



DATE: December 3, 2019

CATEGORY: New Business

DEPT.: City Manager's Office

TITLE: **Final 2017 and Preliminary 2018
Community Greenhouse Gas
Inventories**

RECOMMENDATION

Adopt the final 2017 and preliminary 2018 community greenhouse gas (GHG) emissions inventories.

BACKGROUND

In November 2009, the City Council adopted voluntary GHG reduction targets for the community as a whole, with initial targets for 2012, 2015, 2020, and 2050. These targets set an absolute reduction in total emissions below a baseline year (2005). These targets were developed and adopted in response to the Global Warming Solutions Act of 2006 (AB 32), which requires California to reduce Statewide GHG emissions. Subsequently, through the City's Climate Protection Road Map (CPR), the City Council adopted additional interim targets at five-year intervals between 2020 and 2050 to more closely track the City's progress. Mountain View's current communitywide GHG reduction targets are shown in Table 1.

Table 1: Community GHG Reduction Targets

Year	Reduction Target (below 2005 baseline levels)
2005	N/A
2012	5%
2015	10%
2020	15% to 20%
2025	26%
2030	37%
2035	48%
2040	58%
2045	69%
2050	80%

Attachment 1 presents the Council-approved GHG reduction targets both as a percentage of 2005 emissions and as the absolute emissions levels that the targets imply. (A separate item on this agenda proposes adjustment of these targets.)

Current City Policy Guidance

The CPR presents a projection of communitywide GHG emissions through 2050 and a number of strategies that would help the City reduce its absolute emissions to 80 percent below 2005 levels by 2050. The CPR served as the primary basis for the Environmental Sustainability Action Plan 3, which included actions for Fiscal Years 2016-19.

Between September 2017 and June 2018, the City convened the Environmental Sustainability Task Force 2 (ESTF-2), an advisory body of appointed community members who lived or worked in Mountain View. The core purpose of ESTF-2 was to evaluate whether current sustainability plans and goals should be modified based on new technologies and processes for addressing climate change. ESTF-2 produced a Final Report with 36 recommendations to reduce the City's GHG emissions through 2030. Staff conducted an analysis of these recommendations to verify assumptions and estimates, and presented the results to the City Council on December 4, 2018. The ESTF-2 recommendations, along with the Program Assessment and Strategic Plan presented to Council on April 30, 2019, served as the basis for Sustainability Action Plan 4, approved by Council on October 22, 2019.

Collaboration with Google

In 2018, the City participated in a public-private partnership with Google (through their Civic Leadership Program) to streamline the City's GHG inventory process. Through the development of a new workflow process and data analysis templates, the City reduced the time necessary to conduct both the community and municipal operations inventories by about 80 percent. As a result of this project, as well as the addition of a full-time Analyst in the 2018-19 budget, staff is now able to conduct GHG inventories in-house rather than relying on consultants, saving about \$15,000 per inventory and improving the consistency and accuracy of inventory methodologies and calculations.

ANALYSIS

Conducting a communitywide GHG inventory involves measuring energy used, water consumed, solid waste produced, and wastewater generated by residential and nonresidential activities in the City. The greenhouse gases resulting from these

activities are then calculated in terms of metric tons of carbon dioxide equivalent, or MT CO₂e. For mobile source emissions, such as transportation and off-road equipment, where measured data is not available, emissions are estimated at the County level using standardized GHG accounting methodologies and then adjusted to City scale.

All of Mountain View's GHG inventories have been prepared using a national standard developed by the International Council for Local Environmental Initiatives (ICLEI). This standard, the U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions (the Protocol), establishes reporting requirements and provides detailed accounting guidance for quantifying GHG emissions. Staff used the Protocol to examine emissions in five sectors: energy use, transportation (on-road vehicles), waste, water (potable water use and wastewater treatment), and off-road mobile sources (construction and commercial/industrial equipment). Although the Protocol provides a common framework for calculating community emissions, any GHG inventory represents an estimate 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. The Protocol does not fully account for lifecycle emissions from food, air travel, and purchased goods and services, which could be estimated in a consumption-based emissions inventory, as discussed in a separate item on the December 3, 2019 agenda.

