



STAFF REPORT

City Council

Meeting Date:

8/27/2024

Staff Report Number:

24-143-CC

Informational Item:

Tesla police patrol vehicle pilot update

Recommendation

This is an informational item and does not require City Council action.

Policy Issues

In 2019 the City Council adopted Resolution No. 6943 declaring a climate emergency calling for accelerated climate action by the City. In 2020 the Council adopted the Sustainable Fleet Policy (Resolution No. 6552) which prioritizes the purchase and use of zero-emission fleet vehicles and equipment. Later that year the City adopted the Climate Action Plan (CAP) aiming to be carbon neutral by 2030. The scope of the CAP was updated in 2021, focusing on using six strategies. CAP strategy No. 5 is to eliminate fossil fuel use in city operations by 2030. CAP5 sets a more ambitious target than the sustainable fleet policy, which allows for fossil fuel use where there is no feasible alternative. The Tesla pilot was an effort to evaluate whether a zero-emission patrol vehicle could be built, as there were none available direct from a manufacturer.

Background

The City last completed a greenhouse gas (GHG) inventory for municipal operations in 2019, where the fleet emissions made up approximately 48% of the overall emissions from municipal operations. Fleet decarbonization presents a significant opportunity to lower emissions to meet CAP targets, improve air quality and reduce noise in the community from City vehicles. As with most cities, the police department generates the most vehicle miles traveled, and most emissions. Of all police vehicles, patrol has the largest emissions profile due to the unique duty cycle demands on that group. The police department has regularly deployed more fuel efficient, lower-emission vehicles ahead of the rest of the fleet. In October 2021 there were no purpose-built patrol electric vehicles (EV) and the City of Fremont was the only agency to have outfitted a civilian EV (Tesla Model S) for police operations. As part of the 2021 vehicle purchase (Attachment A), the City Council authorized the purchase, outfitting and pilot use of three 2022 Long Range Tesla Model Y EVs for police patrol operations to evaluate whether the vehicles could perform police duties. Staff tracked outfitting costs, vehicle performance and officer experience. The vehicles were purchased in October 2021, received in June 2022 and immediately sent for outfitting. The first vehicle was outfitted and ready for service in December 2022. Staff began the pilot when the second vehicle was ready for service. The pilot ran from Jan. 1, 2023 to Jan. 1, 2024. Staff provided an update to the Environmental Quality Commission (EQC) on the Tesla pilot at a special meeting Jan. 31. The presentation for that meeting, including vehicle photographs, is available via Attachment B.

Analysis

Pilot structure

The pilot featured three 2022 Long Range Tesla Model Y vehicles identified by fleet ID numbers: 2201,

2202, and 2203. Vehicle 2201 was assigned to the “Mids” shift, or night shift, from 6 p.m. to 6 a.m. Vehicle 2202 was assigned to the day shift from 6 a.m. to 6 p.m. Vehicle 2203 was primarily a backup vehicle in case one of the others was unavailable, but was also available for other non-pilot officers interested in trying the vehicle. Four officer volunteers were assigned to the pilot vehicles at any one time. A new cohort of volunteer officers was brought on when officer shift schedules changed or when officers opted out of the pilot. Vehicle 2202 was assigned to a patrol sergeant during portions of the pilot who was required at times to drive the watch commander vehicle which has specialized equipment. This contributed in part to the fewer shifts driven by vehicle 2202 than 2201. The vehicles were primarily charged using a seven kilowatt (kW) level-2 (L2) charger within the secure police parking lot at city hall, between shifts.

Data collection

Vehicle trip and battery state information was reviewed through Teslamate, a vehicle tracking software available for all Tesla users, and reports from Geotab telematics devices that recorded similar information on mileage, charging and other trip data. Geotab also provided a data analyst to support staff. Only data from patrol shifts for the assigned vehicles, 2201 and 2202, was used toward the total mileage, shift distances, actual observed range and typical shift charging. Vehicle 2203 was used infrequently and therefore was not included in the analysis. A summary of the overall pilot results is included in table 1.

