

DATE: April 16, 2024

TO: Council Sustainability Committee

FROM: Danielle Lee, Chief Sustainability and Resiliency Officer

VIA: Audrey Seymour Ramberg, Assistant City Manager

SUBJECT: **Final 2021 and Preliminary 2022 Community Greenhouse Gas Emissions Inventories**

RECOMMENDATION

Recommend the City Council accept the Final 2021 and Preliminary 2022 Community Greenhouse Gas Emissions Inventories.

BACKGROUND

The City Council has adopted various greenhouse gas (GHG) emissions reduction targets since 2009 to respond to the climate emergency, with the most recent revisions adopted on December 3, 2019. The current goal is to reduce communitywide emissions 80% below 2005 emissions by 2050. 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. In April and June 2022, staff presented to the Council Sustainability Committee (CSC) a preliminary assessment of the potential to accelerate Mountain View's adopted carbon-neutrality target. The CSC directed staff to develop an accelerated 2035 decarbonization road map (referred to as the 2035 Climate Strategy) for Council consideration.

Every year, staff provides an update to the CSC to review the community's progress and trends in meeting GHG reduction targets. If accepted by the CSC, the report is then forwarded to the City Council for review and acceptance.

ANALYSIS

Conducting a communitywide GHG inventory involves measuring residential and commercial activities that GHG emissions generated from:

- Building energy use that includes electric vehicle charging;
- Fossil fuel-powered vehicle use;
- Water consumed and treated;
- Waste produced; and
- Off-road equipment (e.g., construction, industrial, and gardening equipment).

Staff then calculates Metric Tons of Carbon Dioxide equivalents (MT CO₂e) resulting from the above activities from available data sources. The inventory methodology and data sources are detailed in Attachment 2.

It is important to note that the inventory does not capture all emissions related to the community, such as emissions from food, air travel, or manufacturing goods. It also does not capture all the impacts of local GHG-reduction policies or programs. The inventory represents a rough estimate that is subject to change as better data and methodologies become available.

Emissions can also increase or decrease because of indirect changes, such as economic recessions (decrease emissions), economic upswings (increase emissions), and pandemics (decrease emissions). Viewing the overall trends over time is useful in understanding how policies, programs, and technologies are reducing emissions.

2021 and 2022 Community Greenhouse Gas Emissions Inventory Results

Since Mountain View now conducts community GHG inventories annually, staff has begun presenting a preliminary inventory to Council before all data is available. Receiving Census Bureau data and final emissions factors for electricity can take up to 1-1/2 years. [A preliminary 2021 community inventory was presented to the City Council](#) on June 27, 2023, estimating emissions at 478,419 MT CO₂e. As shown in Table 1, the final calculation of 2021 emissions came in lower at 415,114 MT CO₂e.

Table 1 provides the Final 2021 and Preliminary 2022 GHG emissions and compares them to the target level for that year, the 2005 baseline, and the 2025 and 2030 reduction targets. As shown in Table 1, the City has met its reduction targets for 2021 and 2022. However, emissions are likely to subsequently rise as activities rebound following the temporary reductions in emissions resulting from the COVID-19 pandemic (pandemic).

Table 1: Results of Final 2021 and Preliminary 2022 Community GHG Inventories

GHG Inventory	Total Emissions (MT CO₂e)	Percent Below Annual Target Level	Percent Below 2005 Baseline	Percent Below 2025 Target	Percent Reduction Needed to Reach 2030 Target
Final 2021	415,114	-27.73%	-41.04%	-12.00%	-10.11%
Preliminary 2022	440,136	-19.57%	-37.49%	-6.69%	-15.22%

The Preliminary 2022 inventory shows emissions rising 6% above 2021 levels, primarily due to increased emissions from on-road transportation and electricity as the community slowly continues to emerge from the pandemic into a “new normal.” Preliminary 2022 emissions are 19.6% below the reduction target for 2022 and 6.7% below the target for 2025. Final 2021 GHG emissions were lower than estimated in the preliminary 2021 inventory (478,419 MT CO₂e), largely due to updated data for the on-road transportation and electricity sectors.

Figure 1 provides the results of the City’s community GHG inventories compared to the GHG-reduction targets through 2030. While the last three years are showing a significant decline, it is mainly due to the impacts of the pandemic with a large remote work force that reduced vehicle emissions. Thus, the last few years are not necessarily indicative that the community is on track yet to meeting its reduction targets. The results of the 2023 inventory may provide higher confidence on the community’s progress in reducing GHG emissions.