2017 and 2018 Community Greenhouse Gas Emissions Inventory Results

Since Mountain View now conducts community GHG inventories annually, staff has begun presenting a preliminary, estimated inventory to the City Council before receiving final emissions factors for electricity from PG&E and Direct Access providers, which can take up to 1-1/2 years. A preliminary 2017 community GHG inventory was presented to the City Council on March 19, 2019, which estimated emissions at 716,535 MT CO₂e.

Table 2 provides the results for final 2017 and preliminary 2018 GHG emissions and their comparison to both the 2005 baseline and the upper range of the 2020 targets.

Table 2: Results of Final 2017 and Preliminary 2018 Community GHG Inventories

GHG Inventory	Total Emissions (MT CO₂e)	Percent Above/Below Target Level	Percent Above/Below 2005 Baseline	Percent Reduction Needed to Reach 2020 Target
Final 2017	663,327	7.1%	-5.8%	9.8%
Preliminary 2018	610,226	-0.4%	-13.3%	1.9%

The City does not have official GHG emissions reduction targets for 2017 or 2018, but staff has interpolated targets for these two years using the 2015 and 2020 targets.

2017 is the first year since Mountain View began conducting inventories that emissions have begun to decline and the first year that emissions dropped below the 2005 baseline year inventory level. The preliminary 2018 inventory shows another large drop in emissions, though the City will need to reduce emissions by an additional 11,780 MT CO₂e (1.9 percent) by 2020 to reach the adopted 2020 target.

Final 2017 GHG emissions were significantly lower than estimated in the preliminary 2017 inventory (716,353 MT CO₂e), due to lower emissions from energy and transportation. The final emissions factor for 2017 from Pacific Gas and Electric (PG&E) was significantly lower than the 2016 emissions factor used as a proxy in the preliminary inventory. Updated Census Bureau data for 2017, released in September 2019, resulted in slightly lower transportation emissions due to a reduction in estimated freight vehicle traffic. (The preliminary inventory had used 2015 Census Bureau data, the most recent available at the time, to estimate these emissions.)

Figure 1 provides the results of the City’s community GHG inventories against the GHG reduction targets through 2030. Target reduction levels in interim years have been interpolated on a linear path between official adopted targets. While prior inventory levels were above the reduction target levels, 2018 emissions were 0.4 percent below the interpolated annual target of 612,527 MT CO₂e, as shown in Table 2. This indicates the City is in a good position to achieve the adopted 2020 reduction target.

Figure 1: Community GHG Emissions and Reduction Targets, 2005-2030

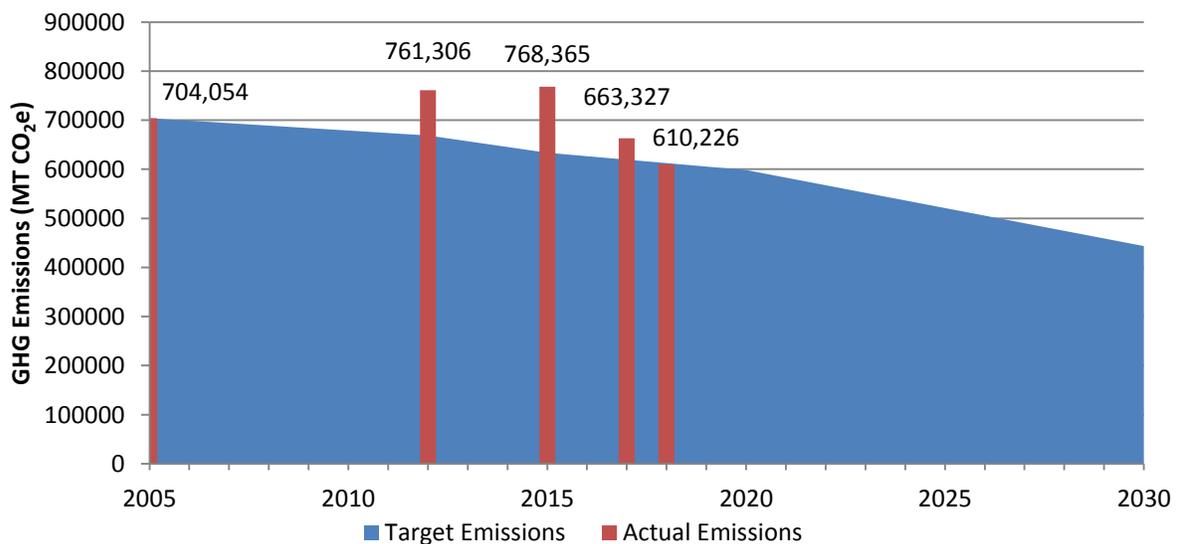
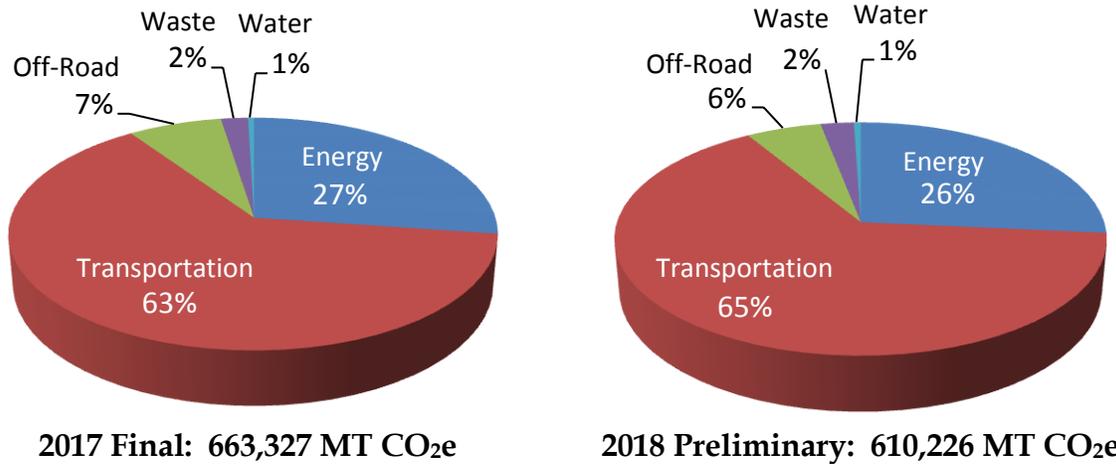


