

**CITY AND COUNTY OF SAN FRANCISCO  
BOARD OF SUPERVISORS  
BUDGET AND LEGISLATIVE ANALYST**

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May 1, 2017

**TO:** Members of the Board of Supervisors  
**FROM:** Budget and Legislative Analyst's Office  
**SUBJECT:** May 2, 2017 Board of Supervisors Meeting



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<b>Item 5</b> <b>File 17-0210 (Amended)</b>	<b>Department:</b> Office of the City Administrator
<b>EXECUTIVE SUMMARY</b>	
<b>Legislative Objectives</b>	
<ul style="list-style-type: none"> <li>• Ordinance amending the City’s Administrative and Environment Codes to require that new light duty passenger vehicles procured for the City fleet be a Zero Emission Vehicle (ZEV), such that all light duty passenger vehicles in the City’s fleet are ZEVs by December 31, 2022, unless a waiver or exemption is obtained, and encouraging selection of ZEVs in other vehicle classes as technology improves.</li> </ul>	
<b>Key Points</b>	
<ul style="list-style-type: none"> <li>• A Zero Emission Vehicle is a vehicle that produces no emissions from the on-board source of power, as determined by the California Air Resources Board.</li> <li>• Between FY 2010-11 and FY 2015-16, the number of City passenger vehicles <u>increased</u> from 2,650 to 2,743, an increase of 93 vehicles or 3.5%.</li> </ul>	
<b>Fiscal Impact</b>	
<ul style="list-style-type: none"> <li>• This ordinance would necessitate the replacement of between 735 and 1,283 existing passenger vehicles with ZEVs by December 2022 at a total cost of between \$20,212,500 (735 vehicles x \$27,500 per vehicle for the Smart Electric Drive) to \$59,851,950 (1,283 vehicles x \$46,650 for the BMWi3) over the next five and a half years.</li> <li>• The average cost of installing a level-two charger is \$16,000. To install between 663 and 1,211 chargers will cost between \$10,608,000 and \$19,376,000.</li> <li>• Total cost to purchase new electric passenger vehicles and install electric chargers would range from \$30,820,500 to \$79,227,950. Subtracting revenue from selling vehicles and current vehicle replacement results in net additional costs of \$19,678,793 to \$63,202,380.</li> </ul>	
<b>Policy Consideration</b>	
<ul style="list-style-type: none"> <li>• There are various policy and implementation issues to consider with the proposed ordinance, including (a) existing restrictions, (b) lease and grant unknowns, (c) operational concerns and (d) City priorities.</li> </ul>	
<b>Recommendations</b>	
<ul style="list-style-type: none"> <li>• Amend the proposed ordinance on page 1, line 21 to insert the word “passenger” to clarify in the City’s Administrative Code that all light duty “passenger” vehicles in the City fleet must be Zero Emission Vehicles by 2022, to be consistent with the definitions and provisions in the Environment Code.</li> <li>• Approval of the proposed ordinance, as amended, is a policy decision for the Board of Supervisors.</li> </ul>	

## MANDATE STATEMENT

According to Charter Section 2.105, all legislative acts shall be by ordinance and require the affirmative vote of at least a majority of the members of the Board of Supervisors.

## BACKGROUND

In 2010, the Board of Supervisors approved the Healthy Air and Clean Transportation Program (HACTO), which required that each City department reduce the City's vehicle fleet by 5% of the existing non-safety, passenger and light duty vehicles annually over a 5-year period, and reduce the vehicles over 12 years of age, with specific waivers permitted. On July 15, 2015, the Board of Supervisors approved an ordinance (File 14-0950) amending the City's Environment and Administrative Codes to (a) transfer responsibility for fleet management and vehicle selection for HACTO from the Department of the Environment to the Office of the City Administrator, (b) replace the City's mandatory vehicle reduction requirements with policies to optimize the size and use of the City's vehicles, (c) use technology to promote the safe and environmentally-friendly use of vehicles and (d) reduce average per-mile greenhouse gas emissions from the City's vehicles. These Code amendments specified a reduction in gas emissions of four percent by the end of fiscal year 2017, and 15 percent by the end of fiscal year 2021.