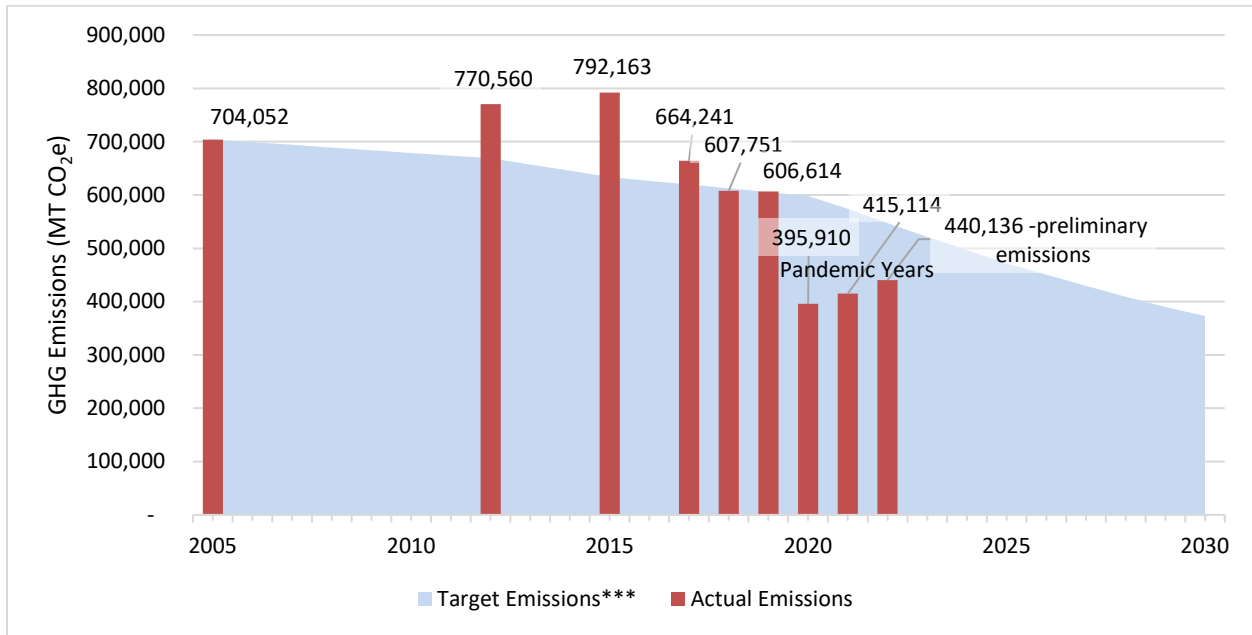


Figure 1: Community GHG Emissions and Reduction Targets, 2005 through 2030

***Chart shows the upper limit of target range.

Figure 2 shows a breakdown of 2021 and 2022 GHG emissions by sector. Transportation and energy remained the two largest emissions sources in 2021 and 2022. Overall emissions by sector remained similar.

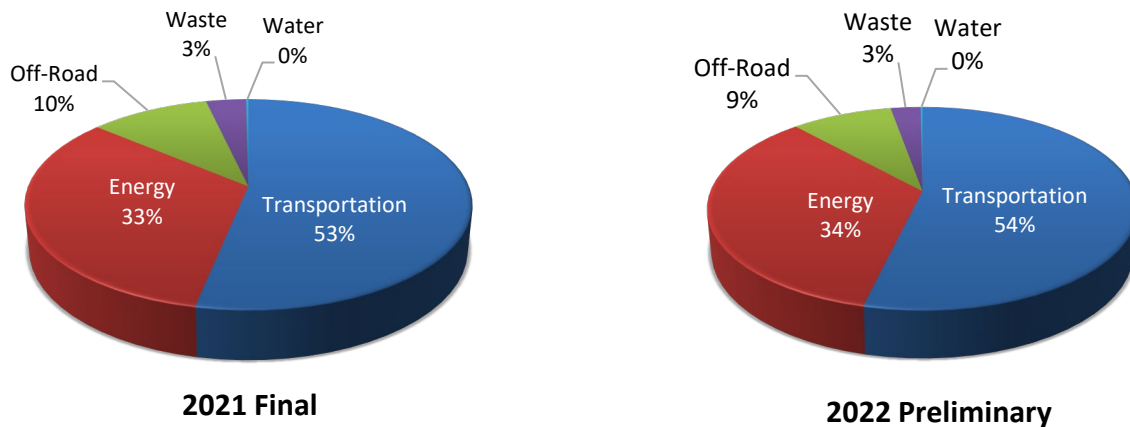


Figure 2: Final 2021 and Preliminary 2022 Community GHG Emissions by Sector

Figure 3 provides emissions by sector for several inventory years from 2005 to 2022 (see Attachment 2 for a full breakdown of emissions). While there have been gains in reducing

emissions from cleaner sources of electricity, more efficient and cleaner-fuel vehicles, and lower VMT per capita, the pandemic was and will be the major contributing factor for emission reductions in transportation for 2020-2023.

