Takoma Park City Council Meeting – January 8, 2025
Agenda Item 1

Presentation
Fleet Electrification Assessment

Recommended Council Action
Receive the presentation.

Context with Key Issues
The City availed itself of a Fleet Assessment for transition to electric vehicles through a program offered by Pepco via ICF. The assessment reviewed the City's fleet of 69 vehicles and 3 non-road equipment fleet and made recommendations for replacements over a 15-year timeframe (2025 – 2038). The analysis used a total cost of ownership model, identifying those vehicles that were economically advantageous for conversion. The evaluation identified 57 on road vehicles that have EV options and determined 23 of them would be economically beneficial to convert over the next 14 years. The potential savings were calculated to be over $228,000 over the next 29 years. Currently the City's fleet includes 8 EV's including 7 sedans and the EV street sweeper.

The recommended schedule for purchase of the EV vehicles is based on the expected vehicle replacement timeframe and is illustrated in Chart G on page 13 of the report. This includes 1 vehicle in both FY25 and FY26, 3 vehicles in FY27, 7 vehicles in FY28, 2 vehicles in FY29, 1 vehicle in FY30, 2 vehicles in FY31, 4 vehicles in FY32, 1 vehicle in FY36 and 1 vehicle in FY38.

The analysis also included recommendations for the number of chargers needed both onsite as well as offsite for take home vehicles for the number of recommended EV's.

The report also provided information related to Police Patrol vehicles, which is still being evaluated by the City's Police Command Staff for applicability.

Through this Pepco program, the City will also be eligible for potential cost reductions and grants for vehicle purchases and EV charging support through Pepco, as well as tax credits through the Clean Vehicle Credit program through the IRS.

Council Priority
Environmentally Sustainable Community

Environmental Considerations
The City has an expressed goal through the Climate Emergency Resolution to reduce greenhouse gas emissions. Transportation accounts for 49% of the overall greenhouse gas emissions in the City.

Fiscal Considerations
The analysis provided recommends vehicle transitions in those cases that are financially beneficial through a lower total cost of ownership which includes vehicle purchase, fuel costs, and maintenance costs over the life of the vehicle. While the purchase cost may in some cases be higher for EV's than gas fueled vehicles, the lifetime costs in those cases would be reduced. The City's budget process

provides for vehicle purchase costs in the Equipment Replacement Reserve. However, fuel and maintenance costs are included in the operating budget. So, while the total cost of ownership may be lower, where those reductions will be represented is dispersed.

Racial Equity Considerations
There are no racial equity considerations directly associated with fleet electrification.

Attachments and Links
City of Takoma Park Fleet Electrification Assessment

City of Takoma Park

Fleet Electrification Assessment

January 2, 2025

ICF on behalf of Pepco Holdings, Inc. Fleet Advisory Services

Table of Contents

Executive Summary

CITY OF TAKOMA PARK

Executive Summary

The Pepco Fleet Assessment Program provides fleet electrification recommendations and objective guidance from our team of electric vehicle (EV) experts. We are here to help you, City of Takoma Park (Takoma Park), understand the impacts of transitioning your fleet to EVs and support you every step of the way. This custom report assessed two (2) scenarios. The majority of this report focuses on a cost effective scenario which identifies the vehicles that meet usage requirements and would be most cost-effective to convert to electric and summarizes the associated financial and environmental benefits. A second scenario assesses the costs and impacts of 100% fleet electrification. This scenario identifies all vehicles that have an electric equivalent and summarizes the associated financial and environmental outcomes. Appendix A contains more information about the 100% electrification scenario.

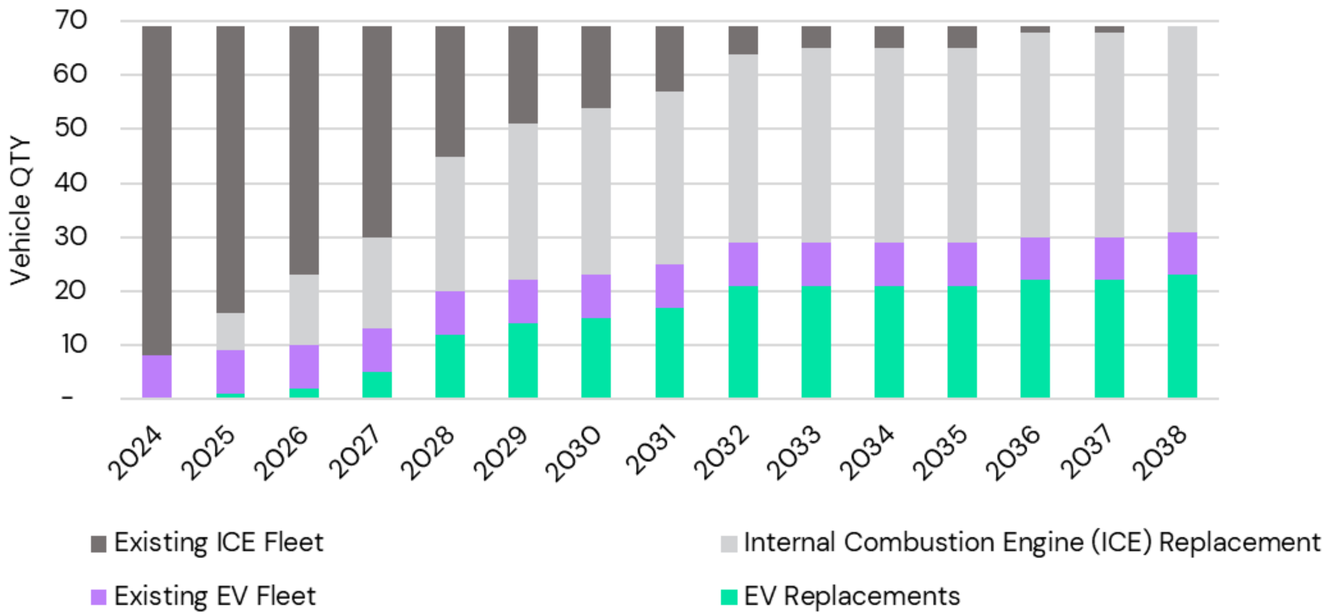
The timeframe identified for the vehicle replacements is 2025 to 2038, which accounts for a maximum vehicle life of 15 years based on assumptions used in the model. However, the fleet total cost of ownership (TCO) analysis extends to 2052 to account for the ongoing fuel and maintenance costs from the vehicles acquired in 2038. We assessed the economic feasibility of 72 vehicles in the Takoma Park's fleet including 69 on-road vehicles and 3 non-road vehicles. [1] We identified 57 on-road vehicles that have EV options available and 23 of those that would be beneficial to convert over the next 14 years. Chart A illustrates the phasing in of these electric vehicles as you replace your existing fleet vehicles. These 23 vehicles would result in a net present value (NPV) TCO savings of $228,819 over the next 29 years, which accounts for the savings across the vehicles' full lifespans.

[1] There are 3 non-road vehicles included in the total vehicle counts that are excluded from the Electric Vehicle Acquisition Recommendations and Fleet Environmental Impact Analysis sections of this report. Non-road vehicles are discussed separately in the Non-Road Equipment Section.

Executive Summary

CITY OF TAKOMA PARK

CHART A. Recommended EV Replacement Timeline: Fuel Types



The report also details the analysis assumptions, specific vehicle recommendations, financial and environmental impacts, and next steps. Your Fleet Advisory Services Porgram Account Manager (Brandon Schneider) will continue to check in with you and provide one-on-one support for the length of the program as you navigate fleet electrification. Please review this report and reach out to your ICF Account Manager at PHIEVsmart@icf.com with any questions or to discuss next steps.

Executive Summary

CITY OF TAKOMA PARK

Based on our analysis, converting 23 on-road vehicles to EVs is estimated to produce the following impacts:

$228,819
TCO savings over 29 years*

$228,283
fuel cost savings over 29 years*

$298,214
maintenance savings over 29 years*

2,329
metric tons (MT) of CO_2 eliminated over 29 years

* NPV assumes a 5% discount rate

Over 29 years, those estimated CO_2 reductions equate to:

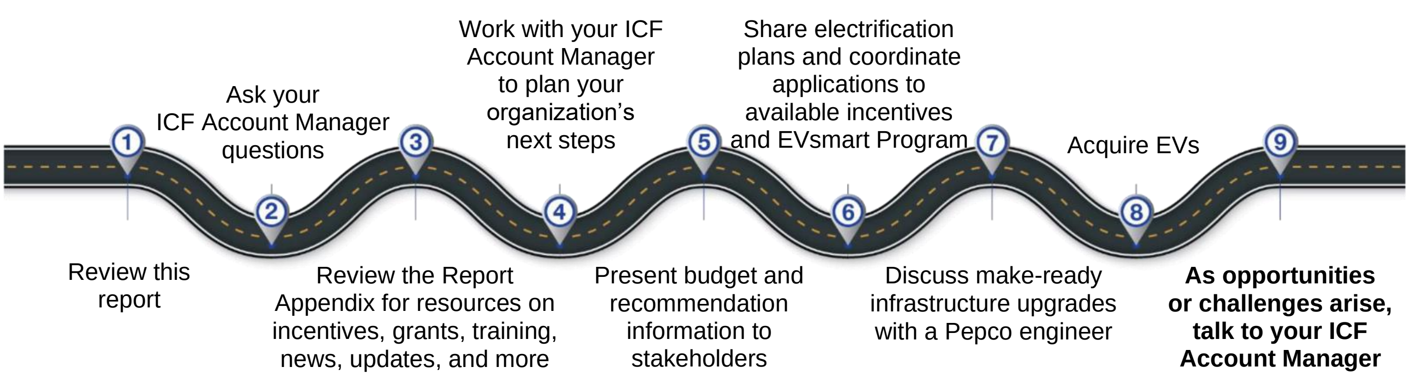
eliminating **268** homes' energy use for one year, or:

switching **88,509** incandescent lamps to LEDs, or:

recycling **792** tons of waste instead of landfilling it, or:

planting **38,432** trees.

Your Roadmap to Fleet Electrification



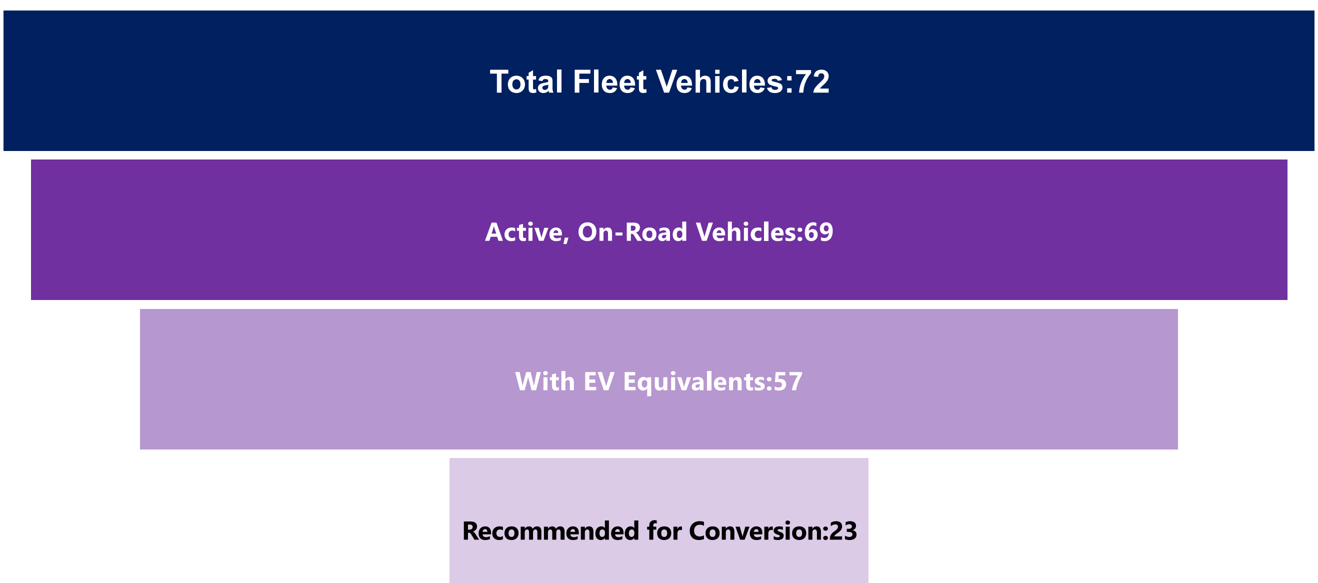
Project Information

On August 01, 2024, representatives from Takoma Park, including Ian Chamberlain, Deputy Director of Public Works, Dorothy Estrada, Sustainability Manager, Daryl Braithwaite, Public Works Director, Joy Togo, Sustainability Intern, Keith Perry, Equipment Maintenance Supervisor, met with the ICF Account Manager, Brandon Schneider, and other program staff for an initial intake call. The discussion covered topics including an overview of the Fleet Assessment Program, fleet data availability, fleet usage characteristics, and the City's motivation for exploring EV options. A key takeaway of the intake call was a focus on electrification to reach the city's climate goals.

Takoma Park provided an initial fleet dataset on July 22, 2024. The Account Manager provided follow up questions on August 02, 2024, and the fleet responded on August 06, 2024. Takoma Park's fleet dataset was used to establish a fleet baseline in the model.

There are 72 vehicles in the Takoma Park's current fleet, 69 active on-road vehicles and 3 pieces of non-road equipment. Of the 69 on-road vehicles, 57 have EV equivalents commercially available, and 23 would be cost beneficial to convert to EVs at this time. This breakdown is illustrated in Chart B. Note that non-road vehicles are included in the total vehicle counts, but are excluded from the Electric Vehicle Acquisition Recommendations and Fleet Environmental Impact Analysis sections of this report. Non-road vehicles are discussed separately in the Non-Road Equipment section.

CHART B. Fleet Assessment Vehicle Breakdown



Project Information

CITY OF TAKOMA PARK

Existing On-Road Fleet Makeup

There are 69 on-road vehicles in Takoma Park's current fleet, all of which are gasoline-, diesel-, or battery electric-powered as shown in Table A. Over half of the fleet is made up of light-duty vehicles which is illustrated in Chart C below. All the SUVs and about a quarter of sedans are police vehicles. Police vehicles are assessed separately due to their significantly different duty cycles and applications. The estimated retirement schedule for the existing fleet is represented in Chart D. This schedule informs the recommended EV replacement schedule, which is shown later in chart G.