Figure 2 shows a breakdown of 2017 and 2018 GHG emissions by sector.

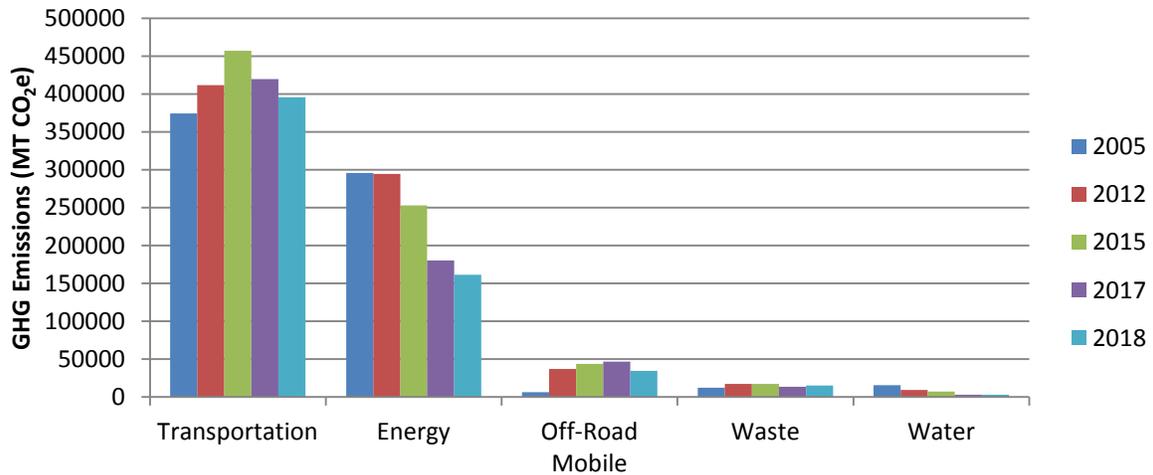
Figure 2: Final 2017 and Preliminary 2018 Community GHG Emissions by Sector



As shown in Figure 2, transportation and energy remained the two largest emissions sources in 2017 and 2018. While overall emissions dropped 8 percent from 2017 to 2018, the percentage of emissions attributed to each sector remained relatively consistent.

Figure 3 provides GHG emissions by sector for each inventory year from 2005 to 2018. (Attachment 2 provides the full breakdown of emissions by sector between 2005 and 2018.) The majority of emissions reductions from 2015 to 2018 came from the transportation and energy sectors, driven by cleaner sources of electricity, more efficient and cleaner-fuel vehicles, and lower vehicle miles traveled (VMT) per capita.