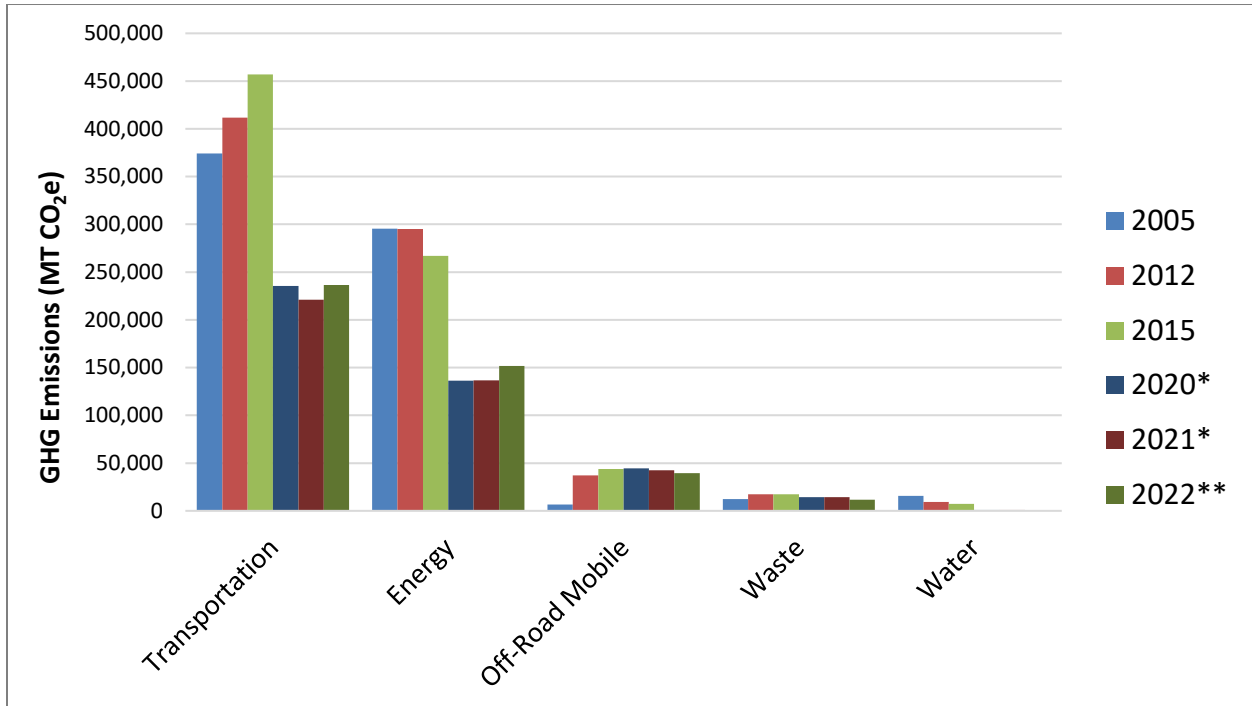


Figure 3: Comparison of Community GHG Emissions by Sector, 2005 Through 2022

*Years impacted by the COVID-19 pandemic.

**2022 emissions are preliminary.

Attachment 3 provides a detailed breakdown of emissions by sector. The following sections present an analysis of emission trends by sector with 2021 and 2022 data.

Transportation

Emissions from on-road vehicles declined 48% from their peak in 2015 to their preliminary 2022 emissions level. Estimated per-capita VMT for the service population (resident population plus number of employees) declined from 18.7 miles per day in 2015 to 11.88 miles per day in 2021, then increasing to 12.1 in 2022.

Decreased activity and higher remote work rates as a result of the pandemic likely contributed to the decline in VMT since 2019. Higher vehicle fuel-efficiency standards and an increase in the number of electric vehicles (EVs) have also contributed to some of the decrease between 2015 and 2022. Postpandemic data starting from 2023 will likely provide greater insight on

emission reductions for transportation. In addition, as part of the development of the 2035 Climate Strategy, staff can explore enhanced solutions for measuring transportation emissions and progress. Attachment 3 contains information on transportation emissions methodology and data sources.

As shown in Figure 4, gasoline-powered passenger vehicles and light-duty trucks continue to generate most of the City’s transportation-related emissions. The City can further reduce these emissions by supporting transit-oriented development, walkable neighborhoods, travel by nonvehicular modes, remote work efforts, and the transition to cleaner vehicles. These strategies can contribute other community benefits, such as better air quality, safer streets, a vibrant downtown, and improved health.