Table 1: Pilot summary			
Category	Vehicle 2201 (night shift)	Vehicle 2202 (day shift)	Total
Shifts driven	252	113	365
Total shift mileage (mi)	7779.4	1541.9	9321.3
Longest shift distance (mi)	103.3	76.1	n/a
Gallons of gasoline avoided (gal)	648.3	128.5	776.8
Avoided emissions (MTCO ₂ e)	5.8	1.1	6.9
Fuel savings (\$)	466.76	92.5	559.28

To collect qualitative data on the officer experience staff used a survey tool to solicit feedback from officers daily for the first months of the pilot and kept open communication channels to receive input from the officers using the vehicles. Midway through the pilot, two officers requested to be reassigned, citing a number of officer safety concerns with the vehicles. Some of these issues were able to be addressed with workarounds and outfitting corrections, while others were more foundational to the vehicles and the officers were not comfortable continuing to use them.

Officer experience

Officers using the vehicles appreciated the acceleration, steering and vehicle speed compared to the hybrids and remaining gasoline-only patrol vehicles. However, the Tesla presented challenges due to the small interior space, “smart car” features, and low vehicle profile limiting maneuverability (e.g., jumping curbs, off-road use).

Space constraints

The Long Range Tesla Model Y was selected for the pilot over the Ford Mustang Mach-E and other EVs due to the advertised range and larger size. Once the Tesla is outfitted for patrol use, the partition between the front and back seat limits room in the front, which accommodates the center console, light controls and communications tablet. This leaves a reduced amount of space for an officer in full patrol gear. The width of

duty belts and bulletproof vests do not fit well in the bucket seat and the height of the center console required larger officers to sit at an angle or with their sidearm pinned and inaccessible while in the vehicle.

The equipment overhangs the passenger seat making it nearly unusable. This is not an immediate issue, as the current patrol operations do not deploy two officers in every vehicle, but would limit the ability to transport personnel or change operations in the future. In particular, the passenger seat space would not allow training officers to comfortably sit next to a trainee for a 12-hour shift, preventing field training for new officers. The rear seats provide very little room for anyone detained or transported in the back of the car.

The Teslas are also constrained with respect to storage space. The officers noted they typically store gear in two totes in the back of the hybrid Ford Explorers: one for standard equipment that is consistent from vehicle to vehicle, and another for personalized equipment. Two standard totes do not fit in the back of the Tesla. While the Tesla does have a number of unique storage spaces, including the front trunk and under-trunk storage, they are more difficult to access.

“Smart car” challenges

The following “smart” features of the Teslas created challenges for patrol operations:

- Autopilot interference: There is a delay when officers shift into drive; and on occasion the Teslas automatically stop when an officer attempts to pull off to the side of the road to approach vehicles or people.
- Lighting controls (tablet): Tesla does not allow direct access to the system; officers need to use a multistep touch screen process to follow standard practice to dim their lights upon approach at night.
- Proximity locking, sleep mode and self-closing doors: The car knows when the key is, or is not, present within an effective range. The cars will not lock if the key, or enabled smartphone, are near the vehicles and will conversely lock if the key or smartphone is away from the vehicle.

A workaround using sentry mode in the settings was developed to keep the lights on during traffic stops but locking remains an issue. The issue is made worse by the doors closing automatically on the slightest incline. The officers also noted that the Tesla lever handle can be difficult to use.

Outfitting

All police vehicles require specialized outfitting to ensure officers have the proper equipment to perform their duties safely. Purpose-built patrol vehicles that provide additional functionality off the assembly line must facilitate modifications for agency customization because they also require further outfitting. Table 2 lists the outfitting for the Teslas as compared to the hybrid Ford Explorer police vehicles.