Figure 3: Comparison of Community GHG Emissions by Sector, 2005-2018

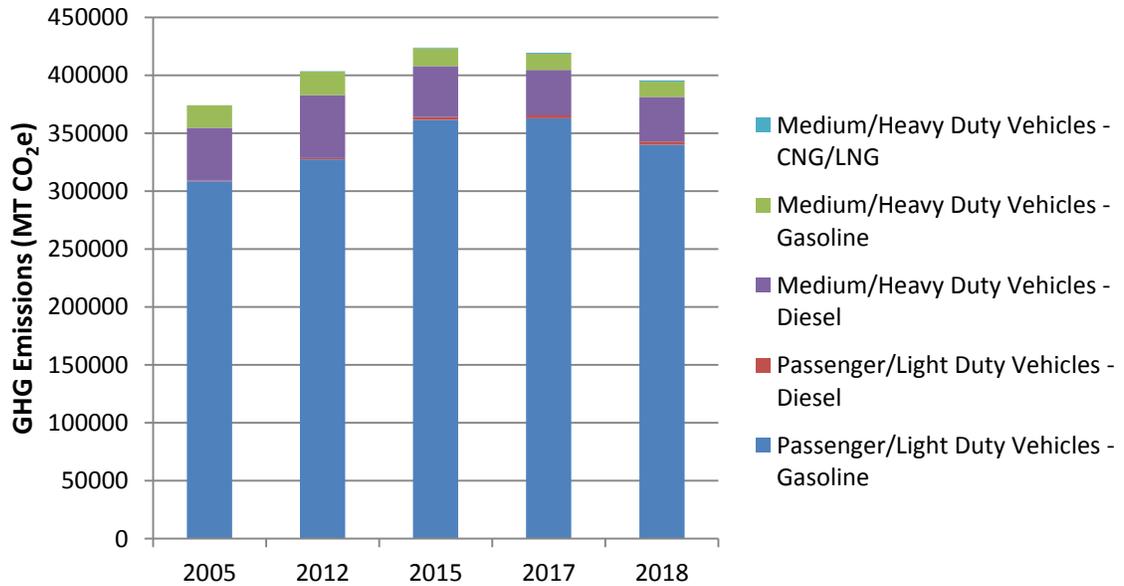


The following section presents an analysis of 2017 and 2018 GHG emissions by sector. With the exception of data for 2005, charts in this section provide GHG estimates using a methodology consistent with the most recent inventories and corrected for some calculation errors made in prior inventories in order to provide a more accurate representation of year-to-year changes in emissions.

- **TRANSPORTATION:** Emissions from on-road vehicles declined 7.1 percent from the peak in 2015 to 2018. Estimated per-capita VMT for the service population declined from 18.7 miles to 18.1 miles daily. Additional contributors to the emissions decrease include higher vehicle fuel efficiency standards and an increase in the number of electric vehicles (EVs). These factors offset the slight increase in overall VMT from 2015 to 2018, driven by a net increase in the service population. The travel model that estimates Citywide VMT uses a large number of inputs on land use and population changes, making it difficult to attribute the decrease in per-capita VMT to any specific strategy or cause. That said, the City has been actively working to reduce VMT through a variety of strategies. As staff implements the actions in SAP-4, we will make every effort to secure “before” and “after” project metrics to demonstrate the impact of the actions.

As shown in Figure 4, gasoline-powered passenger vehicles and light-duty trucks continue to generate the vast majority of the City’s transportation-related emissions. These emissions will continue to decline if expected trends in VMT per capita, fuel efficiency, and EV adoption continue. This demonstrates that it is possible to reduce GHG emissions from transportation even while the service population increases. The housing units allowed through the North Bayshore and East Whisman Precise Plans are expected to result in further decreases in per-capita VMT as they are developed due to addressing the jobs-housing imbalance, creating complete neighborhoods, and supporting active transportation and transit.

