COUNCIL REPORT

CITY OF MOUNTAIN VIEW

DATE: June 22, 2021

CATEGORY: Consent

DEPT.: City Manager's Office

TITLE: **Final 2018 and Preliminary 2019 Community Greenhouse Gas Inventories**

RECOMMENDATION

Adopt the Final 2018 and Preliminary 2019 community greenhouse gas emissions inventories.

BACKGROUND

In November 2009, the City Council adopted voluntary greenhouse gas (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 of 2005. The targets were developed and adopted in response to the Global Warming Solutions Act of 2006 (Assembly Bill 32), which requires California to reduce Statewide GHG emissions. Subsequently, through the City's Climate Protection Road Map (CPR), the City Council adopted interim targets at five-year intervals between 2020 and 2050 to track the City's progress more closely.

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, including recommended changes to the GHG reduction targets. Staff assessed these recommendations to verify assumptions and estimates and presented the results to Council on December 4, 2018. In March 2019, the City Council directed staff to evaluate the ESTF-2-recommended changes to the City's reduction targets. In December 2019, staff recommended and Council adopted revised GHG reduction targets for the years 2025 to 2050 that decline by a constant percentage rather than a constant amount. Table 1 below shows Mountain View's revised current communitywide GHG reduction targets.

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	33%
2030	47%
2035	59%
2040	68%
2045	75%
2050	80%

Attachment 1 presents the Council-approved GHG reduction targets as a percentage of 2005 emissions and as absolute emissions levels.

Current Sustainability Action Plan

In October 2019, Council adopted Sustainability Action Plan 4 (SAP-4) for Fiscal Years 2019-20 through 2021-22 to serve as the City's continued plan for strategic investment in sustainability. Among its proposed 81 new actions and 79 already approved actions, SAP-4 contains both smaller projects that provide GHG reductions in the near term and larger, longer-term infrastructure projects that may not have immediate impact but will yield significant GHG reductions over time. SAP-4 actions are organized around 27 high-level goals in the transportation, energy, land use, zero-waste, water, parks and ecosystems, and core sustainability sectors. These goals highlight the synergies between different actions across City departments and recognize the broad array of interdependent policies and programs needed to achieve the City's sustainability goals. On May 11, 2021, staff provided an update to the City Council on the status of SAP-4 implementation.

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. Staff then calculates greenhouse gases resulting from these activities in terms of metric tons of carbon dioxide equivalent, or MT CO_2e. For mobile source emissions, such as transportation and off-road equipment, where measured data is not available, staff uses standardized GHG accounting methodologies to estimate emissions at the County level and then adjusts them to a 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 based on the best available data and calculation methodologies. These estimates are subject to change as better data and calculation methodologies become available.

The Protocol does not fully account for life-cycle emissions from food, air travel, and purchased goods and services, which are accounted for in a Consumption-Based Emissions Inventory (CBEI). Community inventories and CBEIs are intended to address different emissions sources and underlying factors and to inform different decision-making processes. For this reason, a CBEI is a complement to, but not a replacement for, a traditional community inventory. In response to community interest, staff analyzed the possibility of using a CBEI in Mountain View and presented this analysis to Council on December 3, 2019. As stated in that report, staff does not recommend conducting ongoing City-level CBEIs for Mountain View due to: (1) the challenges in obtaining necessary and accurate data; (2) the staff time and expense involved; and (3) the fact that a CBEI would not account for the impact of initiatives in Mountain View. For more information on CBEIs, see the December 3, 2019 Council report entitled "Community Greenhouse Gas Accounting, Reduction Targets, and Carbon Neutrality."

2018 and 2019 Community Greenhouse Gas Emissions Inventory Results

Since Mountain View now conducts community GHG inventories annually, staff has begun presenting a preliminary, estimated inventory to Council before all data is available. Receiving final emissions factors for electricity from Pacific Gas and Electric (PG&E) and Direct Access providers and data from the Census Bureau can take up to 1.5 years. A preliminary 2018 community GHG inventory was presented to the City Council on December 3, 2019, estimating emissions at 610,226 MT CO_2e. As shown below, the final calculation of 2018 emissions came in slightly lower.

Table 2 provides the Final 2018 and Preliminary 2019 GHG emissions and compares them to the 2005 baseline, the upper range of the 2020 target (i.e., 20%), and the 2025 target.

