



DATE: April 21, 2020

CATEGORY: Consent

DEPT.: City Manager's Office

TITLE: **2018 Government Operations
Greenhouse Gas Inventory**

RECOMMENDATION

Adopt the 2018 government operations greenhouse gas emissions inventory.

BACKGROUND

In March 2010, the City adopted voluntary, absolute greenhouse gas (GHG) reduction targets for municipal operations toward a goal of reducing emissions 80 percent below 2005 levels by 2050. The adoption of the targets was in response to the Global Warming Solutions Act of 2006 (Assembly Bill 32), which requires California to reduce Statewide GHG emissions. Additional interim targets were added in May 2015 as part of the Municipal Operations Climate Action Plan. Starting in 2009, the City Council approved a series of implementation plans to address sustainability and work toward these reduction targets, including Environmental Sustainability Action Plans 1, 2, and 3. The most recent plan, Sustainability Action Plan 4 (SAP-4), spanning 2019-22, was adopted by Council on October 22, 2019.

The City completed an inventory of its 2005 government operations GHG emissions, which serves as the baseline for future years. Mountain View's current GHG reduction targets for government operations, expressed as a percentage below 2005 levels, are shown in Table 1. To measure its progress against these targets, the City committed to conducting an inventory of emissions from its operations every five years.

Table 1: Adopted Government Operations GHG Reduction Targets

Year	Target Emissions Reduction
2010	15 percent
2015	20 percent
2020	25 percent
2025	34 percent
2030	44 percent
2035	53 percent
2040	62 percent
2045	71 percent
2050	80 percent

Conducting a government operations GHG emissions inventory involves measuring the energy and fuel consumed, as well as the waste generated, through the agency's operations and calculating the quantity of GHG emissions resulting from those activities. All of the City's government operations GHG inventories have used a national standard, the Local Government Operations Protocol, developed by the California Air Resources Board, the California Climate Registry, and the International Council for Local Environmental Initiatives (ICLEI). This protocol provides standard accounting principles, boundaries, quantification methods, and procedures for reporting GHG emissions from local government operations. Although the protocol provides a common national framework for all local governments to assess GHG emissions, any GHG inventory represents an estimate of emissions using the best available data and calculation methodologies at the time it was conducted. These estimates are subject to change as better data and calculation methodologies become available.

ANALYSIS

In 2018, government operations generated 8,700 metric tons of carbon dioxide equivalent (MT CO₂e), 26.1 percent less than 2015 emissions and 51.1 percent less than 2005 baseline emissions, which is a much more significant reduction than the targets for this time frame. The Shoreline landfill remained the largest source of emissions (46 percent), followed by the City's vehicle fleet and off-road equipment (20 percent), buildings and facilities (16 percent), and employee commutes (15 percent).

Figure 1: 2018 Government Operations GHG Emissions Inventory (8,700 MT CO₂e)

