



CITY OF MOUNTAIN VIEW

**MEMORANDUM**

Community Development Department

**DATE:** March 15, 2018

**TO:** Council Environmental Sustainability Committee

**FROM:** Steve Attinger, Environmental Sustainability Coordinator  
Wayne Chen, Assistant Community Development Director  
Randal Tsuda, Community Development Director

**SUBJECT:** **2015 Local Government Operations Greenhouse Gas Emissions Inventory**

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**PURPOSE**

This memorandum presents the results of Mountain View's 2015 Local Government Operations (LGO) greenhouse gas (GHG) emissions inventory.

**RECOMMENDATION**

Provide input on the 2015 local government operations greenhouse gas emissions inventory.

**EXECUTIVE SUMMARY**

Local government operations greenhouse gas emissions decreased by 33.9 percent between 2005 and 2015, from 17,783 metric tons of carbon dioxide equivalent (MT CO<sub>2e</sub>) to 11,753 MT CO<sub>2e</sub>.<sup>1</sup> A large percentage of these reductions (85.6 percent) was due to a reduction in landfill gas produced by the City's closed landfill. With the exception of the vehicle fleet, for which emissions increased by 1.3 percent, emissions from all sources, including solid waste landfill, buildings and facilities, employee commute, public lighting, water transportation, wastewater treatment, and government-generated solid waste, decreased between 2005 and 2015.

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<sup>1</sup> CO<sub>2e</sub>, or CO<sub>2</sub> equivalent, describes how much global warming a given type and amount of greenhouse gas (e.g., carbon dioxide, methane, nitrous oxide, ozone) may cause, using the functionally equivalent amount or concentration of carbon dioxide (CO<sub>2</sub>) as the reference.

These emissions reductions are well ahead of the City's reduction targets. As outlined in the Municipal Operations Climate Action Plan (MOCAP), the City's goal was 20 percent below 2005 emissions levels by 2015, to 14,226 MT CO<sub>2</sub>e. The 2015 level of local government operations emissions puts the City well ahead of its 2015 target (17.4 percent below) and 2020 target (11.9 percent below) and only 16 MT CO<sub>2</sub>e (less than 1 percent) greater than its 2025 target.

Achieving the City's 2050 emissions reduction targets, however, will require a concerted effort to both reduce natural gas used in City facilities and gasoline and diesel fuel used for the City's vehicle fleet. By 2050, the City will need to reduce its emissions, relative to 2005, by 14,226 MT CO<sub>2</sub>e, to a total of 3,557 MT CO<sub>2</sub>e. This represents a 69.7 percent reduction from 2015 emissions levels. For additional perspective, fuel use in 2015 alone, from natural gas in buildings, and gasoline and diesel fuel for the City's vehicle fleet and City employee commutes, produced 4,270 MT CO<sub>2</sub>e. Achieving these long-term reduction targets will require a stronger emphasis on fuel switching from natural gas to electricity and electrification of the vehicle fleet. Policies and incentives that encourage commuting by means other than fossil-fuel powered single-occupancy vehicles and efforts to further balance jobs and housing can support reductions in employee commute-related emissions, which otherwise are largely outside of the City's control.

## **BACKGROUND**

In March 2010, the City adopted voluntary, absolute greenhouse gas emissions reduction targets for municipal operations toward a goal of reducing emissions 80 percent below 2005 levels by 2050. *These targets require an absolute reduction in total emissions below a baseline year (2005), regardless of City employee, residential, and commercial growth.* The adoption of the targets was in response to the Global Warming Solutions Act (AB 32), requiring California to reduce Statewide greenhouse gas emissions. For 2015, the reduction target was set at 20 percent below 2005 baseline 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 work toward these targets, including Environmental Sustainability Action Plans 1, 2, and 3 (ESAP-1, ESAP-2, and ESAP-3). To measure its progress, the City committed to conducting an inventory of local government operations emissions every five years.

Following are Mountain View's government operations greenhouse gas emissions reduction targets, below 2005 baseline levels:

- 15 percent by 2010;
- 20 percent by 2015;
- 25 percent by 2020;
- 34 percent by 2025;
- 44 percent by 2030;
- 53 percent by 2035;
- 62 percent by 2040;
- 71 percent by 2045; and
- 80 percent by 2050.

Conducting a greenhouse gas emissions inventory involves measuring the energy, fuel, water use and waste generated through government operations and calculating the number of metric tons of greenhouse gases, or carbon dioxide equivalent (MT CO<sub>2</sub>e), resulting from those activities. The City completed an inventory of its 2005 government operations greenhouse gas emissions, which serves as the baseline for future years. The initial inventory was conducted in conjunction with ICLEI—Local Governments for Sustainability, which specializes in climate change and greenhouse gas inventories for cities and counties. Subsequent inventories in 2010 and 2015 were conducted by Ecoshift Consulting under contract with the City.

The inventories conducted in 2005, 2010, and 2015 all use a national standard developed in partnership by the California Air Resources Board (CARB), the California Climate Action Registry (CCAR),<sup>2</sup> and ICLEI, in cooperation with The Climate Registry<sup>3</sup> and

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<sup>2</sup> The California Climate Action Registry (CCAR) provides leadership on climate change by developing and promoting credible, accurate, and consistent greenhouse gas reporting standards and tools for organizations to measure, monitor, third-party verify, and reduce their greenhouse gas emissions consistently across industry sectors and geographical borders.