Table 2: Results of Final 2018 and Preliminary 2019 Community GHG Inventories

GHG Inventory	Total Emissions ($MT CO_2e$)	Percent Above/Below Target Level	Percent Above/Below 2005 Baseline	Percent Reduction Needed to Reach 2020 Target	Percent Reduction Needed to Reach 2025 Target
Final 2018	604,318	-1.34%	-14.17%	0.97%	21.94%
Preliminary 2019	601,980	-0.58%	-14.50%	0.59%	21.64%

The City does not have official GHG emissions reduction targets for 2018 or 2019, but staff has interpolated targets for these two years based on the 2015 and 2020 targets.

Emissions declined in 2018 and remained below 2005 baseline inventory levels. The preliminary 2019 inventory shows emissions continuing to drop slightly. The City will need to reduce emissions by an additional 3,534 MT CO_2e (0.59%) to reach the adopted 2020 target. To reach the 2025 reduction target of 33%, Mountain View will need to reduce its emissions a significant amount, equating to 130,263 MT CO_2e (21.64%).

Final 2018 GHG emissions were slightly lower than estimated in the preliminary 2018 inventory (610,226 MT CO_2e) due to lower emissions from energy, solid waste, and off-road mobile sources. PG&E's final emissions factor for 2018 was significantly lower than the 2017 emissions factor used as a proxy in the preliminary inventory. Additionally, final off-road mobile emissions were slightly lower due to updated Census Bureau data for 2018 (the preliminary inventory had used 2017 data, the most recent available at the time) that estimated less freight vehicle traffic within the City. Final 2018 solid waste emissions were significantly lower than estimated in the preliminary inventory because it used a different Intergovernmental Panel on Climate Change (IPCC) Assessment, which determines the global warming potential of GHG relative to carbon dioxide. The preliminary 2018 inventory used the IPCC Fourth Assessment, which specified a higher global warming potential for methane, therefore inflating the emissions from solid waste. To maintain consistency with past inventories, the final 2018 inventory used the global warming potential values from the IPCC Second Assessment. More information on the IPCC Assessments and global warming potential methodology is provided later in this report.

Figure 1 provides the results of the City's community GHG inventories compared to the GHG reduction targets through 2030. For interim years, staff has interpolated reduction targets on a linear path between official adopted targets. As shown in Table 2, final 2018 emissions were 1.34% below the interpolated annual target of 612,527 MT CO_2e, and

preliminary 2019 emissions were 0.58% below the interpolated target of 605,486 MT CO_2e. This indicates the City is in a good position to achieve the adopted 2020 target. However, as shown in Table 1, the City's reduction targets decline 13% between 2020 and 2025, requiring a significant decrease in emissions by 2025.

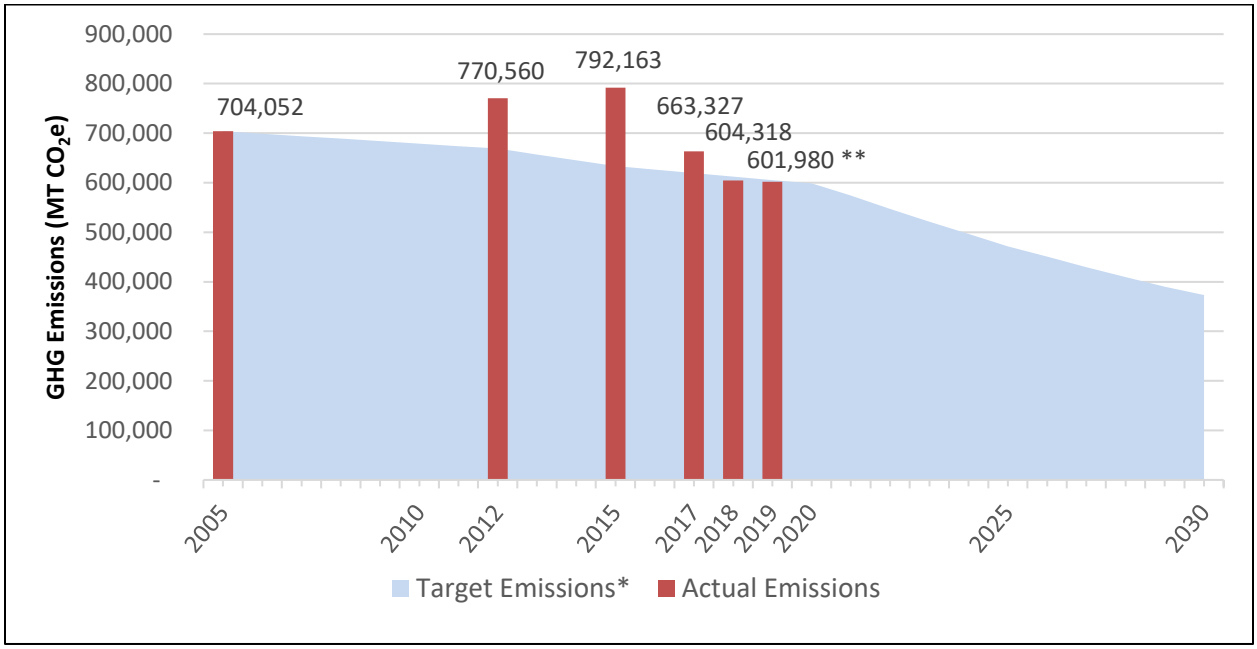


Figure 1: Community GHG Emissions and Reduction Targets, 2005-2030

* Chart shows the upper limit of the target emissions levels for 2016-20 and is based on a 15% reduction by 2020.