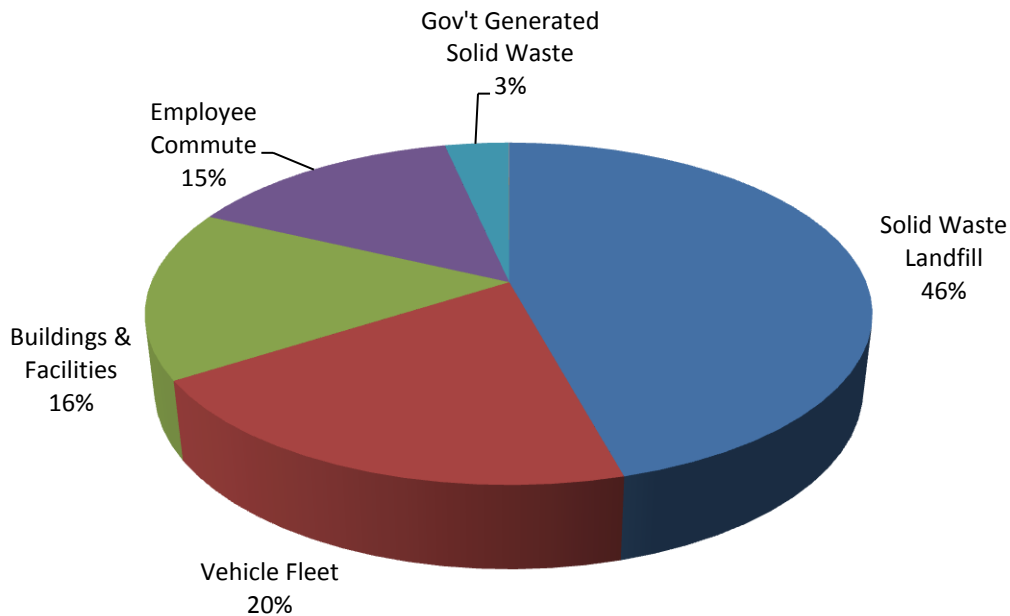


Table 2 shows both emissions and percent of total emissions by sector for the baseline year (2005), the previous inventory (2015), and the current inventory (2018).

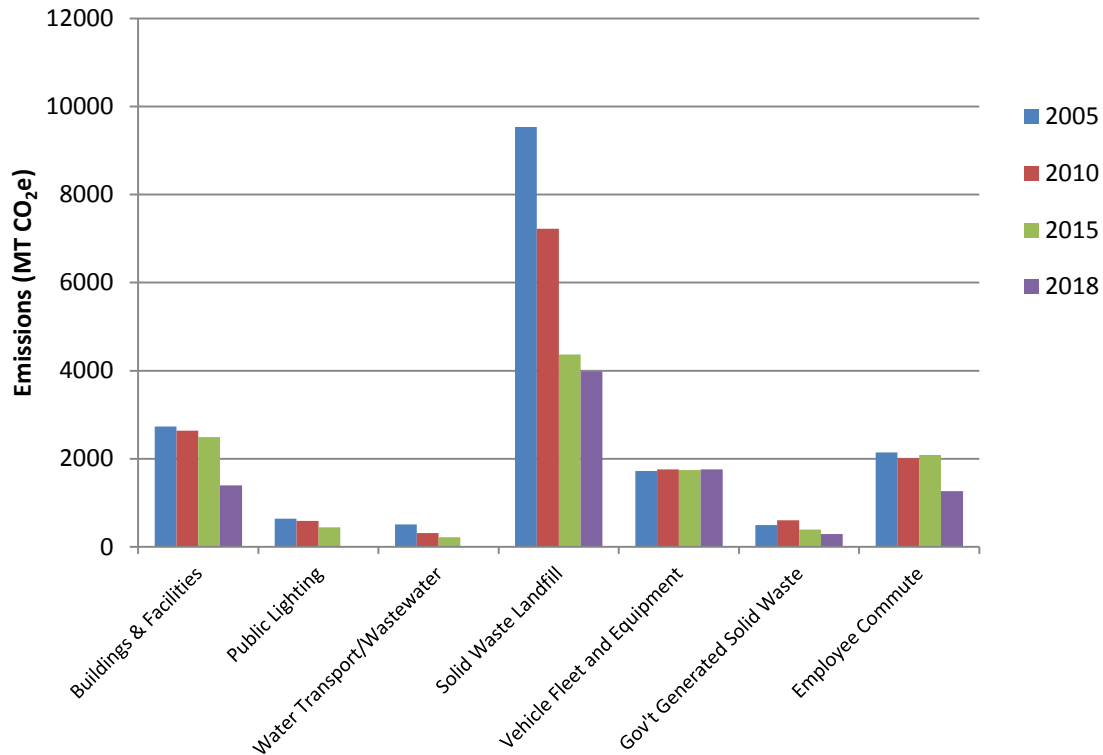
Table 2: Total and Percent Change in GHG Emissions, 2005, 2015, 2018