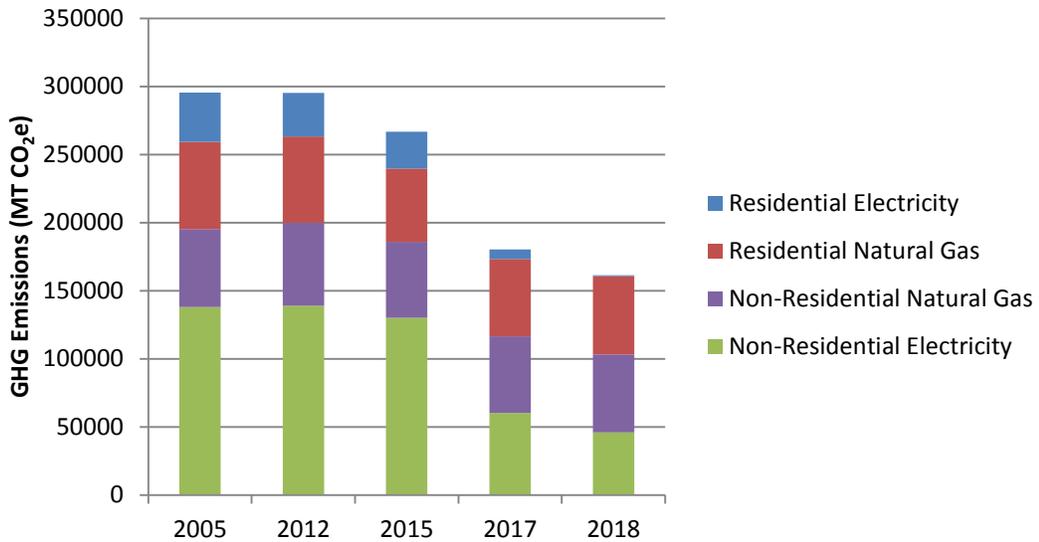
Figure 4: Transportation Emissions by Vehicle and Fuel Type, 2012-2018



Primary strategies to maintain the downward trend in transportation emissions include reducing VMT by supporting travel by nonvehicle modes and accelerating the transition to cleaner vehicles such as EVs. These strategies provide additional benefits for the Mountain View community, including increased air quality, safer streets, a vibrant downtown, and improved health. The City’s efforts to increase the number of EV chargers at City facilities and require EV chargers in new residential and commercial development are intended to accelerate adoption of EVs in the community and achieve further GHG reductions in transportation.

ENERGY: With the transition of nearly all of the community’s electricity accounts to Silicon Valley Clean Energy (SVCE), natural gas comprises the majority of energy sector emissions at 71 percent. The City’s GHG reduction strategy in this sector focuses on reducing natural gas use and addressing commercial energy use, which accounts for 64 percent of energy sector emissions, compared to 36 percent from the residential sector.

Figure 5: Residential and Nonresidential Energy Emissions, 2005-2018



Cleaner electricity from SVCE drove the majority of Mountain View’s energy sector and overall emissions reductions between 2015 and 2018. SVCE began providing practically carbon-free electricity to residential and commercial customers in Mountain View in April 2017. SVCE currently provides electricity to more than 97 percent of residential and commercial customers in its service territory previously served by PG&E, and SVCE’s opt-out rate has remained very stable at about 3 percent.

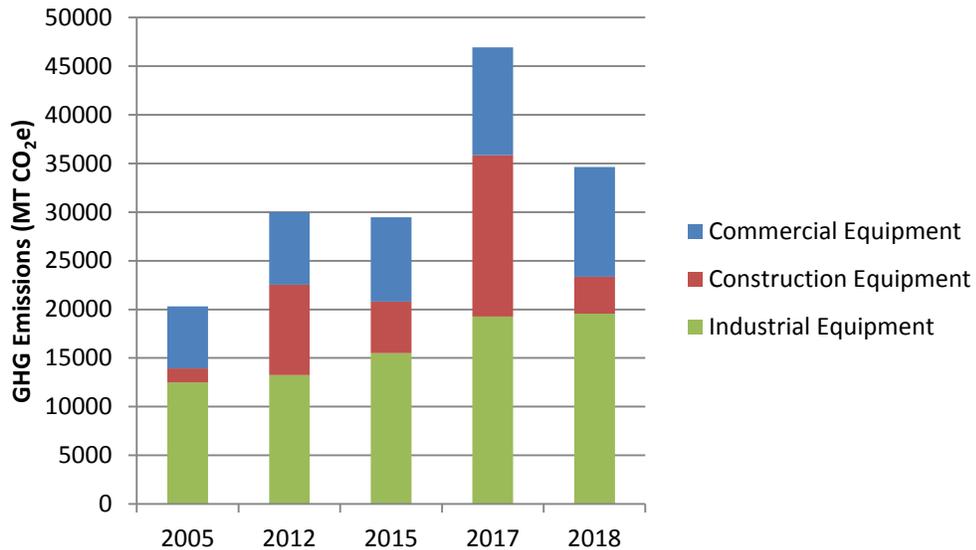
The City Council’s November 12, 2019 adoption of Reach Codes to require all-electric construction for new residential and commercial buildings ensures that new development will not increase natural gas emissions. In addition, SAP-4, approved by the City Council on October 22, 2019, contains several measures aimed at reducing natural gas use in existing buildings.