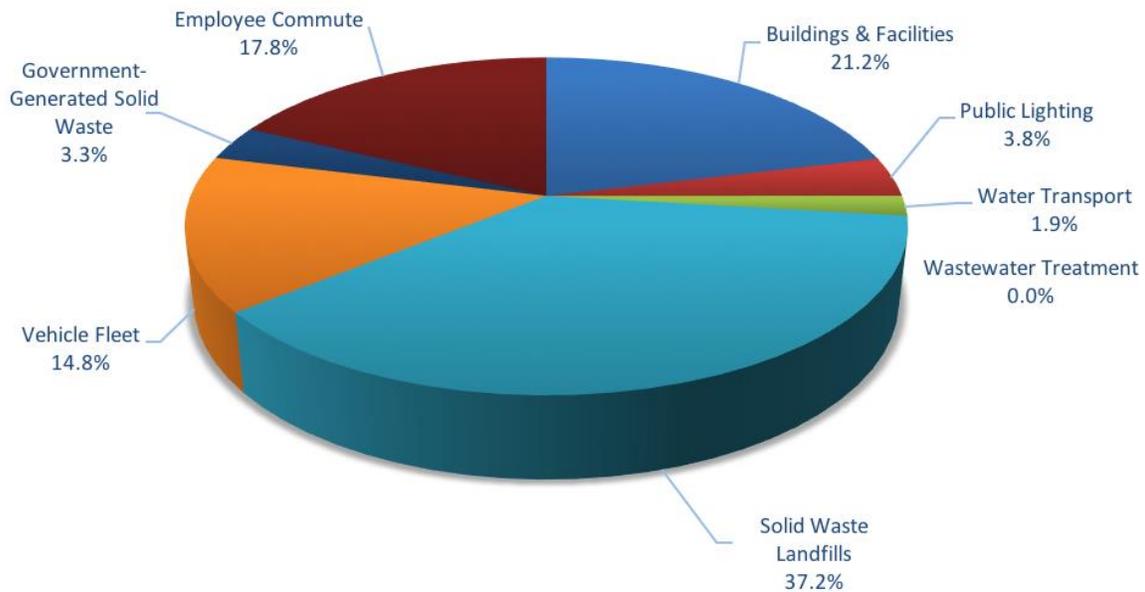
<sup>3</sup> The Climate Registry is a nonprofit collaboration among North American states, provinces, territories, and Native Sovereign Nations that sets consistent and transparent standards to calculate, verify, and publicly report greenhouse gas emissions into a single registry.

other stakeholders. This standard, the Local Government Operations Protocol (LGOP),<sup>4</sup> provides standard accounting principles, boundaries, quantification methods, and procedures for reporting greenhouse gases from local government operations. Although the LGOP provides a common national framework for all local governments to establish their emissions baseline, it is important to note that any emissions 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.

## RESULTS AND DATA ANALYSIS

In 2015, local government operations generated **11,753 MT CO<sub>2</sub>e**, 22.4 percent less than 2010 emissions and 33.9 percent less than 2005 baseline emissions. The sources of emissions in 2015 were similar to those in 2005 and 2010, with the most emissions from the solid waste landfill (37.1 percent), employee commutes (17.8 percent), buildings and facilities (21.2 percent), and the City's vehicle fleet (14.8 percent) (see Figure 1).

**Figure 1: 2015 Greenhouse Gas Emissions Inventory (11,753 MT CO<sub>2</sub>e)**



For context, in 2005, total local government operations greenhouse gas emissions were **17,783 MT CO<sub>2</sub>e** (see Attachment 1, Figure 1A). In 2010, total greenhouse gas emissions from local government operations were **15,152 MT CO<sub>2</sub>e** (see Attachment 1, Figure 1B).

<sup>4</sup> CARB, CCAR, ICLEI, and The Climate Registry. September 2008. The Local Government Operations Protocol (LGOP) for the Quantification and Reporting of Greenhouse Gas Emissions Inventories: Version 1.1.

These numbers represent an update from the originally reported 2010 local government operations emissions of 14,995 MT CO<sub>2</sub>e, which reflects updated government-generated waste, employee data, and a correction in the employee commute emissions from the original 2010 inventory.

Table 1 shows both emissions and percent of total emissions by sector for each inventory year, 2005, 2010, and 2015. This data is also illustrated in Figure 2.

**Table 1: Total and Percent Change in Greenhouse Gas Emissions, 2005, 2010, 2015**

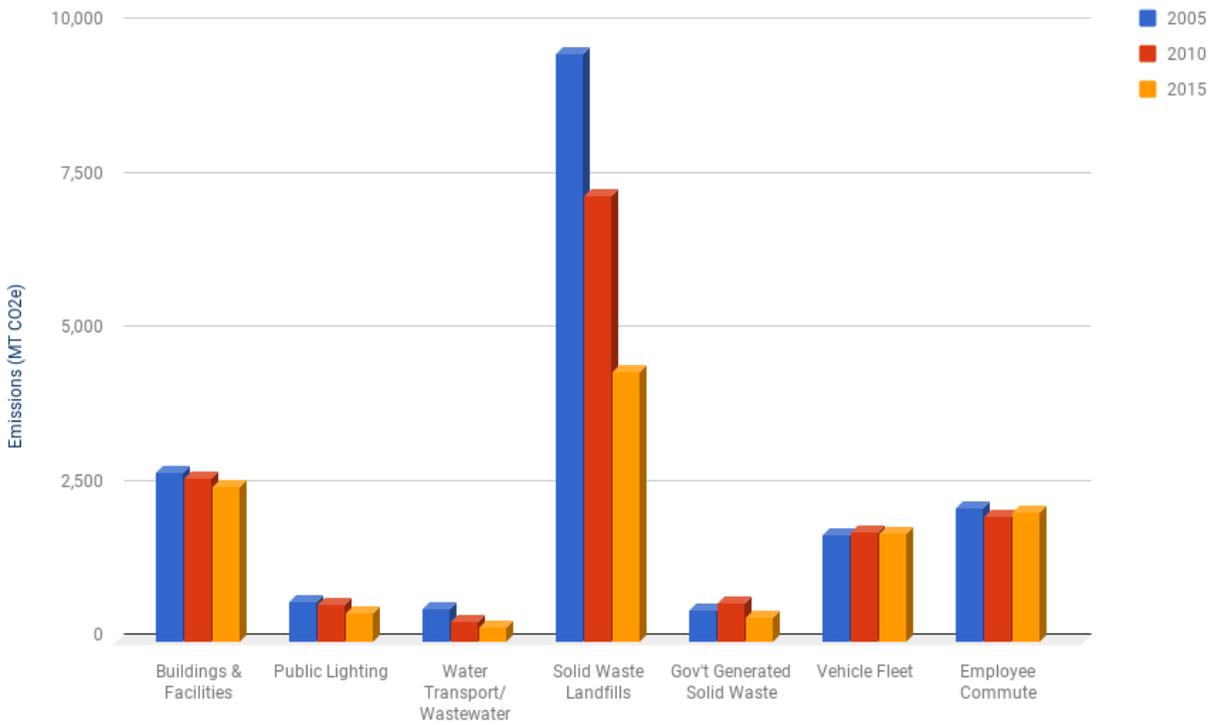
Sector	2005 GHGs (MT CO <sub>2</sub> e)	2005 GHGs (%)	2010 GHGs (MT CO <sub>2</sub> e)	2010 GHGs (%)	2015 GHGs (MT CO <sub>2</sub> e)	2015 GHGs (%)	Change 2005- 2010 (%)	Change 2010- 2015 (%)	Change 2005- 2015 (%)
Buildings and Facilities	2,736	15.4%	2,637	17.4%	2,496	21.2%	-3.6%	-5.3%	-8.8%
Public Lighting	640	3.6%	591	3.9%	447	3.8%	-7.7%	-24.4%	-30.2%
Water Transport	377	2.1%	219	1.4%	225	1.9%	-41.9%	2.6%	-40.4%
Wastewater Treatment	134	0.8%	96	0.6%	-12 <sup>5</sup>	0.0%	-28.4%	-112.9%	-109.2%
Solid Waste Landfill	9,531	53.6%	7,226	47.7%	4,368	37.2%	-24.2%	-39.5%	-54.2%
Vehicle Fleet	1,722	9.7%	1,761	11.6%	1,744	14.8%	2.3%	-0.9%	1.3%
Gov't Gen. Solid Waste	495	2.8%	604	4.0%	394	3.3%	22.0%	-34.8%	-20.5%
Employee Commute	2,148	12.1%	2,018	13.3%	2,091	17.8%	-6.1%	3.6%	-2.7%
<b>TOTAL</b>	<b>17,783</b>	<b>100.0%</b>	<b>15,152</b>	<b>100.0%</b>	<b>11,753</b>	<b>100.0%</b>	<b>-14.8%</b>	<b>-22.4%</b>	<b>-33.9%</b>