Table 2: Vehicle purchase and outfitting costs				
Category	Hybrid Ford Explorer	2022 Long Range Tesla Model Y	Difference (\$)	Difference (%)
Purchase price with taxes and fees	\$51,620	\$64,270	\$12,650	25
Tablet computer solution (communications)	\$2,800*	\$2,800	\$0	0
Computer antenna (communications)	\$176	\$176	\$0	0
Police radio (communications)	\$1,586	\$1,586	\$0	0
Ballistic panels (outfitting)	\$0	\$7,500	\$7,500	-
Graphics (outfitting)	\$710	\$710	\$0	0
Safety outfitting	\$20,500	\$25,000	\$4,500	22
Wheel covers (outfitting)	0	\$300	\$300	-
Key/fobs (outfitting)	\$5	\$410	\$405	8,100
Communications subtotal	\$4,562	\$4,562	\$0	0
Outfitting subtotal	\$21,215	\$33,920	\$12,705	60
Total	\$77,397	\$102,752	\$25,355	33

*The hybrids actually reused computer solutions from older vehicles at a \$0 cost to the City, the tablet cost was assumed for comparison if outfitting a new vehicle. Patrol vehicles can reuse some equipment if consistent with current standards.

Safety outfitting includes the lights, sirens, pedestal, center console, push bar, partitions, hard seats and specialized rear seatbelts, wiring harness and hardware, controllers, communications equipment, gun rack and window guards. The delays for all vehicles occur when parts are missing or the outfitters are backed up with other orders, because the vehicles are outfitted sequentially, one at a time, and cannot proceed from one outfitter to the next until the work is completed. The advantage with purpose-built police vehicles is that some functionality can be added before the vehicle is delivered. For example, the hybrid Ford Explorers can be upfitted to include ballistic door panels from the manufacturer, whereas the Teslas had to be sent to an additional outfitter in southern California. The outfitters are more familiar with the non-EV police vehicles and parts are typically more readily available. The safety outfitting for the Teslas included painting the doors white, which was done at the same time to save time, but otherwise was more expensive because of the parts and limited Tesla experience of the outfitter. Staff selected the same company who outfitted the Model S and Model Y for the Fremont Police Department, but those vehicles each had a separate 12-volt battery to power some of the equipment. The 2022 Model Y eliminated that additional battery requiring all equipment to be connected to the main battery for the vehicle.

Deployment took approximately 14 months including a nine-month delivery delay due to global supply chain issues and five months for vehicle outfitting. Standard outfitting for the hybrid Explorers varies depending on availability of parts and capacity at the outfitters but can typically be completed within three to six months.

It is anticipated that the EVs will require approximately 50% less maintenance over the life of the vehicle as compared to combustion engines. During the pilot, the tracked Tesla required 15 total days of work completed outside the City shop, whereas the tracked hybrid Explorer required only five. Total in-house

maintenance time for the different vehicles was closer (eight hours to seven-and-one-half hours respectively), though for different reasons.

Throughout the outfitting for both Fremont and Menlo Park, the outfitter relayed that they attempted to reach out to Tesla but were not able to access or modify the central operating system.

The majority of the challenges stemmed from the outfitting of the Tesla.

Items that Tesla could address to support patrol use:

- Public safety mode that disables some civilian steering corrections;
- Customizable sleep mode to keep lights on;
- Improved access to light controls for public safety modifications;
- Unlimited digital keys for police accounts;
- Supportive pricing and customer service; and
- Discounted vehicles without seats or full finishes.

Outfitting changes that could support future patrol vehicles:

- Checklist to ensure voice commands are off and rear doors do not open from the interior;
- Pre-programmed sentry mode workaround to prevent the lights from timing out or turning off;
- Alternate single rear seat configuration for additional passenger seat space;
- Wider, flatter seats that better fit an officer in patrol gear; and
- Lower console height to allow duty belts to spill over for officer comfort and duty belt access.

Vehicle performance

Neither EVs nor non-EVs regularly achieve the advertised range or fuel efficiency during normal operations. Staff were interested to see how much the added weight from the outfitting and the rigors of police activity would affect the advertised range and whether the actual range could still work for the typical demands of a patrol shift. The advertised range of the 2022 Long Range Tesla Model Y at the time of the pilot was 330 miles. An actual expected range of 195 miles was calculated using the actual distances travelled and resulting reductions in charge for the full pilot.

The vehicles were weighed three times during outfitting: once when received, with a starting gross vehicle weight of 4,360 lbs; a second time after the ballistic panels were installed, adding 120 lbs.; and finally at deployment. The equipment installed as part of the vehicle outfitting added roughly 860 lbs., or approximately 20% the gross vehicle weight, for a final deployed vehicle weight of 5,224 lbs. Table 3 includes details on the typical shift distance, longest shift distance, and actual expected range for the assigned vehicles in the pilot.