** 2019 emissions are preliminary.

Emissions by Sector

Figure 2 shows a breakdown of 2018 and 2019 GHG emissions by sector. Transportation and energy remained the two largest emissions sources in 2018 and 2019. While overall emissions dropped 0.39% from 2018 to 2019, the percentage of emissions attributed to each sector remained relatively constant.

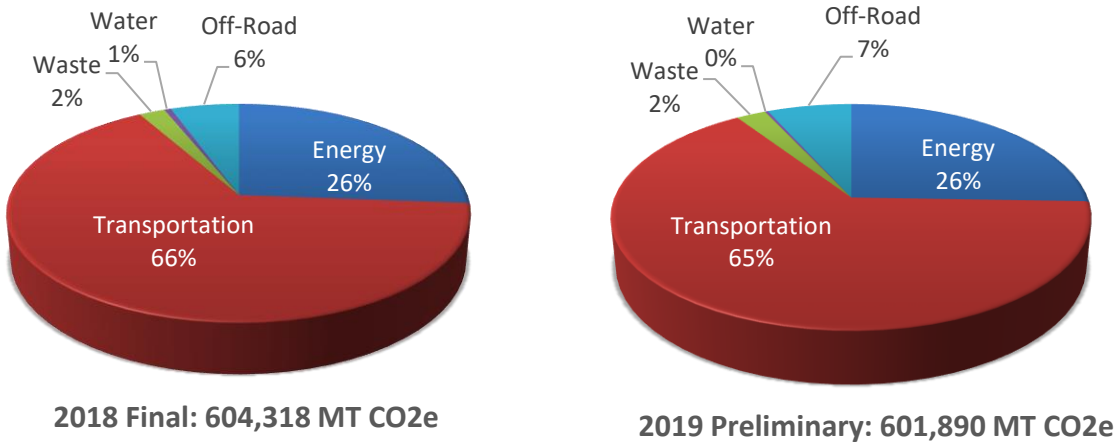
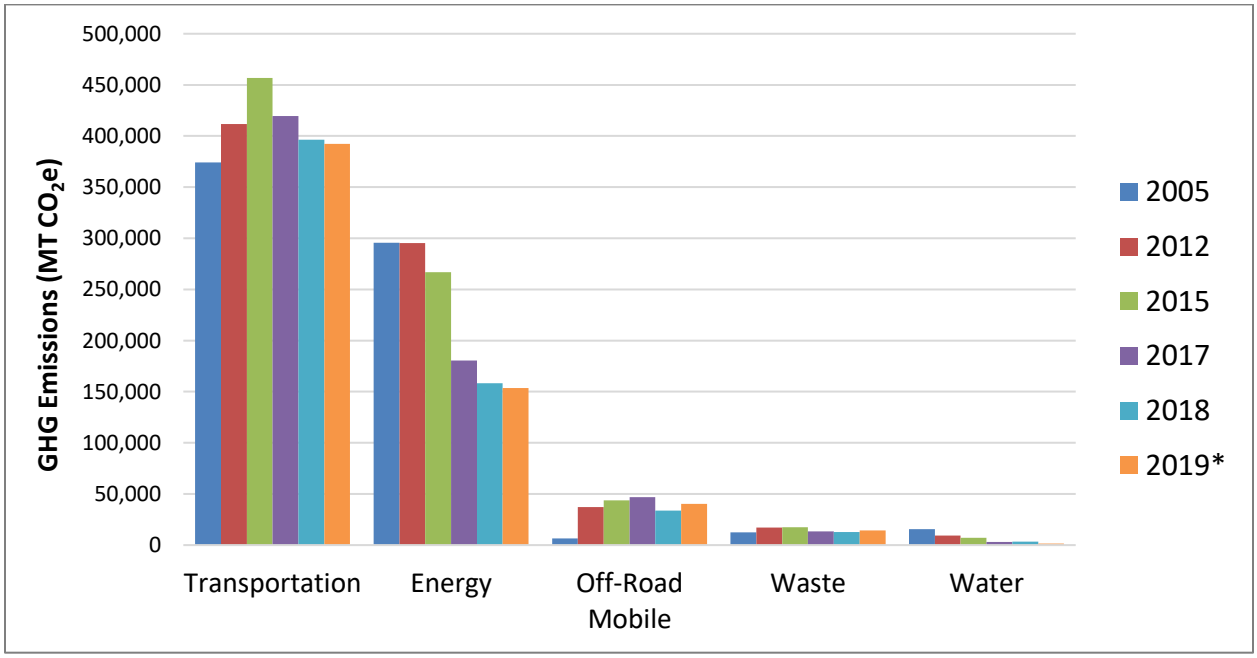


