Depts.	Timeline
<ul style="list-style-type: none"> - Develop an internal EV communications plan and commit to outreach to ensure that drivers are aware of the differences between EVs and their gasoline/diesel counterparts. 	Comms EHS Streets	2023-2024
<ul style="list-style-type: none"> - Include additional EV driver education training requirements as part of the human resources driver assessment onboarding. Provide specialized training for medium/heavy class vehicles. 	EHS Human Resources	2023

- Provide opportunities for staff to test drive EVs and electric equipment by hosting ride and drive events.	EHS Streets	Annually
- Explore opportunities to subsidize electric vehicle purchases for city staff.	EHS	Annually
- Create a process to address EV safety questions and emergency response management. - Develop internal protocols for battery management and what to do if an EV battery is low and the driver is not near a charging station.	EHS Parking Streets	2023/ Annually
- Make EV information, resources, and experiences more widely available. Promote wins and share lessons learned with the broader community.	Comms EHS	Annually
- Perform selective outreach and act as a resource for private business and organizations interested in electric and zero emission fleet vehicles.	EHS	2023/ Annually

Conclusion:

Moving away from fossil fuels and towards electric and zero-emission vehicles and equipment will reduce the city’s total emissions footprint, help demonstrate Aspen’s climate values, and set a strong precedent for electrification to the rest of the community. The FZER outlines the steps and actions necessary for the city to add electric and zero emissions vehicles on a timeline to meet Aspen’s climate goals without compromising operational demands. The implementation of this plan will be led by the Environmental Health and Sustainability Department in collaboration with several key departments including Streets, Finance, Parks, and Capital Assets over the next several years. This internal planning document is meant to guide staff actions and will be regularly checked-in on and updated as new developments and technologies come to light.

Appendix

ATTACHMENT A: Stakeholder participant list.

Name	Position	Department
Steve Barr	Parks Operations Manager	Parks
Shannon Buckner	Executive Assistant	Office of the City Manager
Tyler Christoff	Director	Streets
Linda Consuegra	Assistant Chief	Aspen Police Department
Gabriel Finesilver	Transportation Coordinator	Transportation/Mobility
Blake Fitch	Parking Operations Manager	Parking
Justin Forman	Field Operations Manager	Utilities
Matthew Gillen	Executive Director	Housing
Mike Horvath	Senior Project Manager	Engineering
Tim Karfs	Sustainability Programs Administrator	Climate Action Office, Environmental Health and Sustainability
Perry Kleespies	Senior Project Manager	Asset Management
Andrew Kramer	Budget Manager	Finance
Matt Kuhn	Director	Parks
Daniel Maldonado	Assistant Street Superintendent	Streets
Jerry Nye	Superintendent Streets/Fleet Manager	Streets
CJ Oliver	Director	Environmental Health and Sustainability
Pete Rice	Deputy City Engineer	Parking, Transportation, Engineering
Lynn Rumbaugh	Transportation Program Manager	Transportation
Sarah Sachs	HR Business Partner Representative	Human Resources
Robert Schober	Director	Capital Assets
Tessa Schreiner	Sustainability Manager	Climate Action Office, Environmental Health and Sustainability
John Sobieralski	Network Coordinator	Information Technology
Pete Strecker	Finance Director	Finance
Phillip Supino	Director	Community Development
Michael Tunte	Landscape Architect and Construction Manager	Parks and Open Space
Ladd Vagen	Interim Director of Information Technology	Information Technology
John Woltjer	Police Officer IV	Aspen Police Department

