



DATE: April 12, 2022

CATEGORY: Consent

DEPT.: City Manager's Office

TITLE: **Final 2019 and Preliminary 2020
Community Greenhouse Gas Inventories**

RECOMMENDATION

Adopt the Final 2019 and Preliminary 2020 Community Greenhouse Gas Emissions Inventories.

BACKGROUND

On November 3, 2009, the City Council adopted voluntary greenhouse gas (GHG) reduction targets for the community, 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 Roadmap (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. On March 19, 2019, the City Council directed staff to evaluate the ESTF-2-recommended changes to the City's reduction targets. On December 3, 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. On April 12, 2020, the City Council passed a resolution for Mountain View to become a carbon-neutral city by 2045. This means that in addition to achieving the adopted 2045 GHG-reduction target of 75% below 2005 levels, Mountain View has committed to balancing any remaining GHG emissions with carbon sequestration projects (such as planting trees or restoring wetlands) or carbon offsets.

Current Sustainability Action Plan

On October 22, 2019, Council adopted Sustainability Action Plan 4 (SAP-4) for Fiscal Year 2019-20 through Fiscal Year 2021-22 to serve as the City's continued plan for strategic investment in sustainability. Among its 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 among 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. Another update was provided to the Council Sustainability Committee on December 1, 2021.

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 GHGs resulting from these activities 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, 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 (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. Global warming potentials represent one set of metrics subject to change over time based on the best available science. These metrics are used to convert the quantity of methane and nitrous oxide emissions to MT CO₂e. When conducting the preliminary 2020 inventory, staff updated the emissions in recent inventories (2017, 2018, and 2019) based on the global warming potential data from the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report, which reflects the best available science. Previously, inventories have used the IPCC Second Assessment, which specified a lower global warming potential for methane and a higher warming potential for nitrous oxide. Updates based on the new global warming potentials had minimal impacts on overall emissions, increasing 2017, 2018, and 2019 emissions by less than 1%. The emissions from the early inventories (2005, 2012, and 2015) continue to be based on the IPCC Second Assessment since these early inventories were calculated by consultants and are more difficult to update.

The Protocol does not fully account for life-cycle emissions from food, air travel, and purchased goods and services, which would be 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.

2019 and 2020 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, as well as data from the Census Bureau, can take up to 1.5 years. A preliminary 2019 community inventory was presented to the City Council on June 22, 2021, estimating emissions at 601,980 MT CO₂e. As shown in Table 2, the final calculation of 2019 emissions came in slightly higher.

Table 2 provides the Final 2019 and Preliminary 2020 GHG emissions and compares them to the 2005 baseline, the target level for that year, and the 2025 and 2030 reduction targets.

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

GHG Inventory	Total Emissions (MT CO₂e)	Percent Above/Below Target Level	Percent Above/Below 2005 Baseline	Percent Reduction Needed to Reach 2025 Target	Percent Reduction Needed to Reach 2030 Target
Final 2019	606,614	0.19%	-13.84%	22.24%	38.49%
Preliminary 2020	448,063	-25.13%	-36.36%	-5.28%	16.72%

Emissions declined in 2019 and remained below 2005 baseline inventory levels. **The Preliminary 2020 Inventory shows emissions dropping another 26% below 2019 levels, a significant but likely temporary decrease due to the COVID-19 pandemic.** Preliminary 2020 emissions are 25% below the adopted reduction target for 2020 and 5% below the target for 2025. To reach the 2030 reduction target, Mountain View will need to reduce its emissions another 16.72% or 74,915 MT CO₂e.

Final 2019 GHG emissions were slightly higher than estimated in the preliminary 2019 inventory (601,980 MT CO₂e) due to updates to global warming potentials and data from the Census Bureau. As discussed earlier in the Analysis section, the Final 2019 Inventory was updated to use the IPCC Fifth Assessment Report, which determines the global warming potential of greenhouse gases relative to carbon dioxide. The Preliminary 2019 Inventory used the IPCC Second Assessment, which specified a lower global warming potential for methane and a higher warming potential for nitrous oxide. Updated Census Bureau data for 2019 (the Preliminary Inventory had used 2018 data, the most recent available at the time) estimated more freight vehicle traffic within the City, resulting in slightly higher emissions from medium- and heavy-duty vehicles in the Final 2019 Inventory.