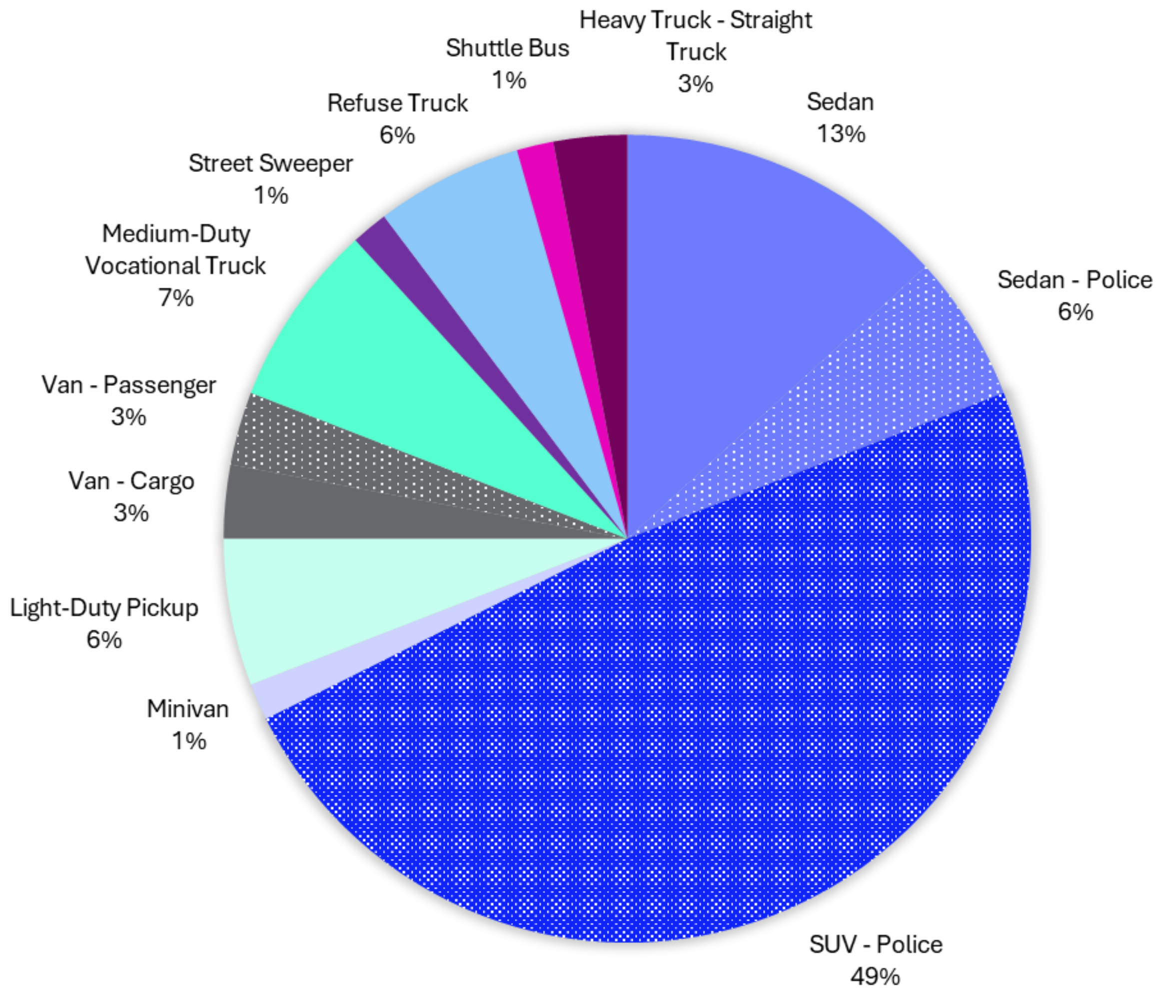
TABLE A. Existing Fleet Fuel Type Distribution

Vehicle Type	Gasoline	Diesel	BEV
Sedan	6	0	7
SUV	33	0	0
Minivan	1	0	0
Light-Duty Pickup	3	2	0
Van	4	0	0
Heavy Truck	0	2	0
Medium-Duty Vocational Truck	1	4	0
Refuse Truck	0	4	0
Street Sweeper	0	0	1
Shuttle Bus	1	0	0
TOTAL	**49**	**12**	**8**

Project Information

CITY OF TAKOMA PARK

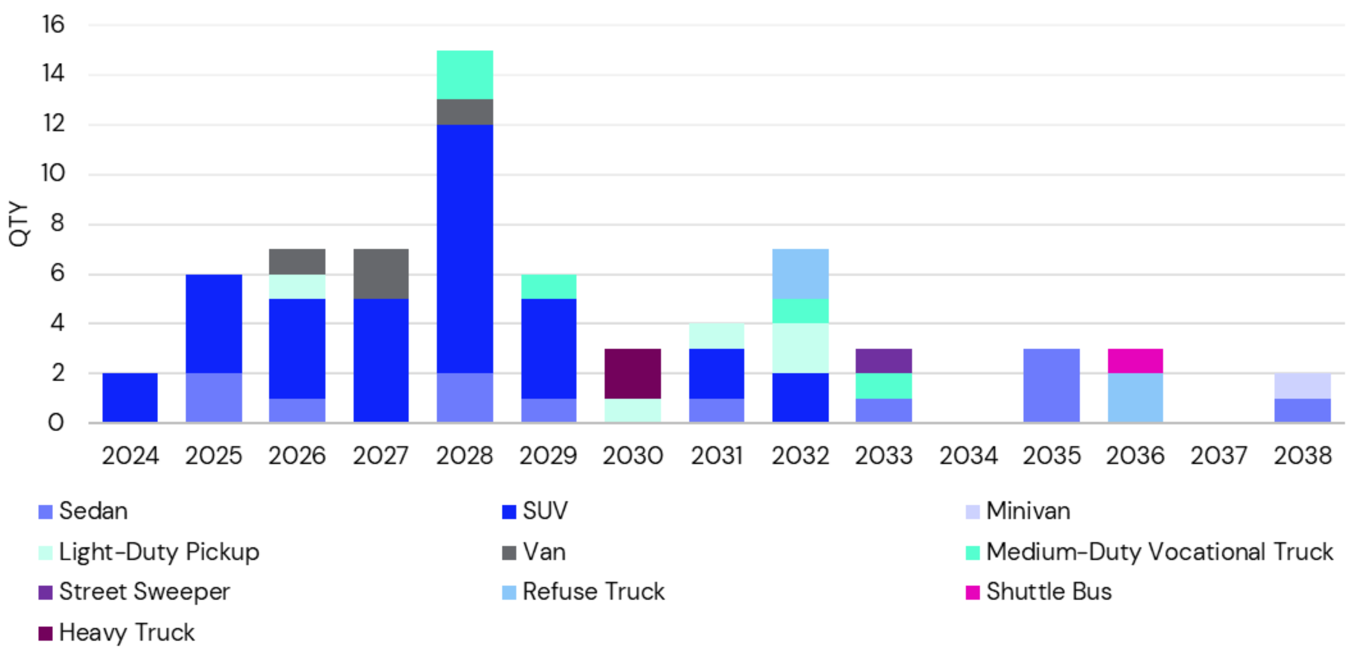
CHART C. Existing Fleet - Vehicle Types



Project Information

CITY OF TAKOMA PARK

CHART D. Existing Fleet - Retirement Schedule



The 3 pieces of non-road equipment are summarized in Table B below and were excluded from this analysis and the Electric Vehicle Acquisition Recommendations section of this report. (see the Non-Road Equipment Section for more information). In total 11 vehicles where excluded from the analysis and are summarized in Table B below.

TABLE B. Vehicle Types Excluded from Analysis

Vehicle Type	Quantity	Reason for Exclusion
Non-Road Equipment	3	Non-road equipment (See Non-Road Equipment Section)
Sedan	7	BEVs (already converted)
Street Sweeper	1	
TOTAL	**11**	

Key Assumptions

Key assumptions and data sources that were used in this analysis include the following. The Electric Vehicle Acquisition Recommendations section below provides additional detail on the financial assumptions in the model.

- **Recommendation Threshold**: EVs are recommended only when the EV TCO is less than the TCO of the comparable internal combustion engine (ICE) vehicle. A second scenario where EVs are recommended for every ICE vehicle is described in greater detail in Appendix A.
- **Vehicle Pricing**: The model uses manufacturer suggested retail prices (MSRPs) for EVs where available. When MSRP pricing is unavailable, the model uses average pricing based on vehicle and fuel type based on Argonne National Laboratory's Alternative Fuel Life Cycle Environmental and Economic Transportation (AFLEET) Tool and ICF's *Comparison of Medium- and Heavy-Duty Technologies in California* report for the California Electric Transportation Coalition (CalETC report). Vehicle pricing was escalated annually using the U.S. Energy Information Administration's (EIA) 2023 Annual Energy Outlook (AEO) and ICF's CaleETC report for the California Electric Transportation Coalition. The model assumed all vehicles are owned and not leased.
- **Fuel and Maintenance**: The model uses Takoma Park's FY 2025 prices which are $3.12 per gallon of diesel and $2.69 per gallon of gasoline. In general, Takoma Park gets a lower rate on fuel than the national average gasoline and diesel price. The model determines the average annual fuel use for each vehicle based on its average annual mileage and average fuel economy (miles per gallon), and then multiplies the fuel use value by the price per gallon of fuel. ICF uses annual mileage and fuel efficiency assumptions by vehicle and fuel type from the AFLEET Tool and ICF's CalETC report. The model also uses these sources to estimate average per mile maintenance costs based on vehicle and fuel type. Maintenance costs were escalated 2.20% annually.
- **Electricity Pricing**: The model uses Pepco's General Service $0.14/kWh base rate, escalated annually using projections from the U.S. EIA's 2023 AEO Reference Case for Transportation: Electricity. The rate analysis section uses Pepco's GS rate ($0.037/kWh) and GL rate ($0.019/kWh).
- **Vehicle Replacements**: Takoma Park identified the vehicles for replacement from 2025 to 2038. For all other years, the model uses the vehicle lifespan assumptions by vehicle type in AFLEET to estimate the vehicle retirement schedule. The vehicle lifespan was added to the model year to determine the replacement year, with the minimum being 2025.
- **Timeframe**: This analysis focuses on vehicle replacements for 2025 through 2038, with TCO calculations extending out across the vehicle lifespans to 2052.
- **Discount Rate**: 5% was used for NPV calculations.
- **Vehicle Ranges**: The EV mileage ranges per charge were accounted for when recommending vehicle replacements. The analysis used an average temperature range of 22 to 88°F to assess the potential impact temperatures can have on EV ranges; this reduced EV model ranges to 80% of their maximum mileage range. For Takoma Park's current vehicles, the model uses AFLEET assumptions by vehicle type to estimate the range required each day; this varies from 50 to 150 miles per day depending on the vehicle type only if daily range was not provided.

- **Electric Vehicle Supply Equipment (EVSE) Pricing and Incentives**: The EVSE pricing assumptions and incentive program amounts applied in the analysis are detailed further in the Incentives and Funding Source Assumptions Applied section below.

EV Model Comparison

CITY OF TAKOMA PARK

Electric Vehicle Acquisition Recommendations

There are 69 active and on-road vehicles scheduled for retirement between 2025 and 2038, and 23 of them will be cost effective to convert to battery electric vehicles (BEVs). Chart E below shows the TCO for the 23 recommended vehicles each year if they were replaced with conventional, ICE vehicles versus with the recommended EVs. This timeline is based on the existing fleet retirement schedule outline in Chart D above. Based on these estimates, you may see a financial payback as early as 2034. While initial annual EV costs are higher than ICE costs, the overall cumulative EV TCO is lower due to incentives and reduced operational costs, as shown in Chart F.

CHART E. Fleet Recommended Replacements TCO Comparison – Annual

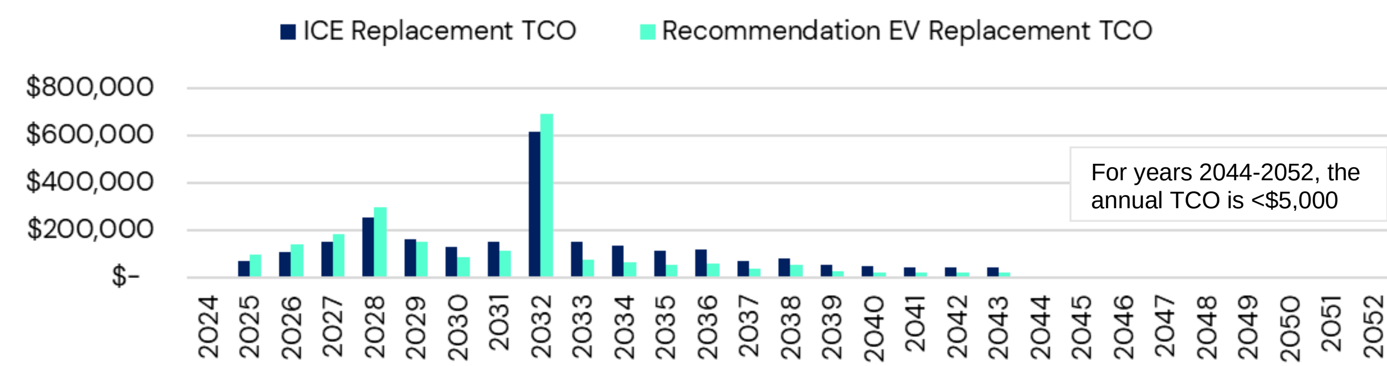


CHART F. Fleet Recommended Replacements TCO Comparison – Cumulative

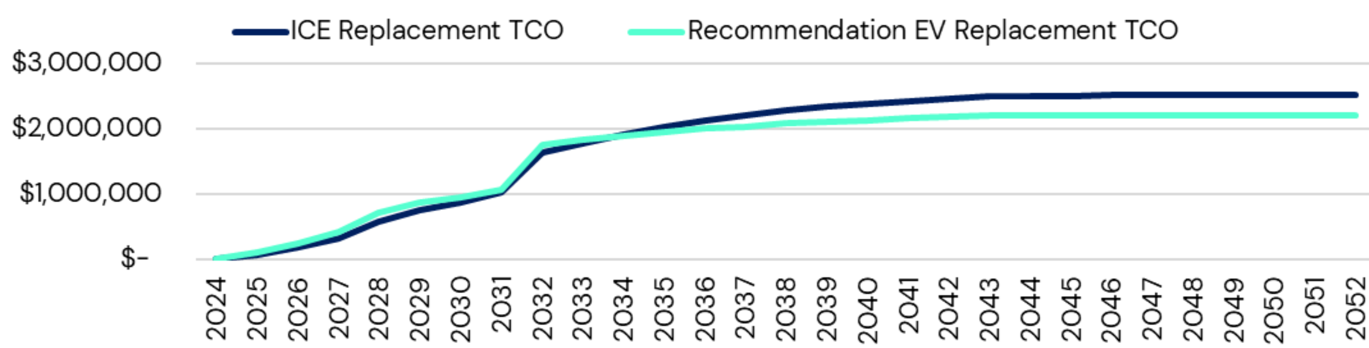


Table C on the next page identifies the vehicles that will be cost effective to convert to electric within the next 14 years. Chart G illustrates the recommended replacement timeline for these vehicles. Each vehicle within your fleet has been assessed to identify the lowest cost option, while also accounting for potential mileage and charging time restrictions.