Sector	2005 GHGs (MT CO ₂ e)	2005 GHGs (%)	2015 GHGs (MT CO ₂ e)	2015 GHGs (%)	2018 GHGs (MT CO ₂ e)	2018 GHGs (%)	Change 2015-2018 (%)	Change 2005-2018 (%)
Buildings and Facilities	2,736	15.4	2,496	21.2	1,395	16.0	-44.1	-49.0
Public Lighting	640	3.6	447	3.8	0	0.0	-100	-100
Water Transport	377	2.1	225	1.9	1.6	0.0	-99.3	-99.6
Wastewater Treatment	134	0.8	1.8*	0.0*	1.1	0.0	37.6	-99.2
Solid Waste Landfill	9,531	53.6	4,368	37.1	3,981	45.8	-8.9	-58.2
Vehicle Fleet and Equipment	1,722	9.7	1,744	14.8	1,759	20.2	0.8	2.1
Gov't Gen. Solid Waste	495	2.8	394	3.3	294	3.4	-25.2	-40.5
Employee Commute	2,148	12.1	2,091	17.8	1,268	14.6	-39.4	-41.0
TOTAL	17,738	100	11,767*	100	8,700	100	-26.1	-51.1

* Indicates corrected value compared to originally reported 2015 inventory.

Figure 2 illustrates the changes in emissions by sector for each year in which a government operations inventory has been conducted.

Figure 2: Greenhouse Gas Emissions by Sector, 2005, 2010, 2015, 2018



The total emissions reduction between 2015 and 2018 was 3,068 MT CO₂e. The largest source of emissions reduction was from electricity use, which is captured in five sectors: Building and Facilities, Public Lighting, Water Transport, Wastewater, and Solid Waste Landfill. In 2017, the City began purchasing 100 percent renewable electricity from Silicon Valley Clean Energy (SVCE), which eliminated emissions associated with electricity use. Therefore, while electricity use across all areas of the City's operations increased by 2 percent between 2015 and 2018, there was still a decrease of 2,017 MT CO₂e from electricity use in this time frame due to the switch to 100 percent renewable electricity. However, while municipal electricity use no longer creates GHG emissions, there are still benefits from implementing energy efficiency initiatives, which yield ongoing operational cost savings in the short- and long-term.

Summary of Emissions Changes by Category

- **Solid Waste Landfill (45.8 percent of total 2018 emissions):** Landfill emissions decreased by 8.9 percent between 2015 and 2018. The GHG emissions attributed to

this sector are from the operation of the Shoreline Landfill, which has been closed since the early 1990s. As organic matter in the landfill decays, it produces methane, a potent greenhouse gas. Methane and other landfill gases are expected to be generated through about 2042 at gradually decreasing levels. Direct leakage of a small fraction of the methane produced accounts for 99.9 percent of emissions associated with the landfill.

The Shoreline Landfill has a highly efficient landfill gas collection system, which captures 93.7 percent of the methane produced. Some of this collected gas is used by two microturbines to generate on-site power for the City's sewage pump station, flare station, and irrigation pump station. The remainder of the collected methane is combusted (burned off) through flaring, significantly reducing the resulting GHG emissions. In some years, the City sells landfill gas to Google LLC (Google) for use in its gas generation system, which provides energy to some of its facilities. While no landfill gas was sold to Google in 2018, this did not have a significant effect since emissions from flaring of landfill gas accounted for less than 0.1 percent of total landfill emissions.