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 2019 emissions were 0.19% above the interpolated annual target of 605,486 MT CO₂e. Preliminary 2020 emissions were 25.13% below the adopted target of 598,446 MT CO₂e and 5.28% below the 2025 target of 471,716 MT CO₂e. **The large emission reductions between 2019 and 2020 were largely due to a significant decrease in vehicle miles traveled (VMT) as a result of Shelter-in-Place orders during the COVID-19 pandemic.** As these travel trends are unlikely to be sustained long-term, the City will likely require significant emission reductions to achieve its 2025 and 2030 reduction targets.

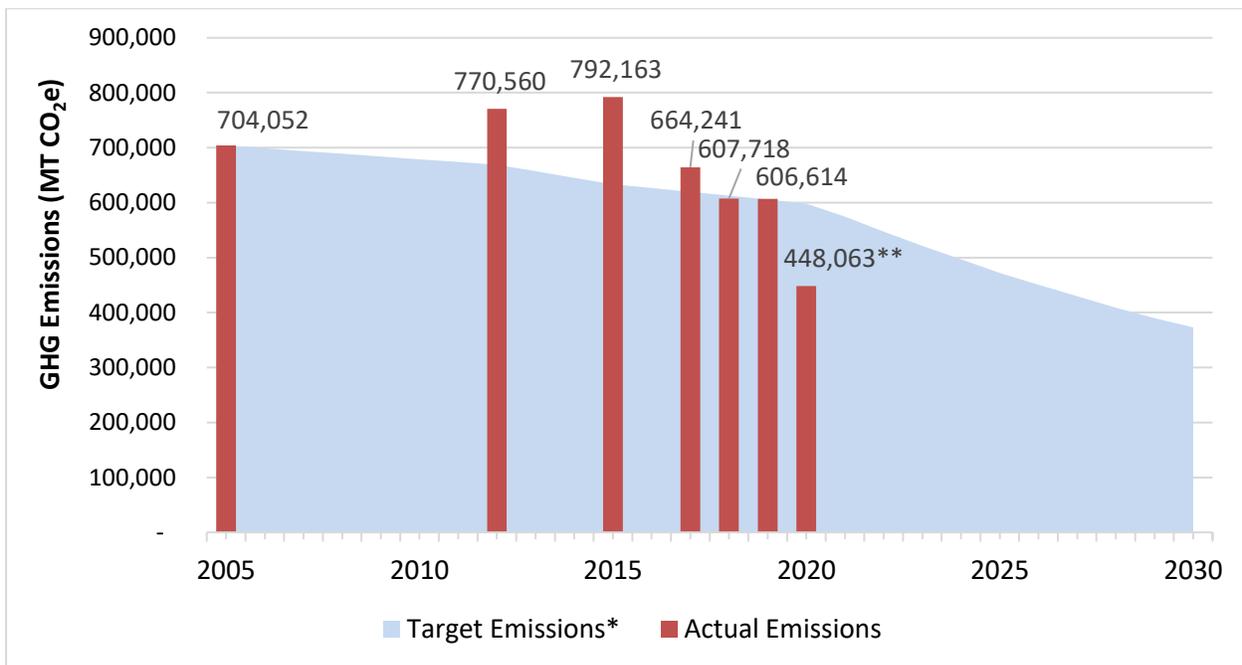


Figure 1: Community GHG Emissions and Reduction Targets, 2005 Through 2030

*Chart shows the upper limit of target range.

**2020 emissions are preliminary.

Figure 2 shows a breakdown of 2019 and 2020 GHG emissions by sector. Transportation and energy continue to be the two largest emissions sources. While overall emissions dropped 26.14% from 2019 to 2020, the percentage of emissions remained similar for waste, water, and off-road mobile sources. In 2020, the percentage of emissions from energy and transportation shifted slightly, largely due to lower emissions from on-road transportation.