*Note: Numbers may not add to total due to rounding.*

Figure 2 presents an overview of emissions by sector for the three inventory years. As a result of: (1) less landfill gas being generated by Mountain View's closed landfill; (2) City operations' staff efforts to reduce waste and increase efficiencies; and (3) a cleaner electricity grid, **2015 greenhouse gas emissions from government operations decreased in nearly all sectors relative to 2005 emissions.** The one exception is the City's vehicle fleet, which increased slightly in 2010, and decreased again in 2015, but remained above 2005 levels.

<sup>5</sup> In 2015, on-site power generation at the wastewater treatment facility exceeded demand, resulting in negative emissions.

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



Adjustments to the 2005 and 2010 GHG Emissions Inventories

The original 2005 emissions inventory showed that government operations generated 18,349 MT CO<sub>2</sub>e. By 2010, these emissions had decreased to 14,995 MT CO<sub>2</sub>e. However, while conducting the 2015 emissions inventory, staff updated the 2005 and 2010 inventory results based on refinements or corrections to buildings and facilities, government-generated solid waste, and employee commute data. The updated 2005 inventory showed emissions levels of 17,783 MT CO<sub>2</sub>e, while the updated 2010 inventory showed emissions levels of 15,152 MT CO<sub>2</sub>e. For more information about these adjustments, see Attachment 2.

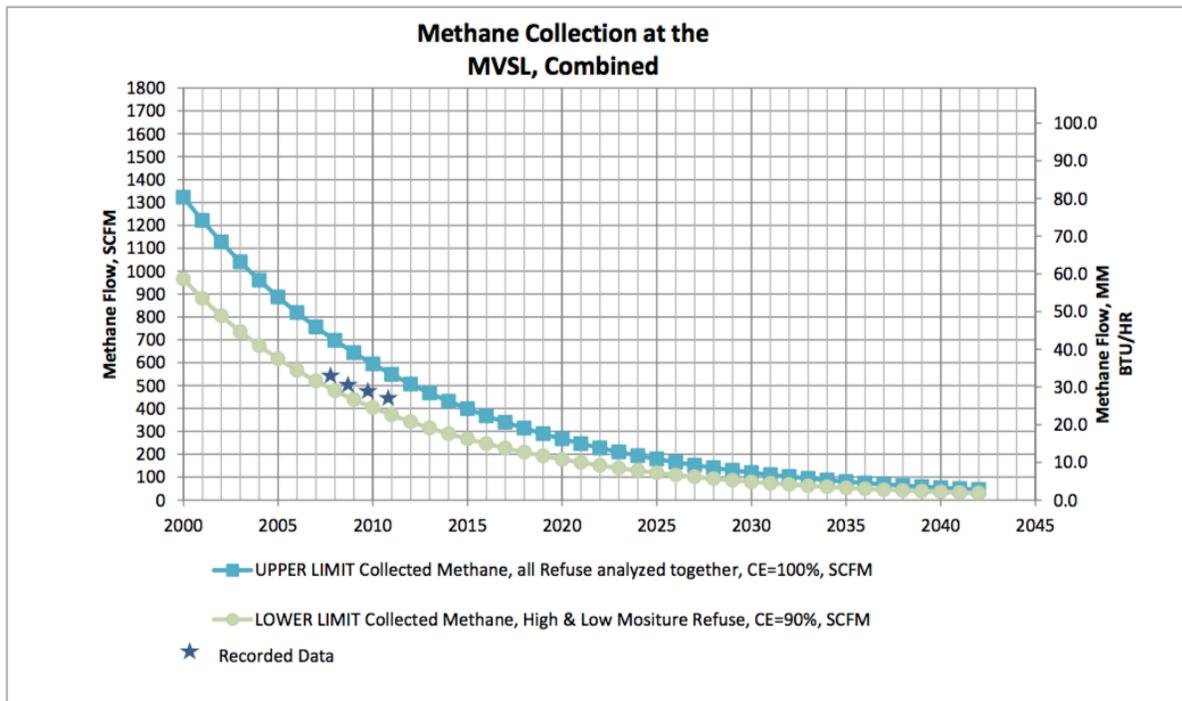
Emissions Reductions between 2010 and 2015

Between 2010 and 2015, greenhouse gas emissions from City operations were reduced by 3,399 MT CO<sub>2</sub>e. The primary sources of emissions reductions, in order of their magnitude, follow.

