

GREEN FLEET ACTION PLAN

An Updated Action Plan
for the City of Seattle



2019

Prepared by:

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Executive Summary

Human activity is accelerating the rate at which the earth warms. Greenhouse gas (GHG) emissions from transportation and other sources will raise the earth's temperature by an estimated 1.5C between 2030 and 2052. This level of GHG emissions is poised to affect every community around the world. The City of Seattle has an opportunity to minimize the impacts from our business and operations.

In the Puget Sound region, transportation accounts for over 60 percent of the GHG emissions. Therefore, the City has acutely focused on reducing emissions from the Citywide fleet in support of [Seattle's Climate Action Plan](#). The City has made "greening the fleet" a significant effort over the last 10 years and very recently has promulgated policy directives to more aggressively tackle fleet emissions. Combined, these policies have clearly articulated two simple and measurable goals:

1. Reduce GHG emissions by 50 percent by 2025.
2. Use only fossil-fuel-free (F3) fuel by 2030.

This is a major undertaking and the Green Fleet Action Plan (GFAP) update takes the City to the next significant phase in the journey toward achieving these goals. To do this effectively, the GFAP has three guiding principles to help shape what actions the City will pursue to have the most effect on reducing GHG emissions:

1. **Rapid fleet electrification** – build the electric vehicle (EV) charging infrastructure, deploy market-ready EVs, and pilot emerging EV technology in medium- and heavy-duty vehicles.
2. **Reduce fuel use** – implement opportunities to increase service delivery efficiency, turn off engines when not in use, and eliminate unnecessary vehicle miles traveled.
3. **Use Fossil Free Fuels (F3)** – substitute sustainable bio-based fuels as a direct replacement for fossil-based fuels.

Each guiding principle, however, comes with its own challenges and barriers. To reduce fuel use, departments must redefine how they deliver services, challenge internal policies that result in additional vehicle miles traveled and invest in communication technology to reduce travel. To rapidly electrify the fleet, equipment manufacturers must get new vehicles to market and the City must allocate funds for increased acquisition costs of vehicles and charging infrastructure. To substitute liquid fuels, preferred feedstocks must be used in fuel production to meet sustainability goals, and a consistent supply of fuel made available in the region. Consequently, the City has a lot of work to do and the GFAP update provides the necessary actions to overcome these challenges and achieve success.

The City is in a great position to move the needle on fleet GHG emission reductions and become fossil-fuel free through this set of actions. The City employs a green fleet manager to champion implementation; departments have fleet coordinators to push adoption; there is executive leadership and policy directives; and there is an evolving market for vehicles and fuels that is both informed and motivated by our interest. The City of Seattle will continue to lead the nation by aggressively pursuing these actions and lead by example to reduce transportation related GHGs in the municipal fleet as a key climate strategy.