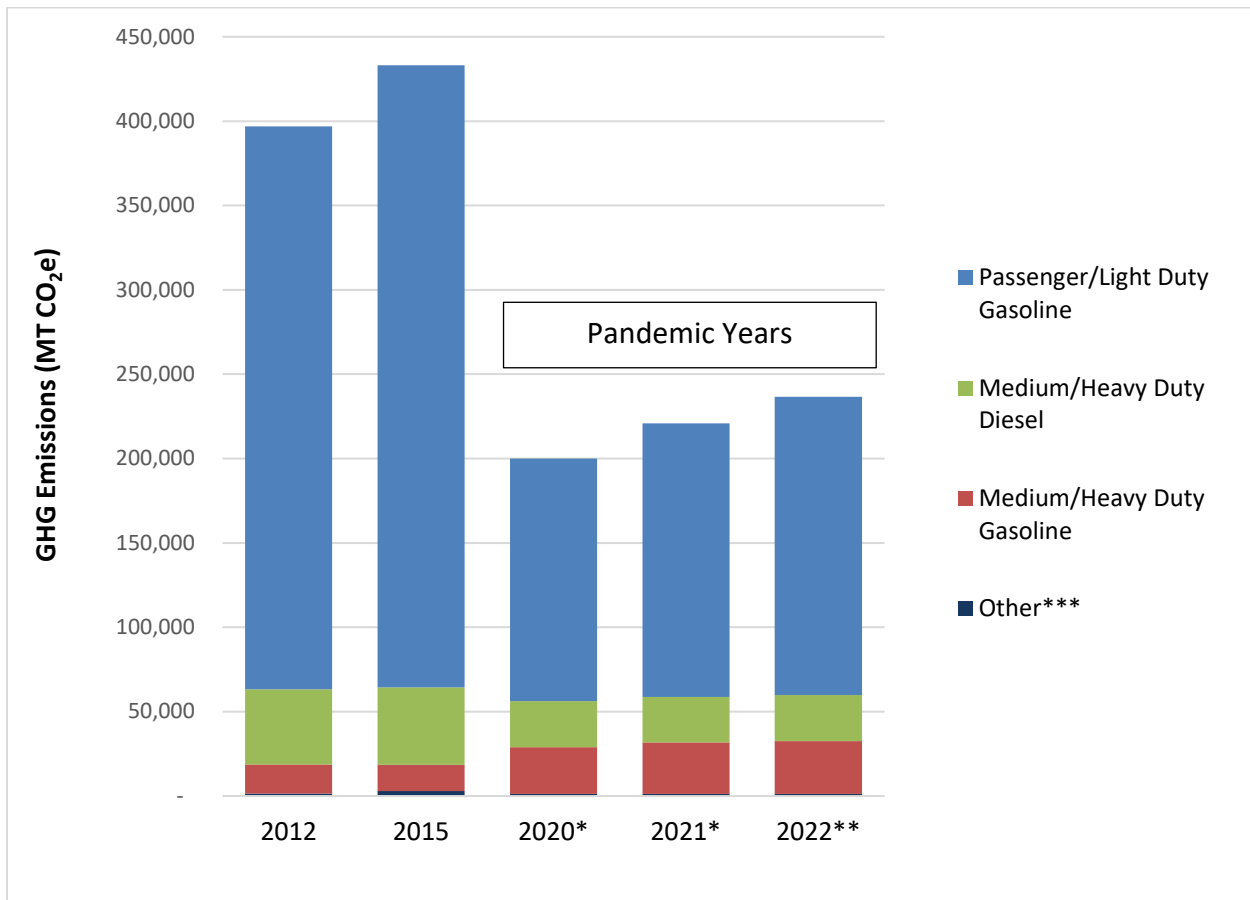


Figure 4: Transportation Emissions by Vehicle and Fuel Type, 2012 through 2022

* Years impacted by the COVID-19 pandemic.

** 2022 emissions are preliminary.

*** Includes emissions from Medium/Heavy-Duty CNG/LNG and Passenger/Light-Duty Diesel.

Staff also tracks other transportation metrics, including travel modes and electric vehicle adoption. According to Census data, the percentage of residents who drive alone to work has decreased significantly since 2015 (see Table 2). This is largely due to an increase in remote work because of the pandemic.

Table 2: Commuting Characteristics of Mountain View Residents for 2015, 2021, and 2022¹

Means of Transportation to Work	2015	2021	2022
Drove alone	73.4%	34.4%	53.2%
Carpooled	6.0%	4.1%	4.5%
Public transportation	5.3%	2.0%	2.1%
Walked	2.7%	3.5%	3.2%
Bicycle	7.2%	4.5%	5.6%
Taxicab, motorcycle, or other means	1.9%	1.0%	1.2%
Worked from home	3.4%	50.5%	30.2%
TOTAL	100%	100%	100%

According to data from the California Energy Commission, sales of new zero-emission vehicles in Mountain View continue to grow. As shown in Figure 5, over three times as many new zero-emission vehicles were sold in 2023 as in 2017. The data in Figure 5 represents the zip codes within Mountain View (94035, 94039, 94040, 94041, 94042, and 94043). Additionally, 42% of new light-duty vehicle sales were of zero-emission vehicles in Santa Clara County in 2023.²

¹ U.S. Census Bureau, ACS One-Year Estimates Subject Tables, <https://data.census.gov/table/ACSST1Y2022.S0801?t=Commuting&g=160XX00US0649670>.

² California Energy Commission (2023). California Energy Commission Zero Emission Vehicle and Infrastructure Statistics. Data last updated December 31, 2023. Retrieved March 26, 2024 from <http://www.energy.ca.gov/zevstats>.