**SOLID WASTE LANDFILL (37.2 percent of total 2015 emissions):** Landfill emissions decreased by 39.6 percent between 2010 and 2015. Reductions in landfill emissions accounted for 84.0 percent (or 2,858 MT CO<sub>2</sub>e) of total emissions reductions between

2010 and 2015. The City’s landfill has been closed since the early 1990s. As organic matter in the landfill decays over time, it produces less landfill gas, or methane, a potent greenhouse gas. Landfill gas will continue to be generated through 2042, albeit at gradually decreasing levels. Figure 3, prepared for the Landfill Master Plan,<sup>6</sup> illustrates upper and lower limits of the Shoreline Landfill’s current and future methane production in standard cubic feet per minute (SCFM). The data was generated using a methane production model. The upper limit assumes that refuse in the landfill was wet but not saturated and that the landfill gas collection system was 100 percent efficient. The lower limit assumes two moisture contents for waste, with the upper waste having lower moisture content than the lower waste, and that the landfill gas collection system was 90 percent efficient. The stars represent actual measurements, suggesting that production from the Shoreline Landfill is closer to the lower limit.

**Figure 3: Methane Collection at the Mountain View Shoreline Landfill (MVSL)**



**Source:** Nirmal Sajjan, Principal City Engineer, taken from Shoreline Landfill Master Plan, 2013.

In 2015, 359 million SCFM of landfill gas was collected at the landfill. Nearly 8.0 percent of the landfill gas collected went to power two microturbines that generate renewable on-site power for the City’s sewage pump station, flare station, and irrigation pump station. Another 43.2 percent was sold to Google for use in its gas generation system, which provides energy to its complex at Amphitheatre Parkway and Charleston

<sup>6</sup> TetraTech BAS. 2013. Shoreline Landfill Master Plan. Project 12-39. Final Draft. January 2013.

Road. Close to half (48.8 percent) was combusted (burned off) through flaring. Combustion is the most common technique used to manage landfill gas since methane gas, when flared, is converted to carbon dioxide (CO<sub>2</sub>), reducing its greenhouse gas impact. Emissions from the landfill include the direct emissions from landfill gas utilization for power and flaring, as well as indirect emissions from purchased electricity needed to make up any power in excess of that provided by the microturbines. It does not include any emissions associated with the landfill gas sold to Google.

**EMPLOYEE COMMUTE (17.8 percent of total 2015 emissions):** Employee commute emissions in 2015 were about 3.6 percent higher than in 2010. While the percentage of those driving alone decreased slightly, from 82 percent to 81 percent, and carpool/vanpool participation increased, the percentage of employees walking and biking to work decreased between 2010 and 2015. A 2015 employee commute survey was completed by 58 percent of employees. *It is notable that 81 percent of the respondents who drove alone to and from work in 2015 traveled, on average, 43 miles round-trip.* The jobs-housing imbalance in Mountain View directly and significantly impacts the City's greenhouse gas emissions. Table 2 summarizes the results of employee commute surveys conducted for the 2005, 2010, and 2015 inventories, both in terms of the number of responses and the percentage mode share represented by these responses.

**Table 2: Employee Commute Modes of Travel, 2005, 2010, 2015**

Mode	2005		2010		2015	
	Responses	Percent	Responses	Percent	Responses	Percent
Drive Alone	223	74.1%	346	82.0%	269	81.0%
Carpool/Vanpool	14	4.7%	21	5.0%	27	8.1%
Transit	28	9.3%	13	3.1%	14	4.2%
Biking	3	1.0%	13	3.1%	7	2.1%
Walking	9	3.0%	17	4.0%	5	1.5%
Other/Telecommute	N/A	N/A	4	0.9%	N/A	N/A
Split Modes	24	8.0%	4	0.9%	10	3.0%
Not Indicated	N/A	N/A	4	0.9%	N/A	N/A
<b>TOTAL</b>	<b>301</b>	<b>100.0%</b>	<b>422</b>	<b>100.0%</b>	<b>332</b>	<b>100.0%</b>
Number of Employees <sup>7</sup>	998		1,032		986	
Effective FTEs	695		757		658	

**GOVERNMENT-GENERATED SOLID WASTE (3.3 percent of total 2015 emissions):** Emissions from government-generated solid waste decreased by 34.8 percent between 2010 and 2015. These emissions reductions accounted for 6.2 percent of total greenhouse gas reductions from government operations between 2010 and 2015. Encouraged by City staff in the Solid Waste Program, all City facilities reduced the tons of waste landfilled between 2010 and 2015, several by a considerable margin. For example, the Municipal Operations Center (MOC), which generated 60 percent of the City’s 2015 waste, cut its landfilled waste in half between 2010 and 2015.

**BUILDINGS AND FACILITIES (21.2 percent of total 2015 emissions):** Emissions from buildings and facilities decreased by 5.4 percent between 2010 and 2015. These reductions from electricity, natural gas, diesel, and refrigerant use accounted for 4.2 percent of total government operations greenhouse gas emissions reductions. The data in Table 3 illustrates overall a small reduction in total electricity use for buildings and facilities, while natural gas consumption remained virtually the same between 2010 and 2015. In addition to a cleaner electricity grid, some of the actions that contributed to reductions in electricity and natural gas use at City facilities included the following:

<sup>7</sup> The number of employees represents full-time, part-time, and hourly employees. Effective full-time equivalent employees (FTEs), used in the analysis of employee commute emissions, is the sum of 100 percent of full-time, 55 percent of part-time, and 21 percent to 26 percent (depending on the year) of hourly employees, based on payroll system information.

- *Senior Center:* Technology was added to optimize control over the heating, ventilating, and air-conditioning (HVAC) system.
- *Eagle Pool:* A new boiler was installed to heat the pool, and LED lighting was added to the building.
- *Whisman Sports Center:* T-12 lighting was replaced with T-8 lighting.