Figure 2: Final 2018 and Preliminary 2019 Community GHG Emissions by Sector

Figure 3 provides GHG emissions by sector for each inventory year from 2005 to 2019 (see Attachment 2 for a full breakdown of emissions). Most emissions reductions between 2015 and 2019 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.



* 2019 emissions are preliminary.

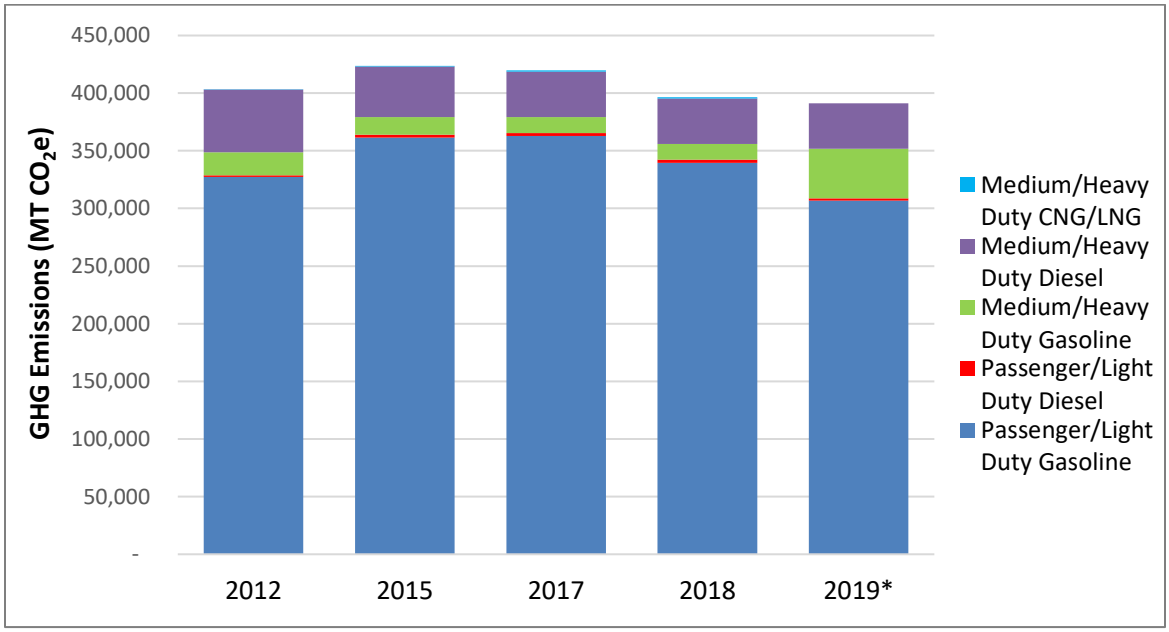
Figure 3: Comparison of Community GHG Emissions by Sector, 2005-2019

The following section presents an analysis of 2018 and 2019 GHG emissions by sector. Except for data for 2005, charts in this section provide GHG estimates based on a methodology consistent with the most recent inventories. To provide a more accurate representation of year-to-year changes in emissions, staff has corrected some GHG estimates in prior inventories.

- **Transportation (65% percent of total preliminary 2019 emissions):** Emissions from on-road vehicles have declined 14%, comparing their peak in 2015 to preliminary 2019 emissions. Estimated per-capita VMT for the service population (which is calculated by adding the resident population to the number of employees) declined from 18.7 to 18.1 miles per day. Higher vehicle fuel efficiency standards and an increase in the number of electric vehicles (EVs) have also contributed to the emissions decrease. These factors offset the slight increase in overall VMT from 2015 to 2019, which was due to a net increase in the service population.

  The Citywide VMT estimates used in the inventories are calculated with a travel demand model that uses many inputs on land use and population changes. The 2019 preliminary inventory uses 2018 per-capita VMT to estimate on-road vehicle emissions because an updated travel model for 2019 is not yet available. Therefore, the on-road transportation emissions estimated in the preliminary 2019 inventory do not consider any changes to per capita VMT resulting from land use changes or transportation demand management measures implemented in 2019. Staff plans to work with a consultant to develop an updated travel model or improve other data sources to estimate VMT for future inventories.