Goal Chart

How the City Reaches the 2025 50% GHG Reduction Goal

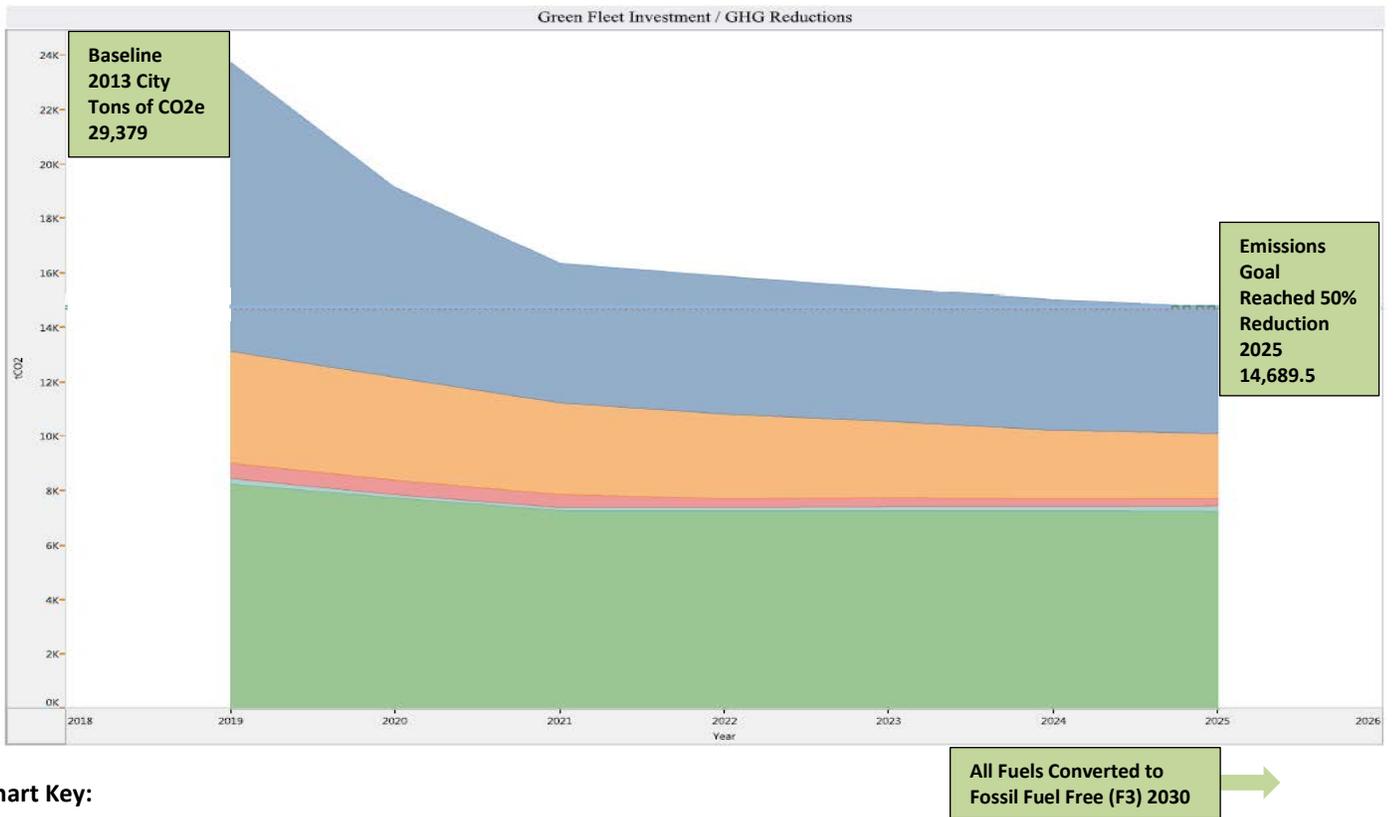


Chart Key:

- Renewable/Biodiesel blend
- Electrification-Light Duty
- Electrification-Heavy Duty
- Renewable/Hybridization Gains
- No Market-Ready Green Options

(technologies may advance quickly and provide many opportunities)

The City's Cost to Go Green

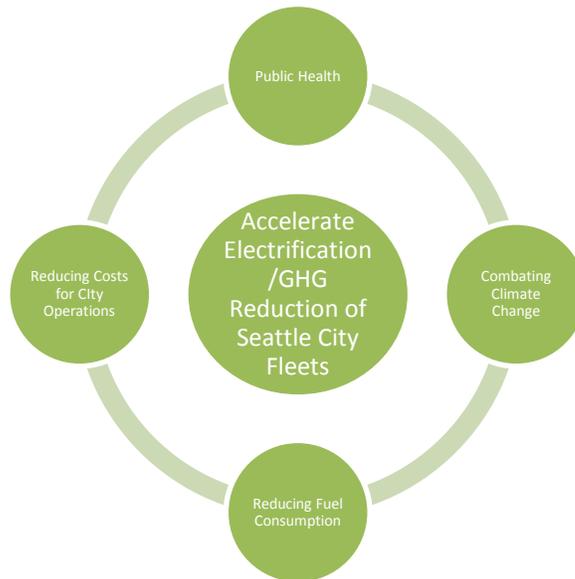
The goals in the Green Fleet Action Plan (GFAP) will require significant financial investment. The estimated cost to implement all action items and meet all current City climate goals is \$28 million over seven years, of which \$4.7 million is currently funded in the 2019 adopted budget. This cost estimate represents today's market but is expected to fluctuate over time as critical technologies advance, at higher or lower cost to those who will use them. The City will continuously re-evaluate technology, cost and funding sources as plan implementation progresses.

The chart above depicts the long-term budgeted items of renewable/bio diesel, EVSE, telematics, battery electric, plug-in hybrid, hybrid electric vehicles, electric retrofits, and alternate fuel heavy duty auxiliary unit costs to give a current view of the projected estimated funding needed to support and meet the goals of the GFAP.

City of Seattle 2019 Green Fleet Action Plan

Introduction

Climate change represents a significant threat to our lives and posterity. The transportation sector accounts for over two-thirds of Seattle’s greenhouse gas (GHG) emissions and is a main driver of climate change. The City of Seattle is committed to protecting public health, combating climate change and reducing fuel consumption and associated costs for City operations.



Since 2003, the City’s Green Fleet Action Plan (GFAP) has helped the City reduce fuel consumption and fleet emissions. Over the last 15 years, the GFAP has advanced Seattle’s national leadership in green fleet efforts and we now have one of the largest fleets of alternative fuel vehicles in the nation. In 2010, *100 Best Fleets* awarded the honor of #1 Green Fleet in North America to the Department of Finance and Administrative Services’ (FAS) Fleet Management (FM). This celebrated accomplishment is a testament to what we can achieve with dedicated resources and committed leadership. In 2016, the City launched [Drive Clean Seattle](#) as a broad transportation electrification initiative and a key climate strategy using the municipal fleet to lead by example. Seattle has made a commitment to the Paris Climate Accord and continues to demonstrate to the rest of the world the City’s commitment to defeating climate change.