Joshua Zeeb	GIS Analyst	GIS, Engineering
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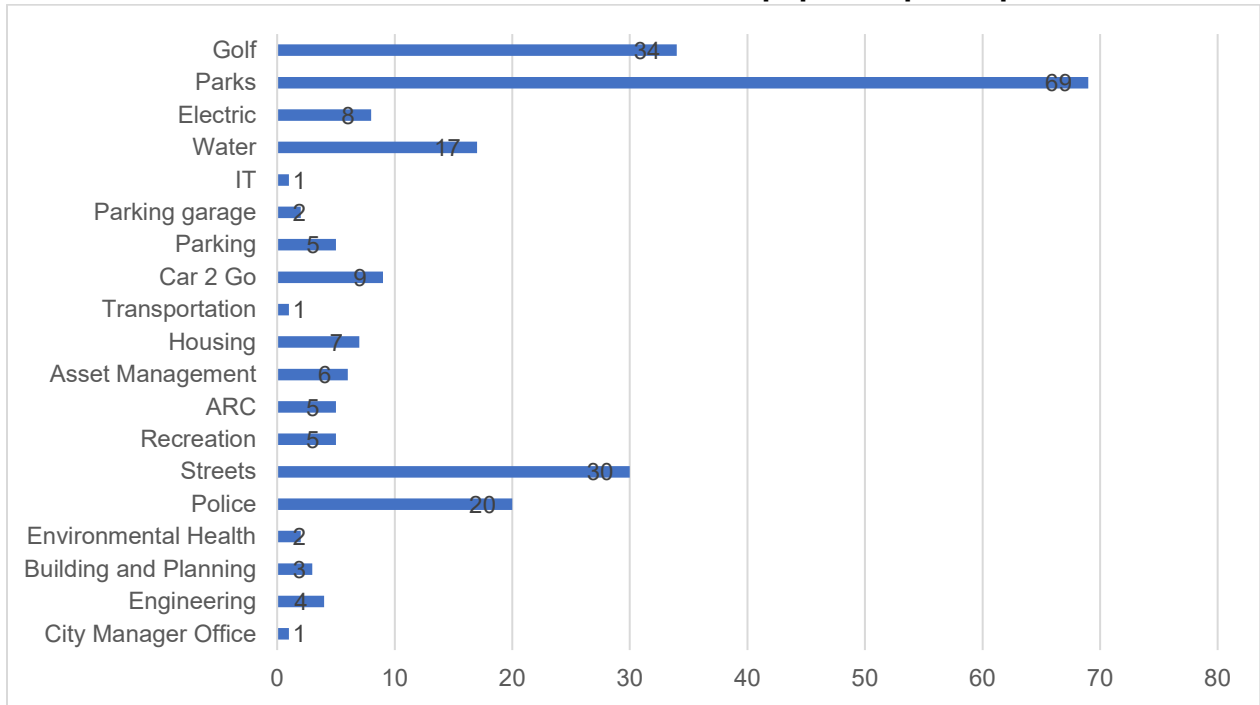
ATTACHMENT B: Full stakeholder recommendation list: Lead departments are responsible for coordinating department stakeholders and managing deliverables.

Stakeholder Recommendations	Lead Depts.	Timeline
Fleet and equipment inventory		
- Align work deliverables with finance procurement windows.	EHS Finance Streets	2023/ Annually
- Send a list of suitable EV and electric equipment replacements and identify near and long-term deployment opportunities to departments.	EHS	2023/ Annually in March
- Assess and improve format and accessibility of fleet inventory data.	EHS Finance Streets	2023
- Develop a plan to inventory all equipment assets including small gas-powered tools (e.g. chainsaws, and snow blowers).	EHS	2023-2024
Fleet and equipment replacement process		
- Introduce battery electric, hybrid, plug-in electric hybrid, and hydrogen fuel cell vehicles to the fleet incrementally and after applying lessons learned from EV pilots. - Replace existing vehicles and equipment with EVs only when the asset has reached its end of duty life cycle.	All depts.	2023/ Annually, in March
- Incorporate additional flexibility in the 7/years and/or 80,000 miles vehicle replacement schedule to support the transition or retirement of select vehicles.	EHS Finance Streets	2023-2025
- Adopt an EV decision-making matrix to evaluate, document, and share fleet decisions on how each new vehicle purchase is made. The matrix is to be used in conjunction with the vehicle replacement schedule. See the EV Decision-Making Matrix listed in the appendix for an example of the criteria to be used.	EHS Streets	Annually, in March
- Each department to publish planned replacements annually. Review and update the EV decision-making matrix as needed.	EHS Streets	Annually, in March
- Pursue EV pilot opportunities for light trucks, carpool vehicles, medium/heavy-duty vehicles, and off-road equipment.	All depts.	Annually

- Incorporate progressively heavier class vehicles into the fleet on a timeline specified by climate goals.		
- Continue to install and monitor telematics on new EV purchases on an opt-in basis. - Formalize processes for departments to share EV transition insights and best practices.	EHS	Annually
Budget considerations		
- Review state and federal EV and charging station funding opportunities to offset costs.	EHS	2023/ Annually
- Establish an EV fleet finance team to address the high upfront costs of new EV and charging station purchases and account/budget for the transition from gas/diesel expenses to a utility bill expense.	EHS Finance Streets	2023-2024
- Continue to review and refine total cost of ownership and emissions estimates for EVs with respect to updates to electric rates and policies.	EHS Finance Utilities	Annually
- Explore the use of incentives for internal fleet purchasing. Encourage fleet efficiency, and right sizing decisions at the end of each vehicle duty lifecycle.	EHS Finance	2023-2025
Charging infrastructure needs		
- Create policies and standard operating procedures for charging infrastructure use, maintenance, and funding contributions.	EHS Finance Streets	2024, Annually
- Perform a comprehensive fleet and facilities infrastructure analysis to understand fleet operational and future EV charging needs, building and transformer capacity, evaluate costs and decide on appropriate charging equipment, and to assess new charging demands and anticipate grid impacts.	Assets EHS Finance Streets Utilities	2023/ Annually
- Explore on-site solar or managed charging and storage to reduce impacts on the electric grid.	EHS Utilities	2023-2025
- Develop a fleet EV charger maintenance schedule to report problems, and ensure funds for ongoing maintenance, support and connectivity, and warranty costs.	EHS Finance Streets	2023-2024
- Develop policies that prioritize city fleet vehicle charging over public charging including specific rates and time of use charges.	EHS	2023
- Consider opportunities to equip approved staff with the ability to charge city vehicles at home.	EHS Human Resources Streets	2023