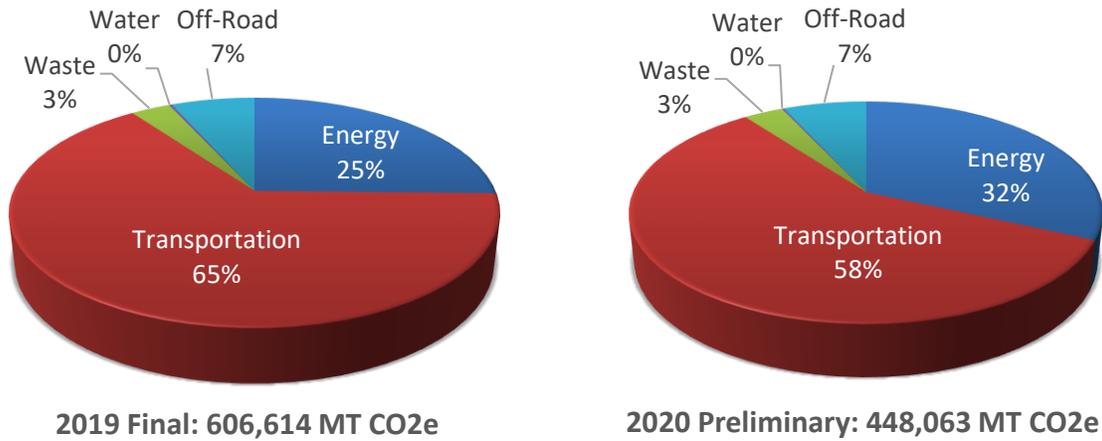


Figure 2: Final 2019 and Preliminary 2020 Community GHG Emissions by Sector

GHG Emissions by Sector

Figure 3 provides GHG emissions by sector for each inventory year from 2005 to 2020 (see Attachment 2 for a full breakdown of emissions). Most emissions reductions between 2015 and 2020 came from the transportation and energy sectors, driven by cleaner sources of electricity, more efficient and cleaner-fuel vehicles, and lower VMT per capita.

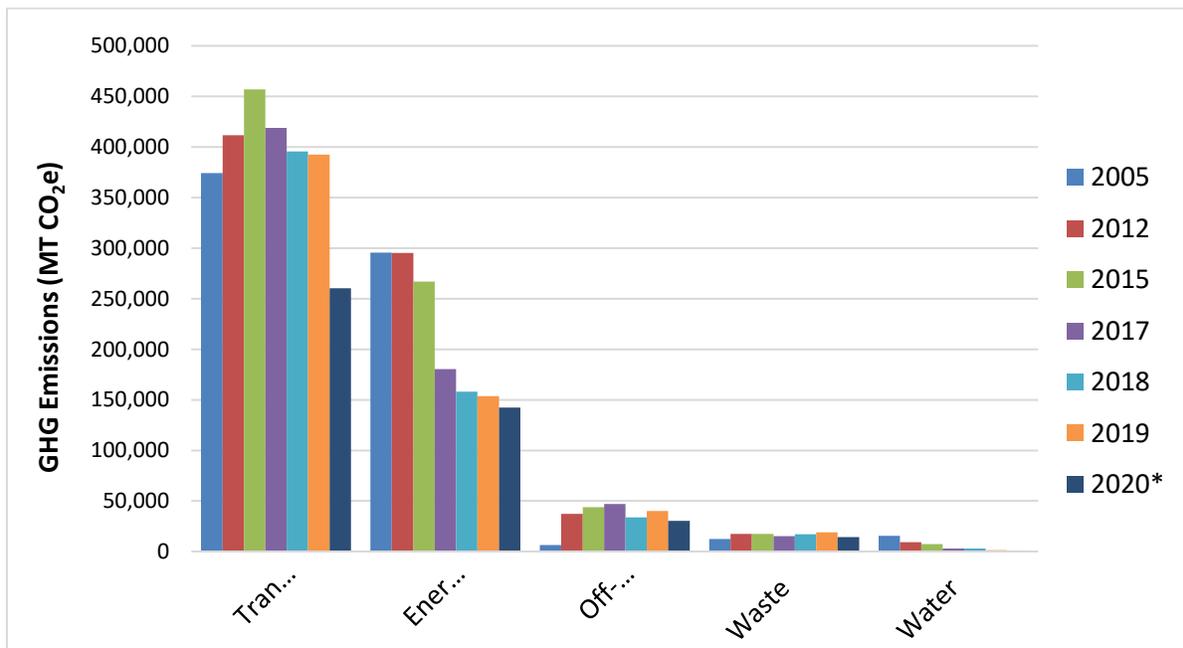


Figure 3: Comparison of Community GHG Emissions by Sector, 2005 Through 2020

*2020 emissions are preliminary.