- **Vehicle Fleet and Equipment (20.2 percent of total 2018 emissions):** Emissions from the municipal vehicle fleet increased by 0.8 percent between 2015 and 2018. This sector includes emissions from gasoline and diesel use in fleet vehicles as well as off-road equipment. While diesel use was down, gasoline consumption increased 2.4 percent between 2015 and 2018. An increase in estimated refrigerant use in vehicles due to a larger vehicle fleet also contributed to the increase in emissions. The City's vehicle fleet added four new hybrid and two new battery electric vehicles between 2015 and 2018, bringing the fleet total to 47 hybrid and six fully electric vehicles out of 274 total vehicles in active use. Approximately 48 percent of active fleet vehicles in 2018 were passenger vehicles (including sedans, minivans, and sport utility vehicles), of which 40 percent were either hybrid or electric.
- **Buildings and Facilities (16.0 percent of total 2018 emissions):** Emissions from buildings and facilities decreased by 44.1 percent between 2015 and 2018. This category includes emissions associated with building electricity and natural gas use, fuel used in stationary generators, and refrigerant-containing equipment. GHG reductions in this category were due to the purchase of 100 percent renewable electricity from SVCE. Natural gas use at City facilities, along with associated GHG emissions, increased 22 percent from 2015 to 2018, offsetting some of the electricity reductions. Addressing this source of emissions will be necessary to meet the City's adopted GHG reduction goals for government operations (shown in Table 5), as natural gas use now comprises 15 percent of total GHG

emission from City operations. Table 3 summarizes the changes in energy use at City facilities.

Table 3: Electricity and Natural Gas Consumption at City Facilities, 2015 and 2018

Facility	Electricity (kWh)			Natural Gas (Therms)		
	2015	2018	Percent Change	2015	2018	Percent Change
Civic Center (City Hall and Center for the Performing Arts)	1,922,396	2,222,779	15.6%	61,691	107,576	74.4%
Library	1,270,019	1,079,032	-15.0%	12,915	26,382	104.3%
Police/Fire Administration Building	1,200,105	1,213,505	1.1%	21,571	28,458	31.9%
Municipal Operations Center	766,057	703,476	-8.2%	14,700	23,604	60.6%
Community Center	444,876	70,004	-84.3%	8,981	2,206	-75.4%
Minor Facilities	415,094	482,496	16.2%	200	0	-100.0%
Mountain View Sports Pavilion	402,491	393,278	-2.3%	6,618	5,262	-20.5%
Senior Center	356,769	465,758	30.5%	9,957	13,782	38.4%
Fire Stations	329,903	337,471	2.3%	13,547	18,118	33.7%
Other Community Services Facilities	230,302	508,842	120.9%	10,075	12,276	21.8%
Eagle Park Building and Pool	201,213	228,030	13.3%	31,905	0	-100.0%
Whisman Sports Center	156,303	108,950	-30.3%	3,915	2,035	-48.0%
TOTAL	7,695,528	7,813,621	1.5%	196,075	239,699	22.2%

Natural gas use increased at many City facilities between 2015 and 2018, primarily due to outdated system controls and deterioration of older equipment. Many of these systems are scheduled for upgrades or replacement in the next few years to address these issues. Other reasons for significant changes in energy use at City facilities from 2015 to 2018 include the following:

- Civic Center: Additional electric vehicle chargers were installed in the parking garage in 2016, contributing to increased electricity use.
- Library: A new high-efficiency chiller was installed, decreasing electricity use.
- Municipal Operations Center (MOC): Solar photovoltaic panels were installed at the MOC in 2016, contributing to a reduction in electricity use. These panels were offline for half of 2018, so staff expects a greater reduction in electricity use in future years.