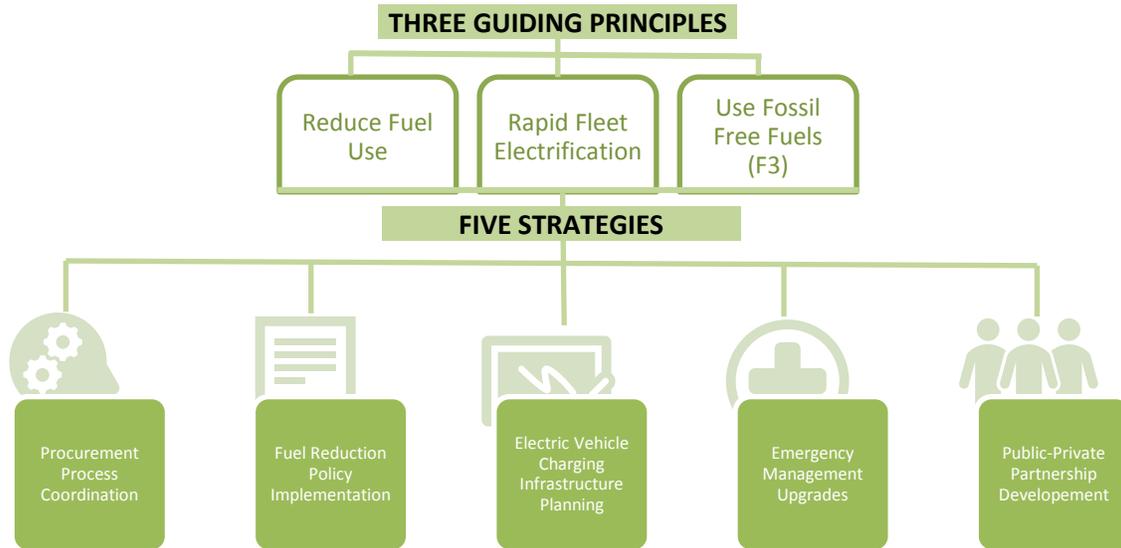
The updated 2019 GFAP renews our commitment to this essential initiative and lays the groundwork to continue achieving tangible results in advancing the City’s green fleet and climate agenda. Additionally, the actions we take will be informed by and reflect the City’s commitment to race and social justice, equity and inclusion.

The 2019 GFAP is a GHG reduction and rapid electrification plan for the City’s fleet of vehicles and equipment. The plan’s objective is to reduce GHG emissions by 50 percent by the year 2025 and being fossil fuel liquid fuel free by 2030 (based on 2013 fuel consumption – methodology outlined in Appendix B). This corresponds to a reduction of petroleum fuel, conversion to fossil-free fuels (F3), and an increase in electrification. This goal was driven in part by the City’s Climate Action Plan 2050 GHG reduction targets as well as [RCW 43.19.648](#), which mandates 100 percent biofuel (renewable) and electric fuel use (to the extent practicable) for all publicly owned vehicles. Other drivers include improving public health and reducing dependence on foreign oil.

While an aggressive goal, FAS believes this target is attainable through the five action items outlined in this plan and resolute executive leadership by departments, the Mayor’s Office and the City Council. Implementation of this plan began Jan. 1, 2019, and progress will be measured annually.

Five Strategies for Success

The success of a GHG reduction strategy and aggressive electrification requires a solid road map. The GFAP identifies five strategies for achieving annual reduction goals as well as advancing the overall agenda set forth by Seattle’s Climate Action Plan. Support from all City departments is critical to achieving this plan.

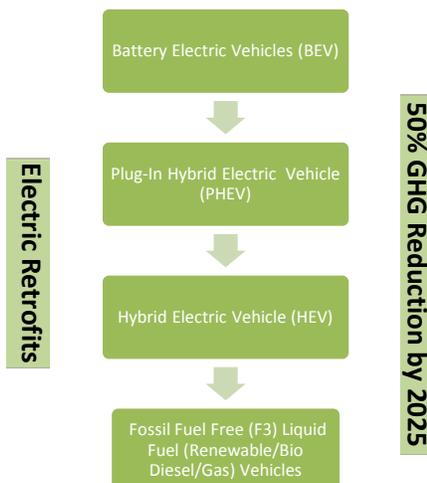


Strategy 1. Procurement Process Coordination

To reduce GHG emissions and rapidly electrify our fleet, the City must strategically purchase fossil-fuel-free vehicles when replacing or adding vehicles. To complete this action, the FAS green fleet program manager, departments and senior automotive engineers (FAS, Seattle City Light and Seattle Public Utilities) must collaborate to meet requirements of a true green vehicle standard that includes all vehicles. To identify the best options for electrifying fleet vehicles for procurement, the City has created a calculator to rank vehicles by using total cost of ownership (TCO) + GHG formulas (see Appendix B). Those making vehicle purchases will follow the procurement process below, which includes a preferred vehicle hierarchy: first, battery electric; second, plug-in hybrid; and third, hybrid; or, with approval from FAS, new generation fossil-fuel free liquid trucks striving for near zero particulate emissions with innovative auxiliary systems. FAS will conduct demo or pilot programs before any fleet wide vehicle purchases.

The procurement process is as follows:

1. When replacing, upgrading or adding vehicles, senior auto engineers, green fleet manager and lease program manager use the decision-hierarchy chart below:



2. Green fleet manager and senior automotive engineers coordinate to ensure all departments use the same decision hierarchy when purchasing vehicles directly.
3. Green fleet manager utilizes TCO/GHG calculator to determine if selected vehicles meet the cost-effective threshold of 10 percent over in-kind replacement to move forward in the procurement process. Costs for early adoption of green technology using pilots will not be a factor in the purchasing decision.
4. FAS and departments determine whether operations will be impacted by new technology. Potential operational impacts include, but are not limited to, fuel availability during emergencies and capability of vehicle to meet basic field operations requirements. If there is not agreement between FAS and departments, a purchase decision can be referred to the Vehicle Use Committee.
5. Green fleet manager and senior automotive engineers will determine the best purchasing method to include joint (e.g., Sourcewell, National Association of State Procurement Officer ValuePoint-NASPO, Washington state, etc.) or internal requests for proposals/invitations to bid.
6. City Purchasing and Contracting Services will use a WMBE inclusion plan with the procurement activity to ensure economic opportunity through City contracting.
7. Procure green vehicle(s) within agreed specifications determined by FAS, departments and senior automotive engineers.