An analysis of 2019 and 2020 GHG emissions by sector is provided below. 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:** Preliminary 2020 emissions from on-road vehicles declined 39% from their peak in 2015. 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 miles per day in 2015 to 18.1 miles per day in 2019, and then decreased significantly to 12.36 miles per day in 2020. Higher vehicle fuel efficiency standards and an increase in the number of electric vehicles (EVs) have also contributed to the overall emissions decrease between 2015 and 2020.

The significant decrease in VMT between 2019 and 2020 is largely due to Shelter-in-Place orders issued during the COVID-19 pandemic and is not likely to continue long-term. On December 1, 2021, staff presented an analysis of pandemic travel patterns to the Council Sustainability Committee. This analysis discussed local traffic data provided by the Caltrans Performance Measurement System (PeMS) for the U.S. 101 freeway in Santa Clara County, which suggests that traffic volumes in the vicinity of Mountain View dropped to approximately 60% of typical levels (accounting for month-to-month seasonality). Since the initial drop, traffic volumes rebounded to about 80% of typical levels by summer 2020, and 96% (northbound) to 90% (southbound) of typical levels by winter 2021.

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 Final Inventory uses 2018 per-capita VMT to estimate on-road vehicle emissions because an updated travel model for 2019 is not available. Therefore, the on-road transportation emissions estimated in the Final 2019 Inventory do not consider any changes to per-capita VMT resulting from land use changes or transportation demand management measures implemented in 2019. An updated travel demand model was also not available for 2020, so a reduction factor based on Caltrans traffic data was applied to the 2018 per-capita VMT to estimate on-road vehicle emissions for the preliminary 2020 Inventory. 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.