EV Model Comparison

CITY OF TAKOMA PARK

The financial savings and GHG emission reductions represent the difference between replacing the recommended vehicles with EVs compared to replacing them with ICE vehicles. The TCO used in the financial savings accounts for the following, as applicable:

- Capital costs
- Charging infrastructure hardware costs
- Charging infrastructure installation costs
- Annual fuel costs
- Annual maintenance costs
- Potential EV or EVSE incentives or grants

For the cost-effective scenario there are 46 vehicles with EV equivalents that are not recommended for conversion, either due to already being an EV (8 existing BEVs), the currently available EV model does not meet the current ICE vehicle use-case (12 vehicles), or the TCO for the ICE vehicle being lower than any of the EV options' TCO (26 vehicles). Future EV model options or incentive program availability may open opportunities for these to be converted.

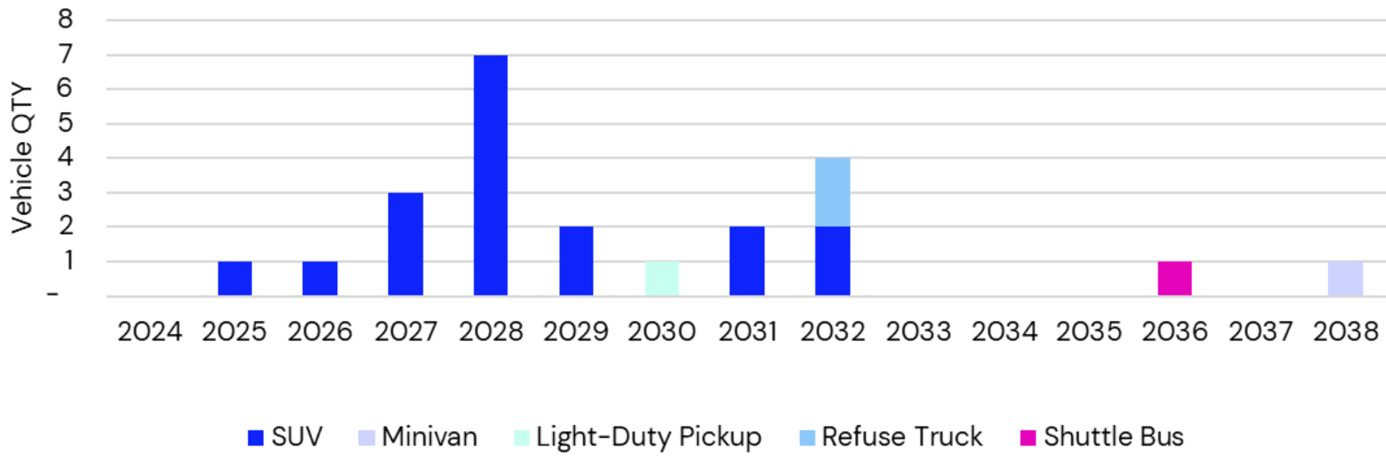
TABLE C. 14-Year Electrification Recommendations

Vehicle Type	Quantity Up for Retirement (in 14 Years)	Quantity Recommended to Convert to Electric	Recommended Make/ Model/ EV Type	Financial Savings (across 29 years)	GHG Emission Reductions (across 29 years, MT)	EVSE	
						L2	DCFC
SUV - Police	33	17	Ford/Mustang Mach-E Select AWD Standard Range (Police)/BEV	$78,907	819	17	-
		1	Tesla/Model Y Long Range (Police)/BEV	$16,808	96	1	-
Refuse Truck	4	2	Lion Electric/Lion6 Refuse/BEV	$90,968	1,254	-	2
Light-Duty Pickup	5	1	Ford/F-150 Lightning Pro SSV SR/BEV	$10,051	54	1	-
Shuttle Bus	1	1	Ford/E-Transit Cutaway/BEV	$24,710	18	1	-
Minivan	1	1	Canoo/Lifestyle Vehicle AWD – Premium/BEV	$7,375	88	1	-
Sedan	13	0	N/A	-	-	-	-
Medium-Duty Vocational Truck	5	0	N/A	-	-	-	-
Van	4	0	N/A	-	-	-	-
Heavy Truck	2	0	N/A	-	-	-	-
Street Sweeper	1	0	N/A	-	-	-	-
TOTAL	**69**	**23**		**$228,819**	**2,329**	**21**	**2**

EV Model Comparison

CITY OF TAKOMA PARK

CHART G. Recommended EV Replacement Timeline: Vehicle Types



EV Charging Infrastructure Assumptions Applied

About EV Charging Infrastructure

EVs require access to chargers, also known as Electric Vehicle Supply Equipment (EVSE). In a fleet application, the majority of charging is typically done at the fleet facility – overnight or between shifts. Facility-based charging can be supplemented with periodic charging at workplaces, idle locations, and public destinations as needed.

There are three types of EV chargers: Level 1, Level 2, and Direct Current (DC) Fast.

Level 1 chargers provide charging through a 120-volt (V) AC plug. A Level 1 charger plugs directly into a household outlet on one end, and into the vehicle's SAE J1772 charge port on the other end. Level 1 chargers are the slowest category of EVSE and provide 2 to 5 miles of range per hour of charging.

Level 2 chargers provide charging through 240 V or 208 V electrical service. Level 2 charging equipment is common for home, public, and workplace charging. The large majority of public chargers in the United States are Level 2. Level 2 chargers can operate at up to 80 Amperes (Amps) and 19.2 kilowatts (kW), and provide faster charging than Level 1 EVSE. Typically, a Level 2 charger provides 10 to 20 miles of range per hour of charging.

DC Fast chargers enable rapid charging through 208/480 V three-phase input. Installing DC Fast chargers may require infrastructure upgrades and these high-powered chargers cost significantly more than a Level 2 charger. DC Fast chargers will typically add 75-150 miles of range for every 30 minutes spent charging. The range of miles added depends on various factors, such the vehicle type and the DC Fast charger capacity. For example, the Chevrolet Bolt can add about 85 miles per 30 minutes charging and the Nissan LEAF PLUS can add about 150 miles per 30 minutes charging. A transit bus or heavy truck will be able to add 60-125 miles for every 30 minutes spent charging, depending on the capacity of the DC Fast charger.

Some EVs may have limited battery acceptance rates due to the capacity of their onboard chargers. If the EVSE is capable of delivering more power than the maximum acceptance rate of a vehicle's onboard charger, the car's charge rate will be limited to the maximum acceptance rate of the onboard charger. Charging an EV with a charger that has a higher kW rating than the onboard charger capacity will not damage the EV or the EVSE. In fact, purchasing a high-output charger helps future-proof EVSE investments so they are useful for years to come.

EV Charging Infrastructure Assumptions in Your Analysis

During Takoma Park's intake call, it was indicated that there are 2 private (fleet) chargers located at the Takoma Park Department of Public Works facility. It was also indicated that there are 3 public EV chargers at the Takoma Park's Community Center. The following EVSE recommendations do not account for the City's existing chargers.

Takoma Park will need a maximum of 2 DCFC and 21 Level 2 chargers to support the recommended 23 EVs. This conservatively assumes a one-to-one charger-to-vehicle ratio and does not account for any existing chargers at Takoma Park's fleet facilities. The determination of charger type (Level 2 versus DC Fast) and charger kW range is made based on battery size, range, mileage, number of shifts per day, and time charge between shifts and at night. All DC Fast charger recommended are for heavy-duty EV applications (e.g. refuse trucks). Your ICF Account Manager can also provide helpful resources on charging best practices.

Depending on the scheduled duty cycles of the vehicles, it may be possible to reduce the number of chargers by:

- Manipulating the duty cycles of the vehicles to allow for successive (non-overlapping) charging schedules;
- Identifying managed charging solutions to optimize charger use; and
- Garaging EVs together to allow for shared chargers.
- Leveraging publicly available EVSE, where appropriate
- Make use of opportunity charging when vehicles are stationary, but still in-use

While some fleets may require 1 or fewer chargers-per-vehicle, Takoma Park may want to consider purchasing additional vehicle chargers to maximize service reliability. The installation of additional EVSE at vehicle depots allows for greater room for error by engineering redundancy into fleet operations. Depending on the length of typical service routes, Takoma Park may also want to consider opportunity charging using on-route chargers. On-route chargers improve range, uptime, and service reliability by eliminating the need to return to a charging depot during the day and reducing total overnight charge time. The Utah Transit Authority (UTA) recently contracted with GILLIG to deploy 4 high-power on-route chargers that will service 44 electric transit buses.

The charger equipment and installation cost assumptions used for your analysis are highlighted in Table D:

TABLE D. Charger Equipment Cost Assumptions

Charging Level	Nameplate Demand (kW) Range	Hardware Cost	Installation Cost	Total
L2	4–6 kW	$500	$3,500	$4,000
L2	6–8 kW	$1,000	$3,500	$4,500
L2	8–11 kW	$1,500	$3,500	$5,000
L2	12–15 kW	$2,000	$3,500	$5,500
L2	15–19 kW	$2,500	$3,500	$6,000
DCFC	50 kW	$29,000	$28,070	$57,070
DCFC	150 kW	$50,000	$42,200	$92,200
DCFC	300 kW	$128,000	$61,560	$189,560

Note that these are estimates and do not consider any incentives (see below for more information). The model assumes that EVSE is non-networked. While non-networked chargers may have lower capital costs, networked chargers provide greater control of charging cycles and can result in lower electricity costs if charging at off-peak hours.

It may be possible to reduce the cost of EVSE hardware and installation, by:

- Mounting EVSE on the wall, rather than on a pedestal, to simplify the installation process;
- Purchasing a non-networked charger, rather than a networked charger, which will save on up-front costs and ongoing network, data and service fees;
- Purchasing multiple EVSE at once to capture volume discounts;
- Installing multiple EVSE at the same location to spread fixed electricity upgrade, EVSE installation, and maintenance costs across more chargers;
- Installing infrastructure with excess capacity to future-proof charging sites;
- Installing chargers during new construction to reduce design and installation costs; and

We strongly encourage Takoma Park to reach out to Pepco before installing any new charging infrastructure. Your Account Manager can also answer questions on charging best practices.

Site Assessment

Takoma Park will need a maximum of 2 DCFC and 21 Level 2 chargers to support the recommended 23 EVs. This will result in an estimated incremental 441 kW total power demand and 26,352 annual kWh across the 3 Takoma Park sites, summarized in Table E below. Due to high duty cycles for police vehicles, the take home police chargers identified or additional chargers if necessary may be installed at the Police Station. Depending on the scheduled duty cycles of the vehicles, it may be possible to reduce the number of chargers.

EV Model Comparison

CITY OF TAKOMA PARK

TABLE E. Site Load Impact Study

Site Name	Charger Type	Installed # Ports	Max Power Demand (kW)	Hardware Cost	Installation Cost	Make Ready Cost
Dept. of Public Works	L2 (12–15 kW)	1	15	$1,060	$1,856	$121,782
	DCFC (150 kW)	2	300	$64,461	$54,405	
Police Station	L2	0	0	–	–	–
	DCFC	0	0	–	–	
Take Home – Police Station	L2 (3–6 kW)	17	102	$6,420	$44,940	$61,309
	L2 (6–8 kW)	3	24	$2,211	$7,738	
Total		**23**	**441**	**$74,152**	**$108,939**	**$183,091**

Make Ready Costs

Make-Ready Upgrades

Make-Ready Upgrades entail infrastructure developments on both the customer-side and on the utility-side of the meter. Costs are variable based on the project size and scope, and information on the impacts of make ready costs are detailed here. Utility Side costs include any upgrades required between the Transmission Lines and your metered location. Utility Side costs may include extending power lines and upgrading transformers. The Customer Side costs include any upgrades to bring electricity from the electrical meter up to the customer's panel, where electricity is delivered to your site. These upgrades may entail upgrading electrical capacity of panels or circuit breakers, installing wiring under or overground, engineered site design, permitting, and labor costs. Remember to engage early and often with your utility.

Labor

Labor and Installation costs will vary by local electrician rates along with the amount of time required to complete the work. This analysis assumes a labor rate of $120-$150 per hour. Labor is separated by installation hours and non-installation hours, which include mounting, signage, protection, and restoration of the charger.

Material

Material costs include wiring and panel upgrades. The cost of conduit and cables will vary based on the distance from the charger to the electrical panel and by the size of the wire used. Electrical Panels, or circuit breakers, split the power that enters from the meter into multiple circuits, serving as a safety barrier. The capacity of the panel must be increased when adding significant new electrical load.

Trenching and Site Work

One of the largest cost impacts to a site upgrade project relates to the level of effort required to connect the new chargers to the electrical grid. To connect conduit, a site will likely require wiring above ground or below ground. If making an underground connection, trenching, or digging, will be required. Trenching costs are typically based on distance and type of ground surface. Asphalt or concrete is significantly more expensive to trench through than soil or grass. Wiring completed above ground is often the lowest cost option. Additionally, the distance between the charger and panel can greatly impact costs. The farther the charger is from the panel, the more conduit will be required to make a connection. Conduit and cables can cost up to $25 per linear foot required. To reduce costs, the university may consider locating chargers as close as possible to the panel, even if this is out of the way. Then, invest in good signage to direct users to the charging site.