Actions:

- 1) Make all fleet vehicle purchases using the green vehicle selection process for all new or vehicle replacements starting in 2019.**
- 2) Purchase hybrid police patrol vehicles starting in 2019 to convert total patrol car fleet by 2025.**
- 3) Conduct both joint (Sourcewell, National Association of State Procurement Officer ValuePoint-NASPO, Washington state, etc.) and request for proposals starting in 2019 for green vehicles.**
- 4) Pilot green technology that do not yet meet operational or cost criteria for general implementation.**

FAS will continuously re-evaluate the electric and hybrid vehicles available from equipment manufacturers. As technologies mature, it will be possible to replace more types of vehicles with electrically powered engines.

If all electrification options are exhausted, FAS will purchase fossil-fuel-free (F3) liquid fuels that are renewable hydrocarbon biofuels (also called "green" hydrocarbons, biohydrocarbons, drop-in biofuels and sustainable or advanced hydrocarbon biofuels) when a sustainable supply of a preferred fuel is available and recognized by California Air Resource Board (CARB). CARB is the primary agency responsible for actions to protect public health from the harmful effects of air pollution and is an example of the many approaches now used worldwide to address climate change.

Types of renewable hydrocarbon biofuels that will be purchased and used in City fleets include:

- Renewable diesel (R99) – Also called "green" diesel, renewable diesel is a biomass-derived transportation fuel suitable for use in diesel engines. It meets the ASTM D975 specification in the United States.
 - Biodiesel (B99) – Biodiesel is a renewable, biodegradable fuel manufactured domestically from vegetable oils, animal fats or recycled restaurant grease. It meets the ASTM D6751 specification in the United States.
- All renewable fuels will be considered when available but currently are not factored into the reduction goal.*

Actions:

- 1) Purchase R99 or R99 blended with 20 percent used cooking oil biodiesel (B99) by 2019 (requires product transfer document-PTD) with certified pathways verification and no palm oils.
- 2) Continue to purchase used cooking oil B99.
- 3) Conduct a request for proposals for F3 starting in 2019.

Strategy 2. Fuel Reduction Policy Implementation

The greatest opportunity to reduce GHG is to reduce overall fuel use. There are multiple factors that, when adjusted, can save fuel, including driver behavior, routine maintenance, idling reduction and more. The City's annual fleet fuel budget is \$8 million; a successful plan that reduces fuel consumption and rapidly electrifies the fleet will provide financial, environmental and health benefits to the City. Reducing fuel use is also essential due to the projected higher cost of fossil-free fuels.

Executive orders [2016-09](#), [2018-02](#) and [2018-05](#) direct FAS and City departments to assess existing and implement new policies, including but not limited to take-home vehicles, right-sizing of department fleets, reduction of dependency on City-owned vehicles, telecommuting and prohibition of idling (anti-idling). Departments should also consider changes to operational practices and policies that could reduce vehicle miles traveled (VMT).

For right-sizing fleets, vehicle reduction will be enforced, through EO [2018-05](#), by reducing the City fleet and incorporating a right-sizing and fleet utilization standard of 200 miles per month per vehicle as a threshold. The reductions will be reviewed and decided upon by the Vehicle Use Committee (VUC) comprised of the City Budget Director, FAS director and a representative of the Mayor's Office. No vehicle additions will be approved unless the vehicle is selected using the green vehicle selection hierarchy and all off-setting reduction waivers are approved by the VUC.

Any construction of new fossil fuel infrastructure for the City's fleet is prohibited. Fire and police department facilities construction or relocation of existing facilities in accordance with department operational needs and race and social justice goals can be exempted with documentation supporting the exemption and written approval from a deputy mayor.

Actions:

- 1) All departments will evaluate the vehicles considered take-home vehicles and identify which vehicles or groups of vehicles can be eliminated from the take-home pool.
- 2) All departments will target for elimination those vehicles that travel less than 200 miles a month in their fleet reduction proposals required by EO [2018-05](#).
- 3) City departments will enforce the policies established in executive orders [2016-09](#), [2018-02](#) and [2018-05](#) to include telecommuting.
- 4) All departments will make the necessary internal policy changes to reduce unnecessary VMT by Dec. 30, 2022.
- 5) Pilot a telematics system and report on its cost effectiveness by Jun. 30, 2019. FAS will provide a vehicle telematics strategy by Dec. 31, 2019.
- 6) Procure a telematics system Q2 2020.
- 7) All departments will determine third-party rental options that will be used to offset vehicle and equipment reductions as necessary.

FAS will provide an annual report to department directors and the Mayor's Office, no later than March 30 of each year, reflecting the prior year's performance. This annual report will consist of the following:

- Progress toward goals set within the GFAP.
- Exceptions made to fleet procurement standards and green fleet policies.
- Policy recommendations to achieve continued progress toward 2025 goal of 50 percent GHG reduction and the 2030 goal of having a fossil-fuel-free fleet.

FAS will provide quarterly fuel reports to fleet coordinators for fuel use, including lower than average fuel economy (MPG) with excessive fuel use, by vehicle. The City will use this information to track progress on the overall City GHG goal, policy and to ensure compliance with executive orders [2016-09](#), [2018-02](#) and [2018-05](#).