  As shown in Figure 4, gasoline-powered passenger vehicles and light-duty trucks continue to generate most 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. As they are developed, the housing units allowed through the North Bayshore and East Whisman Precise Plans are expected to further decrease per-capita VMT by addressing the jobs-housing imbalance, creating complete neighborhoods, and supporting active transportation and transit. Note that 2018 and 2019 emissions do not reflect the increased telecommuting that occurred in 2020 as a result of the COVID-19 pandemic.

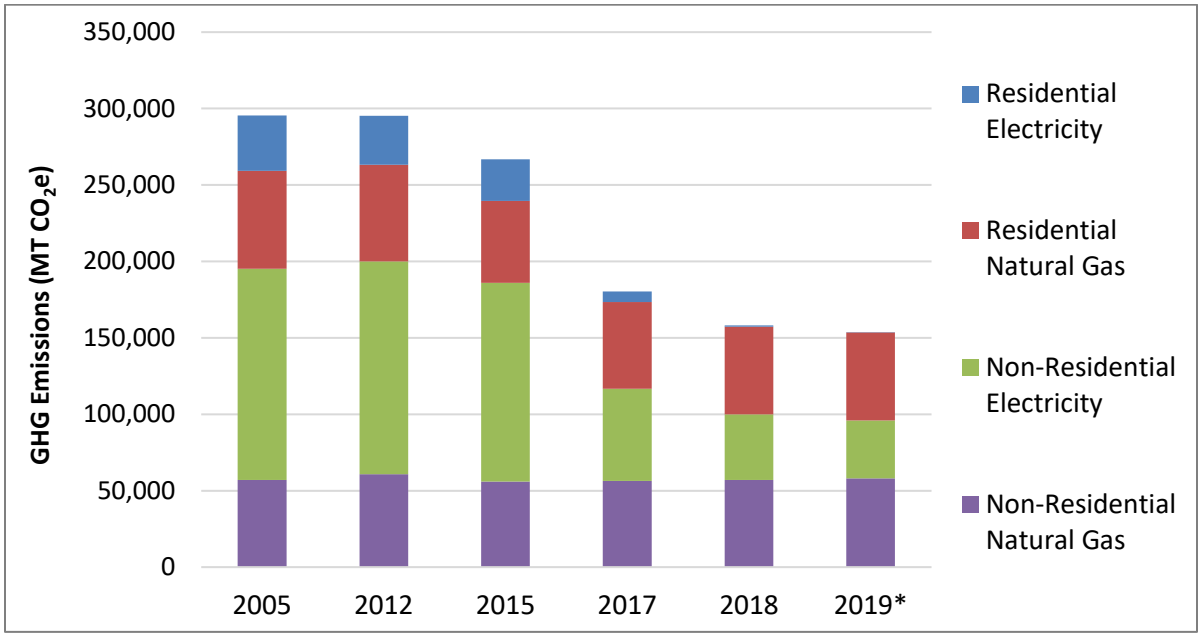


* 2019 emissions are preliminary.

Figure 4: Transportation Emissions by Vehicle and Fuel Type, 2012-2019

The City can continue reducing transportation emissions by supporting travel by nonvehicular modes and accelerating the transition to cleaner vehicles. These strategies provide additional community benefits, including better air quality, safer streets, a vibrant downtown, and improved health.

- **Energy (26% of total preliminary 2019 emissions):** With the transition of nearly all the community's electricity accounts to Silicon Valley Clean Energy (SVCE), natural gas comprises the majority of energy sector emissions at 75%. The City's GHG reduction strategy in this sector focuses on reducing natural gas use and addressing commercial energy use, which accounts for 62% of energy sector emissions.



* 2019 emissions are preliminary.

Figure 5: Residential and Nonresidential Energy Emissions, 2005-2019

Cleaner electricity from SVCE drove the majority of Mountain View's energy sector and overall emissions reductions between 2015 and 2019. SVCE began providing carbon-free electricity to residential and commercial customers in Mountain View in April 2017. SVCE currently provides electricity to just under 98% of residential and commercial customers in its service territory previously served by PG&E, and SVCE's opt-out rate has remained stable at about 2% to 3%.