The ordinance also required a report reviewing the implementation of these policies after one year, which was submitted to the Board of Supervisors on November 30, 2016. Contrary to the objective of reducing vehicles, this review found that in the six-year period between FY 2010-11 when HACTO was approved and FY 2015-16, the number of City light-duty vehicles<sup>1</sup> increased from 2,650 to 2,743, an increase of 93 vehicles or 3.5%. The Office of the City Administrator plans to issue a follow-up report in the fall of 2017 regarding the reductions in greenhouse gas emissions from City vehicles.

The City Administrator is currently responsible for implementing and administering HACTO, in consultation with the Director of the Department of the Environment, and for promulgating appropriate rules, regulations and guidelines for such implementation. All City departments are currently restricted to using the Vehicle Selector List<sup>2</sup> issued by the City Administrator when purchasing sedans, light duty pickup trucks, and vans with a gross vehicle weight under 8,500 pounds.

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<sup>1</sup> All vehicles less than 8,500 pounds.

<sup>2</sup> The Vehicle Selector List is a document issued by the City Administrator, in consultation with the Department of the Environment, which provides emissions data for light-duty passenger vehicles, light-duty trucks and vans less than 8,500 gross pounds. The Vehicle Selector List is compliant with the Healthy Air and Clean Transportation Ordinance (HACTO) and takes into account environmental considerations with the goal of reducing greenhouse gas emissions.

## DETAILS OF PROPOSED LEGISLATION

### Environment Code Amendments

The proposed ordinance would amend the City's Environment Code to require that all light duty passenger vehicles<sup>3</sup> procured for the City fleet be Zero Emission Vehicles (ZEV), unless a waiver, exemption or applicable exception is obtained from the City Administrator. A waiver could be granted by the City Administrator if

(a) There is no passenger vehicle or light duty truck approved by the Vehicle Selector List that meets all applicable safety standards and requirements,

(b) The passenger vehicle or light duty truck will be used primarily outside the geographic boundaries of San Francisco, or

(c) The common intended use for the vehicle is to regularly travel more than 100 miles without access to an electric charging station.

Under the proposed ordinance, departments could submit one waiver request to cover their annual vehicle purchases.

The proposed ordinance would also amend the City's Environment Code to seek out new and emerging technologies to upgrade the City's trucks and vans to zero emission standards and to encourage the selection of ZEV in other vehicle classes, as technology improves. In accordance with the proposed ordinance, a ZEV is a vehicle that produces no emissions from the on-board source of power, as determined by the California Air Resources Board.

The proposed ordinance also provides exemptions for

(a) Emergency vehicles<sup>4</sup> if the public safety department purchasing the vehicles concludes, after consultation with the City Administrator, that the purchase of Zero Emission emergency vehicles is not feasible or would otherwise interfere with the department's public safety mission,

(b) San Francisco Municipal Transportation Authority buses,

(c) Response to emergency needs,

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<sup>3</sup> Light-Duty Passenger Vehicle is defined in the proposed ordinance as a passenger vehicle that meets the criteria of a Federal Highway Administration Class 2 Vehicle that include all sedans, coupes and station wagons primarily for the purposes of carrying passengers and comprising of no more than five seats in addition to the driver's seat. Light-Duty Truck is defined in the proposed ordinance as any motor vehicle, with a manufacturer's gross vehicle weight rating of 8,500 pounds or less, designed primarily for transportation of property or is a derivative of such a vehicle, or is available with special features enabling off-street or off-highway operation and use.

<sup>4</sup> Emergency vehicles as defined in the proposed ordinance means any vehicle publicly owned and operated used by a public safety officer for law enforcement, fighting fires or emergency fire calls, emergency medical technicians, paramedics, Office of the Chief Medical Examiner or Department of Animal Care and Control. Unless equipped with lights and sirens, vehicles used for primarily administrative functions such as passenger transport are not considered Emergency Vehicles.

(d) Up to 10% of the total light duty passenger vehicle fleet may be exempted from these requirements if the alternate vehicles are Plug-in Hybrid Electric Vehicles and

(e) If exempt from the requirements, a vehicle is selected with as low emissions and high efficiency ratings as practicable.