Due to customer confidentiality constraints, the City was unable to obtain a detailed breakdown of electricity usage by energy service provider (PG&E, SVCE, or Direct Access) for 2018, as it has for previous inventory years. However, SVCE was able to provide the City with the aggregate total emissions from both residential and nonresidential electricity use. The 2018 results are based on preliminary emissions factors, and the 2018 inventory will be finalized once final emissions factors and other remaining data are available.

- **OFF-ROAD MOBILE:** The off-road mobile sector consists of construction equipment and commercial/industrial equipment. Emissions from this sector

spiked in 2017, primarily due to an increase in estimated construction-related emissions, as shown in Figure 6.

Figure 6: Off-Road Mobile Emissions, 2005-2018



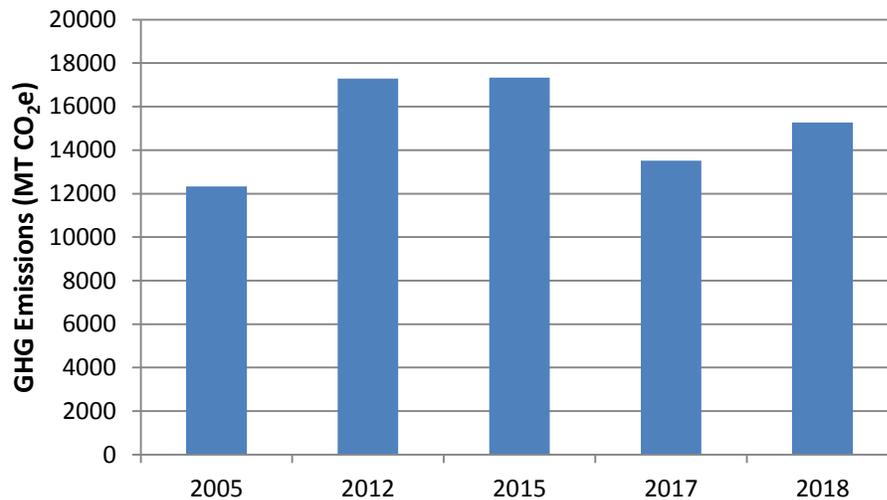
Off-road emissions are estimated by downscaling County-level data provided by the California Air Resources Board (CARB). The estimation tool used in previous inventories is no longer supported by CARB and has been replaced with a newer tool that does not align exactly with the categories of off-road equipment included in previous community inventories. To better present long-term trends in this sector, Figure 6 shows off-road emissions for all years using the new estimation tool rather than previously reported emissions values.

County-level emissions data is downscaled to Mountain View using two main scale factors: the ratio of new housing permits (to calculate construction equipment emissions) and the jobs ratio (to calculate commercial and industrial equipment emissions). Therefore, the trends in estimated off-road emissions for Mountain View closely track changes in the relative amount of housing construction and jobs growth in the City. The preliminary 2018 inventory uses the 2017 jobs ratio to downscale County-level data since this is the most recent year available for this data set from the Census Bureau.

- **WASTE:** Solid waste emissions are dependent on both the total amount of solid waste sent to a landfill and the estimated percentage of organic material in the waste stream. Organic material, such as yard trimmings, food scraps, and food-soiled paper, is the primary contributor of GHG emissions from solid waste, due to

the release of methane as these materials decompose. As discussed in the March 19, 2019 Council report accompanying the Preliminary 2017 Community GHG Inventory, the 2012 and 2015 inventories incorrectly omitted certain categories of waste that contribute to GHG emissions. As a result, solid waste emissions previously appeared to decline significantly between 2005 and 2012 despite an increase in the amount of waste generated. Figure 7 provides the corrected solid waste emissions for 2012 and 2015.

