



DATE: March 19, 2019

CATEGORY: New Business

DEPT.: City Manager's Office

TITLE: **Preliminary 2017 Community Greenhouse Gas Emissions Inventory**

RECOMMENDATION

Provide input on the preliminary 2017 community greenhouse gas emissions inventory and recommended actions related to future inventories.

BACKGROUND

Greenhouse Gas (GHG) Reduction Targets

In November 2009, the City Council adopted voluntary GHG emissions reduction targets for the community as a whole. *These targets set an absolute reduction in total emissions below a baseline year (2005), regardless of residential and commercial growth.* 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. The City established initial targets for 2012, 2015, 2020, and 2050. Subsequently, the Council adopted additional interim targets, at five-year intervals, between 2020 and 2050, to more closely track the City's progress towards meeting its 2050 target. Mountain View's communitywide GHG emissions reduction targets are shown in Table 1.

Table 1: Community Greenhouse Gas Emissions 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%

Year	Reduction Target (below 2005 baseline levels)
2040	58%
2045	69%
2050	80%

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

Current City Policy Guidance

To guide its GHG emissions reduction strategies, the City has developed several policies and plans, and benefited from advisory bodies, including the following:

- **Greenhouse Gas Reduction Program (GGRP):** Created in 2012, the GGRP sets forth GHG emissions reduction targets for development projects, based on service population,¹ with prescribed greenhouse gas mitigation measures to offset the environmental impacts of implementing the General Plan.
- **Climate Protection Roadmap (CPR):** The CPR, completed in September 2015, presents a projection of communitywide GHG emissions through 2050 and a number of strategies that would help the City reduce its absolute emissions 80 percent below 2005 levels by 2050.
- **Municipal Operations Climate Action Plan (MOCAP):** The MOCAP, approved by Council in May 2015, guides the City's municipal operations GHG emissions reduction efforts. Like the CPR, the MOCAP provides specific strategies for reducing absolute emissions 80 percent below 2005 levels by 2050.
- **Environmental Sustainability Action Plans (ESAPs):** The first two plans, ESAP-1 (2008-11) and ESAP-2 (2011-14), guided the City's actions to meet general sustainability goals and were developed based on the recommendations of the City-appointed 2008 Environmental Sustainability Task Force (ESTF). ESAP-3 (2016-19) was developed primarily based on actions in the CPR and MOCAP, and to a lesser extent the recommendations from ESTF.
- **Environmental Sustainability Task Force 2 (ESTF-2):** The Environmental Sustainability Task Force 2, a Council advisory body of appointed community

¹ Service population includes both residents and workers. The GGRP approach of per-capita emissions targets for the service population is appropriate for development projects, but absolute emissions targets are necessary for managing greenhouse gas emissions in the community as a whole.

members who live or work in Mountain View, was convened between September 2017 and June 2018. The purpose of ESTF-2 was to help the City meet its climate goals by: (1) evaluating whether current City sustainability plans and goals should be modified based on new technologies and processes for addressing climate change; and (2) extending the capacity of Environmental Sustainability staff (through June 2018) in the areas of residential and business outreach and regional collaboration. ESTF-2 produced the Final Report of the 2017-18 Environmental Sustainability Task Force,² which recommended specific actions to reduce community GHG emissions and prioritized these actions for 2020, 2025, and 2030. This report was presented to Council on June 26, 2018. Staff performed a high-level analysis of these recommendations to verify assumptions on cost and GHG emissions reduction scenarios and presented these results to Council on December 4, 2018. These recommendations, and the Environmental Sustainability Strategic Plan, will be used to develop ESAP-4.

- **Environmental Sustainability Strategic Plan:** In response to the Task Force recommendations, the City hired a consulting firm (Cadmus) in fall 2018 to: (1) assess current staffing and operations in order to provide options for structures, staffing, and funding levels going forward; (2) develop an Environmental Sustainability Strategic Plan; and (3) help staff analyze the most complex ESTF-2 recommendations, as needed. The Strategic Plan will be presented to Council on April 30.