**Table 3: Electricity and Natural Gas Consumption at City Facilities, 2010 and 2015**

Facility	Electricity (kWh)			Natural Gas (therms)		
	2010	2015	Percent Change	2010	2015	Percent Change
Civic Center (City Hall and Center for the Performing Arts)	1,640,306	1,922,396	17.2%	41,187	61,691	49.8%
Police/Fire Administration Building	1,186,586	1,200,105	1.1%	20,036	21,571	7.7%
Mountain View Sports Pavilion	989,534	402,491	-59.3%	3,585	6,618	84.6%
Library	982,890	1,270,019	29.2%	9,853	12,915	31.1%
Municipal Operations Center	747,202	746,889	-0.0%	21,473	14,370	-33.1%
Senior Center	452,160	356,769	-21.1%	12,669	9,957	-21.4%
Community Center	339,520	444,876	31.0%	6,964	8,981	29.0%
Minor Facilities	286,791	229,262	-20.1%	695	530	-23.7%
Fire Stations	285,313	329,903	15.6%	14,101	13,547	-3.9%
Eagle Park Building and Pool	261,560	201,213	-23.1%	45,000	31,905	-29.1%
Other Community Services Facilities	200,434	238,468	19.0%	15,538	10,075	-35.2%
Whisman Sports Center	182,960	156,303	-14.6%	4,888	3,915	-19.9%
<b>TOTAL</b>	<b>7,555,256</b>	<b>7,498,704</b>	<b>-0.7%</b>	<b>195,989</b>	<b>196,075</b>	<b>0.0%</b>

For more information on the highest electricity and natural gas-consuming facilities, see Attachment 3.

**PUBLIC LIGHTING (3.8 percent of total 2015 emissions):** Emissions associated with electricity used to power traffic lights, streetlights, park lighting, and other public lighting decreased by 24.4 percent between 2010 and 2015. These reductions accounted for 4.2 percent of the total emissions reductions between 2010 and 2015. Reductions were due to better and more efficient equipment as well as a cleaner electricity grid.

For example, in 2012, 177 streetlights were replaced with more energy-efficient units and, in 2015, another 1,183 streetlights were upgraded, saving the City a total of 435,000 kilowatt-hours (kWh) of electricity annually. That is on the order of the annual electricity consumption of the Mountain View Senior Center. City-owned and operated traffic and pedestrian signals were also upgraded to light-emitting diodes (LEDs).

### Greenhouse Gas Emissions Targets Versus Actual Emissions

In March 2010, the City Council established near-term greenhouse gas emissions reduction targets for municipal operations for 2010 through 2020, as well as a long-range target for 2050. In 2015, the City amended these targets by adding interim targets for each five-year period between 2020 and 2050. The City's greenhouse gas emissions targets for municipal operations are included in Table 4 below. These adopted targets encourage City staff to develop and implement actions that will increase operational efficiencies, save money, and reduce emissions.

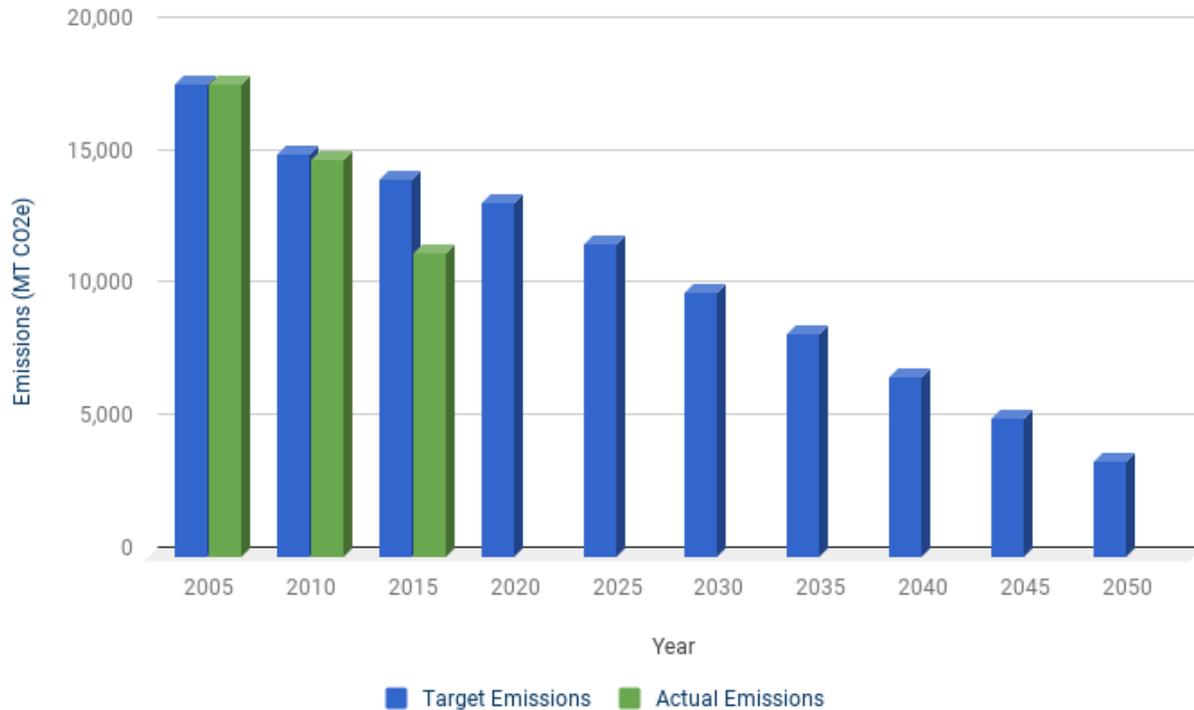
**Table 4: Target and Actual Emissions and Percentage Reductions Relative to 2005**

Year	Target Emissions Reduction (%)	Target Emissions Levels (MT CO <sub>2</sub> e)	Target Emissions Reductions (MT CO <sub>2</sub> e)	Actual Emissions Levels (MT CO <sub>2</sub> e)	Actual Emission Reductions (MT CO <sub>2</sub> e)	Actual Emissions Reduction (%)
2005	N/A	17,783		17,783 <sup>8</sup>		
2010	15%	15,116	2,667	15,152	2,631	14.8%
2015	20%	14,226	3,557	11,753	6,030	33.9%
2020	25%	13,337	4,446			
2025	34%	11,737	6,046			
2030	44%	9,958	7,825			
2035	53%	8,358	9,425			
2040	62%	6,758	11,055			
2045	71%	5,157	12,626			
2050	80%	3,557	14,226			

The City's municipal emissions targets and actual measured emissions are represented graphically in Figure 4. The 2015 local government greenhouse gas emissions inventory indicates that the City surpassed its emissions reduction targets by 2,473 MT CO<sub>2</sub>e, **putting the City 33.9 percent below 2005 levels, or 17.4 percent below its 2015 emissions target.**

<sup>8</sup> The 2005 baseline emissions levels (17,783) represent an update from the original inventory (18,349) based on updated information about solid waste disposed and employee commute emissions.