Actions:

- 1) Provide an annual report by March 30 to directors and the Mayor's Office to include an update on the 50 percent reduction plan over six years at 7.8 percent GHG reduction per year.**
- 2) Provide quarterly reports to City departments showing their progress on meeting fuel reduction targets.**
- 3) Send quarterly vehicle efficiency reports to departments identifying vehicles that operate out of normal MPG efficiency for a class of vehicle.**

Strategy 3. Electric Vehicle Charging Infrastructure Planning

In 2005, Seattle City Light became the first electric utility in the country to achieve zero net GHG emissions. It has maintained this carbon-neutral status while providing clean electricity at some of the lowest rates in the country. The abundance of this resource and its low cost are the keys to electrifying the City's fleet. But to rapidly electrify the fleet, the City must, develop and maintain a robust charging infrastructure (EVSE) network by assuming the entire fleet is electrified and pricing out all fleet vehicle parking spots. It is critical to have infrastructure in place before vehicles are purchased. FAS will assist in forming teams with City departments to install EVSE infrastructure, maintenance and ensure accessibility of charging stations, as well as identify locations for backup generators required for emergency response. The green fleet manager will continue coordinating EVSE installation projects around the city and will be responsible for program management of EVSE infrastructure.

Actions:

- 1) Install EVSE infrastructure 2019 through 2025.**
- 2) Any capital departments doing major renovations, remodels or new construction will evaluate the need for EVSE and incorporate into the project.**
- 3) Determine costs for all fleet department vehicle(s) by parking spot and location for EVSE needs in 2019-2025.**
- 4) Install contingency generators for EVSE sites (emergency management teams will assist in determining best locations).**
- 5) Incorporate EV charging needs in the Emergency Fuel Contingency Plan.**

Strategy 4. Emergency Management Upgrades

Emergency management vehicles are any vehicle that a department deems necessary for emergency response, including but not limited to vehicles used in public safety, utilities, roads maintenance, federal or state compliance, and those designated and authorized to respond to an emergency or a life-threatening situation. They also include vehicles that will be necessary for the City's response to and recovery from a major disaster, such as an earthquake.

Emergency management vehicles will be monitored closely by both FAS and departments as equipment manufacturers provide green fleet alternatives in the form of battery electric, plug-in hybrid, hybrid or new generation fossil-fuel-free liquid trucks that have near zero particulate emissions. Currently, hybrid systems are being installed on some Seattle Fire Department ambulance vehicles to assist in electrifying the fleet.

Actions:

- 1) Purchase emergency management vehicles with new green options as the market and technology changes, with an assessment of how these operations would be impacted, for new or replacement vehicles starting in 2019.**
- 2) Partner with the Office of Emergency Management and department operations to identify what vehicles can be electrified and still provide adequate first response to emergencies.**
- 3) Continue to install hybrid systems and green technology in emergency vehicles as available.**
- 4) Incorporate EV charging needs in the Emergency Fuel Contingency Plan, including but not limited to providing generator fueling for electric vehicles at selected locations.**

Strategy 5. Public-Private Partnership Development

A team of FAS, Office of Sustainability and Environment (OSE), SCL and Seattle Department of Transportation (SDOT) staff will partner to advance the City's electrification infrastructure goals by analyzing the opportunity for publicly accessible charging networks. FAS and OSE will partner with public and private firms to promote the use of alternative fuel vehicles, to increase energy security, reduce fleet operating costs, and improve the environment while reducing petroleum use in the transportation sector. Together, these can create economic opportunity and improve public health. The effective methods will include partnering and creating collaborations in building an effective EVSE network and third-party electrified mobility services that serve both public and private goals to reduce GHGs. During 2019 through 2030, FAS will engage in the following strategies to encourage City fleets to reduce fossil-fuel use and carbon emissions:

- Partner with Puget Sound Clean Air Agency, Western Washington Clean Cities and Washington State Department of Commerce to educate regional fleets and individuals on alternative fuels, vehicle availability and green fueling options.
- Collaborate with the Washington State Public Fleet Management Association (PFMA) to promote fleet best practices and clean fleet initiatives among Washington's government fleet professionals.
- Promote carbon reduction strategies and energy conservation tips through the FAS website, special communiques, signage at electric charging stations, and through video and other electronic mediums.
- Encourage employees to walk, ride bikes, use EVs or use public transportation to reduce petroleum use and carbon emissions as an alternative to single-or low-occupancy vehicle travel.

Actions:

- 1) Procure third-party electrified mobility services by Q2 2019.**
- 2) Investigate opportunities to install EV charging stations in Seattle facilities for joint City fleet and third-party electrified mobility services use.**
- 3) Deploy EVs and infrastructure in traditionally underserved communities to improve areas with poor air quality.**
- 4) Form partnerships in historically underserved communities to create job opportunities.**