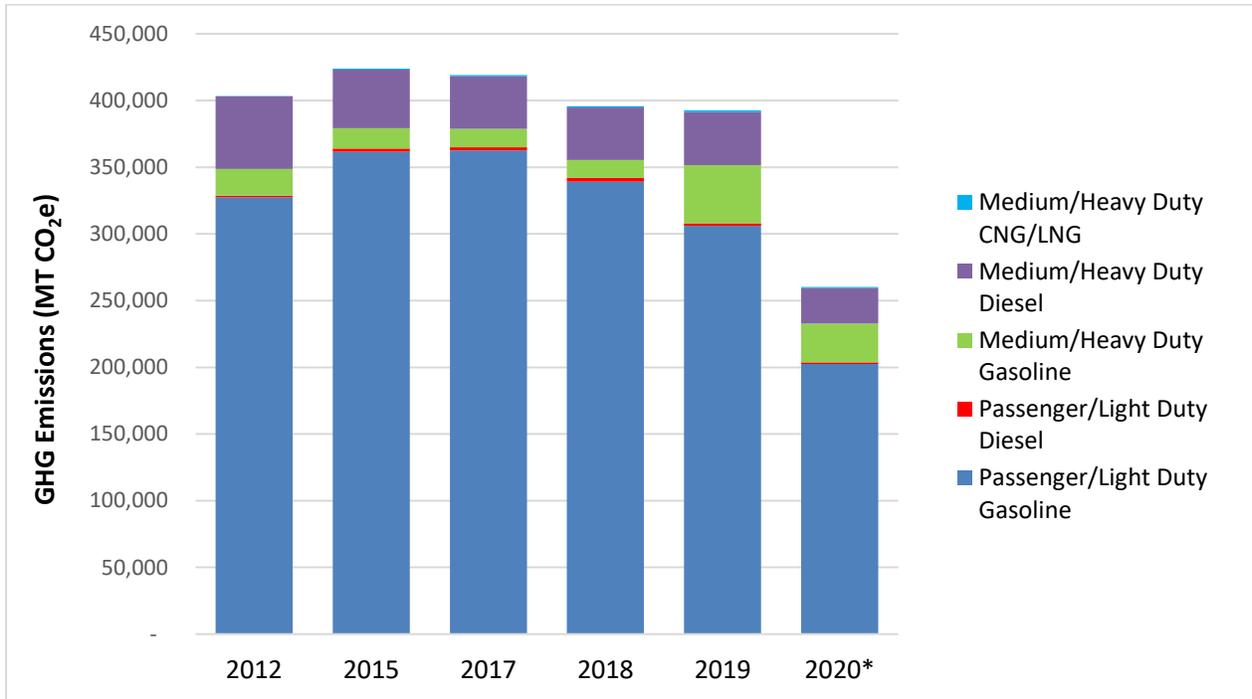


Figure 4: Transportation Emissions by Vehicle and Fuel Type, 2012 Through 2020

**2020 emissions are preliminary.*

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

- Energy:** With the transition of nearly all the community’s electricity accounts to Silicon Valley Clean Energy (SVCE), which provides carbon-free electricity, natural gas comprises the majority of 2020 energy sector emissions at 76%. The City’s GHG reduction strategy in this sector focuses on reducing natural gas use and addressing commercial energy use, which accounts for 59% of energy-sector emissions in 2020.

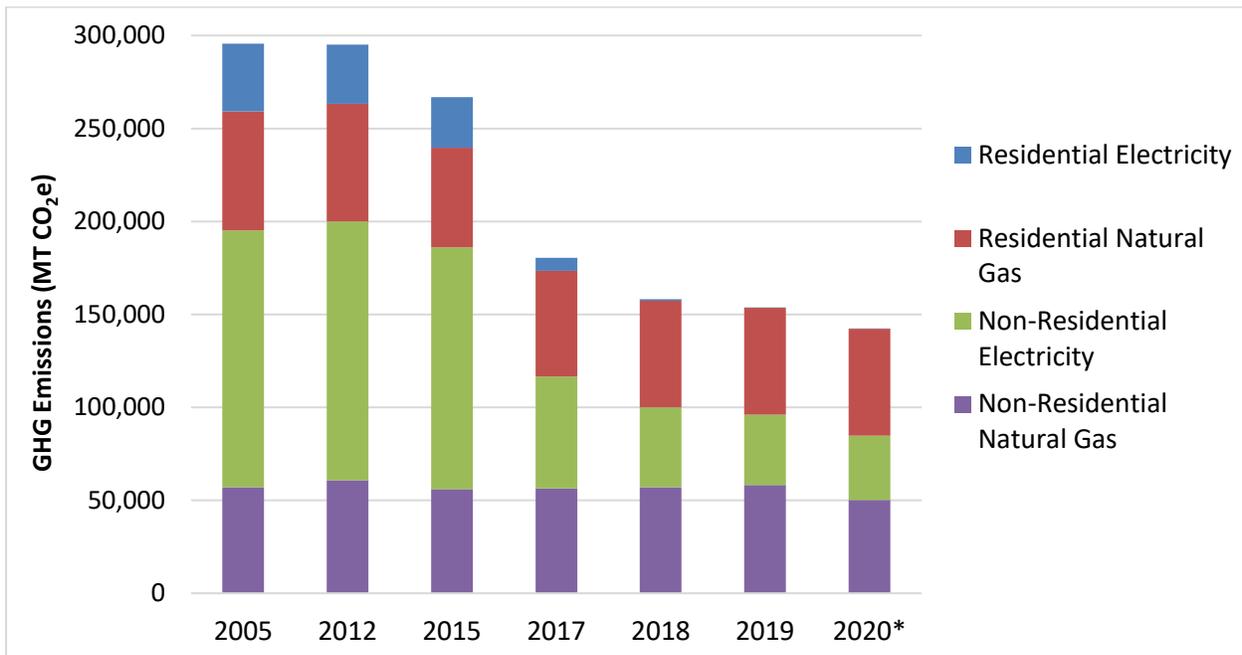


Figure 5: Residential and Nonresidential Energy Emissions, 2005 Through 2020

**2020 emissions are preliminary.*

Clean electricity from SVCE drove the majority of Mountain View’s energy sector and overall emissions reductions between 2015 and 2020. SVCE began providing carbon-free electricity to residential and commercial customers in Mountain View in April 2017. SVCE currently provides electricity to around 96.3% of residential and commercial customers in its service territory previously served by PG&E.

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. Staff has begun the process of developing an updated Reach Code for Council to consider adopting in late 2022, concurrent with the State-required adoption of the 2022 Standards. 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 2019 or 2020. However, SVCE provided the City with the aggregate total emissions from both residential and nonresidential electricity use.