**Figure 4: Target versus Actual Greenhouse Gas Emissions, 2005 to 2050**



### Opportunities for Future Emissions Reductions

Additional actions identified to further reduce municipal operations emissions can be found in Environmental Sustainability Action Plan 3 (ESAP-3), which spans Fiscal Years 2016 through 2019. As of April 2017, the City began purchasing 100 percent renewable and carbon-free electricity for 100 percent of the electricity it uses from Silicon Valley Clean Energy (SVCE). The emissions reductions associated with this will be reflected in future inventories, reducing to zero the City's greenhouse gas emissions from electricity, which comprised 17 percent of total greenhouse gas emissions from government operations in 2015. Anticipated reductions in landfill gas will also help the City achieve its near-term emissions reduction targets.

The City may also want to explore other opportunities to use or reliably sell its landfill gas. As of January 2018, a large fraction (about 40 percent) of the landfill gas generated and typically sold to Google is currently being burned off through flaring. Google's gas generation system has been offline for several months due to maintenance. Since Google owns the rights to the landfill gas, when they do not use it, it adds to Mountain View's greenhouse gas emissions. Google is looking into options for bringing the system back online.

By 2050, however, the City will need to reduce its municipal emissions by 14,226 MT CO<sub>2</sub>e relative to 2005 emissions, to a total of 3,557 MT CO<sub>2</sub>e, approximately 8,000 MT CO<sub>2</sub>e less than 2015 emissions. For perspective, fuel use alone in 2015—natural gas in buildings, gasoline, and diesel fuel for the City’s vehicle fleet and employee commutes—produced more than 4,000 MT CO<sub>2</sub>e. Achieving the proposed long-term reduction targets will require a stronger emphasis on reducing our reliance on fossil fuels through fuel switching from natural gas to electricity, improved vehicle fuel economy, and electrification of transportation. While City employee commuting remains largely outside the City’s control, incentives that encourage commuting by means other than gasoline-fuel-powered, single-occupancy vehicles (e.g., walking, biking, carpooling, transit, or electric vehicles) and efforts to further balance jobs and housing can help the City reduce employee commute emissions. The City has a commute benefit program that includes a mass transit stipend and pretax employee contributions for transit costs and other program elements, and the City is continuing to assess additional programs to encourage alternative commute methods.

#### Future Greenhouse Gas Inventories

To track progress toward its emission reduction targets, the City conducts an inventory of its government operations greenhouse gas emissions at least every five years. The City plans to conduct its 2020 LGO greenhouse gas inventory starting in 2021.

#### FISCAL IMPACT

The cost of conducting the 2015 local government operations greenhouse gas emissions inventory was approximately \$20,000, not including staff time. This included additional expenses associated with adjusting the 2005 and 2010 inventories based on updated information. Any future programs or actions will be brought to the City Council for funding.

**NEXT STEPS**

Committee input on the 2015 Local Government Operations emissions inventory will be presented to the City Council in spring 2018.

SA-WC/RT/2/CDD

816-03-15-18M-E-1

- Attachments:
1. 2005 and 2010 Greenhouse Gas Emissions Inventory Results
  2. Adjustments to 2005 and 2010 Greenhouse Gas Emissions Inventories
  3. Highest Electricity and Natural Gas-Consuming Facilities

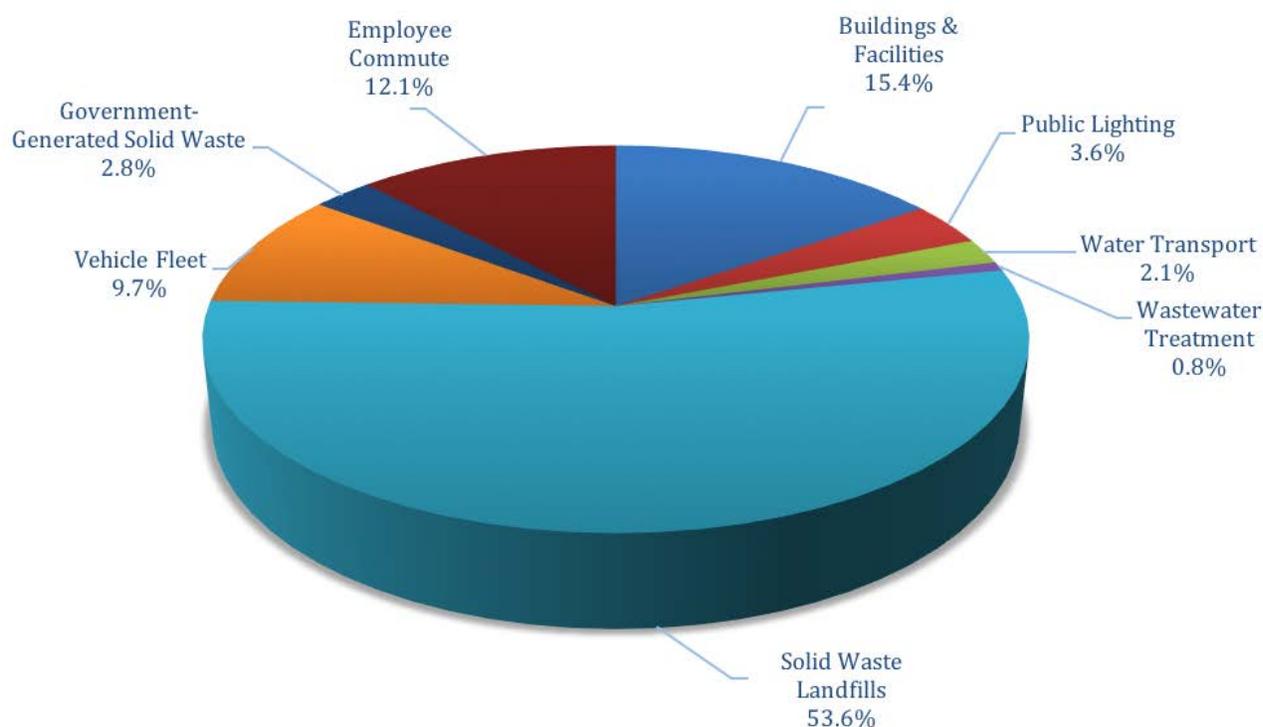
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## 2005 and 2010 Local Government Operations Greenhouse Gas Emissions Inventory Results