#### Administrative Code Amendments

The proposed ordinance would also amend the City's Administrative Code to require that all light duty vehicles in the City's fleet be ZEVs by December 31, 2022. Light duty vehicles are not specifically defined in the proposed ordinance but as noted above, Light-Duty Passenger Vehicles and Light-Duty Trucks are defined in the ordinance. Therefore the proposed ordinance should be amended on page 1, line 21 to insert the word "passenger" to clarify in the City's Administrative Code that all light duty "passenger" vehicles in the City's fleet must be ZEV by 2022, as proposed in the definitions and provisions in the Environment Code.

Without the above-noted amendment to the proposed ordinance, the Administrative Code would require all light duty vehicles in the City's fleet to be ZEVs and does not provide an automatic exemption for light duty trucks, Sport Utility Vehicles (SUVs) or passenger vans. However, there currently is no ZEV light duty truck, SUV or passenger van option for lease or purchase on the market. According to Mr. Bruce Robertson, Finance Manager at the Department of Public Works, Public Works received a quote from a vendor regarding the costs to retrofit a light duty truck or passenger van to become a plug-in hybrid for \$95,690 per vehicle. However, such an option would still not be compliant with the proposed ordinance.

Therefore, the following fiscal impact analysis assumes the proposed ordinance is amended, as recommended by the Budget and Legislative Analyst.

### **FISCAL IMPACT**

#### Number of Light Duty Passenger Vehicles

As of March 2017, the City leased and owned a total of approximately 5,876 vehicles across all City departments. The total 5,876 vehicles include buses, tractors, and heavy duty trucks and light duty trucks which would be exempt under the proposed amended ordinance. The proposed ordinance also provides exemptions for emergency patrol vehicles, which are estimated at 252 vehicles. Excluding emergency patrol vehicles, there are an estimated total of 1,334 City light duty passenger vehicles as shown in Table 1 below.

**Table 1: Light Duty Passenger Vehicles, Excluding Patrol Vehicles, by Department**

<b>Department</b>	<b>Compressed natural gas</b>	<b>Electric</b>	<b>Gasoline</b>	<b>Gas Hybrid</b>	<b>Plug-in Hybrid</b>	<b>Total</b>
Airport	14		35	39	1	89
Building Inspection	23	10	2	69	3	107
Courts <sup>5</sup>	7		53	38		98
Public Works	7	10	3	71	5	96
Fire			25	49		74
General Services Agency		5	3	18	2	28
Health	27		15	36		78
Human Services	3	2	6	54		65
Library		2		1	1	4
Muni	5		52	67		124
Other	1		4	10		15
Police	8		272	46		326
Port		1	4	12		17
Public Utilities Commission	7		24	99	3	133
Recreation and Park	8	6		11		25
Sheriff	7		30	13		50
Technology				5		5
<b>Grand Total</b>	<b>117</b>	<b>36</b>	<b>528</b>	<b>638</b>	<b>15</b>	<b>1,334</b>

Source: Office of the City Administrator (OCA). While individual City departments may have slightly different vehicle counts, OCA data is used for consistency of definition, because OCA is responsible for implementing HACTO and the Purchaser, which is responsible for purchasing City vehicles, and Central Shops, which is responsible for maintaining City vehicles, are both under OCA.

As shown in Table 1 above, the City currently has 36 electric vehicles and 15 plug-in hybrid vehicles of the total 1,334 light duty passenger vehicles. The proposed ordinance provides that up to 10% of the total light duty passenger vehicle fleet could be plug-in hybrid vehicles<sup>6</sup>. Therefore, the City would need to replace 1,283 passenger vehicles with ZEVs (1,334 total less 36 electric vehicles less 15 plug-in hybrid vehicles).

The proposed ordinance also allows public safety departments with emergency vehicles to apply for exemptions if the purchase of zero emission emergency vehicles is not feasible, would otherwise interfere with the department's public safety mission or to respond to emergency needs. If all public safety vehicles received exemptions from the proposed ordinance, this could include up to 548 passenger vehicles.<sup>7</sup> Deducting the 548 public safety vehicles, the 36 electric

<sup>5</sup> Court vehicles include District Attorney, Public Defender, Juvenile Probation and Adult Probation.