- Community Center: The new Community Center was under construction in 2018, significantly reducing electricity and natural gas use.
 - Minor Facilities: The increase in electricity use is primarily due to the installation of five dual-port electric vehicle chargers in the parking garage at 850 California Street in 2016.
 - Senior Center: Increased energy use is likely due to an increase in rentals and functions at this facility between 2015 and 2018.
 - Fire Stations: Implementation of system upgrades led to a 53 percent decrease in natural gas use at Fire Station No. 4. Repair of equipment at Fire Station No. 2 replaced controls and led to a 10 percent decrease in natural gas use between 2015 and 2018.
 - Other Community Service Facilities: Most of the increase in electricity use is due to the City taking over the management of utility accounts for Michaels at Shoreline. Additionally, the new Teen Center is much larger than the previous building, leading to an increase in energy use.
 - Eagle Park Building and Pool: The natural gas meter at this facility was malfunctioning in 2017 and 2018 and did not record usage during the inventory year. Pacific Gas and Electric has since repaired the meter but did not provide an estimate for 2018 usage.
- **Employee Commute (14.6 percent of total 2018 emissions)**: Employee commute emissions in 2018 were about 26.1 percent lower than in 2015. This is due to both a decrease in the number of City employees and a change in commuting habits. Use of transit, biking, and walking as part of commute trips increased significantly from 2015 to 2018. Notably, transit accounted for 18.6 percent of total commute miles in 2018 as the average transit trip was longer than the average driving trip. Table 4 summarizes the results of employee commute surveys conducted for 2015 and 2018.

Table 4: Employee Commute Modes of Travel, 2015-2018

Mode	Percent of Commute Trips		Percent of Commute Miles	
	2015	2018	2015	2018
Drive Alone	79.9%	70.5%	80.6%	69.5%
Carpool	8.1%	6.0%	8.5%	9.3%
Transit	7.6%	14.3%	10.0%	18.6%
Bike	2.6%	4.5%	0.8%	1.2%
Walk	1.8%	4.8%	0.2%	1.4%

* Numbers may not add to 100 percent due to rounding.

Between 2015 and 2018, the City implemented a pilot program to allow some employees to telecommute, which decreased GHG emissions by reducing the total number of commute trips. The City’s commuter benefit programs, including transit and bicycle stipends, also support increased use of these commute modes and contribute to GHG reductions.

- Government-Generated Solid Waste (3.4 percent of total 2018 emissions):** Emissions from government-generated solid waste decreased by 25.2 percent between 2015 and 2018 due to increased diversion of organic waste from the landfill. California’s mandatory organics recycling law (Assembly Bill 1826) took effect in 2016, requiring large commercial entities (including City facilities) to divert their organic waste from landfills. Increased diversion of commercial organic waste is reflected in the most recent waste characterization study conducted by the City, which was used to estimate emissions in this category.
- Water Transport (0 percent of total 2018 emissions):** Emissions in this category decreased by 99.3 percent between 2015 and 2018 due to the City’s purchase of 100 percent renewable electricity from SVCE. This category includes energy and fuel use for water transport, including water delivery pumps, sprinklers and irrigation control, stormwater management, and other purchased electricity use for water delivery. While electricity emissions in this category were eliminated with the switch to renewable electricity, there is still a small amount of emissions (1.6 MT CO₂e) from diesel fuel used to power pumps.
- Wastewater Treatment (0 percent of total 2018 emissions):** Emissions from energy and fuel used to power sewage infrastructure decreased 37.6 percent between 2015 and 2018 due to a decrease in diesel fuel consumption. Original reported emissions in 2015 for this category were negative 12 MT CO₂e due to on-site microturbines that produce electricity. However, while this site produced more energy than it consumed (leading to a negative value for electricity

production), the associated emissions should have been reported as zero rather than negative. Corrected values show a slight decrease in emissions rather than an increase. While electricity emissions were zero in both 2015 and 2018 due to on-site power generation and purchase of renewable energy, there are still small amounts of emissions (1.1 MT CO_{2e}) for sewage infrastructure from natural gas and diesel use.

- **Public Lighting (0 percent of total 2018 emissions):** Emissions associated with electricity used to power traffic lights, streetlights, park lighting, and other public lighting decreased by 100 percent between 2015 and 2018. The elimination of these emissions, which comprised 3.6 percent of the City’s baseline 2005 inventory, was due to the City’s purchase of 100 percent renewable electricity from SVCE.

Greenhouse Gas Emissions Targets Versus Actual Emissions

Table 5 displays the City’s progress in achieving its adopted GHG reduction targets.