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 new workflow process and data analysis templates, this project is expected to reduce the time necessary to conduct both the community and municipal operations inventories from approximately 260 to 40 hours total. As a result of this project, as well as the addition of a full-time Analyst in the 2018-19 budget, City staff will now be able to conduct GHG inventories primarily in-house, saving about \$15,000 per inventory. Additionally, by better utilizing an online inventory software platform (ClearPath) developed by ICLEI, staff now has access to a wider range of tools for GHG reduction analysis and planning.

² The Final Report of the 2017-18 Environmental Sustainability Task Force is available at: <http://mountainview.legistar.com/gateway.aspx?M=F&ID=4781bd4b-f8a1-4b63-8dc3-47947c4fe068.pdf>

New Climate Change Reports Amplify Urgency

In October 2018, the Intergovernmental Panel on Climate Change (IPCC), the foremost worldwide authority on climate change, issued a [Special Report](#) and its **most extensive warning yet**. The report explained the large difference in risks and benefits between a 1.5 degrees C and 2.0 degrees C rise in temperature and indicated that the impacts of a 1.5 degrees C temperature rise would be noticeably worse than the impacts we are currently experiencing.

“One of the key messages that comes out very strongly from this report is that we are already seeing the consequences of 1.0 degree C of global warming through more extreme weather, rising sea levels and diminishing Arctic sea ice, among other changes,” said Panmao Zhai, co-chair of one of the IPCC working groups.

Additional key messages from the report include:

- Government pledges made through the Paris Agreement, for 2030, will now not be sufficient.
- Failing to keep temperature rise below 1.5 degrees C will cause dangerous changes to the planet, and staying below this level will require “rapid, far-reaching and unprecedented changes in all aspects of society,” including land use, energy, industry, buildings, transportation, and cities.
- Projections indicate that the world is currently headed towards 3.0 degrees C, and we are likely to reach the 1.5 degrees C level between 2030 and 2052. Thus, **global emissions of CO₂ need to be reduced 45 percent below 2010 levels by 2030** to avoid a significant loss of Arctic ice and coral reefs, and severe droughts and floods.
- Limiting warming to 1.5 degrees C will be difficult, but is possible, and doing so will bring many benefits compared to limiting warming to 2.0 degrees C. **Changes that individuals, organizations, and civil society make to reduce greenhouse gas emissions can have a big, positive impact.** It is not a matter of which solutions are needed; all solutions are needed.

Subsequently, in November 2018, the U.S. government released its own report on climate change, the [Fourth National Climate Assessment, Volume II](#). This report, which focused on the United States, explained the seriousness of climate change and provided the following key points:

- The earth's climate is now changing faster than at any point in the history of modern civilization.
- The evidence of human-caused climate change is overwhelming and continues to strengthen. Climate-related threats to Americans' physical, social, and economic well-being are rising.
- *The impacts of global climate change are already being felt in the United States and are projected to intensify in the future—but the severity of future impacts will depend largely on actions taken to reduce GHG emissions and to adapt to the changes that will occur.*
- **Decisions made today determine risk exposure for current and future generations** and will either broaden or limit options to reduce the negative consequences of climate change.

ANALYSIS

Conducting a communitywide GHG inventory involves measuring the energy, fuel, and water consumed, as well as the waste and wastewater generated, by residential and commercial activities in the community. The greenhouse gases resulting from these activities are then calculated in terms of metric tons of carbon dioxide equivalent, or MT CO₂e. The City's initial baseline 2005 inventory was conducted in conjunction with ICLEI-Local Governments for Sustainability, an organization that specializes in climate change and GHG inventories for cities and counties. Subsequent inventories for 2012 and 2015 were conducted by Ecoshift Consulting under contract with the City.

All of Mountain View's GHG inventories have used a national standard developed by ICLEI. This standard, the U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions (the Protocol),³ establishes reporting requirements and provides detailed accounting guidance for quantifying GHG emissions associated with a range of emission sources and community activities. 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

³ ICLEI-Local Governments for Sustainability. 2013. U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions. Version 1.1 (2013).

(construction equipment and lawn and garden equipment). Although the Protocol provides a common framework for calculating community emissions, it is important to note that any emissions 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.

Preliminary GHG Inventories and Data Availability

GHG inventory calculations rely on a combination of measured data and Protocol-approved estimation methodologies to calculate the emissions resulting from community activities. Measured data includes energy used, water used, wastewater processed, and solid waste generated during a calendar year. Most of this data is available around six to nine months after the end of the calendar year, which is the earliest that a preliminary GHG inventory can be developed.