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 results in 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. The 2020 Preliminary Inventory uses the 2019 PG&E emissions factor as well because the emissions factor for 2020 is not yet available.

- **Off-Road Mobile:** The off-road mobile sector consists of construction, commercial, and industrial equipment. Emissions from this sector spiked in 2017, primarily due to an increase in construction, as shown in Figure 6.

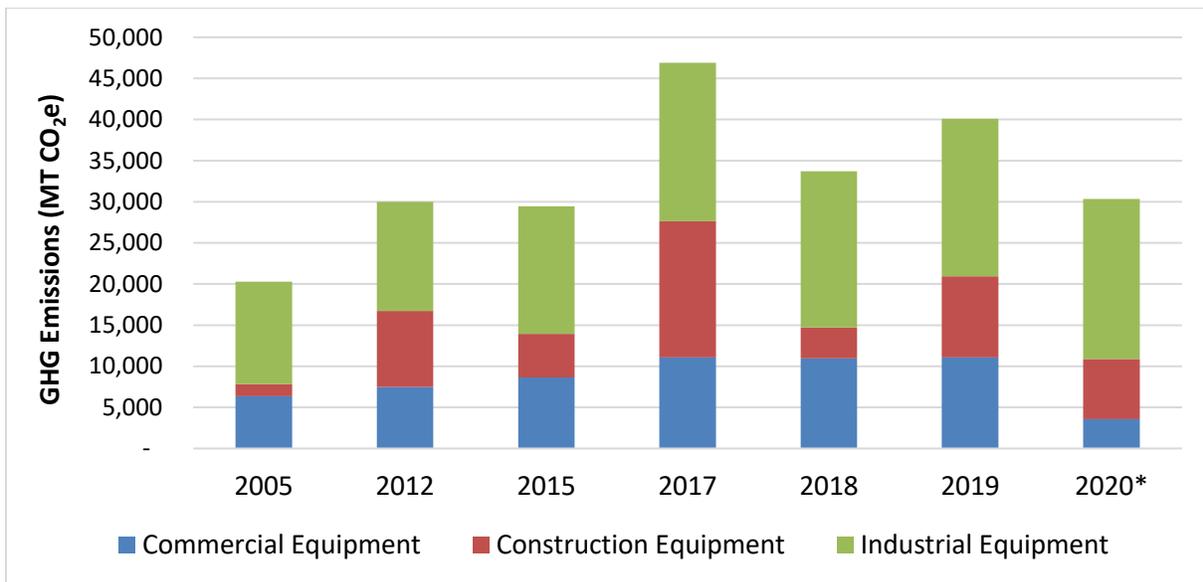


Figure 6: Off-Road Mobile Emissions, 2005 through 2020

**2020 emissions are preliminary.*

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). The City’s estimated off-road emissions are, therefore, correlated with the relative amount of housing construction and job growth in the City. The Preliminary 2020 Inventory uses the 2019 jobs ratio data because it is the most recent data available from the Census Bureau.

- **Waste:** Solid waste emissions are dependent on both the total amount of solid waste sent to landfills 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.