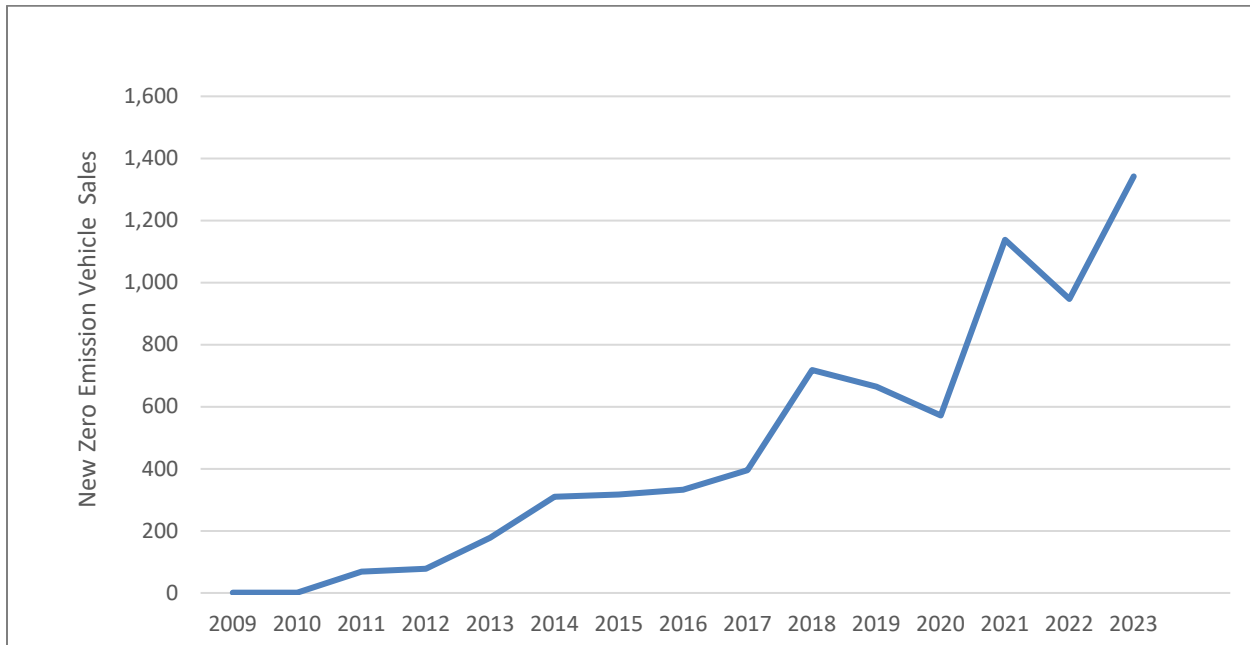


Figure 5: New Zero Emission Vehicle Sales in Mountain View Zip Codes³

Energy

Clean electricity from Silicon Valley Clean Energy (SVCE) drove the majority of Mountain View's energy sector emissions reductions between 2015 and 2018. Since then, emissions from energy have remained relatively constant. SVCE began providing carbon-free electricity in Mountain View in April 2017 and currently provides electricity to around 96.4% of residential and commercial customers in its service territory, previously served by PG&E. Although the remote work force was still large between 2020 and 2022, many buildings were still operating as some employees needed to work within commercial buildings. Thus, the pandemic only slightly affected emissions reductions for buildings.

As shown in Figure 6, 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. The City's GHG-reduction strategy focuses on reducing natural gas use by encouraging electrification of commercial and residential buildings.

³ California Energy Commission (2024). California Energy Commission Zero Emission Vehicle and Infrastructure Statistics. Data last updated December 31, 2023. Retrieved March 26, 2024 from <http://www.energy.ca.gov/zevstats>.