Figure 7: Solid Waste Emissions, 2005-2018



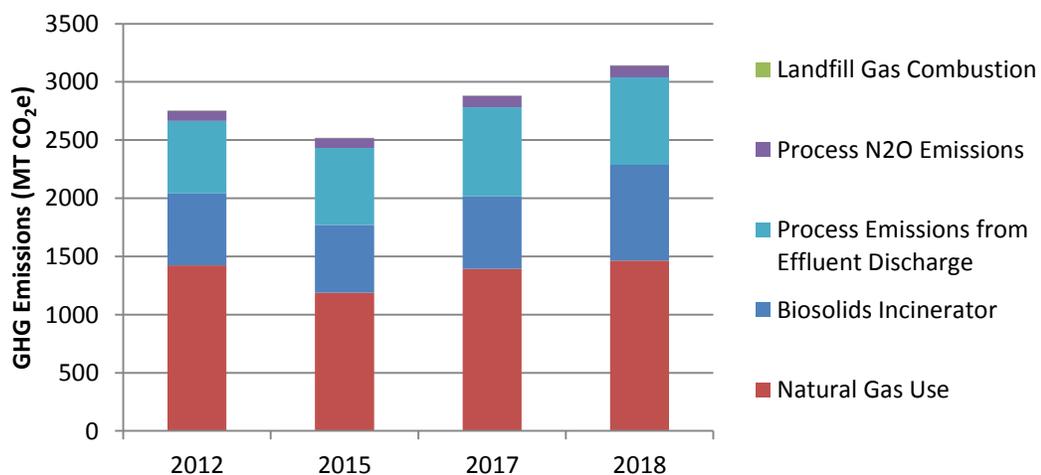
As shown in Figure 7, solid waste emissions declined 22 percent between 2015 and 2017, due to both a decrease in total amount of waste generated and a decrease in the percentage of organic material in the waste stream. However, waste emissions increased from 2017 to 2018 due to an increase in the total tonnage of waste sent to landfill, primarily from construction and demolition debris. The 2017 and 2018 inventories use the same 2017 waste characterization study data, which allows staff to estimate the percentage of organic material in the waste sent to landfill after trash has been sorted at the SMaRT[®] Station. Therefore, any increase in the diversion of organic waste due to the implementation of the City's residential food scraps collection program in July 2017 would not be captured in the 2018 inventory.

The City's residential food scraps collection program allows residents with curbside collection of yard trimmings to dispose of their food scraps and other compostable waste in order to divert it from landfill. There was a 15 percent decrease in the weight of trash collected from homes with curbside collection compared to before implementation of the food scraps collection program. Staff

anticipates a continued decline in per-capita waste generation as the food scraps program is currently being expanded Citywide to multi-family residences. However, the impact of the food scraps program in reducing landfilled organic waste may not be fully reflected in GHG inventories until the City conducts a new residuals characterization study.

- **WATER**: This sector includes emissions from the energy used in extracting, conveying, treating, and distributing potable water, and from the wastewater treatment process. More than 95 percent of emissions in this sector are from wastewater treatment. Figure 8 shows the estimated wastewater emissions from 2012 through 2018. These emissions have risen since 2015 due to an increase in the volume of wastewater being treated. This is correlated with an increase in the volume of potable water use in Mountain View over the same time, which results in more wastewater being produced.

Figure 8: Wastewater Emissions, 2012-2018



As shown in Figure 8, the primary contributor to wastewater emissions is natural gas use at the Palo Alto Regional Water Quality Control Plant (RWQCP). While the City of Palo Alto purchases carbon offsets for its natural gas use, there are still emissions associated with the on-site combustion of natural gas in this process since inventory calculation protocols do not consider offsets as reducing local emissions. The incinerators at the RWQCP are scheduled for decommissioning in 2019, and biosolids will instead be trucked off-site to processing facilities and converted into fertilizers and other beneficial products. This is expected to result in emissions reductions from wastewater treatment beginning in 2019.

Emissions associated with potable water use in Mountain View remain relatively constant and very low as the water supply for Mountain View is primarily gravity-fed and, therefore, requires very little energy. Conservation efforts have also enabled the City to reduce its water use by 29 percent since 2005 despite an increasing population. Increased conservation efforts would reduce both potable water use and the emissions generated from wastewater.