<sup>6</sup> Plug-in hybrid vehicles are comparably priced to ZEVs. Given that the proposed ordinance permits up to 10% of the vehicle fleet to be plug-in hybrids, the following analysis does not consider cost differentials for purchasing new ZEV or plug-in hybrid vehicles.

<sup>7</sup> 98 passenger vehicles in the Courts, 74 passenger vehicles in the Fire Department, 50 passenger vehicles in the Sheriff's Department, and 326 passenger vehicles in the Police Department.

vehicles, and the 15 plug-in hybrids from the total 1,334 vehicles, results in a balance of 735 passenger vehicles that at a minimum would be subject to the proposed ordinance.

Based on fleet utilization statistics the Department of the Environment estimates that at least 126 underutilized City's light duty passenger vehicles could be retired without replacement over the next six years.<sup>8</sup> However, as noted above, the City's fleet actually increased by 93 vehicles between FY 2010-11 and FY 2015-16 when HACTO required 5% reductions in the fleet size. While reductions in the City's light duty passenger vehicle fleet could potentially lead to significant environmental and cost savings in the future, given the historical precedents, no reductions in the passenger vehicle fleet size are assumed in this analysis.

#### Cost of Purchasing Zero Emission Vehicles

Currently there are three main options for ZEVs, including: battery electric vehicles, long-range electric vehicles, and hydrogen fuel cell vehicles. These three types and models, including prices and fuel ranges are summarized in Table 2 below.

**Table 2: Current Zero Emissions Vehicles on the Market**

Car Make and Model	Price <sup>1</sup>	Fuel Range
<b>Battery Electric Vehicle (BEV)</b>		
Smart Electric Drive	\$27,500	68 miles
Ford Focus Electric	32,032	115
Nissan Leaf	33,748	107
BMW i3	46,650	114
<b>Long Range Electric Vehicle</b>		
Tesla Model 3	38,500	215
Chevy Bolt	40,282	238
<b>Hydrogen Fuel Cell EV<sup>2</sup></b>		
Toyota Mirai	63,250	312

1. Table 2 prices come from the manufacturer's suggested retail price of the product plus ten percent for taxes, fees, and closing costs. These prices are slightly higher than the current Vehicle Selector List, as the current Vehicle Selector List expires in October 2017. New term purchase agreements for bulk purchases of City passenger vehicles will be negotiated by Administrative Services after October 2017 and are not currently available. The prices shown in Table 2 above were developed with Administrative Services, which is responsible for purchasing vehicles for City departments.
2. Currently, hydrogen fuel cells can only be fueled at stations at the Airport. Due to its limited fueling capacity, high initial price and expensive fueling cost, the hydrogen fuel cell is not included in our financial analysis.

As noted above, the proposed ordinance would necessitate the replacement of between 735 and 1,283 passenger vehicles with ZEVs by December 2022. Therefore, the total estimated cost of the replacement vehicle procurement would range from \$20,212,500 (735 vehicles x \$27,500

<sup>8</sup> According to the Department of the Environment, underutilized vehicles are used 5 or less days per month and should be retired (63 vehicles in total) and that utilization of cars used 6 to 10 days per month should at least be doubled. The 126 vehicles relates to the non-emergency sedan fleet.

per vehicle for the Smart Electric Drive) to \$59,851,950 (1,283 vehicles x \$46,650 for the BMWi3) over the next five and a half years. In the same time period, based on historical experience, without the proposed ordinance, the City will spend approximately \$10,774,087 to \$14,365,450 to purchase new passenger vehicles.<sup>9</sup>

According to Mr. Wyatt Donnelly-Landolt, Senior Budget and Planning Analyst in the City Administrator's Office, the City usually replaces 75 to 100 passenger vehicles per year. Under the proposed ordinance, as shown in Table 3 below, based on the estimated 735 to 1,283 vehicles to be replaced by December 2022, the City would have to replace an estimated 134 to 233 vehicles each year. This represents an increase of 34 to 158 vehicles each year or a total net increase of 187 to 869 vehicles over the next 5.5 years.