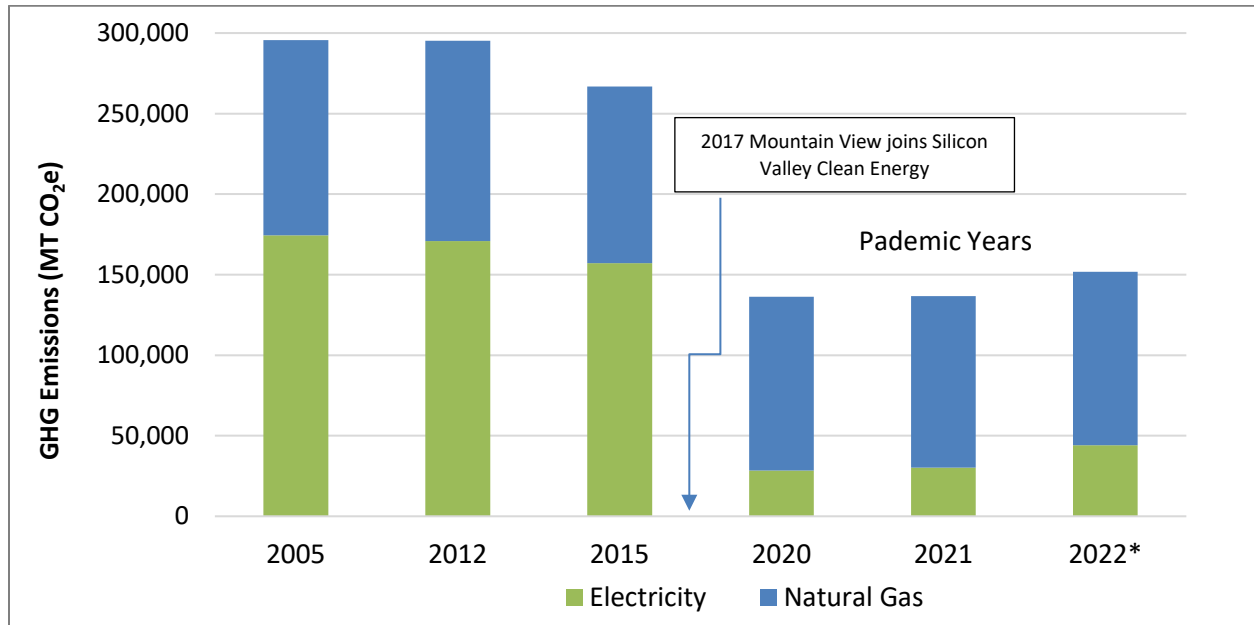


Figure 6: Residential and Nonresidential Energy Emissions, 2005 Through 2022

* 2022 emissions are preliminary.

Off-Road Mobile Equipment

Figure 7 shows off-road mobile equipment emissions from construction, commercial, industrial, lawn and garden, portable, and other equipment. Emissions from off-road mobile equipment decreased about 7% between 2021 and 2022, primarily due to a decrease in emissions from construction.

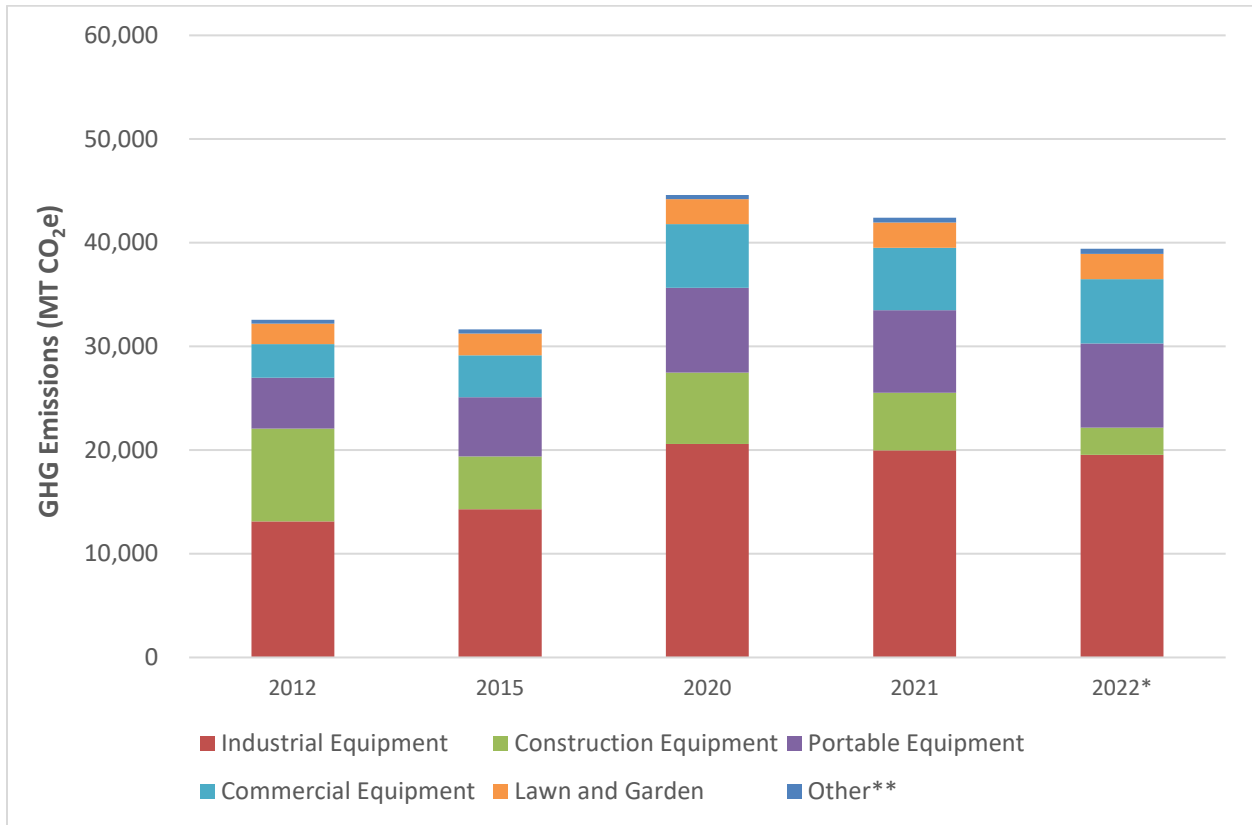


Figure 7: Off-Road Mobile Emissions, 2005 through 2022

* 2022 emissions are preliminary.