Charging Options for Take Home Vehicles

There are 39 vehicles in Takoma Park's fleet that have been identified as take-home vehicles. Enabling take-home EVs to charge at home reduces the need for additional trips, decreases reliance on public chargers, improves uptime, and lessens the need for infrastructure investment at fleet facilities. The easiest way to charge an EV at a residence is by plugging the vehicle into a 120V wall outlet using the Level 1 charger that was purchased with the vehicle. Level 2 chargers are also popular for home charging but rely on a 240V outlet and require the purchase and installation of Level 2 charging hardware.

The City has options on how to approach take home vehicles. In some cases, it may make sense to pay for chargers at the home of the employee. In cases where this isn't feasible, the City can consider a central charging hub where personal vehicles can park, and take-home vehicles can charge. In cases where the duty cycle of the take home vehicle is not cohesive with a charging hub approach, then that vehicle may not be a good candidate for electrification.

If Takoma Park plans to reimburse employees for home charging, the cost of electricity used to charge the vehicle is easy to calculate. Vehicle telematic data that quantifies total energy usage is available through the vehicle manufacturer's smartphone application or the vehicle's dashboard. To calculate the cost of home charging, multiply the amount of energy used to charge the EV by the price of electricity.

Alternative Charger Procurement Options

During the intake call, Takoma Park expressed concern over their budget for procuring BEVs. Takoma Park may want to consider alternative charger procurement options, such as Charging-as-a-Service (CaaS). CaaS programs reduce the up-front cost of EV adoption through turnkey EVSE solutions that can include EVSE hardware, software, maintenance, and support. CaaS shifts the capital risk away from the City by bundling up-front, operational, and energy costs into a fixed rate, resulting in predictable costs. CaaS also addresses operational concerns by providing ongoing support for EVSE maintenance and upgrades, resulting in reliable chargers that are ready to support current and future EVs. Commercially available CaaS programs are offered by Electrada, AMPLY Power, and ChargePoint.

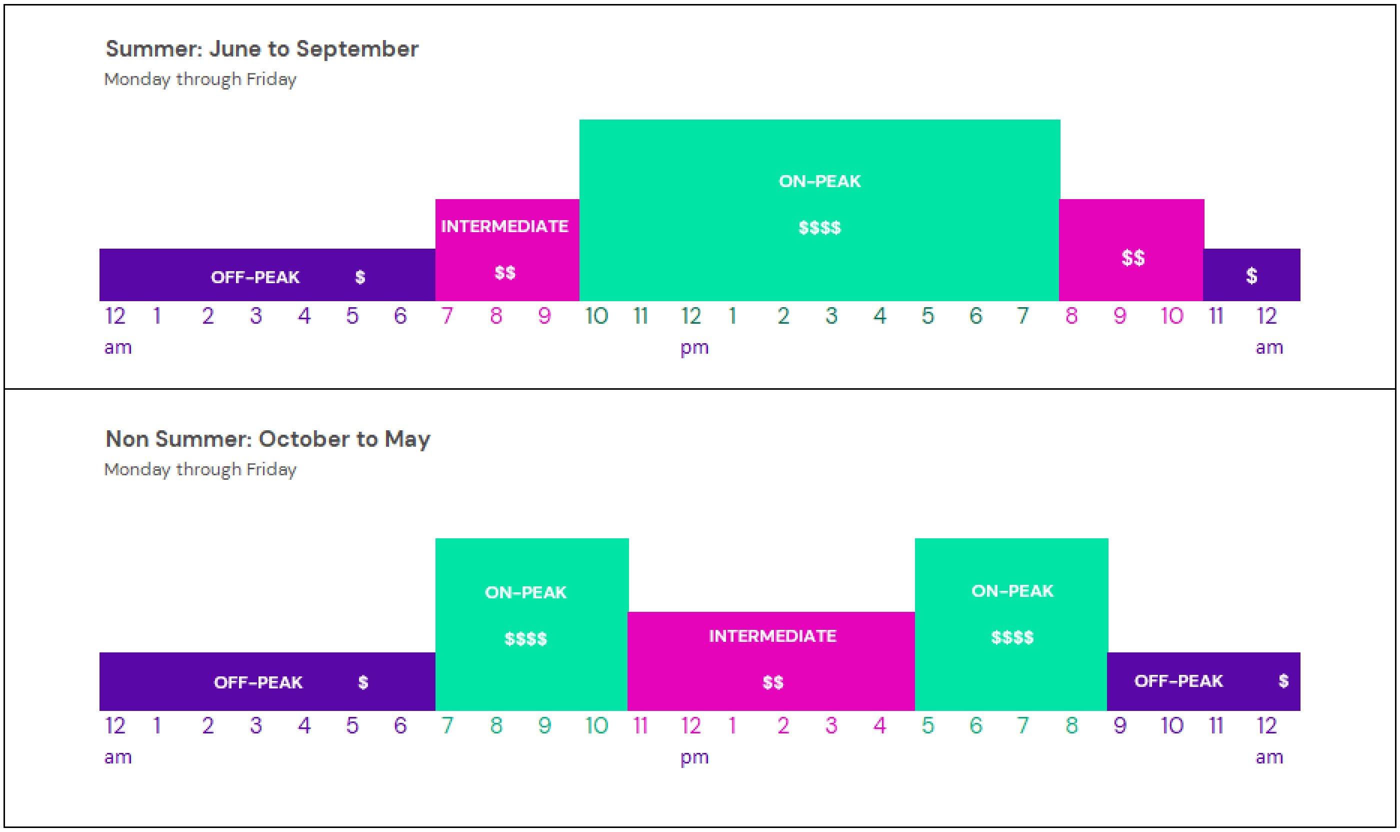
Mobile charging is a portable charging solution that delivers high-speed charging to EVs, independent of the grid, when they are unable to charge at a base site or charging depot. Mobile chargers improve resiliency by adding a layer of protection against blackouts, brownouts, natural disasters. Portable chargers can potentially save money, time, and space because they do not require permanent hardware installation. Mobile chargers are ideal for on-demand off-site charging needs, such as construction and emergency response vehicles, or for temporary charging needs, such as short-term building leases. SparkCharge's Roadie is an example of a commercially available portable charger that provides flexible DC fast charging at any location using a compact modular battery stack.

Managed Charging

Managed charging entails optimizing vehicle charging schedules to save money and reduce peak load impact on the electrical grid. It can be implemented through "smart" equipment and through human planning. By scheduling charges to occur during off-peak hours or enrolling in a service plan with rating periods, a fleet can lower their electricity charges. On-peak hours describe hours with high electricity use and are associated with higher costs, while intermediate and off-peak hours are associated with lower electricity demand and lower costs. The strategies below provide guidance on how to maximize off-peak charging to save money.

- **Off-peak charging:** A fleet may enroll in a service plan that charges higher rates for energy used during on-peak hours and lower rates for energy used during off-peak hours. Peak hours are defined seasonally, as shown in Chart H. At Pepco, fleets are enrolled in the General Service Small (GS) or General Service Large (GL) schedule and maximize the amount of time spent charging during off-peak hours by planning vehicles routes and charging schedules. Additionally, for take-home vehicles that charge on a residential rate, customers can enroll in Pepco's Residential Time of Use (TOU) Rate schedule to benefit from off-peak charging rates.
- **Smart Chargers:** Networked chargers, or smart chargers, use cloud-based software to communicate information between charger, vehicle, and a smart device (i.e. iPhone). Using the software, users can plug in a vehicle and control when charging occurs. Unique to each charging manufacturer and their software, users may set specific hours to charge, regulate the frequency and voltage dispensed, and maximize off-peak charging with the ease of a smart application.

CHART H. Pepco On-Peak and Off-Peak Hours for Commercial Rates (GS/GL)[2]



Vehicle-to-Grid (V2G) Charging

Vehicle-to-grid (V2G) charging is the bi-directional flow of energy and data between an EV and the grid. V2G strengthens resilience by enabling EVs to be used as energy storage assets that provide on-demand back-up power to a building or to the grid. V2G can also help users optimize energy consumption by charging only when energy rates are low and exporting stored power back to the grid only when energy rates are high. A bidirectional charger is required for V2G capability. It relies on the presence of an AC current in the vehicle's battery to reverse the direction of charge. Only CHAdeMO charger adapters currently support bi-directional charging, but V2G-capable CCS charger adapters are in development now and expected to be available to consumers by 2025. Most V2G projects are still in pilot stages, such as the school bus pilot in Beverly, MA.

V2X refers to the applications that EVs batteries can support for purposes other than powering the car. It is a is a collective term for referring to capabilities such as V2G, vehicle-to-home, and vehicle-to-vehicle. As an example of

[2] Excludes weekends and holidays, which are billed at the off-peak rates. Holidays include New Year's Day, President's Day, Good Friday, Memorial Day, Independence Day, Thanksgiving, Christmas and the following Monday if any of these holidays fall on a Sunday. Rates are subject to change throughout the duration of the pilot with approval of the Maryland Public Service Commission.

vehicle-to-vehicle capabilities, the Hyundai Ioniq 5 EV can charge other EVs using its battery. If you are interested in learning more about V2G and V2X, refer to a recent report from the U.S. Department of Transportation Federal Highway Administration and reach out to your Account Manager to discuss opportunities for your fleet.

Electric Rate Analysis

The ICE and EV TCO comparison used Pepco's General Service Small/Large (GS/GL) rate to calculate incremental electricity bills. The GS/GL rate is a Time of Use rate, and our rate analysis identified this rate as the most cost-effective rate option to support the recommended 23 EVs at Takoma Park's sites. The rate analysis also compared this rate against Pepco's fixed General Service rate. Chart I below summarizes the fleet annual fuel costs across each rate, and Chart J summarizes the cumulative fuel costs across each scenario over time.

CHART I. Rate Analysis Fleet Annual Fuel Cost Comparison

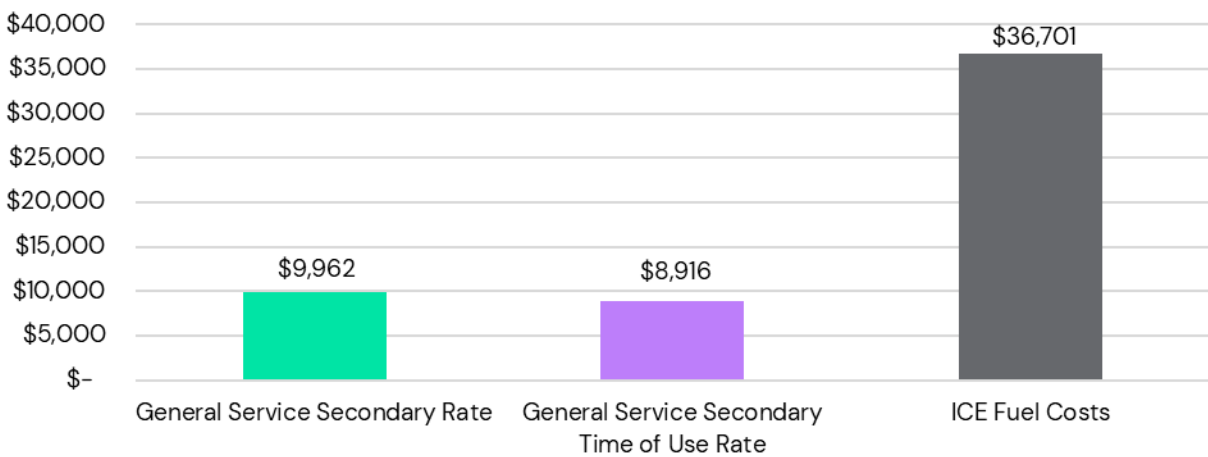
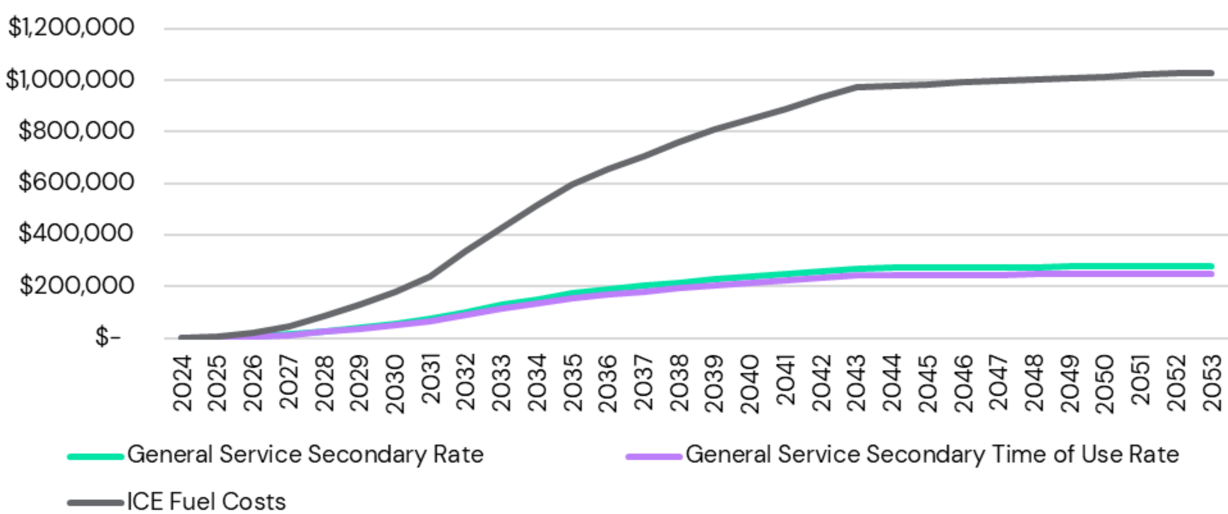


CHART J. Rate Analysis Fleet Cumulative Fuel Cost Comparison



EV Model Comparison

CITY OF TAKOMA PARK

Incentives and Funding Source Assumptions Applied

Incentives are available for the purchase of EVs and EVSE. Table F summarizes the incentives included in your fleet analysis, as well as additional information about how to capitalize on these incentives. Incentives in the analysis are capped at 100% of the vehicle capital and EVSE costs, so the table identifies how the incentives were prioritized and specifically applied through the TCO analysis.