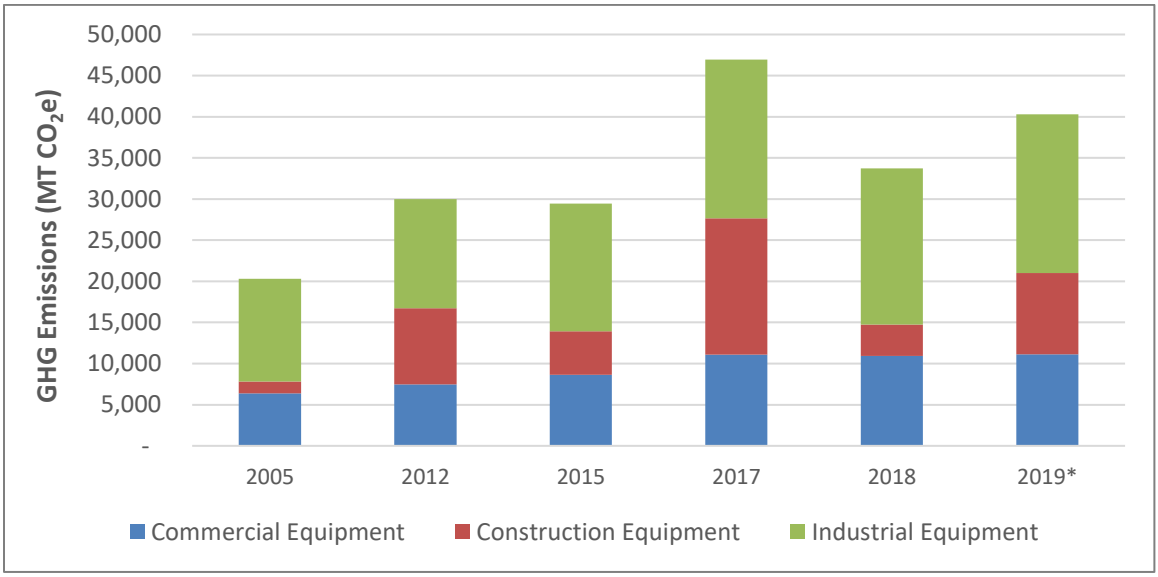
The City Council's November 12, 2019 adoption of Reach Codes to require all-electric construction for new residential and commercial buildings ensures that new development will not increase natural gas emissions. In addition, SAP-4, approved by the City Council on October 22, 2019, contains several measures 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 or 2019. However, SVCE was able to provide the City with the aggregate total emissions from both residential and nonresidential electricity use for 2018 and 2019.

PG&E's emissions factor for 2019 was significantly lower than those of previous years because it was calculated with a new methodology that all California energy

providers are now using to comply with the California Energy Commission's Power Source Disclosure program. This new methodology determines how to allocate emissions given an excess supply of electricity and calculates a lower emissions factor than previous methodologies. This lower emissions factor had little impact on the City's emissions overall because PG&E serves such a small portion of residential and commercial customers.

- **Off-Road Mobile (7% of total preliminary 2019 emissions):** 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 construction-related emissions, as shown in Figure 6.



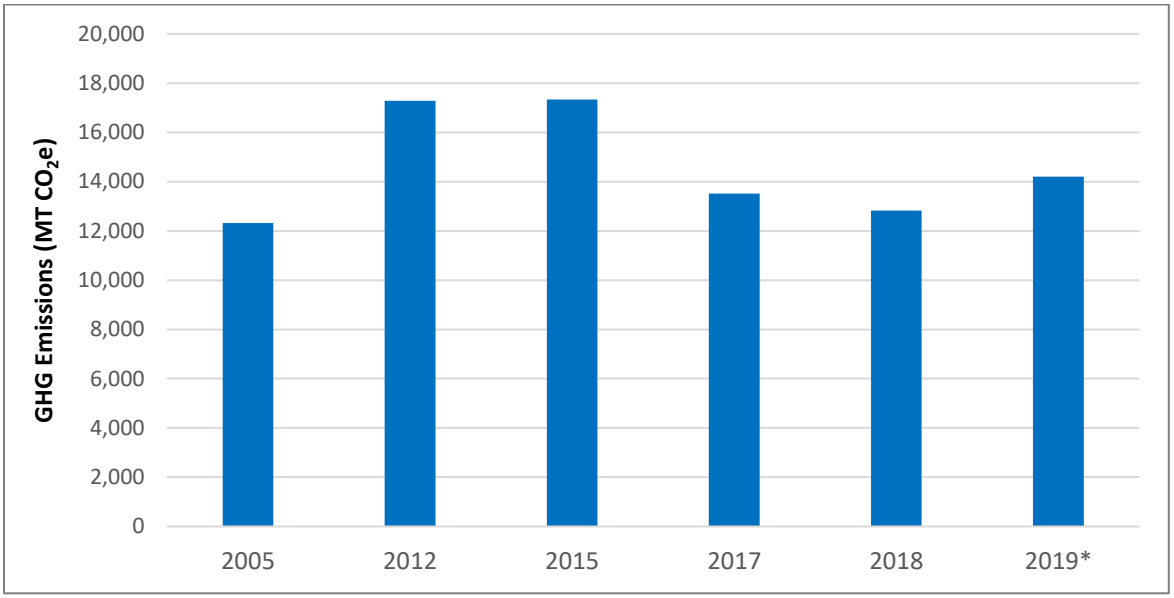
* 2019 emissions are preliminary.