Target Summary Table

Strategies & Actions		Targets
Procurement Process Coordination	<ol style="list-style-type: none"> 1. Make all fleet vehicle purchases EV sedans, light/heavy trucks, SUVs, vans, etc., using the green vehicle selection process for new or vehicle replacements starting in 2019. 2. Purchase hybrid police vehicles starting in 2019 to complete conversion of total of patrol car fleet by 2025. 3. Conduct both joint (Sourcewell, NASPO Valuepoint, State, etc.) and internal request for proposals starting 2019 for green vehicles. 4. Pilot electric and hybrid vehicles that do not yet meet operational or cost criteria for general implementation. 5. Purchase R99 or R99 blended fuel with 20 percent cooking oil biodiesel (B99) by 2019 (requires product transfer document-PTD) with certified carbon intensity pathways verification and no feedstock containing palm oils. 6. Purchase used cooking oil B99. 7. Conduct request for proposals for F3 starting in 2019. 	<p>100% of all new/replacement vehicles will be chosen from green vehicle standard using the City's GHG+ TCO with cost of carbon calculator to determine best purchase.</p> <p>Solicit RFP in 2019 to purchase renewable fuels (F3) by late 2019.</p>
Fuel Reduction Policies	<ol style="list-style-type: none"> 1. All departments will evaluate vehicles that are considered "take-home" vehicles and identify which vehicles or groups of vehicles can be eliminated from the take-home pool. 2. All departments will target for elimination those vehicles that travel less than 200 miles a month in their fleet reduction proposals required by EO 2018-05. 3. All departments will enforce the policies established in executive orders 2016-09, 2018-02 and 2018-05. 4. All departments will make the necessary internal policy changes to reduce unnecessary VMT by Dec. 30, 2022. 5. Pilot a telematics system and report on its cost effectiveness by June 30, 2019. FAS will provide a vehicle telematic strategy by Dec. 31, 2019. 6. All departments will determine third-party rental options that will be used to offset vehicle and equipment reductions as necessary. 7. Provide an annual report by March 30 to department directors and the Mayor's Office to include an update on the 50 percent reduction plan over six years at 7.8 percent GHG reduction per year. 8. Provide quarterly target reports to City departments showing their progress on meeting fuel reductions targets. 9. Send quarterly vehicle efficiency reports to departments identifying vehicles that operate out of normal MPG efficiency for a class of vehicle. 	<p>Policies for VMTs, take-home, telecommuting, etc., will be reviewed and updated no later than Dec. 30, 2019 in accordance with EOs 2016-09, 2018-02, 2018-05.</p> <p>Solicit RFP in 2020 to purchase telematics system by Q2 2020.</p>
EVSE Planning	<ol style="list-style-type: none"> 1. Install EVSE infrastructure 2019 through 2025. 2. Any capital departments doing major renovations, remodels or new construction will evaluate the need for EVSE and incorporate into the project. 3. Determine costs for all fleet department vehicle(s) by parking spot and location for EVSE needs in 2022-2025. 4. Install contingency generators for EVSE sites (emergency management teams will assist in determining best locations). 5. Incorporate EV charging needs in the Emergency Fuel Contingency Plan. 	<p>Install charging stations in fleet facilities for future identified vehicles through 2025.</p>

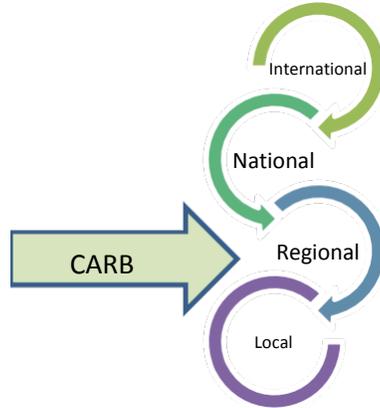
Emergency Management Upgrades	<ol style="list-style-type: none"> 1. Purchase emergency management vehicles with new green options as the market and technology changes, with an assessment of how these operations would be impacted, for new or replacement vehicles starting 2019. 2. Partner with Office of Emergency Management and department operations to identify what vehicles can be electrified and still provide adequate first response to emergencies. 3. Continue to install hybrid systems and green technology in emergency vehicles as available. 4. Incorporate EV charging needs in the Emergency Contingency Fuel plan, including but not limited to providing generator fueling for electric vehicles at selected locations. 	FAS shall partner with OEM no later than Feb. 1, 2019 to identify emergency options to include electrification of vehicles and generator backup.
Public Private Partnership Development	<ol style="list-style-type: none"> 1. Procure third-party electrified mobility services. 2. Investigate opportunities to install Electric Vehicle (EV) charging stations in Seattle facilities for joint City fleet and third-party electrified mobility services use. This initiative is meant to encourage City of Seattle employees to purchase EVs that produce zero emissions. 3. Deploy EVs and infrastructure in historically underserved communities to improve areas with poor air quality. 4. Form partnerships in historically underserved communities to create job opportunities. 	Solicit RFP in 2019 to purchase third-party electrified mobility service by Q2 2019.

Appendix A – GHG Methodology & Baseline Inventory

Methodology

$$\text{GHG}_{\text{Fuels}} + \text{GHG}_{\text{Electricity (EVs)}} = \text{GHG}_{\text{Total}}$$

FUEL Inventory Reporting Standard:



A **regional** reporting standard set forth by the **California Air Resources Board (ARB)** Low Carbon Fuel Standards (LCFS)^{1,2} will be used to inventory the City’s greenhouse gas (GHG) emissions based on 2013 fuel consumption³. International and National standards are too broad in scope and provide emissions factors (EFs) with carbon intensities that are not consistent with our regional fuel types and pathways. While local standards may provide the most accurate EFs, at this time there is only one study⁴ available from Washington state specifically discussing local carbon intensity EFs. While the Washington state study may provide the most applicable localized factors for select fuels, these EFs are not widely published or used and would provide data that is not comparable to other local and regional inventories. Because Washington carbon intensity for fuels is very similar to California, ARB EFs will be used to provide the most accurate, reproducible inventory.

The combustion of fossil fuels in mobile sources emits CO₂, CH₄ and N₂O. As such, all three gasses have already been converted to CO₂ equivalents² (CO₂e) and included in this inventory.