TABLE F. Incentive and Funding Sources

Program	Light Duty	Medium Duty	Heavy Duty	Administrator	Vehicle Costs	EVSE Installation	EVSE Hardware	Program Offerings	Upcoming Deadlines	TCO Funding Assumptions
Commercial Clean Vehicle Credit[3]	✓	✓	✓	IRS	✓			Tax credit amount is equal to the lesser of the following amounts: 15% (PHEV) or 30% (BEV/FCEV) of the vehicle purchase price; Incremental vehicle cost compared to equivalent internal combustion engine vehicle	2032	Tax credit between 15%-30% dependent upon PHEV, BEV, or FCEV or incremental cost
EVsmart Commercial Customer Charger Rebate				Pepco		✓	✓	Receive a rebate of up to 50% the cost of the charger, warranty, and installation. Up to $5,000 per L2 port and $15,000 per DCFC.[10]	700 rebates available on first come first serve basis.	Not applied in this analysis, but fleet may be eligible. Reach out to utility to learn more.
Make Ready Program				Pepco		✓		90% of site customer-side infrastructure costs up to $15,000 per site.	700 rebates available on first come first serve basis.	Not applied in this analysis, but fleet may be eligible. Reach out to utility to learn more.

Tax Credits for Electric Vehicles and Charging Equipment

The Internal Revenue Service (IRS) offers several tax credits to eligible entities procuring electric vehicles and charging equipment. Below are details on credits that may be relevant to your fleet. These summaries are not formal IRS guidance, so they may not be relied upon by taxpayers to substantiate a tax return position. This information does not reflect the application of the law to a specific taxpayer's situation, and the applicable Internal Revenue Code provisions ultimately control. Individuals or entities looking to claim the tax credits may wish to consult with a tax professional, accountant, or attorney on questions regarding eligibility.

[3] Vehicles with a gross vehicle weight rating (GVWR) below 14,000 pounds (lbs.) must have a battery capacity of at least seven kilowatt-hours (kWh) and vehicles with a GVWR above 14,000 lbs. must have a battery capacity of at least 15 kWh. Vehicles must also be made by a qualified manufacturer. Many of these manufacturers are within the US or the US-subsidiary of an international brand.

EV Model Comparison

CITY OF TAKOMA PARK

The Commercial Clean Vehicle Credit offers a tax credit for businesses and tax-exempt organizations that purchase qualified commercial clean vehicles. Qualifying vehicles include plug-in electric vehicles and fuel cell motor vehicles (FCEV). Purchased commercial clean vehicles are eligible for a tax credit amount equal to whichever is less: 15% of the vehicle purchase price for a PHEV, 30% of the vehicle purchase price for a BEV/FCEV, or 100% of the incremental cost to purchase an EV over the alternative ICE vehicle. Vehicles with gross vehicle weight ratings (GVWRs) below 14,000 pounds are capped at $7,500 while those with GVWRs greater than this can receive a credit up to $40,000. There is no restriction on the quantity of credits that businesses may claim. For businesses, the credits are nonrefundable, so you can't get back more on the credit than you owe in taxes.[4]

Another credit that may be relevant for Takoma Park's fleet is the Alternative Fuel Vehicle Refueling Property Credit. For businesses and individuals that place qualified refueling property into service during the tax year, the credit for qualified refueling property subject to depreciation equals 6% with a maximum credit of $100,000 for each single item of property. This credit applies only to specific census tracts, and "property" refers to vehicle charging equipment. To help you determine if your installation location is in an eligible census tract, visit the 30C Tax Credit Eligibility Locator page and mapping tool from Argonne National Laboratory.

Thanks to the Inflation Reduction Act's "elective pay" (also known as "direct pay") provisions, tax-exempt and governmental entities are able to receive a payment equal to the full value of tax credits for qualifying projects. Direct pay allows entities to get their payment if they meet the requirements for both direct pay and the underlying tax credit. Eligible tax-exempt entities include state, local, and territorial governments, tribal and native entities, and other qualifying tax-exempt organizations. The Commercial Clean Vehicles Credit and the Alternative fuel Vehicle Refueling Property Credit are both eligible for elective pay.[5] Visit the White House site on direct pay to learn more and follow the steps listed to apply. For additional information about elective pay for these credits, refer to this overview provided by the IRS for more details: IRS Elective Pay Overview.

EV Model Comparison

There are over 600 EV models in our EV library that were assessed across your fleet's vehicle types and range requirements to compare TCOs and recommend replacement models. While our EV acquisition recommendations are based on the model with the lowest TCO available that fits your fleet's needs, there may be additional EV models within the same price range. Chart K through Chart S highlight the lowest TCOs for each vehicle type within your fleet except Medium-Duty Pickups due to no comparable EVs in the market today. This analysis is for 1 vehicle for each vehicle type, uses Takoma Park's average annual mileage and miles driven per day by vehicle type, and assumes a typical vehicle life. This simple comparison across EV model types does not include any charging infrastructure costs or apply any potential grants or incentives for EVs.

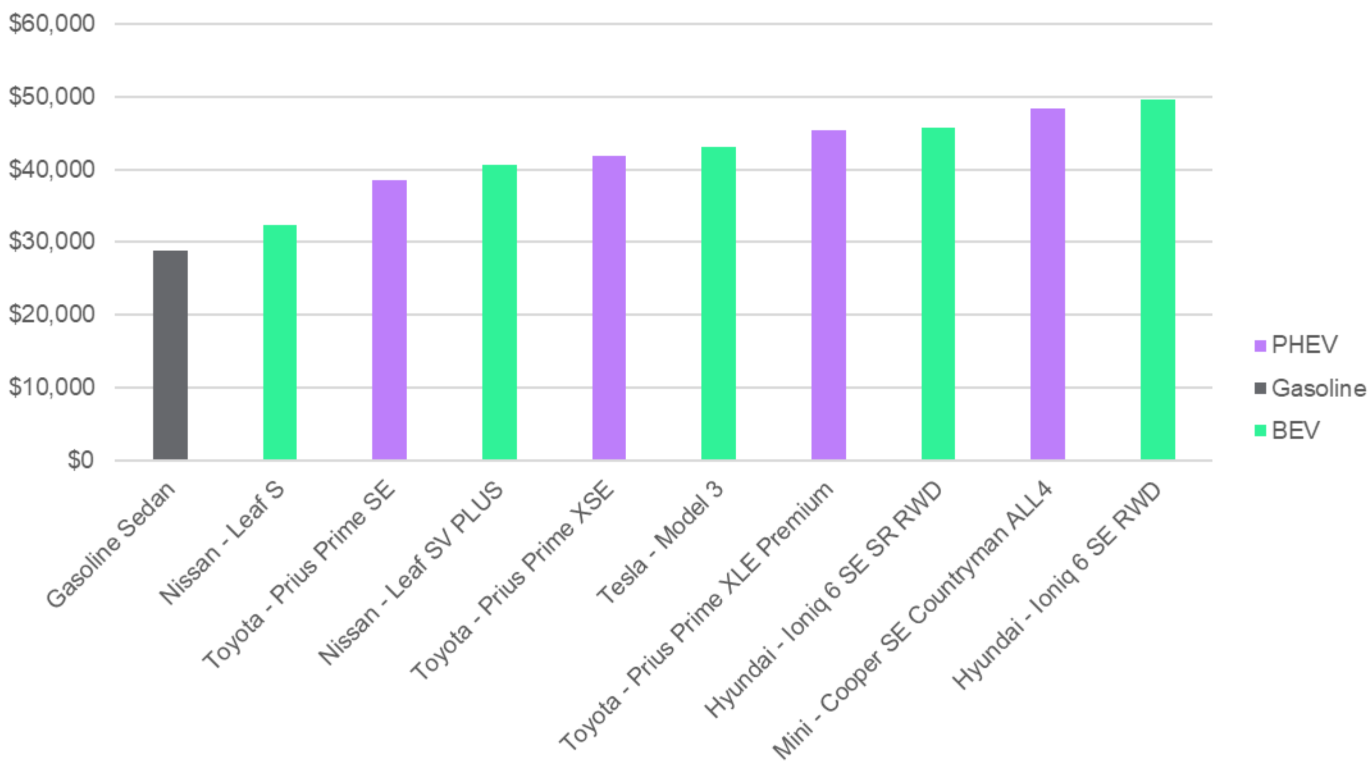
[4] Vehicles with a GVWR below 14,000 lbs. must have a battery capacity of at least seven kilowatt-hours (kWh) and vehicles with a GVWR above 14,000 lbs. must have a battery capacity of at least 15 kWh. Vehicles must also be made by a qualified manufacturer. Many of these manufacturers are within the US or the US-subsidiary of an international brand.

[5] For a list of all clean energy tax credits eligible for elective pay, please visit this IRS publication.

EV Model Comparison

CITY OF TAKOMA PARK

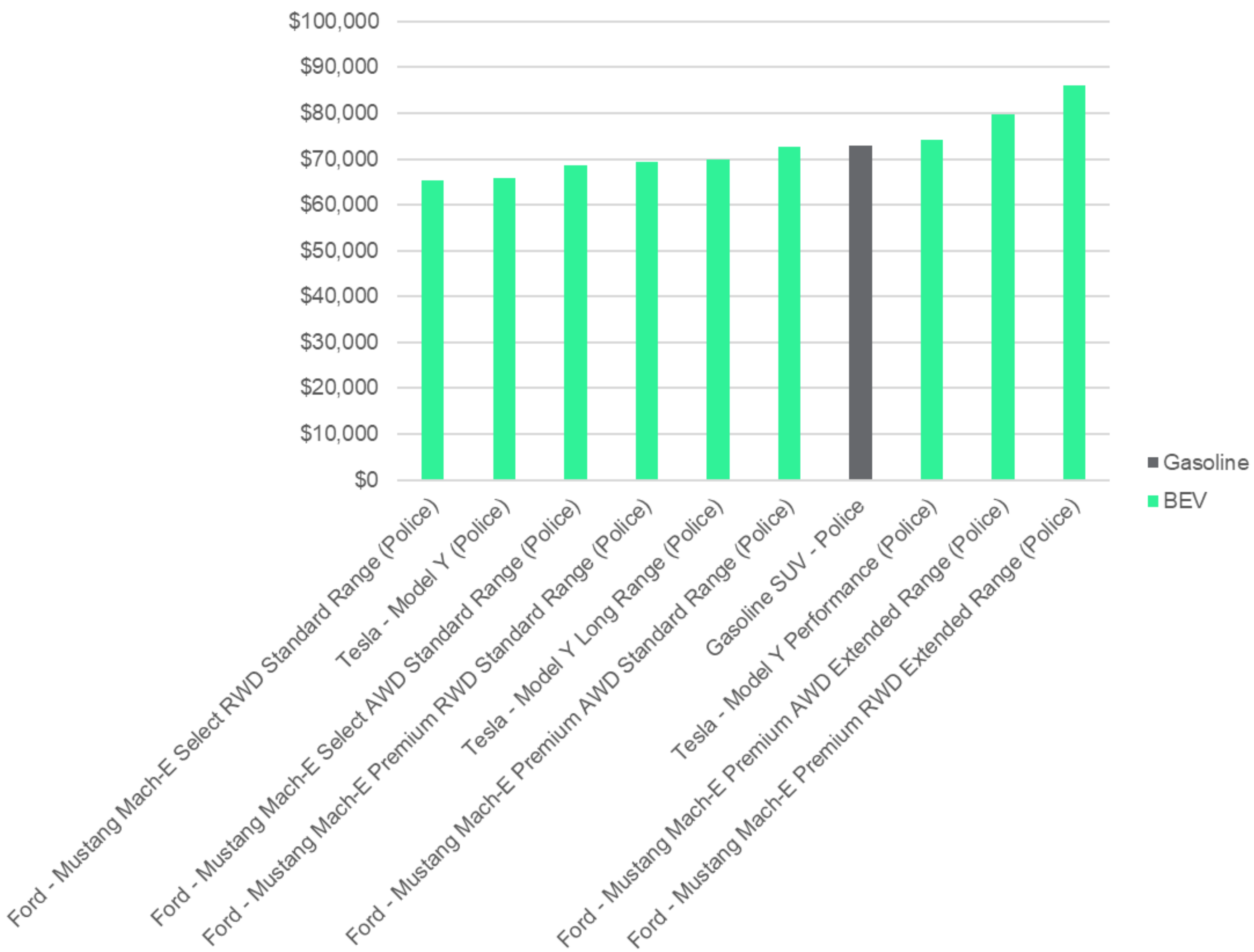
CHART K. Sedan EV Model TCO Comparison



EV Model Comparison

CITY OF TAKOMA PARK

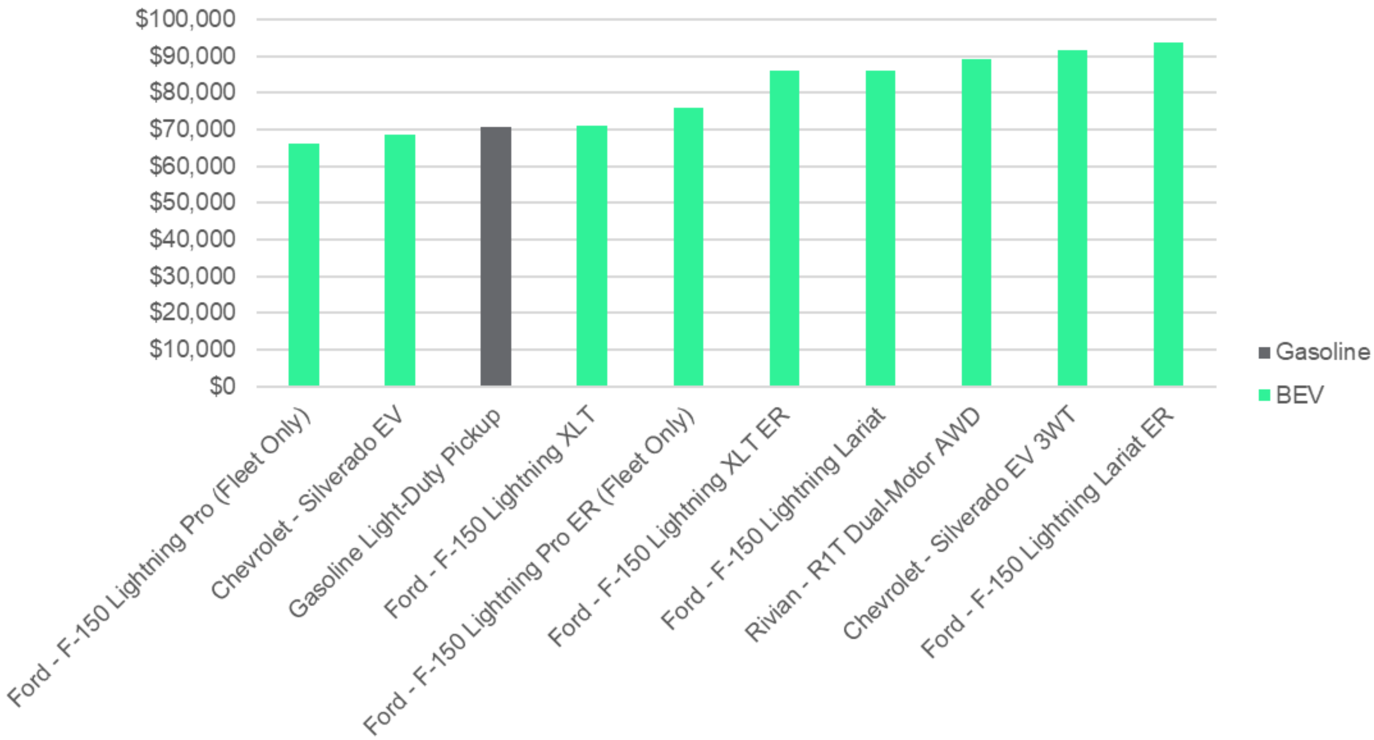
CHART L. SUV-Police EV Model TCO Comparison