**Table 3: Increased Annual Replacement of Vehicles**

	Number of Vehicles
Total Replacement Vehicles Needed	735 – 1,283
Annual Replacement Rate (5.5 Years)	134 – 233
Current Annual Replacement Rate	(75 – 100)
Increased Annual Replacement Rate	34 -158
Increased Total Replacement (5.5 Years)	187-869

### Selling Existing Vehicles

The City would need to sell or terminate the leases on existing vehicles to purchase or lease the new ZEVs. It is possible that increasing the number of vehicles sold by the City in a given year would decrease the future sales price of each vehicle as the additional vehicles flood the market. On the other hand, if the City sells existing vehicles that still have considerable useful life, the sales price of such vehicles could be higher.

Mr. Donnelly-Landolt advises that the City currently leases 22 passenger vehicles, which would be terminated, but not result in any sale revenues for the City.<sup>10</sup> Therefore, the City would sell between an additional 165 vehicles (187 less 22 leased) and 847 vehicles (869 less 22 leased). Based on projected sales of the depreciated value of the existing passenger fleet, the City would realize an estimated \$367,620 and \$1,660,120 of revenues from the sale of the existing fleet.<sup>11</sup>

<sup>9</sup> According to Mr. Wyatt Donnelly-Landolt, the Prius is the most commonly purchased City vehicle and the current Prius One is suitable to estimate the typical amount spent on vehicles. The Prius One is the current standard Prius model, and the MSRP for 2017 plus ten percent is \$26,119. Assuming the replacement rate of 75-100 vehicles per year, the City would replace 412-550 vehicles over the next five and a half years at a total cost of \$10,774,087 to \$14,365,450.

<sup>10</sup> We were unable to determine how many of these leases end before 2022 and how many of the leases would need to be terminated early.

<sup>11</sup> To calculate the value of passenger vehicles from sales, we used the Edmund's car depreciation value guide and then cross-referenced the existing fleet by year and price, to determine the depreciated values. The Office of the City Administrator usually receives approximately 50 percent of the depreciated value on passenger vehicle sales sold at City auctions. Our estimate yielded an average passenger vehicle sale price between \$1,960 and \$2,228,



### Leasing and Rebate Options

As noted above, the City currently leases 22 passenger vehicles, or less than 2% of the City's 1,334 light duty passenger vehicles. According to Mr. Donnelly-Landolt, the City does not typically lease City passenger vehicles because the total cost to lease vehicles is significantly higher than the cost to purchase vehicles as the City generally uses passenger vehicles for an average of ten years, before selling the vehicles at auction.

The City has participated in multiple rebate and grant programs for eligible ZEV and charger purchases, including the Public Fleet Pilot Project, CA Clean Air Rebate, Metropolitan Transportation Commission EV Grant. In addition, the State of California currently has a California Vehicle Rebate Program (CVRP) that offers up to \$2,500 per vehicle purchased or leased, for up to 30 fleet vehicle purchases per municipal government annually.<sup>12</sup> Additionally, the Federal Government has a \$7,500 federal tax credit accessible only through leasing of vehicles. However, the City is not directly eligible for the Federal tax credit, as the City does not file federal tax returns with itemized deductions. Assuming the City participates in the State program to receive \$2,500 per vehicle for 30 vehicles per year, the City could receive an estimated \$75,000 in revenue from the State.

### Cost of operating vehicles

According to the Department of Environment, the cost per mile to fuel an electric vehicle is significantly less expensive than gas vehicles. Without factoring in the cost of the vehicles, maintenance or infrastructure, the Department of Environment reports that the City's current fleet costs an average of 20 cents per mile to fuel and the average cost per mile for ZEVs would be 2.5 cents per mile.<sup>13</sup> According to the Idaho National Laboratory, the average cost for gas cars is 15.9 cents per mile, for gas hybrid cars is 7.8 cents per mile, and for electric cars is 3.3 cents per mile.<sup>14</sup> However, there are several other electric fueling cost issues to consider. For example, tiered pricing<sup>15</sup> can significantly increase the cost of electricity charging bills on leased property.<sup>16</sup> As half of the passenger vehicles currently owned by the City are reported to be parked on leased premises, the issue of tiered pricing must be considered when calculating potential electric costs for powering the City's ZEVs. However, the location and ownership of all

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which is well above the average reported by the Office of the City Administrator of \$1,242 over the past five years. As the City would be selling City vehicles with remaining useful life before they would normally be sold, this appears reasonable.