Figure 6: Off-Road Mobile Emissions, 2005-2019

Off-road emissions are estimated by downscaling County-level data provided by the California Air Resources Board. Staff downscaled County-level emissions data by 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 City's estimated off-road emissions are associated with the relative amount of housing construction and job growth in the City. The preliminary 2019 inventory uses the 2018 jobs ratio data since this is the most recent data available from the Census Bureau.

- **Waste (2% of total preliminary 2019 emissions):** Solid waste emissions are dependent on both the total amount of solid waste sent to a landfill and the

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.



* 2019 emissions are preliminary.

Figure 7: Solid Waste Emissions, 2005-2019

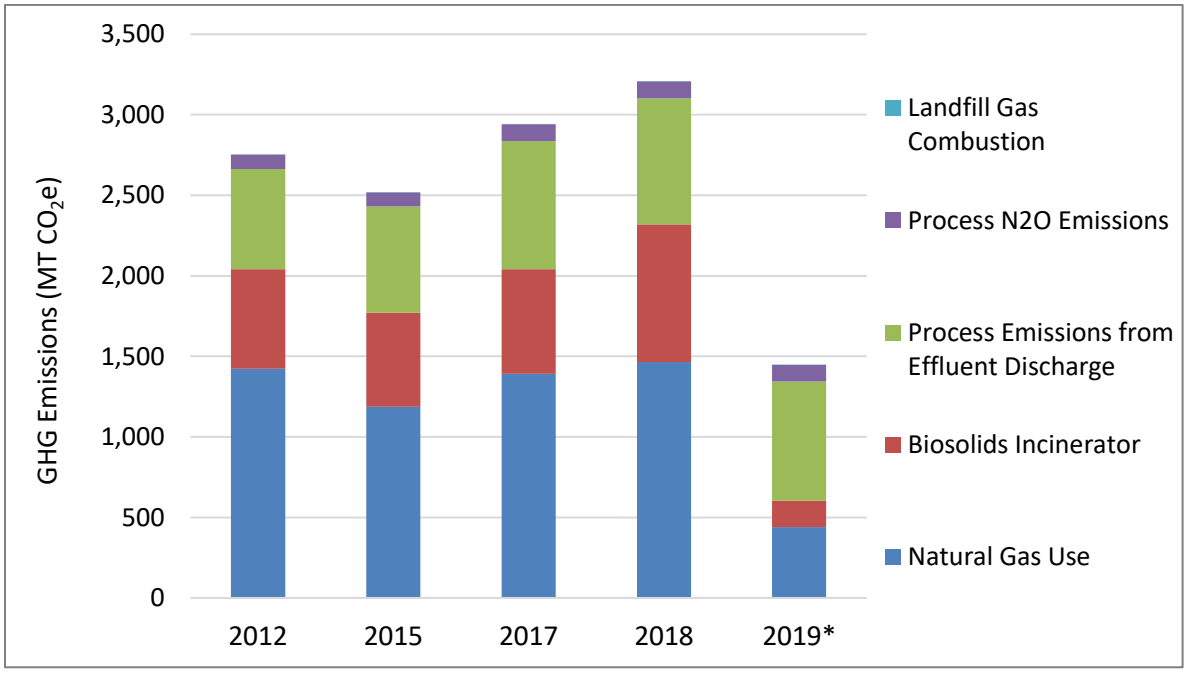
As shown in Figure 7, the final 2018 inventory shows solid waste emissions decreasing slightly from 2017 to 2018. This is a change from the 2018 preliminary inventory, which used a different global warming potential for methane and estimated higher emissions. Figure 7 shows 2018 solid waste emissions calculated with global warming potential values that are consistent with all past inventories.

The 2019 preliminary inventory shows solid waste emissions rising slightly since 2018 due to an increase in the amount of waste sent to landfill, primarily from construction and demolition debris. The 2017, 2018, and 2019 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, the 2018 and 2019 inventories do not capture any additional organic waste diversion occurring as a result of the implementation of the City's residential food scraps collection program in July 2017.

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 to divert it from the landfill. Staff expects per-capita waste generation to continue to decline as the food scraps program is expanded to multi-family residences in July 2021.