EV Model Comparison

CITY OF TAKOMA PARK

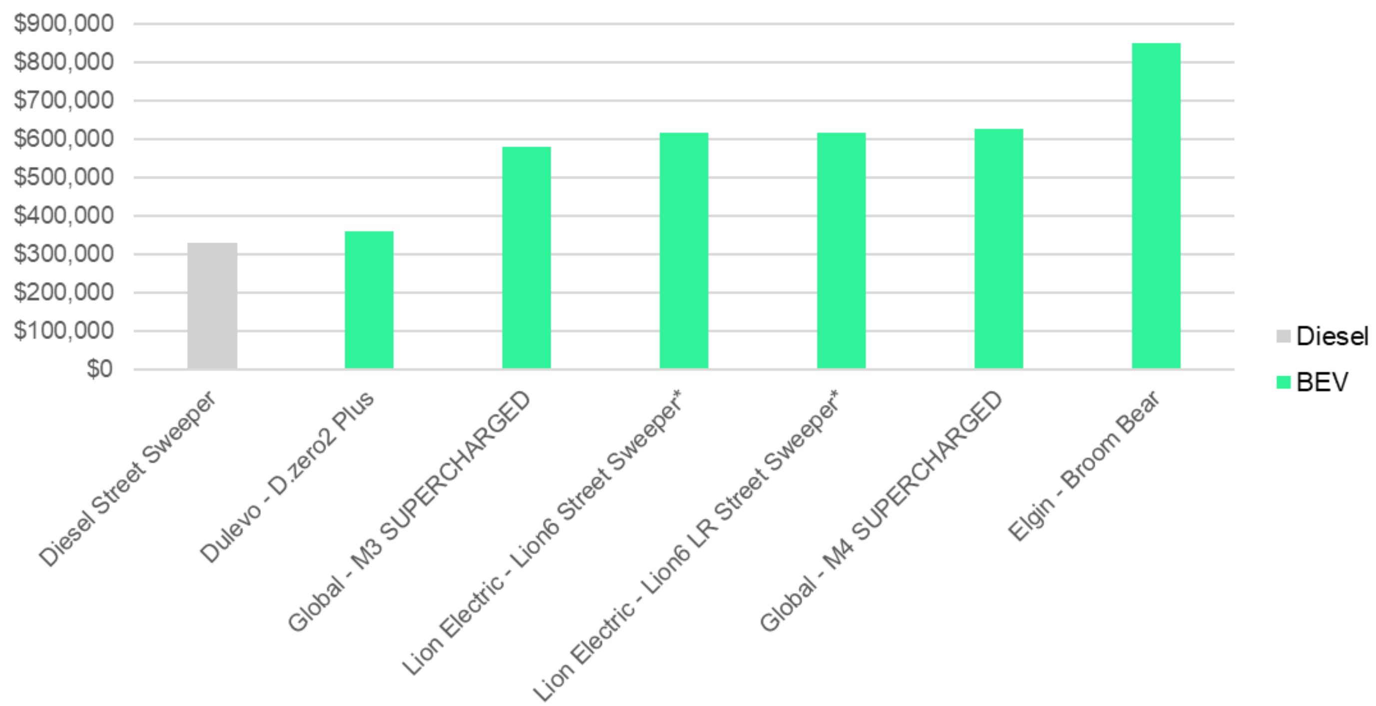
CHART M. Light-Duty Pickup EV Model TCO Comparison



EV Model Comparison

CITY OF TAKOMA PARK

CHART N. Street Sweeper Pickup EV Model TCO Comparison



*Actual MSRP unavailable. Price assumptions are outlined in the Key Assumptions section of this report.

EV Model Comparison

CITY OF TAKOMA PARK

CHART O. Van EV Model TCO Comparison

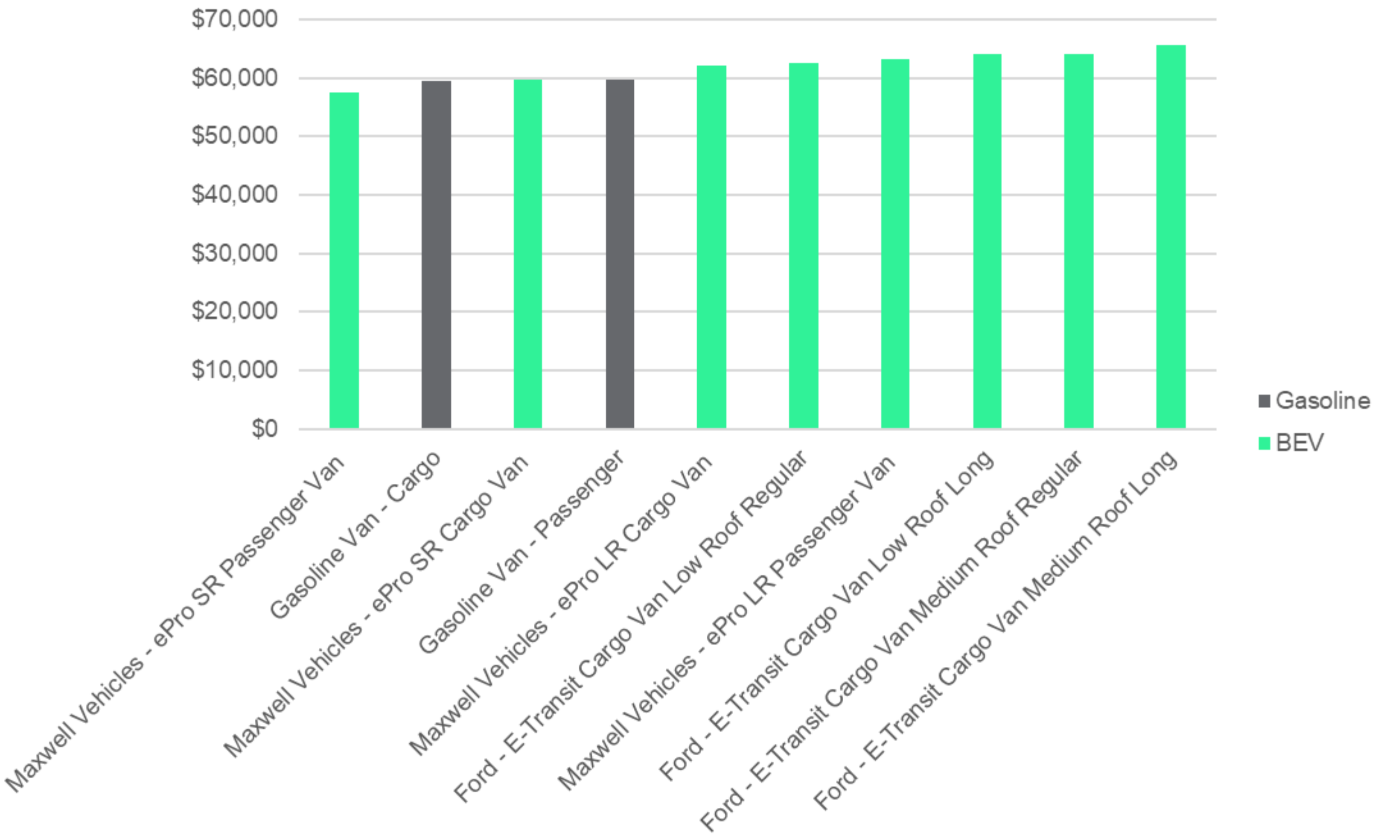
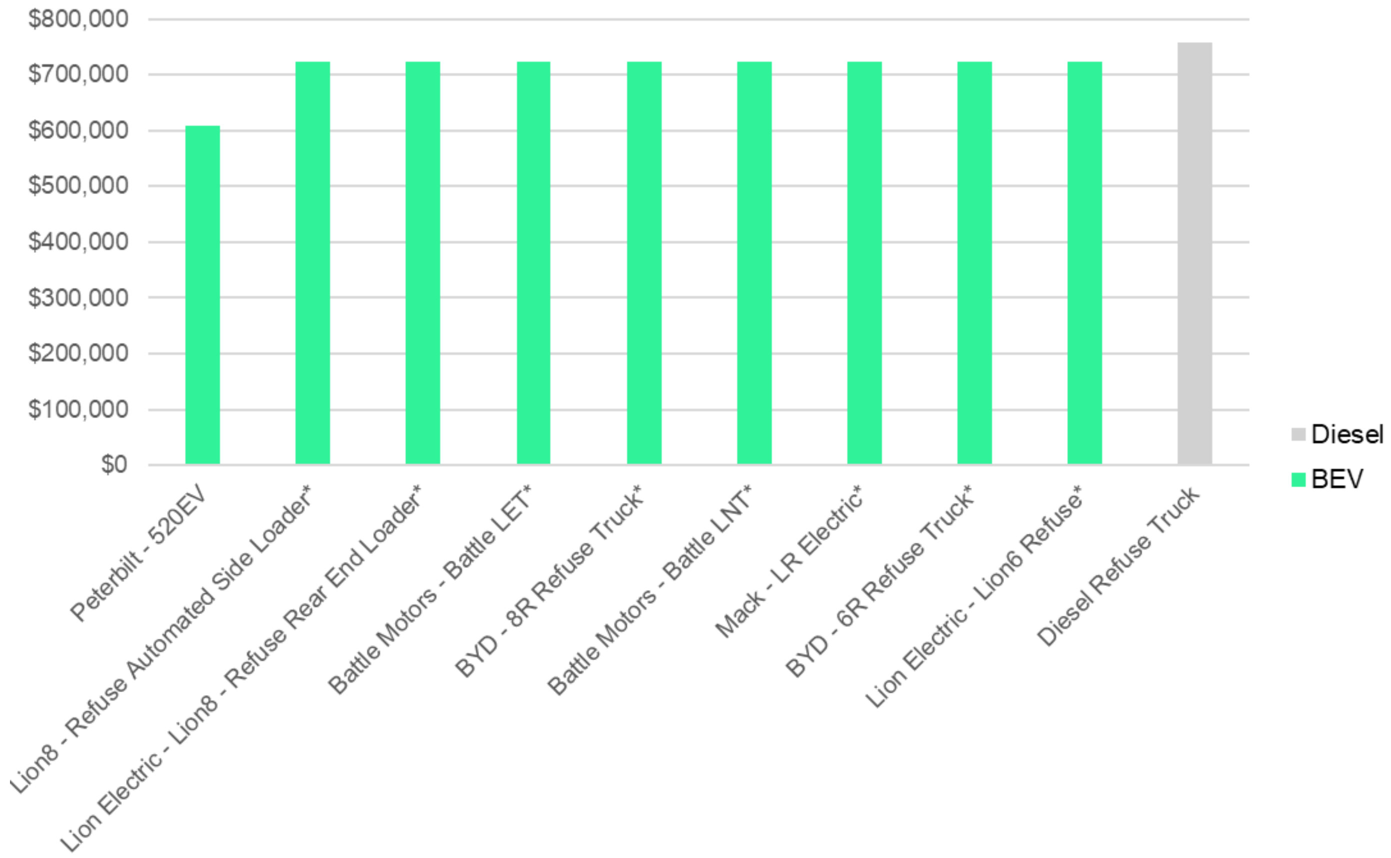


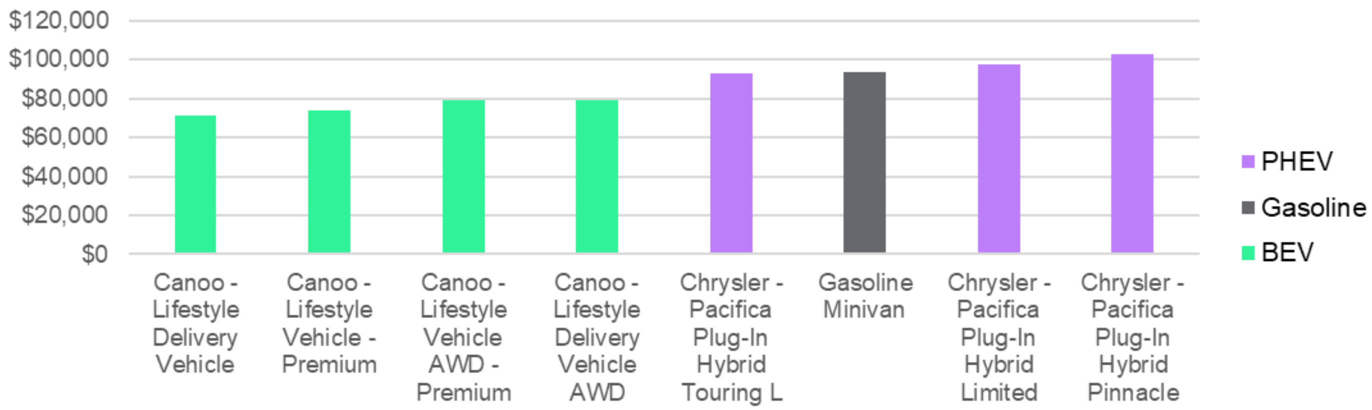
CHART P. Refuse Truck EV Model TCO Comparison

This total cost of ownership includes, capital cost +….