<sup>12</sup> According to Mr. Lars Peters, Executive Mayoral Fellow at the Department of the Environment, the CVRP annual cap applies per public fleet 'entity' and therefore each City department may be able to apply for up to 30 cars.

<sup>13</sup> In addition, SB1 recently approved by the State of California will impose additional \$0.12 per gallon on gasoline with annual inflation adjustment, new Vehicle License Fees between \$25 and \$175 based on the vehicle value and a new \$100 annual vehicle registration fee for ZEVs beginning in 2020.

<sup>14</sup> <https://avt.inl.gov/sites/default/files/pdf/fsev/costs.pdf>

<sup>15</sup> In tiered-pricing, the rate plan often has different pricing levels, known as "tiers," based on how much energy is used. The first and lowest-priced tier is the baseline allowance, and the charges per kilowatt hour increase as the amount of energy use increases.

<sup>16</sup> According to Mr. David Worthington, Fleet Manager at the County of Sonoma, the increase has been reported to be between \$30,000 and \$60,000 per month.

City parking facilities, the number of passenger vehicles parked at each location, and potential tier-pricing that would occur is beyond the scope of this analysis.

### Cost of maintaining vehicles

In the next five years, the cost of maintenance of vehicles may decrease as more new vehicles are in operation. However, according to Mr. Glenn Connor, Program Manager for Renewable Energy Program and Transportation under the Office of Sustainability at the State of California, after the initial period, electric vehicles tend to require more costs to maintain the batteries, and past generations of electric vehicles have needed to be replaced at a faster rate than gas hybrid and gas passenger vehicles in the fleet.<sup>17</sup> Like the costs associated with operating electric passenger vehicles, ongoing maintenance costs are highly contested and therefore extremely difficult to predict.

### Charger Purchase and Installation

In addition to replacing between 735 to 1,283 existing City vehicles with ZEVs, the City will also have to install electric vehicle infrastructure for charging the entire passenger fleet. The City currently operates 249 level-two chargers.<sup>18</sup> According to Mr. Peters, most of these charging stations are publicly available. However, these chargers are not evenly distributed throughout the City. According to Mr. Derrick Leung, Retail Services at the San Francisco Public Utilities Commission, 120 of the City's 249 level-two smart chargers are located at the Airport for public use, and an additional six chargers are located on Treasure Island. Therefore, the City only has 123 chargers (249 less 126) currently located within the City proper.

According to Mr. Donnelly-Landolt, the average cost of installation and hardware for each level-two charger is \$16,000.<sup>19</sup> As most City vehicles are used during the day, it is assumed that each vehicle would need to be fully charged overnight while the vehicle is parked. If every vehicle had access to a level-two charger,<sup>20</sup> the City would need to install between 663 and 1,211

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<sup>17</sup> According to Mr. Connor, the electric vehicles in the State of California's fleet need to be replaced before 100,000 miles.

<sup>18</sup> There are three levels of chargers available for Zero Emission Vehicles. The first is level-one, and requires 7 to 29 hours to charge a single car. A level-two charger supplies 240V and averages from 2-10 hours to charge a single vehicle. A level-three charger is a fast-charge and can charge an entire car in about 30 minutes. According to Mr. Donnelly-Landolt, a fully electric vehicle requires level-two or level-three chargers for practical use. According to Mr. Connor, the State of California only uses level-two smart chargers for both electric and plug-in hybrid vehicles which can capture and share data on electric vehicle usage for the State's electric vehicle fleet. Therefore, the proposed analysis uses level-two chargers smart chargers.

<sup>19</sup> According to Mr. Robertson, the Department of Public Works estimates that the installation costs only of a level-two charger in an area that already has power capacity, trenched lines, and appropriate conduits is \$13,000. This does not include the hardware. Furthermore, the average installation cost only for the County of Sonoma and the County of Alameda is \$32,000 and \$33,600 for each dual-headed level-two charging stations respectively, or an average of \$16,000 and \$16,800 per charger. The State of California estimates hardware and installation costs of \$36,000-\$40,000 for dual-headed level-two charging stations, or an average of \$18,000-\$20,000 per charger. Therefore, the \$16,000 estimate is a conservative estimate.