Table 5: Target and Actual Emissions and Percentage Reductions Relative to 2005

Year	Target Emissions Reduction (%)	Target Emissions Levels (MT CO _{2e})	Actual Emissions Reduction (%)	Actual Emissions Levels (MT CO _{2e})
2005	N/A	17,783		17,783
2010	15	15,116	14.8	15,152
2015	20	14,226	33.9	11,753
2018	N/A	N/A	51.1	8,700
2020	25	13,337		
2025	34	11,737		
2030	44	9,958		
2035	53	8,358		
2040	62	6,758		
2045	71	5,157		
2050	80%	3,557		

The 2018 emissions level of 8,700 MT CO_{2e} represents a reduction of 51.1 percent below 2005 levels, exceeding the 2030 reduction target. While the City has had good success in exceeding its near-term reduction targets through sustained employee efforts, these reductions were largely caused by the switch to 100 percent renewable electricity through SVCE and the natural decrease in emissions from the closed Shoreline Landfill. Therefore, additional effort will be needed to ensure the City remains on track toward its long-term goals.

Opportunities for Future Emissions Reductions

SAP-4 contains several actions to further reduce emissions from government operations in four key categories: (1) Vehicle Fleet; (2) Buildings and Facilities; (3) Employee Commute; and (4) Government-Generated Solid Waste. Table 6 contains the list of relevant SAP-4 initiatives.

Table 6: Emissions Categories and GHG Reduction Actions in SAP-4

Vehicle Fleet and Equipment
<p>T8.1: Develop a Clean Fleets Policy</p> <p>T8.2: Purchase renewable diesel for the City’s diesel-powered vehicles and equipment</p> <p>T8.3: Develop a Fleet Electrification Plan, potentially leveraging technical assistance programs from SVCE</p> <p>T8.4: Explore options for fuel efficiency measures to reduce fleet fuel use in vehicle types for which electrification is not yet an option</p> <p>T8.5: Explore opportunities to pilot or test heavy-duty electric vehicles</p> <p>P3.1: Provide funds to test new electric landscaping equipment and purchase additional batteries for existing equipment</p>
Buildings and Facilities
<p>B4.1: Analyze opportunities for electrification when major systems are upgraded or buildings are renovated</p> <p>B4.2: Develop designs for a solar hot water system at the Senior Center</p> <p>B4.4: Finalize a building management policy for City facilities</p> <p>B4.5: Develop a policy for new construction and major renovation of City facilities to require: (1) a minimum of LEED Gold® Certification; and (2) review of incremental costs and benefits for achieving LEED Platinum® Certification</p> <p>B4.6: Develop a policy stating a preference for new construction and major renovation of City facilities to include all-electric equipment and renewable energy or other carbon-free energy systems whenever feasible</p> <p>B4.7: Finalize a revolving loan program to create a sustainable funding mechanism for ongoing energy efficiency improvements at City facilities</p> <p>B4.8: Implement efficiency actions identified in prior audits, as well as any other</p>

identified opportunities for basic efficiency upgrades B4.9: Conduct a deep, energy-efficiency and electrification analysis of City facilities
Employee Commute
T9.1: Develop pilot commuter incentive program to encourage City employees to choose sustainable commute options, including the Scoop carpool program, a Mobility on Demand Pilot Program, and bicycle benefits T9.2: Revise employee commute survey to better inform the City's government operations GHG inventory and support development of commuter benefit programs T9.3: Evaluate City employee demand for electric vehicle charging at all City-owned work sites
Government-Generated Solid Waste
Z1.14: Implement municipal zero waste measures identified by the Municipal Operations Zero Waste Plan

FISCAL IMPACT

There is no fiscal impact associated with adopting the 2018 government operations GHG inventory.

ALTERNATIVES

1. Do not adopt the 2018 Local Government Operations Greenhouse Gas Emissions Inventory.
2. Provide other direction.

PUBLIC NOTICING

Agenda posting and e-mails sent to community members who signed up to receive updates about the Mountain View Sustainability Program.

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EB-SA/6/CAM
622-04-21-20CR
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