*Actual MSRP unavailable. Price assumptions are outlined in the Key Assumptions section of this report.

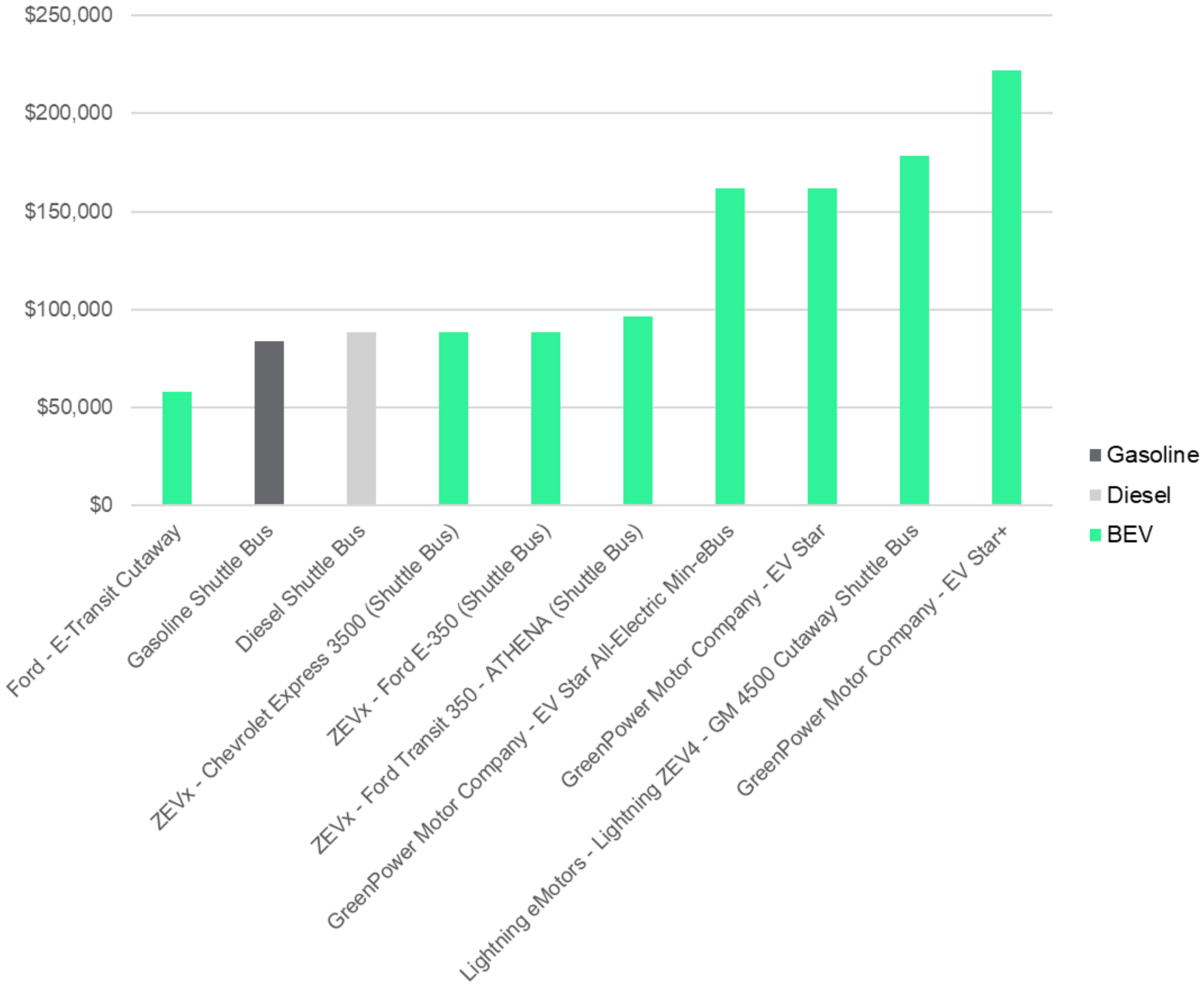
CHART Q. Minivan EV Model TCO Comparison



EV Model Comparison

CITY OF TAKOMA PARK

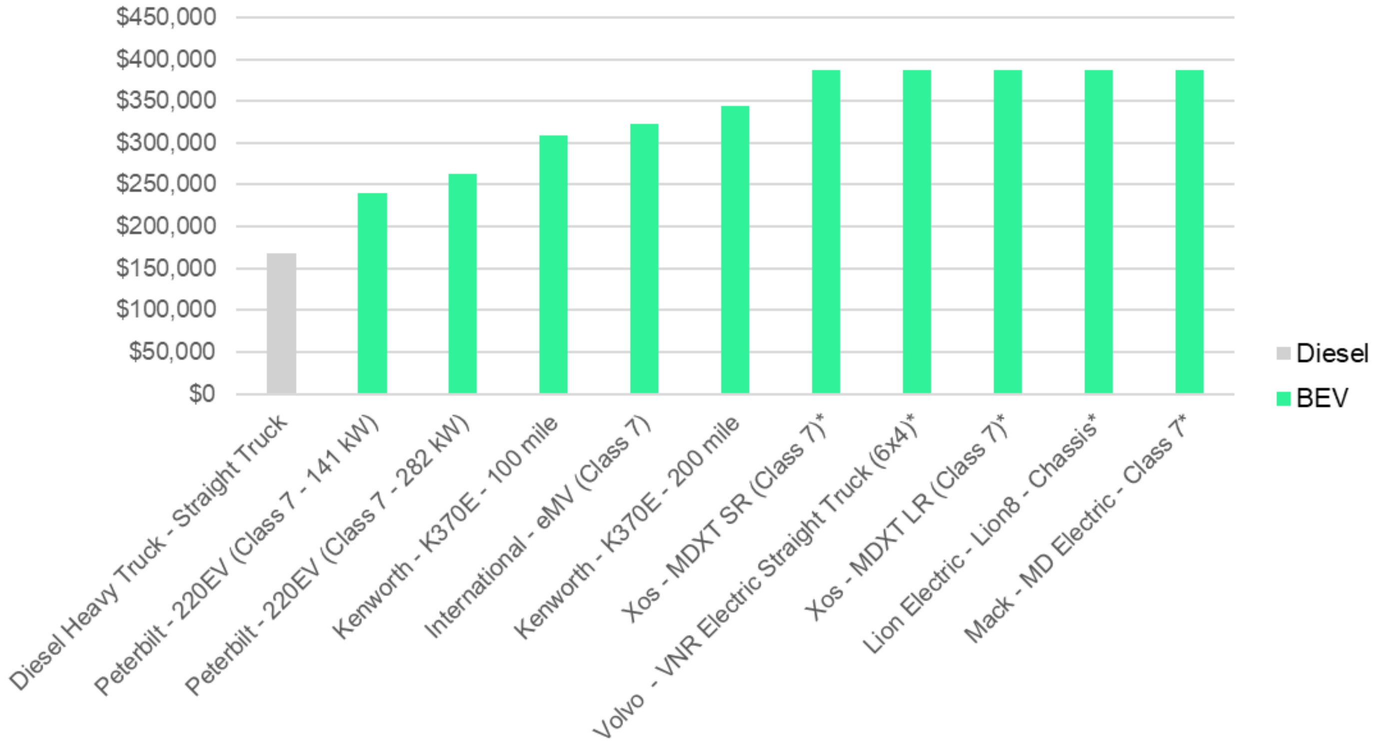
CHART R. Shuttle Bus EV Model TCO Comparison



EV Model Comparison

CITY OF TAKOMA PARK

CHART S. Heavy Truck EV Model TCO Comparison



*Actual MSRP unavailable. Price assumptions are outlined in the Key Assumptions section of this report.

Electric Police Patrol Vehicles

Currently, only six EV models, including one pickup truck, three sedans and two SUVs, are being used as police patrol vehicles in a handful of police fleets in the United States. The Chevrolet Blazer EV PVV is expected to be available in 2024. These models have been considered in Takoma Park's fleet analysis, and additional models will be added as more EVs are piloted for police use. Additionally, the Hyundai Kona Electric SUV is being piloted by some police fleets in Europe, and will be included in future analyses if deemed suitable for Takoma Park's police fleet. The Ford Mustang Mach-E SUV models have passed police pursuit testing. While the Chevrolet Blazer is anticipated to meet pursuit qualifications, official testing results have not yet been released. Police pursuit vehicles (PPVs) are equipped for high-speed response calls, while police patrol vehicles serve administrative or general patrol purposes. The police models that are available now, or will be available in the near future, are listed below.

- Chevrolet Bolt (sedan)
- Tesla Model 3 (sedan)
- Tesla Model S (sedan)
- Ford Mustang Mach-E (SUV)
- Tesla Model Y (SUV)
- Chevrolet Blazer EV PPV (SUV)
- Ford F-150 Lightning Pro SSV (Light-Duty Pickup)

Many police fleets in the U.S. have expressed satisfaction in the performance of their electric vehicles. The City expressed questions about the cost of upfits for police vehicles. Research and information is limited, but in some cases can be a 100% increase in upfitting costs[6]. Some additional research and case studies are listed below:

- **Hyattsville, MD Police Fleet Electrification**:
  - Alternative Fuels Data Center
  - This case study highlights the use of electric vehicles by the Hyattsville Police Department in Maryland, showcasing their efforts to incorporate all-electric cars and motorcycles into their fleet
- **Fit to Serve: Weighing Outsourced and In-House Police Vehicle Upfitting**:
  - Government Fleet
  - This article discusses the considerations for police departments when deciding between outsourcing vehicle upfitting or handling it in-house, including cost, efficiency, and specific needs
- **Electrifying Police Fleets: The Basics**:
  - Government Fleet
  - This resource provides an overview of the initial steps and considerations for police departments looking to transition to electric vehicles, emphasizing the importance of buy-in from all stakeholders
- **Are Electric Patrol Vehicles Ready for Duty?**:
  - Police Magazine
  - This article examines the readiness of electric vehicles for patrol duties, featuring insights from the Avondale Police Department in Atlanta, GA, and the New York Police Department

[6] The Pros and Cons of Electrifying Your Fleet

Used Vehicles

Sales of EVs increased rapidly toward the end of the last decade, and as such, used EVs are becoming available for fleet purchase. Used vehicles have not been included in this analysis but may be a cost-effective option for purchase. Considerations of battery life and quality, range, and maintenance that accompanied the first generation of new EVs are pertinent. However, due to regenerative braking, EVs typically have less wear and tear on the drivetrain and therefore are a good fit to extend the vehicle lifespan. Batteries are generally expected to last upwards of 10 years, with newer models capable of longer lifetimes. On average, EV battery degradation is about 2% per year.

According to the World Resources Institute, 80% of all new EVs that are leased enter the used vehicle market just a few years later at a much lower price, under 40,000 miles, and only halfway through their warranties (EV manufacturers' warranties typically cover 8 years, or 100,000 miles). Additionally, with fewer moving parts, EVs require little maintenance in comparison to ICE vehicles, further factoring into a positive investment. For further information on used EV availability and pricing, see the Recurrent Used Electric Car Prices & Market Report.

Sample SUV-Police Financial Analysis

Table G provides a sample TCO comparison for a single, purchased SUV – Police excluding any state or federal incentives. This analysis uses a 8-year vehicle life and 14,817 annual miles assumption, based on the average annual mileage for SUVs within your fleet.

TABLE G. SUV-Police TCO Comparison

	Gasoline	BEV (Ford Mustang Mach-E)[7]
Capital Cost	$29,800	$45,995
Charging Infrastructure Hardware (L2)	N/A	$2,000
Charging Infrastructure Installation	N/A	$3,500
Annual Fuel/Energy Costs	$1,760	$737
Annual Maintenance Costs	$3,541	$2,233
8-Year Total Costs[8]	**$62,643**	**$68,234**

Charts T and U provide a visual representation of the annual and cumulative cost comparisons across a gasoline and BEV SUV-Police. Lower operational costs result in lower annual TCO costs for the BEV option, however without utilizing incentives the BEV option results in a higher total TCO cost compared to the ICE option.

[7]Information about incentives applied here, EVSE incentives. EV capital and infrastructure costs shown in table does not have incentives applied.

[8] NPV assumes a 5% discount rate.

CHART T SUV-Police 8-Year Annual Cost Comparison

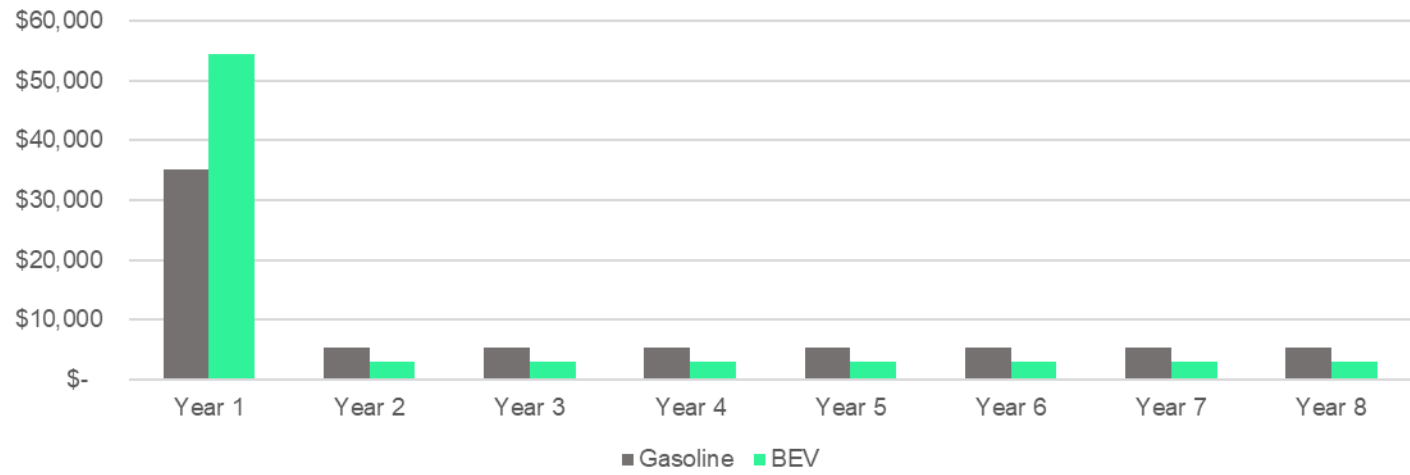
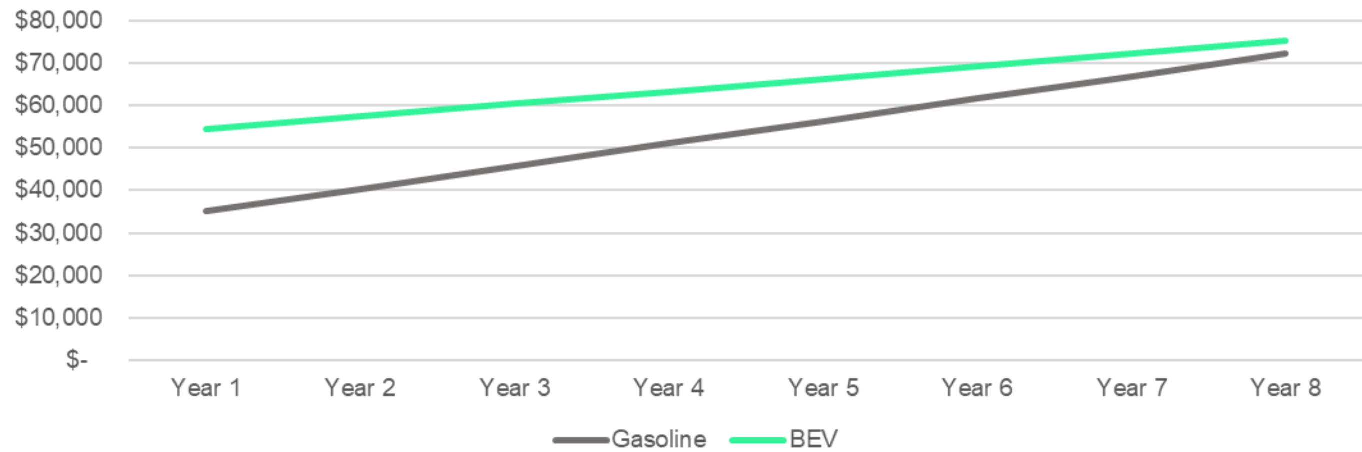