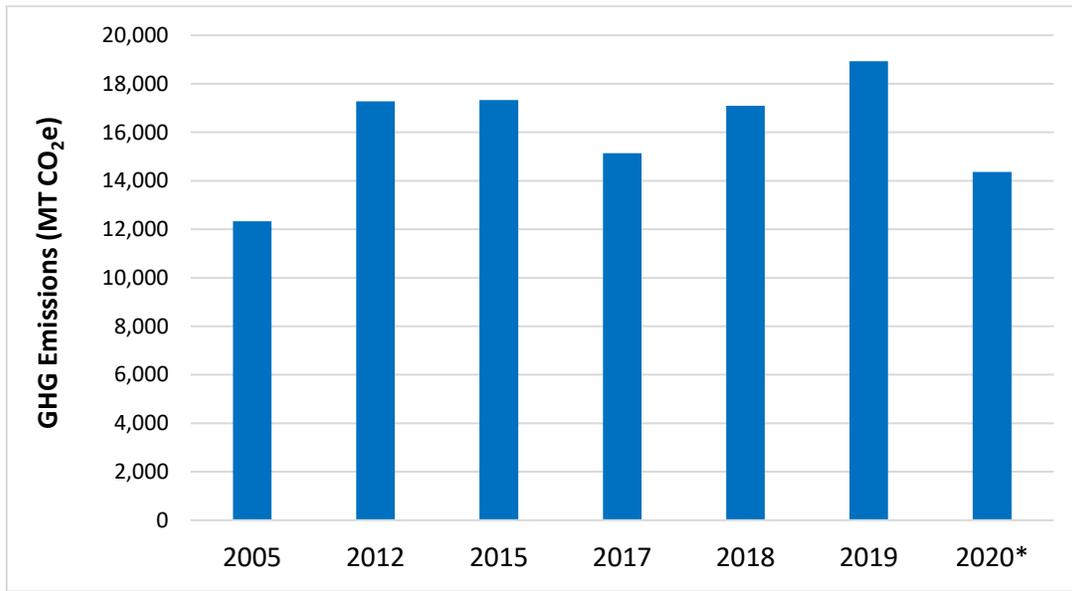


Figure 7: Solid Waste Emissions, 2005 through 2020

**2020 emissions are preliminary.*

As shown in Figure 7, solid-waste emissions increased slightly from 2018 to 2019 due to an increase in the amount of solid waste sent to landfills. The 2020 preliminary inventory shows solid waste emissions dropping from 2019 due to a significant decrease in the amount of landfilled waste. This is likely a result of business closures and Shelter-in-Place orders during the COVID-19 pandemic. The 2017, 2018, 2019, and 2020 inventories use the same 2017 waste characterization study data, which is used to estimate the percentage of organic material sent to landfill after trash has been sorted at the SMaRT® Station. Therefore, **the 2018, 2019, and 2020 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. Per-capita waste generation will likely continue to decline as a result of the expansion of the food scraps program to multi-family residences in July 2021.

- Water:** This sector includes emissions from the energy used to treat wastewater and extract, convey, treat, and distribute potable water. Wastewater treatment contributes over 99% of emissions from the water sector. Figure 8 shows the estimated wastewater emissions from 2012 through 2020. These 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.

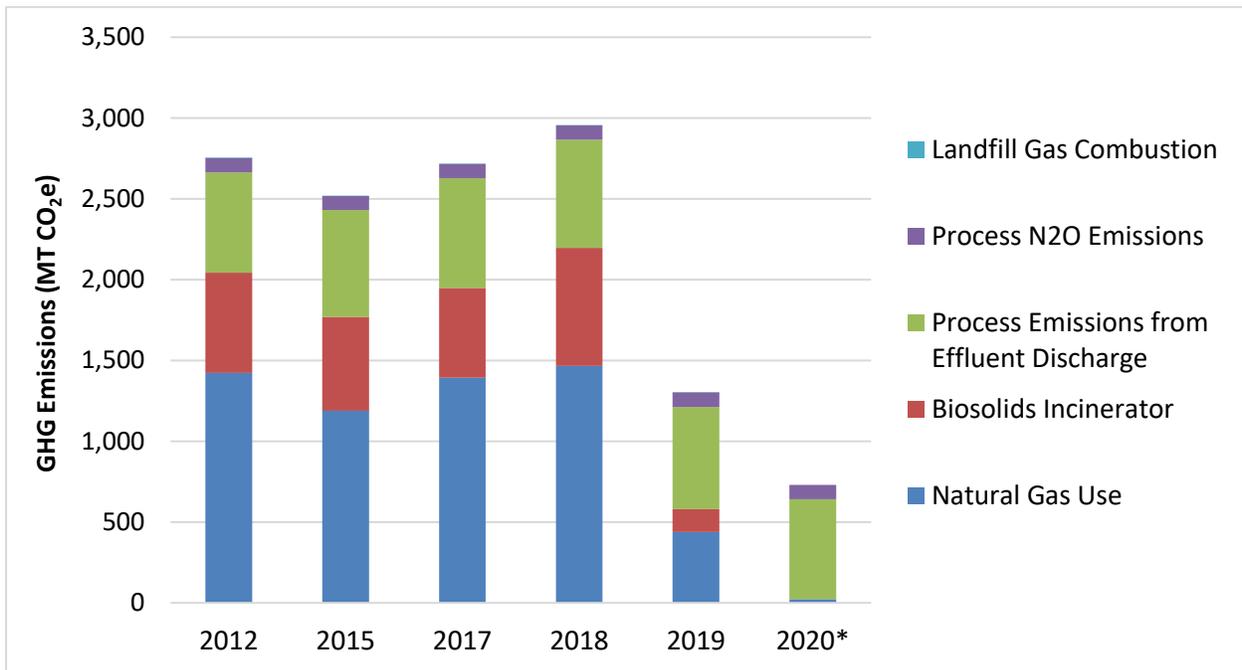


Figure 8: Wastewater Emissions, 2012 through 2020

*2020 emissions are preliminary.