GHG emissions for fuels: CO₂e

$$\text{CO}_2\text{e emissions} = \text{Carbon Intensity Value}^2 \times \text{Fuel Energy Content}^4 \times \text{Fuel consumed}^3$$

Example calculation:

- Carbon Intensity for diesel = 94.71 gCO₂e/MJ
- Fuel Energy Content diesel = 135.5 MJ/gal
- Diesel fuel consumed in 2012 = 1,060,914 gal

Option 1: Diesel CO₂e = 94.71 gCO₂e/MJ x 135.5 MJ/gal x 1,060,914 gal x 1 kg/1000g = 13,614,927 kgCO₂e

Option 2: Fuel Type MTCO₂e = Carbon Intensity x Energy Content(MJ)/453.59g x Fuel Type Gallons/2204.6=MTCO₂e

Baseline Year & Metrics

2013 was selected as the baseline year from which all subsequent benchmarks will be measured. Baseline and annual inventories will quantify emissions as a function of the following metrics:

- Fuel consumption
- Number of vehicles
- Vehicle miles traveled (VMTs)

2013 Baseline Inventory

GHG Fuel					
Fuel Type	2013 Gallons	Carbon Intensity* (gCO2e/MJ)	Energy Content ** (MJ/gal)	kgCO2e	MTCO2e
Biodiesel B20 ¹	31,845	78.936	124.8	315,771	316
CNG ²	483.4	68.00	121.3	3,987	4.0
Diesel ³	1,130,758	94.71	135.5	14,511,249	14,511
Propane ⁴	4,207	83.13	88.1	30,810	30.8
Unleaded Gas ⁵	1,284,063	93.21	121.3	14,518,095	14,518
TOTAL	2,451,356	-	-	29,379,912	29,379

2018 Progress Report

Fuel Type	2018 Gallons	Carbon Intensity* (gCO2e/MJ)	Energy Content** (MJ/gal)	kgCO2e	MTCO2e
Biodiesel B20 ¹	1,094,575	78.936	124.8	10,853,105	10,853
Diesel ³	183,217	94.71	135.5	2,351,261	2,351
Propane ⁴	14,646	83.13	88.1	107,264	107
Unleaded Gas ⁵	1,118,641	93.21	121.3	12,647,772	12,648
Total	2,411,079	-	-	25,959,403	25,959

Total Reduction Over Four Years

2013 Fleet GHG Emissions			
Fuel	29,379	MTCO2e	
Electricity	1.04	MTCO2e	
TOTAL	29,380.04	MTCO2e	

2018 Fleet GHG Emissions			
Fuel	25,959	MTCO2e	
Electric (Carbon Neutral)		MTCO2e	
TOTAL	25,959	MTCO2e	

*Carbon Intensity Values obtained from California Air Resources Board (CARB) Low Carbon Fuel Standard (LCFS) Carbon Intensity Lookup Tables. http://www.arb.ca.gov/fuels/lcfs/010611lcfs_lutables.pdf

References below cite pathway identifier number and analysis notes

¹BIOD002

²CNG002 (Sold as gallons of gas equivalent – GGE – therefore gasoline energy content was used)

³ULSD001

⁴LNG001 (LNG used in the absence of published LPG factor – difference assumed to be <10%)