<sup>20</sup> According to Mr. Worthington, the County of Sonoma has applied and received grant money from multiple sources based on the calculation of one charger per electric vehicle (or one dual-headed station per two vehicles).

chargers at an estimated cost between \$10,608,000 and \$19,376,000<sup>21</sup> over the next five and a half years.

These costs do not assume compliance with the American with Disabilities Act (ADA). According to Ms. Nicole Bohn, Director of the Mayor's Office on Disability, the current California Building Code provides an exemption from ADA for charging stations used exclusively for City vehicles. However, San Francisco employees with disabilities who need accommodation consideration may engage in a reasonable accommodation process. The costs could increase if some of the spaces are made compliant with ADA.<sup>22</sup>

Additionally, if the electric chargers are installed adjacent to older buildings or a large concentration of ZEVs are parked in one facility a new electric breaker panel will likely be required to handle the extra electrical load.<sup>23</sup> This could result in significant costs that cannot be estimated at this time, as the location of the vehicles and the existing electrical capacity at each location is not currently known.

#### Charger maintenance, repair and analytics

In addition to charger installation and electricity charging costs, chargers require maintenance and repair. Sonoma County reports needing to replace electric chords and station heads at charging stations for an average cost of approximately \$335 per year per station,<sup>24</sup> although these costs vary significantly and therefore are difficult to project. There are also ongoing costs associated with level-two smart chargers, including annual subscription costs for software. Smart chargers use internet connectivity to gather information and adapt the electric vehicle charging to incur preferred rates. The City currently has a contract for its level-two smart chargers with ChargePoint, Inc., at a rate of \$255 per charger per year.<sup>25</sup> Based on an estimated between 786 and 1,334 chargers and assuming a rate of \$255 per year, this results in total annual costs of between \$200,430 to \$340,170 per year.

#### Estimated Initial and Annual Costs

In the Budget and Legislative Analyst's previous report to the Budget and Finance Subcommittee of April 20, 2017, the total costs to purchase vehicles and install chargers was estimated at between \$31,048,500 and \$95,139,500. As shown in Table 4 below, based on the amendments proposed to the ordinance, the total estimated initial cost to purchase between

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According to Mr. Connor, the State of California uses the formula of one charger per electric vehicle for planning purposes.

<sup>21</sup> 786 vehicles (total minimum electric and plug-in hybrids) less 123 existing chargers equal 663 required chargers x \$16,000 equals \$10,608,000 and 1,334 vehicles (see Table 1) less 123 existing chargers equal 1,211 required chargers x \$16,000 equals \$19,376,000.

<sup>22</sup> According to Mr. Worthington and Mr. Connor, ADA compliance significantly increases the average cost per charger by approximately \$25,000.

<sup>23</sup> According to Mr. Peters, whether the electrical supply would need to be upgraded requires further study and a value engineering approach specific to fleet use.

<sup>24</sup> According to Mr. Peters, our ongoing cost estimates may have been more typical to the first generation chargers. No estimates were provided for newer generations of chargers.

<sup>25</sup> This is comparable to the current rate paid by the State of California.

735 and 1,283 new electric passenger vehicles and install between 663 and 1,211 electric chargers would range from \$30,820,500 to \$79,227,950. Subtracting the revenue realized from selling existing vehicles and the current replacement rate for passenger vehicles results in a net additional new cost ranging from \$19,678,793 (735 Smart Electric Cars, 636 chargers) to \$63,202,380 (1,283 BMWi3 and 1,160 chargers). The source of revenue to fund this net additional cost has not been identified, but would be subject to future annual appropriations by the Mayor and the Board of Supervisors.