- Evaluate public private partnership opportunities for internal EV charging management on a revolving basis.	EHS Finance	Annually
EV fleet maintenance		
- Continue to review EV training and skill building opportunities for fleet technicians and enroll staff on an as needed basis.	EHS Streets	Annually
- As vehicle and equipment warranty should cover most maintenance needs, there is additional need for clarity behind what fleet technicians should work on. - Assess capacity and needs for additional full-time technicians.	Streets	Annually
- Develop partnerships to ensure the city is up to date on best practices for EV fleet maintenance. - Where possible, utilize local/regional vendors to perform warranty services.	EHS Streets	Annually
Internal and external education		
- Develop an internal EV communications plan and commit to outreach to ensure that drivers are aware of the differences between EVs and their gasoline/diesel counterparts.	Comms EHS Streets	2023-2024
- Include additional EV driver education training requirements as part of the human resources driver assessment onboarding. Provide specialized training for medium/heavy class vehicles.	EHS Human Resources	2023
- Provide opportunities for staff to test drive EVs and electric equipment by hosting ride and drive events..	EHS Streets	Annually
- Explore opportunities to subsidize electric vehicle purchases for city staff.	EHS	Annually
- Create a process to address EV safety questions and emergency response management. - Develop internal protocols for battery management and what to do if an EV battery is low and the driver is not near a charging station.	EHS Parking Streets	2023/ Annually
- Make EV information, resources, and experiences more widely available. Promote wins and share lessons learned with the broader community.	Comms EHS	Annually
- Perform selective outreach and act as a resource for private business and organizations interested in electric and zero emission fleet vehicles.	EHS	2023/ Annually

ATTACHMENT C: Total number of vehicles and equipment per department.



ATTACHMENT D: EV Decision-Making Matrix. Designed to assist departments and Streets department select suitable electric and zero emission replacements.

City of Aspen Electric Vehicle Decision-Making Matrix (Example)

COA FLEET REPLACEMENT - EV DECISION-MAKING MATRIX

Requesting Department	EHS
Date	11/3/2022
Date of Review:	11/7/2022
Streets Initial:	DM

STEP 1: Description of what the vehicle up for replacement is being used for (e.g. occupants, distance driven regularly, tools or specialized use, etc.)

The current model is used to haul tools and equipment to and from job sites within city limits. The vehicle is occasionally used to drive up and down valley. The vehicle rarely has over 2 occupants.

STEP 2: What is the average length of dwell time (the time parked at a specific location) for the vehicle?

Add a brief description of where the vehicle is expected to park and for how long.

The vehicle is anticipated to park at the Rio Grande Parking Garage overnight for approx. 12 hours.

STEP 3: Is there an available EV charging station for the vehicle to utilize? If not, is there a charger scheduled for installation by the time of vehicle delivery?*

Proceed to STEP 4.

Consider delaying the vehicle replacement until an EV charging unit is installed at the parking location.

*Contact EHS or Streets if you have questions on charging station availability.


YES
NO

STEP 4: Determine if there is a suitable electric or zero emission alternative for the vehicle.

Apply results from research into what electric or zero emission vehicles are available to the city.
 Use the *DRVE* tool or visit the Department of Energy Fuel Economy website www.fueleconomy.gov and select "Compare Side-by-Side" to evaluate compatible models.

STEP 5: Send form to EHS + Streets with suggestions for the replacement vehicle.

For EHS + Streets to complete.