Table 3: Vehicle performance	
Category	Total (2201 and 2202)
Longest shift distance	103.3 mi
Median shift distance	19.0 mi
Actual expected range 100% charge	195.2 mi
Actual expected range 80% charge	156.2 mi
Typical shift energy usage (battery % at end of shift - start %)	15.0%
Largest shift energy usage (battery % at end of shift - start %)	75.0%

The table includes the estimated 80% battery range because EVs charge much faster between 20 – 80% charge and best practice for battery health and efficiency in charging is to charge to 80% and recharge when the battery drops to 20%. Based on the shifts recorded in the pilot, the vehicles had sufficient range at 80% charge to complete all shifts. However, standard practice for the patrol unit is to refuel any vehicle after a shift to leave a full tank for the start of the next shift and for the pilot, the vehicles were charged to 100% in part due to uncertainty over whether the vehicles could complete a full shift on a single charge. It is likely patrol vehicles will continue to be charged to 100%, but this range data may inform charging schedules and operations for the non-patrol EVs.

Charging infrastructure

The Tesla pilot revealed that the seven kW L2 chargers would take approximately 11 hours to fully charge a Long Range Tesla Model Y. One seven kW L2 charger with two charging ports was moved into the secure police parking area at City Hall for the pilot, bringing the total number of charging ports for the police department to four. There will be 17 EVs in service for the police department this fiscal year, including planned deployments. The police department has been flexible in using community charging resources while a more robust charging infrastructure is being developed to meet the demands of the electrified fleet. Staff have been working on a capital improvement project to install a new transformer supplied by Pacific Gas & Electric's (PG&E) EV fleet program and make-ready infrastructure (i.e. conduit, wiring, and new switchgear) as well as some initial chargers to address the immediate and planned EV demand for the police department and other fleet vehicles. The planned chargers would be a mix of higher-output 19kW L2 chargers, 40kW L3 chargers and one 120kW expandable L3 charger at City Hall. In addition, a 160kW L3 expandable charger and a higher output L2 are planned for the corporation yard.

The immediate phase includes:

- Corporation yard lot
 - One expandable L3 port
 - Two L2 ports
- City hall PD lot
 - Two expandable L3 ports
 - Four low-power L3 ports
 - Four L2 ports
- City Council Chambers lot
 - Ten L2 ports

Next steps

The police department has shared that the Teslas are useful within the department for patrol and non-patrol operations, but do not appear to be the "patrol cars of the future" in their current configuration. The police department remains committed to continued partnership in testing and evaluating technology and monitoring for production electric patrol vehicles as they emerge on the market to pursue the City's ambitious goal to eliminate fossil fuels from city operations by 2030. Staff across the organization are working collaboratively to monitor available vehicles and deploy the necessary charging infrastructure to support the transition. In 2023 the City Council approved the purchase of one pursuit-rated Chevrolet Blazer EV. Staff have had challenges with the National Auto Fleet group contracted to purchase the vehicle, but are hoping to deploy a Blazer EV as a next stage of the pilot by early 2025.

Impact on City Resources

There is no direct impact on City resources associated with this staff report.

Environmental Review

This information item is not a project within the meaning of the California Environmental Quality Act (CEQA) Guidelines §§15378 and 15061(b)(3) as it will not result in any direct or indirect physical change in the environment.

Public Notice

Public notification was achieved by posting the agenda, with the agenda items being listed, at least 72 hours prior to the meeting.

Attachments

- A. Hyperlink – Oct. 26, 2021, Staff Report # 21-213-CC: menlopark.org/DocumentCenter/View/29903/F6-20211026-CC-Vehicle-purch
- B. Hyperlink – Jan. 31 EQC special meeting Tesla pilot update presentation: menlopark.gov/files/sharedassets/public/v/1/agendas-and-minutes/environmental-quality-commission/2024-meetings/agendas/20240131-environmental-quality-commission-special-meeting-agenda.pdf#page=35

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