**Table 4: Initial and Annual Costs of ZEVs**

	Light duty passenger vehicles, excluding all public safety vehicles	Light duty passenger vehicles, excluding patrol vehicles
Vehicle Purchases	\$20,212,500	\$59,851,950
Charger Installation Fee	10,608,000	19,376,000
<b>Total Costs</b>	<b>\$30,820,500</b>	<b>\$79,227,950</b>
Less Projected Sales Revenue	(367,620)	(1,660,120)
Less Regular Replacement of Vehicles	(10,774,087)	(14,365,450)
<b>Total Net Initial Costs</b>	<b>\$19,678,793</b>	<b>\$63,202,380</b>

Additional costs and savings would be realized for the operation, maintenance and replacement of the electric vehicles and charging stations. For example, additional costs of up to \$340,170 per year may be incurred for potential subscription fees for smart-chargers and up to \$75,000 of potential rebates may be realized from the State of California to purchase 30 ZEVs per year. In addition, annual fuel cost savings could be material but will be impacted by the variability in electricity rates and pricing especially on leased property, concentration of the number of electric vehicles at one location, current and future mix of vehicle types, and fluctuations in gasoline prices.

## POLICY CONSIDERATIONS

There are various implementation issues to consider with the proposed ordinance.

### *Existing Restrictions*

- Recent City ordinances prohibit the City from entering into contracts with companies based in states that bar civil-rights protections for lesbian, gay, bisexual and transgender people, such as the state of Tennessee which currently produces the Nissan Leaf.

### *Lease and Grant Unknowns*

- According to Mr. Donnelly-Landolt, the City leases parking for approximately one-half of the City's entire fleet of passenger vehicles. As electric vehicles will likely need to be charged daily, the City would need to install charging stations on these leased properties. This may create future unknown issues of trying to install level-two chargers and the related electrical infrastructure on leased land.

- The City owns a number of grant-funded vehicles and may not be able to replace these vehicles by the ordinance's deadline due to grant requirements.

#### *Operational Concerns*

- Fully electric vehicles purchased in order to pursue the proposed ZEVs ordinance would limit the City's ability to respond to a disaster. Electric vehicles provide a limited travel range before needing to recharge, which can take ten hours or more. Partial Electric Vehicles and hybrid vehicles provide more flexibility for long distance travel and rapid refueling during a disaster.
- Central Shops has limited capacity to support ZEVs and charger maintenance and repairs and currently has few staff who can work on ZEVs. With fewer combustion engine sedans, the need for maintenance and repairs on these vehicles would decrease. Central Shops may need to outsource maintenance and repairs on ZEVs and associated infrastructure unless existing employees can be retrained to handle electric vehicles. According to Mr. Donnelly-Landolt, current outsourcing of ZEVs takes approximately three weeks, as there are a limited number of certified dealerships and mechanics to work on ZEV. There may be increased costs due to the need for training of current City employees.
- The City is currently relocating Central Shops to recently leased City property in the southern part of the City, at considerable expense. The proposed ZEVs requirements will need to be included in the planning, design and construction of this new Central Shops facility.
- It is not known whether Public Works has the capacity to plan, design and implement the installation of all the required level-two electric chargers and related infrastructure.
- On average, City employees park 300 vehicles on the street or away from the City's parking facilities overnight. With ZEVs, all vehicles would need to park at City parking facilities overnight to receive the necessary electric charging.

#### *City Priorities*

- The City currently has 638 gas hybrid vehicles, which are more efficient than gas only vehicles, representing almost one-half of the City's existing fleet of passenger vehicles. According to Mr. Donnelly-Landolt, the average useful life of a City vehicle is approximately eight to 12 years. Therefore, the proposed ordinance would result in the early replacement of 536 gas hybrid vehicles.
- San Francisco City Charter Section 8A.100 requires that all City Departments pursue a Transit-First Policy. Transit-First states that the City should advocate travel within San Francisco by public transit, bicycle and on foot as an attractive alternative to travel by individual automobiles. According to Mr. Lee, any policy regarding the replacement of passenger vehicles should ensure consistency with the goals of Transit-First.

**RECOMMENDATIONS**

1. Amend the proposed ordinance on page 1, line 21 to insert the word “passenger” to clarify in the City’s Administrative Code that all light duty “passenger” vehicles in the City’s fleet must be Zero Emission Vehicles by 2022, to be consistent with the definitions and provisions in the Environment Code.
2. Approval of the proposed ordinance, as amended, is a policy decision for the Board of Supervisors.