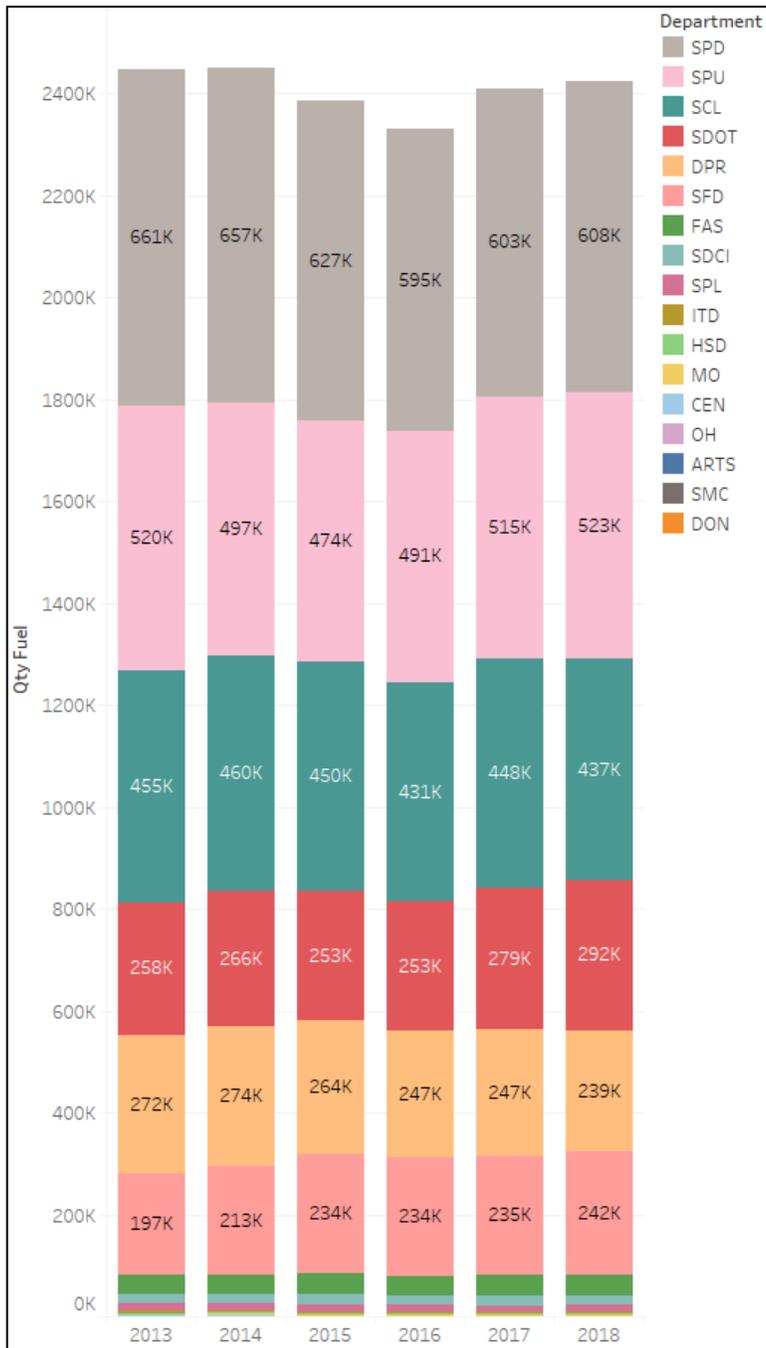
⁵90% CBOB001 + 10% ETHC001

**MIT Unit & Energy Conversions http://mitenergyclub.org/sites/default/files/Units_ConvFactors.MIT_EnergyClub_Factsheet.v8.pdf

***2012 SCL Retail Emissions Factor <http://www.theclimateregistry.org/resources/protocols/general-reporting-protocol/#jump3>

Note: Currently all fuels are fossil based and if fuels become F3, purchases of vehicles or fuels will be considered as an option.

Fuel Consumption by Department (Gallons)



Total Vehicle Count

GHG Emissions per Vehicle		
	2013	2018
Total GHG (kgCO2)	29,379,912	25,959,403
Total Vehicles	3915	4125
kgCO2/Vehicles	7504	6293

Vehicle Miles Traveled (VMT) by Department & GHG Emissions per VMT

Vehicle Miles Traveled		
Department	2013	2018
Arts & Cultural Affairs	5,468	3,984
Seattle Center	26,795	26,137
Dept. of Neighborhoods	5,055	3,989
Dept. of Parks and Recreation	2,141,924	2,149,793
Finance & Administrative Services	734,705	693,761
Human Services Dept.	72,648	94,837
Information Technology Dept.	49,190	53,225
Mayor's Office	12,487	29,849
Office of Housing	18,836	13,005
Seattle City Light	3,346,454	3,173,809
Seattle Dept. of Construction & Inspections	398,130	424,927
Seattle Dept. of Transportation	1,615,036	1,768,329
Seattle Fire Dept.	1,089,829	1,167,726
Seattle Municipal Court	7,046	4,766
Seattle Police Dept.	5,659,457	6,224,788
Seattle Public Library	144,478	147,221
Seattle Public Utilities	3,035,579	2,860,851
Grand Total	18,363,117	18,840,997

GHG Emissions per VMT		
	2013	2018
Total GHG (kgCO ₂)	29,379,912	25,959,403
Total VMTs	18,128,332	18,840,997
kgCO₂/VMT	1.62	1.37

Appendix B – City Total Cost of Ownership Calculator

Acquisition + Life Maintenance + Life Fuel + Cost of Carbon (\$75 per MTCO2e) – Salvage Cost=

Note: Cost of carbon is developed and managed by OSE

(Below is an Example Only)

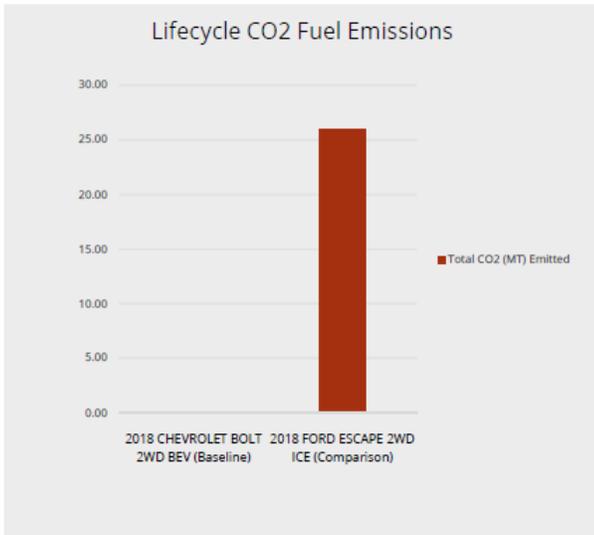
Procurement Summary



	2018 CHEVROLET BOLT 2WD BEV (Baseline)	2018 FORD ESCAPE 2WD ICE (Comparison)
Number of Vehicles Procured	1	1
Years of Use/Ownership	10	10
Miles Procured	55,000	55,000
Acquisition Cost \$	(34,790)	(19,699)
Fuel \$	-	(9,294)
Maintenance and Repairs \$	(10,102)	(14,921)
Carbon \$	-	(1,943)
Vehicle Total Cost \$	(44,892)	(45,858)
Charging Infrastructure \$	-	-
Estimated Salvage \$	6,958	1,970
Total Cost of Ownership \$	(37,934)	(43,888)
Total Cost / Mile \$	(0.690)	(0.798)

**The greenest option (baseline) is
16% less expensive
than the alternative (comparison) vehicle**

Societal Benefit Summary



2018 CHEVROLET BOLT 2WD BEV (Baseline)	VS	2018 FORD ESCAPE 2WD ICE (Comparison)
0 gallons		2,292 gallons

**The greenest option (baseline) fleet uses
2,292 fewer gallons of gasoline
than the alternative option (comparison) fleet**