### 2005 Local Government Operations Greenhouse Gas Emissions Inventory

Mountain View's "baseline" inventory indicates that total local government operations greenhouse gas emissions were **17,783 MT CO<sub>2</sub>e** in 2005 (see Figure A-1). These emissions represent less than 3 percent of the emissions generated in the broader Mountain View community. Most of the 2005 emissions were generated by Mountain View's solid waste landfill (53.6 percent). The next greatest emissions sources were electricity and gas used in buildings and facilities (15.4 percent), fuel used for employee commuting (12.1 percent), and fuel used for the City's vehicle fleet (9.7 percent). Additional emissions arose from energy used for public lighting (3.6 percent), water transport/wastewater (2.9 percent), and from government-generated solid waste (2.8 percent).

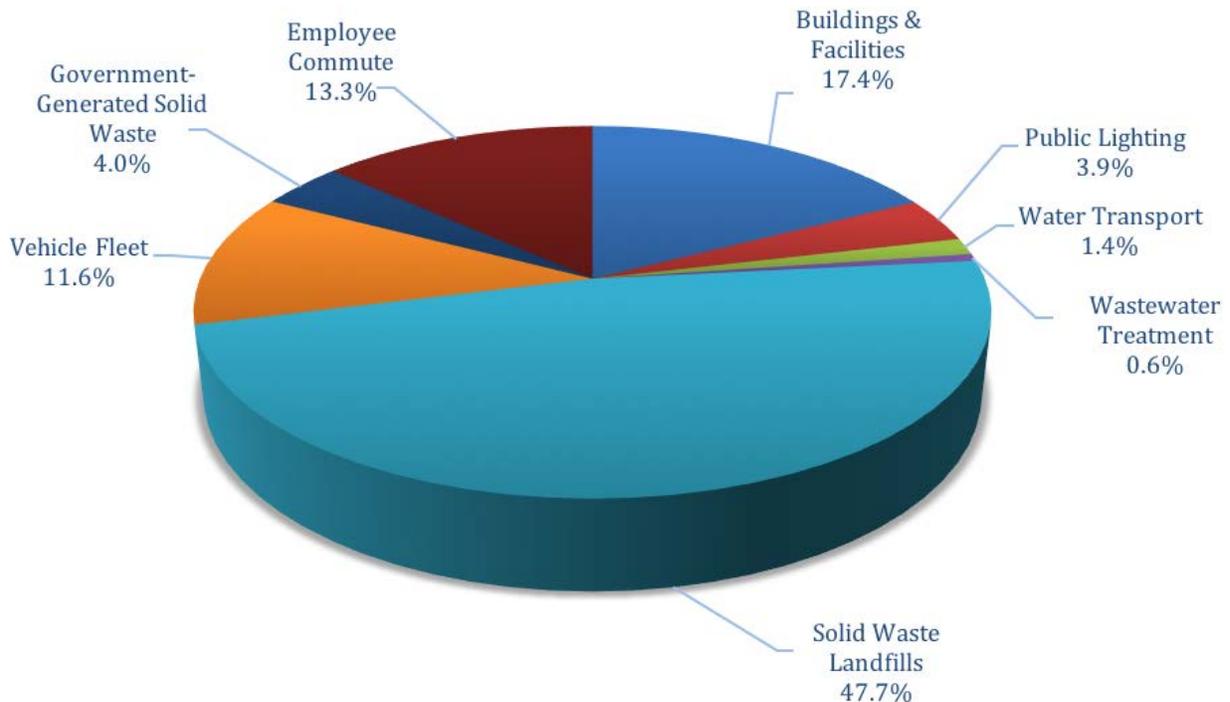
**Figure 1A: 2005 Baseline GHG Emissions (17,783 MT CO<sub>2</sub>e)**



## 2010 Local Government Operations Greenhouse Gas Emissions Inventory

In 2010, total greenhouse gas emissions from local government operations were originally measured as 14,995 MT CO<sub>2</sub>e. During the 2015 inventory, this 2010 estimate was revised to **15,152 MT CO<sub>2</sub>e** to reflect updated numbers for government generated waste as well as updated employee numbers and a correction in the employee commute emissions from the original 2005 analysis and updated employee numbers (see Figure A-2). Total emissions in 2010 decreased 2,870 MT CO<sub>2</sub>e, or 16.1 percent, from the 2005 baseline. With the exception of vehicle fleet emissions and government generated waste, which increased 2.2 percent and 22.1 percent, respectively, emissions from all other sources decreased between 2005 and 2010. The largest emissions sources were the solid waste landfill (48.5 percent), buildings and facilities (15.1 percent), employee commute (13.5 percent), and the City's vehicle fleet (11.8 percent).