** Other includes emissions from forestry and recreational equipment as well as pleasure and commercial harbor craft.

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 emissions from solid waste due to the release of methane as these materials decompose.

As shown in Figure 8, solid waste emissions dropped between 2021 and 2022. This decrease is primarily due to increased diversion of organic material from the landfill as the amount of landfilled waste increased between 2021 and 2022.

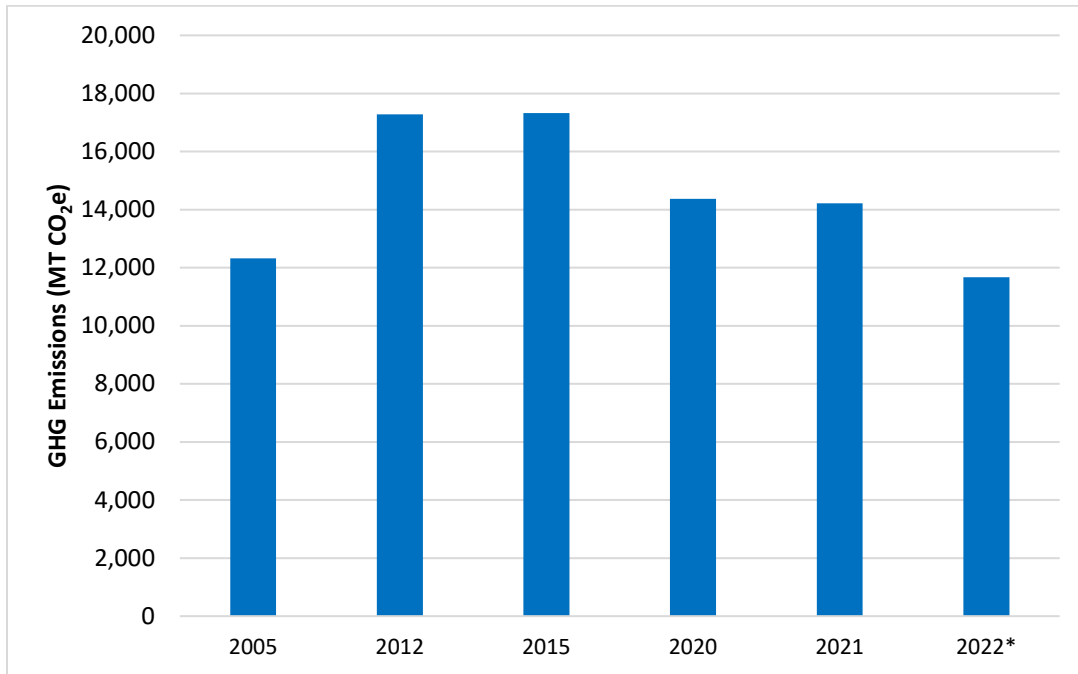


Figure 8: Solid Waste Emissions, 2005 through 2022

* 2022 emissions are preliminary.

Water and Wastewater

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. Emissions associated with potable water use remain low as the water supply for Mountain View is primarily gravity-fed and requires very little energy. Increased conservation efforts would reduce emissions from potable water use and wastewater treatment.

Figure 9 shows the estimated wastewater emissions from 2012 through 2022.