STEP 6: Complete vehicle replacement options analysis:			
	EXISTING GASOLINE	NEW ELECTRIC	NEW HYBRID
			
OVERVIEW			
Year	2022	2022	2022
Manufacturer	Ford	Ford	Ford
Model	Ford F-150	Ford F-150	Ford F-150
Trim	4WD	Lightning 4WD Extended Range	4WD HEV
Engine	2.7 L, V6, Automatic (S10), Turbo	Automatic (A1)	3.5 L, V6 Automatic (S10), Turbo
Vehicle Class	2	2	2
Fuel Type	Regular Gasoline	Electricity	Regular Gasoline
SPECS			
Horsepower rating (hp)	400	580	430
Tow Capacity (lbs)	14,000	10,000	12,700
Payload Capacity (lbs)		2,235	2,120
Gross Vehicle Weight Rating (lbs)	6,010	6,500	6,250
Acceleration (0-60, seconds)	4	4.5	5.8
Torque		775	
Power to Weight Ratio (Divide horsepower by weight)			
Clearance			
Standard or Extended Range Battery	N/A	Extended	N/A
COST			
Purchase Price (\$)	\$34,625	\$39,974	\$42,000
Outfitting Price (\$)			
Source	BidsColorado	BidsColorado	BidsColorado
Current Vehicle Resale Value	\$10,000	\$10,000	\$10,000
State Grant Incentive Available (\$)			
Net Price (\$)	\$24,625	\$29,974	\$32,000
Leasing option (yes/no)			
Leasing Price (\$)			
Leasing Term (yrs)			
Replacement Schedule (yrs)			
MAINTENANCE COSTS			
E.g. Tires, wiper blades, cabin filters, and oil changes.			
Annual Projected Cost (\$)	\$800	~\$100	\$800
FUEL ECONOMY			
EPA Fuel Economy (MPGe or MPG, combined)	21	70	23
Total Range (mi.)	483-546	320	
Fuel Savings or Expenditure (\$)	(\$3,000)	\$5,750.00	(\$1,750)
Annual Fuel Cost (\$)	\$2,700	\$950	\$2,450
Average annual mileage			
Time to charge	N/A	10.1 hrs at 240V	N/A
ENVIRONMENT			
Annual Petroleum Consumption (barrels)	14.9	0.1	12.9
Greenhouse Gas Tailpipe Emissions (U.S. tons per year)	7.3	0	6.4
Price per ton of carbon for 7 year average life (\$50/ton)	\$2,555		\$2,240

ROBUSTNESS/RELIABILITY			
Perform independent research and reach out to other cities.			
Track record of technology.	Good	Fair	Good
Expected percentage of up-time in operation.		90%	
Can handle expected driving conditions?	Yes	Yes	Yes
Degree to which specialized skills are needed for maintenance.	Medium	High	Medium
Does the vehicle support add-ons? Skip if not needed.	Yes	Yes	Yes
DEALERSHIP SUPPORT			
Reach out to manufacturers and dealerships.			
Dealership support location (in miles)	<100 miles	<100 miles	<100 miles
Warranty coverage and conditions	3 yr/36k miles, 5 yr/60k mi powertrain	8/years, 100k mi	3 yr/36k mi, 5 yr/60k mi powertrain
Are replacement parts readily available for the vehicle.	Yes	Yes	Yes

STEP 6: Streets to send the comparison analysis back to the requesting department.

Streets to communicate the results of the analysis and work with the requesting department to understand the cost, carbon, and operational benefits of the replacement vehicle.

STEP 7: Requesting department and Streets select vehicle.

Provide reasons why the vehicle was chosen.

The vehicle scores highly against the gasoline and hybrid alternatives. The F-150 Lightning is currently being used by the City of X and has been performing well in similar conditions. There is currently available L2 charging stations in the Rio Grande Parking Garage. The vehicle is a viable zero emissions candidate to the vehicle currently in use.

RESOURCES

- <https://www.electrificationcoalition.org/resource/drive/>
- <https://www.fueleconomy.gov/feg/Find.do?action=sbsSelect>
- <https://www.bidscolorado.com/co/portal.nsf/xpPriceAgreementsByCategory.xsp>

ATTACHMENT E: Fleet parking locations and distance to transformers.

Parking Garage	Department	Distance To Transformer (ft)
Rio Grande	Environmental Health	56
	Golf	59
	Golf	4
	Housing	72
	Housing	25
Obermeyer	Information Technology	40
	Information Technology	5
	Parks	5
Police	Police	41
Rio Grande	Recreation	56
	Recreation	74
	Streets	69
	Streets	28
	Streets	28
	Transportation	65
	Transportation	55
	Water	50

Parking Garage	Department	Distance To Transformer (ft)
	ARC	12
Obermeyer	Asset Management	40
	Asset Management	56
Rio Grande	Building & Planning	56
Rio Grande	Car 2 Go	59
	Car 2 Go	58
	Car 2 Go	44
	Car 2 Go	44
	Car 2 Go	129
	Car 2 Go	101
Obermeyer	City Manager Office	40
	Electric	39
	Electric	20
Rio Grande	Engineering	56
Rio Grande	Engineering	56
Rio Grande	Engineering	56
	Engineering	49
Rio Grande	Environmental Health	56

Fleet Parking Distance To Transformers

Legend

- Fleet Vehicle Parking
- COA Transformer
- Holy Cross Transformer
- Parking Garage

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