- **Water (0.2% of total preliminary 2019 emissions):** This sector includes emissions from the energy used to treat wastewater and extract, convey, treat, and distribute potable water. Wastewater treatment contributes over 95% of emissions from the water sector. Figure 8 shows the estimated wastewater emissions from 2012 through 2019. Wastewater emissions rose between 2015 and 2018 due to an increase in the volume of wastewater being treated, which correlates with an increase in potable water use.



* 2019 emissions are preliminary.

Figure 8: Wastewater Emissions, 2012-2019

As shown in Figure 8, natural gas use at the Palo Alto Regional Water Quality Control Plant (RWQCP) contributes most wastewater emissions for 2012 to 2018. 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 since inventory calculation protocols do not consider offsets as reducing local emissions. In 2019, natural gas use at the RWQCP decreased significantly, the incinerators at the RWQCP were decommissioned, and some biosolids were trucked off-site to processing facilities and converted into fertilizers and other beneficial products. As

a result, emissions from wastewater treatment decreased by 55% between 2018 and 2019. The preliminary inventory for 2019 includes an estimate of emissions from the treatment of the biosolids at these off-site facilities but does not account for the mobile emissions from the trucking process, per inventory protocol (the trips occur entirely outside of the City's boundary).

Emissions associated with potable water use remain very low as the water supply for Mountain View is primarily gravity-fed and, therefore, requires very little energy. Between 2018 and 2019, emissions from potable water use dropped substantially, mainly due to PG&E's lower emissions factor. As discussed previously, PG&E used a new methodology to calculate the 2019 emissions factor, which contributed to this emissions drop.

Characterizing Per-Capita Emissions

Mountain View experienced significant residential and employee growth between 2005 and 2019, as shown in Table 3. The resident population increased by 15.6%, while the number of employees increased by 88.6%. Although the service population 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	2018	2019	% Change 2005-2019	% Change 2018-2019
Total Emissions (MT CO_2e)	704,054	604,318	601,980	-14.50%	-0.39%
Population/Employment					
Residential	70,629	80,620	81,639	15.59%	1.26%
Employees	54,071	95,309	101,965	88.58%	6.98%
Service Population	124,700	175,929	183,604	47.24%	4.36%
Per-Capita Emissions (MT CO_2e)					
Per Service Population*	5.65	3.44	3.28	-41.97%	-4.55%

* Service population is calculated by adding the resident population to the number of employees.

Service population growth does not necessarily result in an increase in the City's GHG emissions. 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, and improving the community shuttle) have other benefits, such as improved air quality, reduced congestion, and increased access to convenient, safe, and affordable transportation

options. Taken together, these benefits will improve the health of Mountain View's population and environment and positively impact quality of life.

Exploring New Data Sources and Methodologies 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 connected with the Google team working on the Environmental Insights Explorer, a new online tool that uses Google's data to support GHG inventories and other sustainability planning for cities at no cost. While the Environmental Insights Explorer is still under development, City staff continues to work with Google on this tool and plans to use this resource to support future GHG inventories and ongoing sustainability reporting.

As discussed previously, emissions in all inventories to date have been calculated based on global warming potential values from the IPCC Second Assessment Report, which specify the warming potential of GHG (such as methane and nitrous oxide) relative to carbon dioxide. When conducting the 2020 community GHG inventory, staff plans to update emissions in recent inventories (2017, 2018, and 2019) and, if possible, early inventories (2005, 2012, and 2015) based on the global warming potential data from the IPCC Fifth Assessment Report, which reflects the best available science.

FISCAL IMPACT

There is no fiscal impact associated with adopting the Final 2018 and Preliminary 2019 community GHG inventories.

CONCLUSION

The Final 2018 and Preliminary 2019 inventories show emissions continuing to decrease due to the City's efforts, particularly participation in Silicon Valley Clean Energy. While the Preliminary 2019 inventory indicates the City is in a good position to achieve its 2020 reduction target, it is important to implement programs and policies to accelerate this emissions reduction trend, given the additional 22% reduction needed to achieve the 2025 target. The actions approved by Council as part of SAP-4 are expected to help the City achieve near-term GHG reduction targets and identify strategies to meet longer-term goals. Continuing to conduct annual GHG inventories will allow the City to track its progress and evaluate the effectiveness of GHG reduction measures.

PUBLIC NOTICING

Agenda posting and emails sent to community members interested in sustainability.

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Attachments:
1. Community Greenhouse Gas Emissions Reduction Targets and Levels, 2005-2050
2. Total Community Greenhouse Gas Emissions by Sector and Subsector, 2005-2019