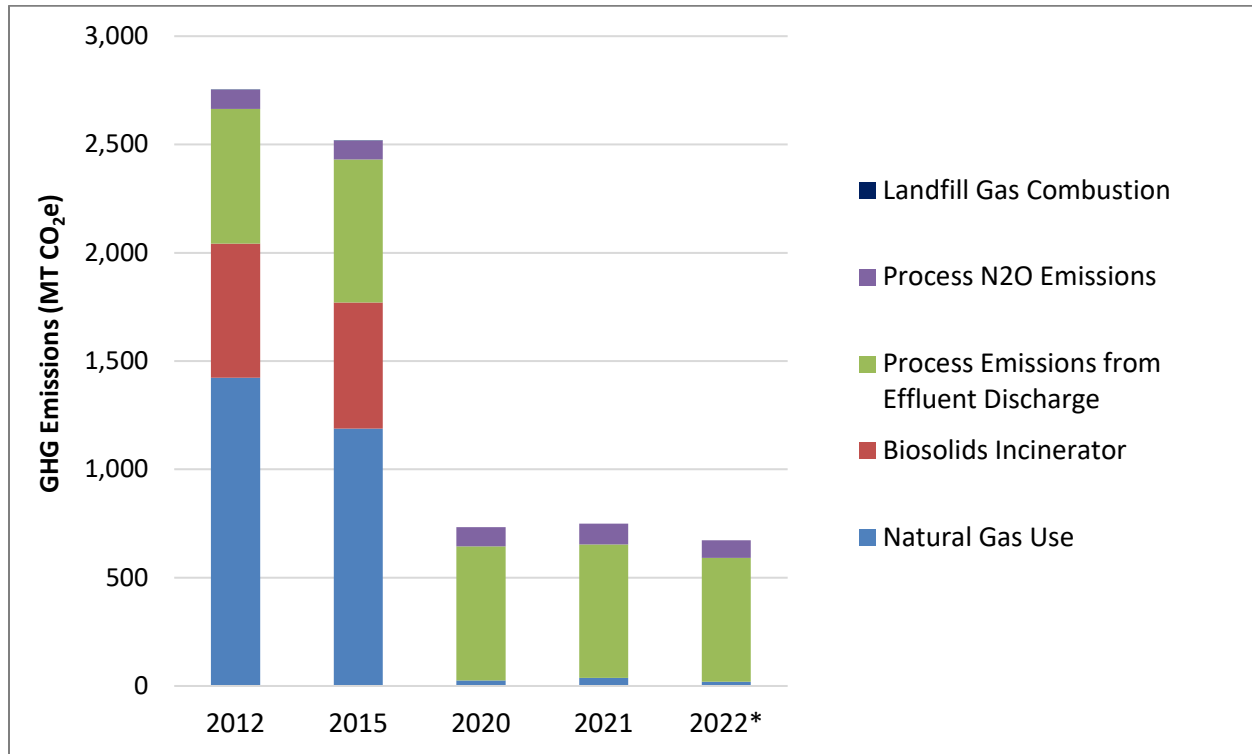


Figure 9: Wastewater Emissions, 2012 through 2022

**2022 emissions are preliminary.*

As shown in Figure 9, natural gas use at the Palo Alto Regional Water Quality Control Plant (Water Treatment Plant) used to contribute most of the wastewater emissions. 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 Water Treatment Plant were decommissioned, decreasing natural gas use significantly. The Water Treatment Plant 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 the Water Treatment Plant, emissions from wastewater treatment dropped another 44%, and then remained similar in 2021 and 2022.

Characterizing Per Capita Emissions

Mountain View has experienced overall residential and employee growth since 2005. While the residential population remained similar between 2021 and 2022, the Citywide employee population, estimated through the American Community Survey, grew by about 19%, likely signaling a partial return of the work force to the office. As shown in Table 3, per capita emissions

also decreased slightly between 2021 and 2022. As mentioned previously, the pandemic years make it difficult to understand the “new normal” emission reductions due to a large, remote work force from 2020 through 2023. The 2023 GHG inventory will provide more insight on the new normal-emission reductions postpandemic.

Table 3: Community GHG Emissions Relative to Population and Employment

	2005	2021	2022
Total Emissions (MT CO₂e)	704,054	415,114	440,136 ¹
Population/Employment			
Residential ²	70,629	83,530	83,856
Employees ³	54,071	68,151	80,980
Service Population ⁴	124,700	151,681	164,836
Per-Capita Emissions (MT CO₂e)			
Per Service Population	5.65	2.74	2.67

¹ 2022 emissions are preliminary.

² State of California Department of Finance, E-5 Population and Housing Estimates for Cities, Counties, and the State, <https://dof.ca.gov/forecasting/demographics/estimates/e-5-population-and-housing-estimates-for-cities-counties-and-the-state-2020-2023/>.

³ U.S. Census Bureau, American Community Survey One-Year Estimates—Table B08604, <https://data.census.gov/table?q=B08604>.

⁴ 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 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), also positively impact quality of life through improved air quality, reduced congestion, and increased access to convenient, safe, and affordable transportation options.

FISCAL IMPACT

There is no fiscal impact associated with adopting the Final 2021 and Preliminary 2022 Community GHG Inventories.

CONCLUSION

The Final 2021 and Preliminary 2022 Inventories indicate the City is on track to meeting its reduction targets. However, the effects of the pandemic make it difficult to evaluate the true

emissions reductions. Future inventories that provide the “new normal” activities will be helpful. It is important to continue to implement programs and policies to accelerate this emissions-reduction trend. The City will continue to explore ways to accelerate emissions reductions through the development of the 2035 Climate Strategy, anticipated to be complete by 2026. Staff will also be reporting accomplishments this year and upcoming activities to the CSC and City Council. Market, state, and federal efforts will also be key to achieving Mountain View’s decarbonization goals.

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- Attachments:
1. Community Greenhouse Gas Emissions Reduction Targets and Levels, 2005 through 2050
 2. Community Greenhouse Gas Emissions Inventory Methodology
 3. Total Community Greenhouse Gas Emissions by Sector and Subsector, 2005 through 2022