**Figure 1B: 2010 GHG Emissions (15,152 MT CO<sub>2</sub>e)**



## Adjustments to 2005 and 2010 Local Government Operations Greenhouse Gas Emissions Inventories

### 2005 Local Government Operations Greenhouse Gas Emissions Inventory Adjustments

For the 2005 local government operations inventory, only employee commute emissions were adjusted. In the original calculation of employee commute emissions, all employees, regardless of their employment type, were assumed to be full-time. However, because part-time and hourly employees typically work fewer hours than full-time employees, and represent a large fraction of Mountain View employees, their commute emissions are likely to be lower. Total employees for 2005 were broken down into the number of full-time, part-time, and hourly employees. Estimates of the percent of full-time equivalent hours worked by each employment category were then used to calculate the number of effective full-time-equivalent (FTE) employees in Mountain View. This number was then used in re-estimating employee commute emissions. As a result, 2005 employee commute emissions decreased by nearly 567 MT CO<sub>2</sub>e (from 2,715 to 2,148), reducing total local government greenhouse gas emissions from 18,349 to 17,783 MT CO<sub>2</sub>e<sup>1</sup>.

### 2010 Local Government Operations Greenhouse Gas Emissions Inventory Adjustments

For the 2010 inventory, buildings and facilities, government-generated solid waste, and employee commute numbers changed. For buildings, an incorrect emissions factor used in the 2010 analysis was corrected, accounting for an estimated 240 MT CO<sub>2</sub>e. Two items affected the employee commute emissions. The first was the re-estimation of employee commute emissions based on effective FTE, mentioned above. The second was an employee commute emissions calculation error in the original AECOM workbook, which was corrected by EcoShift Consulting. Together, these reduced 2010 employee commute emissions by 131 MT CO<sub>2</sub>e (from 2,149 to 2,018 MT CO<sub>2</sub>e). In addition, there were two adjustments made to the government-generated solid waste emissions. The first was based on new data characterizing the City's solid waste stream, available as of 2012. This data replaced default values that were used in estimating 2010 government-generated solid waste. The 2012 waste characterization is considered a better reflection of the 2010 waste stream in Mountain View than the default values provided by the California Integrated Waste Management Board. The second adjustment was made based on a correction to the number of tons of waste landfilled in 2010 supplied by Lori Topley, the City's Solid Waste Program Manager. Together, these caused an increase in government-generated waste emissions of 48 tons, increasing emissions from 556 to 604 MT CO<sub>2</sub>e. In total, a correction to an emissions factor used in buildings and facilities and adjustments to employee commute emissions, combined

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<sup>1</sup> The difference between 18,349 and 17,783 is 566, not 567, which is due to rounding.

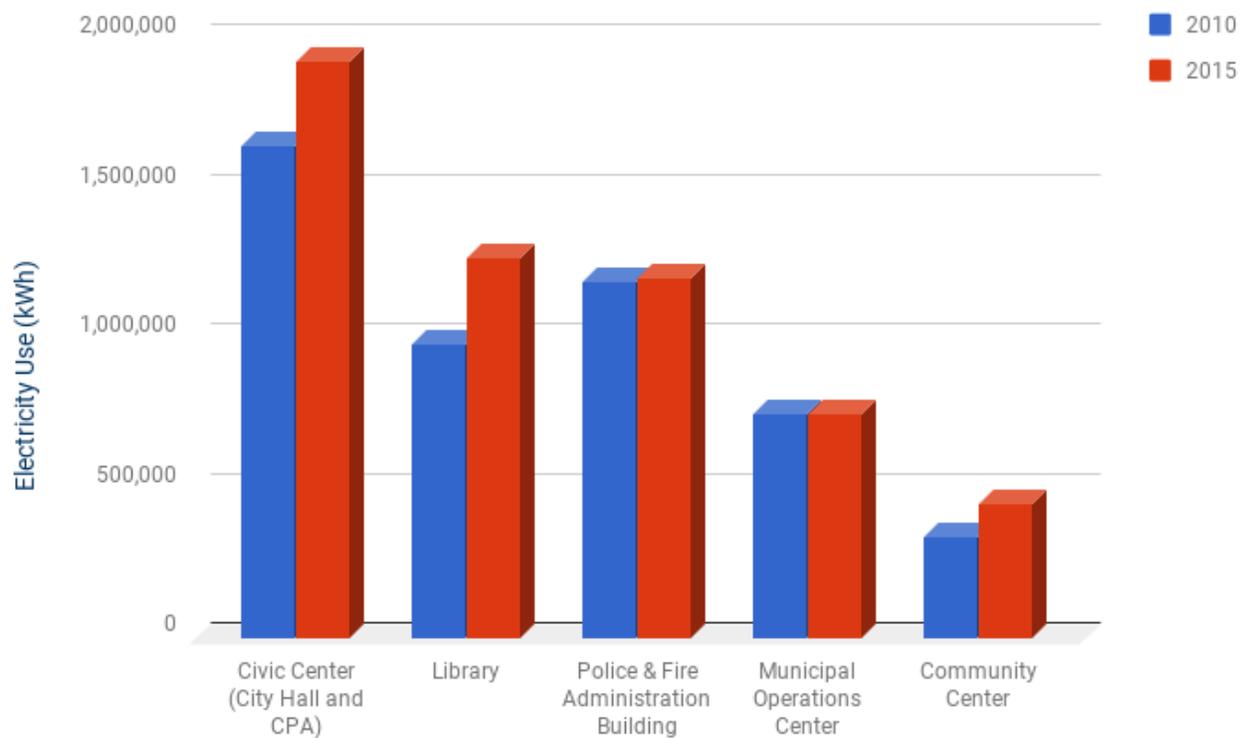
with adjustments to the solid waste generated, increased 2010 emissions from 14,995 to 15,152 MT CO<sub>2</sub>e.

## Highest Electricity and Natural Gas-Consuming Facilities

### Electricity Consumption

Figure 3A shows the five municipal facilities with the highest electricity consumption in 2015, from highest to lowest. Between 2010 and 2015, significant reductions in electricity use are only evident at the Mountain View Sports Pavilion. All other high-consumption buildings either stayed the same or increased.

Figure 3A: 2010, 2015 Electricity Use in High Consumption Buildings



## Natural Gas Consumption

Figure 3B shows the five municipal facilities with the highest natural gas consumption in 2015, from highest to lowest. Between 2010 and 2015, significant reductions in natural gas use are evident at Eagle Park, the Municipal Operations Center and in other community service facilities. Natural gas use increased considerably at the Civic Center and somewhat at the Police and Fire Administration Building.

**Figure 3B: 2010, 2015 Natural Gas Use in High Consumption Buildings**