Characterizing Per-Capita Emissions

Mountain View experienced significant resident and employee growth between 2005 and 2018, as shown in Table 3. The resident population increased by 14.4 percent, while the number of employees increased by 76.3 percent. Although the service population (which is calculated by adding the resident population to the number of employees) has increased, per-capita emissions have decreased. This decline is relatively recent; before 2015, per-capita emissions remained relatively flat.

Table 3: Community GHG Emissions Relative to Population and Employment

	2005	2017	2018	% Change 2005-2018	% Change 2017-2018
Total Emissions (MT CO₂e)	704,054	663,327	607,889	-13.7%	-8.4%
Population/Employment					
Residential	70,629	80,484	80,800	14.4%	0.4%
Employees	54,071	96,026	95,309	76.3%	-0.7%
Service Population	124,700	176,510	176,109	41.2%	-0.2%
Per-Capita Emissions (MT CO₂e)					
Per Service Population	5.65	3.76	3.45	-38.9%	-8.1%

While the growth in service population has exerted upward pressure on the City's GHG emissions, future service population growth may not necessarily have the same effect. For example, addressing the jobs-housing imbalance can reduce GHG emissions by decreasing commuting distances for many employees. Furthermore, the types of initiatives that will continue to reduce per-capita emissions (e.g., creating more walkable and "complete" neighborhoods, expanding bicycle infrastructure, improving the community shuttle, and other initiatives to reduce single-occupancy vehicle use) have significant other benefits for both residents and employees. These co-benefits, such as improved air quality, reduced congestion, expanded and safer pedestrian and bicycle infrastructure, and increased access to convenient and affordable transportation options, will improve the health of Mountain View's population and environment and positively impact quality of life.

It is important to note that the service population does not represent the number of people in Mountain View at any given time. While most employed Mountain View residents work outside the City and most employees in Mountain View reside elsewhere, some Mountain View residents work within the City and are, therefore, “double-counted” in the service population total. As the City takes steps to address the jobs-housing imbalance, the percentage of Mountain View employees living within the City is likely to increase.

Exploring New Data Sources for Future Inventories

As part of the ongoing effort to improve GHG accounting and reporting, staff continues to explore alternative sources of data. Through the Google Civic Leadership Program, staff was connected with the Google team working on the Environmental Insights Explorer (EIE). The EIE is a new online tool that uses Google’s data sets to support GHG inventories and other sustainability planning for cities at no cost. While the EIE is still under development, City staff continues to work closely with Google on this tool and plans to utilize this resource to support both GHG inventories and ongoing sustainability reporting.

FISCAL IMPACT

Other than staff time, there was no cost to conduct the 2017 and 2018 community GHG inventories. In addition, there is no fiscal impact from adopting these two inventories.

CONCLUSION

2017 represents an important turning point for Mountain View as GHG emissions began to decline after many years of increase. Final numbers showed that GHG emissions decreased 14 percent between 2015 and 2017. Preliminary 2018 results indicate a continued downward trend in emissions due to the City’s efforts, particularly participation in Silicon Valley Clean Energy. While the preliminary 2018 inventory indicates the City is in a good position to achieve its 2020 reduction target, it is important to identify programs and policies that can increase this emissions reduction trend. The actions approved by the City Council in October 2019 as part of Sustainability Action Plan 4 are expected to yield the GHG reductions necessary to achieve near-term targets and identify strategies to meet longer-term goals through ongoing climate action planning. Continuing to conduct annual GHG inventories will allow the City to better track its progress and evaluate the effectiveness of GHG reduction measures.

PUBLIC NOTICING

Agenda posting and e-mails sent to community members interested in sustainability.

Prepared by:

Erin Brewster
Sustainability Analyst II

Steve Attinger
Sustainability Coordinator

Reviewed by:

Audrey Seymour Ramberg
Assistant City Manager/
Chief Operating Officer

Approved by:

Daniel H. Rich
City Manager

EB-SA/2/CAM
622-12-03-19CR
190511

- Attachments:
1. Community Greenhouse Gas Emissions Reduction Targets and Levels, 2005-2050
 2. Total Community Greenhouse Gas Emissions by Sector and Subsector, 2005-2018