As shown in Figure 8, natural gas use at the Palo Alto Regional Water Quality Control Plant (RWQCP) contributed most of the wastewater emissions from 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, the incinerators at the RWQCP were decommissioned, decreasing natural gas use significantly. The RWQCP transitioned to trucking biosolids off-site to processing facilities, where they are converted into fertilizers and other beneficial products. As a result, emissions from wastewater treatment decreased by 55% between 2018 and 2019. In 2020, the first year that no biosolids were incinerated at RWQCP, emissions from wastewater treatment dropped another 44%. The inventories for 2019 and 2020 include an estimate of emissions from the treatment of the biosolids at the off-site facilities but do not account for the mobile emissions from the trucking process since 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 requires very little energy. Between 2018 and 2019, emissions from potable water use dropped substantially, mainly due to PG&E's lower emissions factor. Emissions from potable water use increased about 6% between 2019 and 2020 due to a slight increase in the volume of water delivered. Increased conservation efforts would reduce emissions from potable water use and wastewater treatment.

Characterizing Per-Capita Emissions

Mountain View experienced significant residential and employee growth between 2005 and 2020, as shown in Table 3. The resident population increased by 15.6%, while the number of employees increased by 88.6%. While the service population has increased, per-capita emissions have decreased. This decline is relatively recent; before 2015, per-capita emissions had remained relatively flat.

Table 3: Community GHG Emissions Relative to Population and Employment

	2005	2019	2020	% Change 2005- 2020	% Change 2019- 2020
Total Emissions (MT CO₂e)	704,054	606,614	448,063 ⁴	-36.36%	-26.14%
Population/Employment					
Residential ¹	70,629	81,639	81,302	15.59%	-0.41%
Employees ²	54,071	101,965	101,965 ⁵	88.58%	0.00%
Service Population ³	124,700	183,604	183,267	47.24%	-0.18%
Per-Capita Emissions (MT CO₂e)					
Per Service Population*	5.65	3.30	2.44	-41.52%	-26.00%

¹ State of California Department of Finance, E-5 Population and Housing Estimates for Cities, Counties, and the State, 2020, <https://dof.ca.gov/Forecasting/Demographics/Estimates/estimates-e5-2010-2021/>.

² U.S. Census Bureau, Longitudinal Employer-Household Dynamics, 2019, <https://onthemap.ces.census.gov/>.

³ Service population is calculated by adding the resident population to the number of employees.

⁴ 2020 emissions are preliminary.

⁵ Preliminary 2020 inventory uses 2019 employee counts as proxy data as that is the most recent data available.

Service population growth does not necessarily result in an increase in GHG emissions. Addressing the jobs-housing imbalance can reduce 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.

FISCAL IMPACT

There is no fiscal impact associated with adopting the Final 2019 and Preliminary 2020 Community GHG Inventories.

CONCLUSION

The Final 2019 and Preliminary 2020 Inventories show emissions continuing to decrease due to the City’s efforts, particularly participation in Silicon Valley Clean Energy and reductions in VMT. While the Preliminary 2020 Inventory indicates the City has achieved its 2020 and 2025 reduction targets, it is important to implement programs and policies to accelerate this emissions reduction trend, given the additional 17% reduction needed to achieve the 2030 target. Additionally, decreases in VMT during the COVID-19 pandemic, largely responsible for the significant emissions reduction in 2020, are unlikely to continue long-term. 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. The City will also identify new initiatives as part of its carbon neutrality, adaptation, and resilience planning, which will start on April 19, 2022, with the Council Sustainability Committee discussing the possibility of accelerating Mountain View’s carbon-neutrality target year from 2045. 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 through 2050
 2. Total Community Greenhouse Gas Emissions by Sector and Subsector, 2005 through 2020