CHART U SUV-Police 8-Year Cumulative Cost Comparison



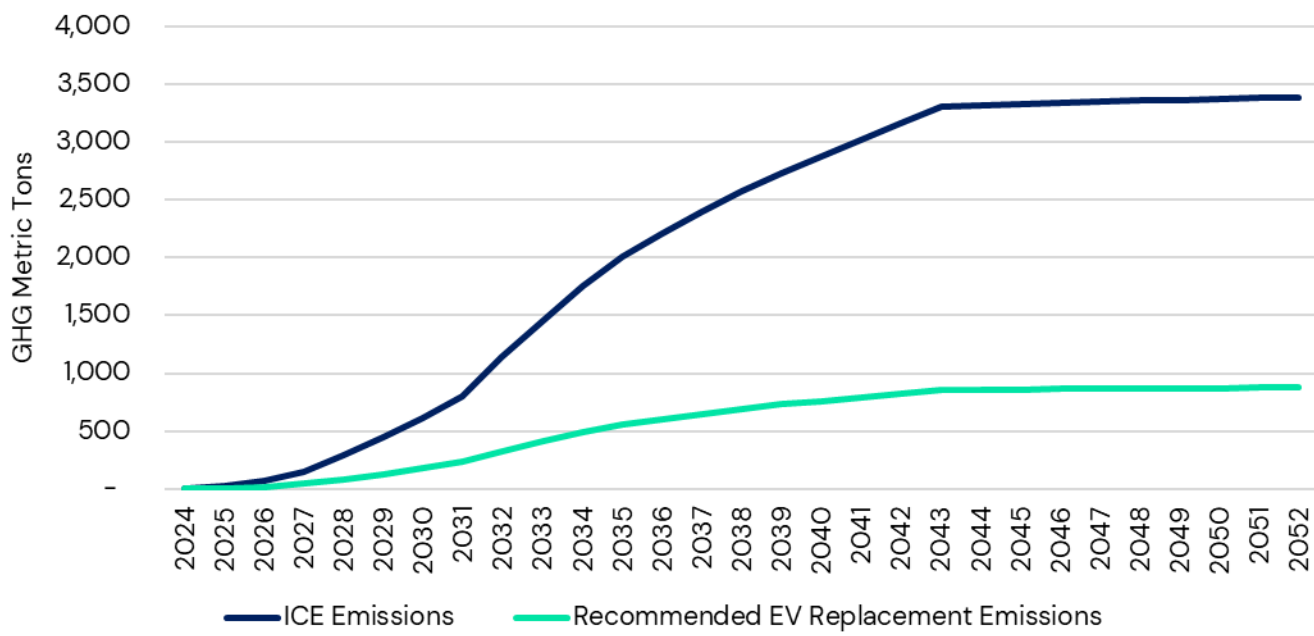
Fleet Environmental Impact Analysis

CITY OF TAKOMA PARK

Fleet Environmental Impact Analysis

By converting the 23 recommended vehicles to EVs, you could reduce GHG emissions by 2,512 MT and NOx emissions by 1,511 pounds (lbs) over 29 years. Chart V below illustrates the cumulative GHG emissions for ICE replacements compared to EV replacements. The GHG emissions included in this analysis account for both tailpipe and source (fuel production) emissions, while the NOx emissions account for only tailpipe emission reductions.

CHART. V Cumulative Fleet Green House Gas Emissions



2,329 GHG Emission Reductions (MT over 29 years)

503 Equivalent to removing passenger vehicles from the road for one year

1,428 NOx Emission Reductions (Lbs. over 29 years)

38,432 Equivalent to tree seedlings grown for 10 years

Non-Road Equipment

There are 3 vehicles in Takoma Park's fleet identified as non-road equipment. Of these vehicle types, backhoes were identified as having electric equivalents options. Electric non-road equipment could help Takoma Park further reduce fuel costs, maintenance costs, and site emissions.

Backhoes

Takoma Park currently owns 1 backhoe. While a relatively new technology, there are a few electric backhoe models available through CASE, Volvo, John Deere, and MultiOne. Capital costs for electric backhoes can be up to 2-3 times the cost of a diesel backhoe, so they do not always make financial sense for conversion. However, electric backhoes backhoes can help reduce operational costs, noise, and emissions. The CASE 580 Backhoe is starting to be adopted in the construction industry. More information is available here: Case launches industry first 580EV electric backhoe loader.

Loaders

Takoma Park currently owns 2 loaders: one John Deere wheel loader and one Bobcat skid steer loader. Wheel loaders are larger and heavier, capable of handling large loads, while skid steers are more compact and versatile in tight spaces. There are several all-electric loaders commercially available, which are primarily compact and mid-size models best suited to replace the skid steer. There are limited models with specifications comparable to the large wheel loader in Takoma Park fleet. However, Volvo is currently developing a hybrid wheel loader (LX1 Hybrid) more comparable to the full-size loaders in Takoma Park's fleet. The Volvo LX1 Hybrid has been shown to reduce fuel usage by up to 50% in real world testing, but there is no timeline for when it will be commercially available. While electric loaders were not considered in this analysis, there are a handful of electric loaders that are commercially available. Commercially available electric loaders are:

- Volvo L25 Electric
- Avant Techno e5
- Kramer 5055e
- Wacker Neuson WL20e
- Schaeffer 24e

Next Steps

CITY OF TAKOMA PARK

Next Steps

- [ ] **Get Support.**
  Have questions about this report? Contact your Account Manager to discuss challenges and answer questions.

- [ ] **Explore Resources for Electrifying.**
  Visit the Pepco EVsmart webpage to find resources about available incentives, trainings, news and updates, and more.

- [ ] **Move Forward with Electrifying Your Fleet.**
  Circulate the findings of this report with key stakeholders in your organization. Contact your Account Manager for additional support in preparing to present these findings.

The EVsmart website has the tools you need to succeed.

Visit the webpage and you can:

- Explore funding opportunities
- Find eligible EV Chargers and Network Providers
- Find information about EV and EVSE operation and maintenance
- Learn about the Pepco Vehicle Charging Time of Use (TOU) Rate
- See frequently asked questions about Pepco rebates

We're here to help.

Contact us for help with your report, support navigating next steps, or just to speak with an expert.

WEB: Electric Vehicle Program (MD) | Pepco - An Exelon Company

EMAIL: PHIEVsmart@icf.com

PHONE: 866.414.1256

Frequently Asked Questions

Will additional training be needed for our drivers or maintenance staff?

Driving an EV is very similar to an ICE, but there are a few differences that your team may need help with, such as charging the vehicle and how to shift it into "drive." The level of training needed may vary depending on the vehicle type.

What is the impact of cold weather on electric vehicle (EV) operation?

This assessment accounts for potential regional temperature impacts on range prior to identifying recommended vehicle replacements. Extreme outside temperatures do reduce range, because more energy must be used to heat or cool the cabin. In Maryland, this can equate to small range reductions in the fall and spring, and up to 30-50% in the winter. The higher end of that spectrum would be during extreme cold (i.e., temperatures not often seen in Maryland).

How long do EVs last?

A manufacturer's warranty of a light-duty EV typically covers 8 years or 100,000 miles, and the expected battery lifetime is 10 to 12 years. Batteries in newer EV models should be capable of longer miles and lifetimes. On average, EV battery degradation is about 2% per year. An EV reaches the end of its useful life when the battery has less than 80% of its initial capacity remaining.

What electrical infrastructure upgrades will be needed to install chargers for my fleet? What are the associated costs?

While the specifics around electrical upgrades are not the focus of this analysis, your ICF Account Manager can connect you with vetted charging station installers, as well as the Pepco EV Implementation Team, to better understand the costs of upgrades. We will also estimate the cost of charging infrastructure in the TCO calculation in this report.

If my fleet doesn't have the budget to purchase vehicles right now, how should we proceed?

This report provides 14 -year recommendations for EV purchases. It also identifies applicable incentives, such as EVsmart Commercial Customer Charger Rebate and other funding that may help cover some of the costs. Future EV models, pricing reductions, and grant programs may open up additional opportunities for electrification.

Appendix A: TCO Threshold Comparison

CITY OF TAKOMA PARK

Appendix A: TCO Threshold Comparison – 100% Electrification Scenario

The comparison below is a TCO threshold comparison highlights the potential impact of the second assessed scenario, where 100% of vehicles that have an electric equivalent are converted to electric regardless of the TCO. Both scenarios are outlined in more detail in the excel recommendations file. Your Account Manger is here to help you navigate these two scenarios and connect you to helpful resources to explore your options.

Recommendation impacts using a cost-effective TCO threshold, where EVs are recommended when their TCO is lower than the TCO of the equivalent ICE vehicle:

23
vehicles recommended

$228,819
TCO savings over 25 years*

$228,283
fuel cost savings over 25 years*

$298,214
maintenance costs savings over 25 years*

2,329
Metric tons (MT) of CO2 eliminated over 25 years

Recommendation Impacts using a 100% TCO threshold, where EVs are recommended whether there TCO is greater or less than the TCO of an equivalent ICE vehicle:

61
vehicles recommended

$727
TCO savings over 25 years

$494,824
fuel cost savings over 25 years

$519,389
maintenance costs savings over 25 years

4,197
Metric tons (MT) of CO2 eliminated over 25 years

* NPV assumes a 5% discount rate

Appendix A: TCO Threshold Comparison

CITY OF TAKOMA PARK

For the 100% electrification scenario there are 8 vehicles with EV equivalents that are not recommended for conversion due to already being an EV (8 existing BEVs). For some vehicle types (light-duty pickup, refuse truck, cargo van) they were assumed to not require plow capability or all-wheel drive. This change was done to provide an EV equivalent and assess the TCO. When procuring an EV replacement, the City should assess the use-case to ensure the EV will perform as well as the ICE vehicle. Table H below gives more details on the lowest cost vehicle makes and models recommended.

TABLE H. 14-Year Electrification Recommendations

Vehicle Type	Quantity Up for Retirement (in 14 Years)	Quantity Recommended to Convert to Electric	Recommended Make/ Model/ EV Type	Financial Savings (across 29 years)	GHG Emission Reductions (across 29 years, MT)	EVSE	
						L2	DCFC
SUV - Police	33	32	Ford/Mustang Mach-E Select AWD Standard Range (Police)/BEV	$16,762	1,237	32	-
		1	Tesla/Model Y Long Range (Police)/BEV	$16,808	96	1	-
Refuse Truck	4	4	Lion Electric/Lion6 Refuse/BEV	$97,629	2,040	-	4
Light-Duty Pickup	5	1	Ford/F-150 Lightning Pro SSV SR/BEV	$10,051	55	1	-
		4	Ford/F-150 Lightning Pro (Fleet Only)/BEV	$21,689	151	4	-
Shuttle Bus	1	1	Ford/E-Transit Cutaway/BEV	$24,710	18	1	-
Minivan	1	1	Canoo/Lifestyle Vehicle AWD – Premium/BEV	$7,375	88	1	-
Sedan - Police	4	3	Tesla/Model 3 Long Range AWD (Police)/BEV	$(37,110)	82	3	-
Sedan	9	3	Nissan/Leaf S/BEV	$(12,324)	21	3	-
Medium-Duty Vocational Truck	5	5	REE Automotive/P7-C/BEV	$(27,838)	116	5	-
Van - Cargo	2	2	Maxwell Vehicles/ePro SR Passenger Van/BEV	$9,955	69	2	-
Van – Passenger	2	2	Maxwell Vehicles/ePro SR Cargo Van/BEV	$(336)	98	2	-
Heavy Truck	2	2	Peterbilt/220EV (Class 7 – 282 kW)/BEV	$(126,644)	126	-	2
Street Sweeper	1	0	N/A	-	-	-	-
TOTAL	**69**	**61**		**$727**	**4,197**	**55**	**6**

Appendix A: TCO Threshold Comparison

CITY OF TAKOMA PARK

The timeframe identified for the vehicle replacements is 2025 to 2038, which accounts for a maximum vehicle life of 15 years based on assumptions used in the model. However, the fleet total cost of ownership (TCO) analysis extends to 2052 to account for the ongoing fuel and maintenance costs from the vehicles acquired in 2038. Of the 69 total on-road vehicles we assessed converting all ICE vehicles, 61 vehicles, to electric. Chart W illustrates the phasing in of these electric vehicles as you replace your existing fleet vehicles.

CHART. W Recommended EV Replacement Timeline: Fuel Types