Some other critical data sources have long delays, which make it difficult to finalize GHG inventory results on a timely basis. One example is the emissions factor for electricity from Pacific Gas & Electric (PG&E), which represents the greenhouse gases produced per kilowatt hour of electricity consumed in a specific calendar year, a necessary variable to translate measured electricity usage into GHG emissions. PG&E's emissions factors vary each year depending on its sources of energy and are not released until roughly 12 to 15 months after the end of the calendar year. Estimation methodologies also rely on some data inputs, such as Census Bureau data, that are not published until one to two years after the calendar year. In an effort to produce more timely GHG inventories, preliminary inventories are often released using previous years' emissions factors or data as a placeholder. Previously, Mountain View has conducted its inventories less frequently and has not needed to use placeholder data.

As the City moves to conduct GHG inventories annually (per prior Council direction but dependent on adequate staffing), however, the difference between preliminary and final data becomes more critical. The purpose of conducting annual inventories is to reflect year-to-year changes as closely as possible. This becomes more difficult when previous years' data or emissions factors are used as a placeholder, meaning that two inventory years share various inputs and, therefore, do not reflect differences such as changing travel behavior, jobs growth, or construction rates. For Mountain View, which is experiencing significant year-to-year change in these areas, estimations based on previous years' factors become less accurate. While preliminary GHG inventories are useful for getting a first look at trends in some areas, they can obscure some significant changes in elements affecting GHG emissions.

To illustrate the difference that using preliminary data can make in final emissions, Table 2 shows the year-to-year variation in emissions factors from PG&E. The percent change from the previous year would result in the same percent difference in total electricity emissions from PG&E, given the same total electricity usage. Using preliminary emissions factors for 2016, for example, would have resulted in a 27.4 percent *overestimate* in GHG emissions from residential and commercial electricity. While PG&E's share of electricity provided to customers in Mountain View sharply decreased after Silicon Valley Clean Energy (SVCE) began operations in 2017, this example illustrates the sometimes large inherent margin of error in preliminary inventories. (PG&E supplied 49.8 percent of the residential electricity load, and 48.1 percent of the nonresidential electricity load, in 2017.)

Table 2: PG&E Emissions Factors 2012-2016

Year	Emissions Factor (lbs. CO ₂ per MWh)	% Change from Previous Year
2012	445	13.2%
2013	427	-4.0%
2014	435	1.9%
2015	405	-6.9%
2016	294	-27.4%

Going forward, staff will endeavor to complete preliminary GHG inventories within six to nine months after the end of the calendar year, as staff capacity allows, but inventories subsequently will need to be finalized once all the required data is available. As an example, the 2017 data in this preliminary report will be updated upon receipt of the final inputs (the timing of which is unknown) and then presented in a future report. The results and analysis in this report note any place where previous years' data is being used as a proxy, and discuss the relevant implications.

2017 Community Greenhouse Gas Emissions Inventory Results

The City does not have a GHG emissions reduction target for 2017, but to stay on track toward adopted goals, emissions reductions should be somewhere between the 10 percent (below 2005 baseline) target for 2015 and the 15 percent to 20 percent target for 2020. **Preliminary GHG emissions for 2017 are estimated at 716,535 MT CO₂e, a decrease of 6.7 percent from 2015 levels but still 2.9 percent *above* the 2005 baseline. This is a significant improvement compared to 2015 emissions, which were 9.1 percent above the baseline, and it represents the first year since Mountain View began conducting inventories that emissions have begun to decline.** While this is positive news, as shown in Figure 1, 2017 GHG emissions are still 15.7 percent above the level needed to stay on target toward our adopted goals (see Attachment 1 for

annual reduction targets and levels). Emissions need to decline much faster to catch up to the City’s adopted reduction targets (shown in Table 1). Mountain View has a 15 percent to 20 percent reduction target for 2020, and to reach the 15 percent reduction level, emissions would need to decline 50 percent faster than they declined from 2015 to 2017. Therefore, programs implemented as soon as possible will give the City its best chance of achieving its 2020 reduction target.

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

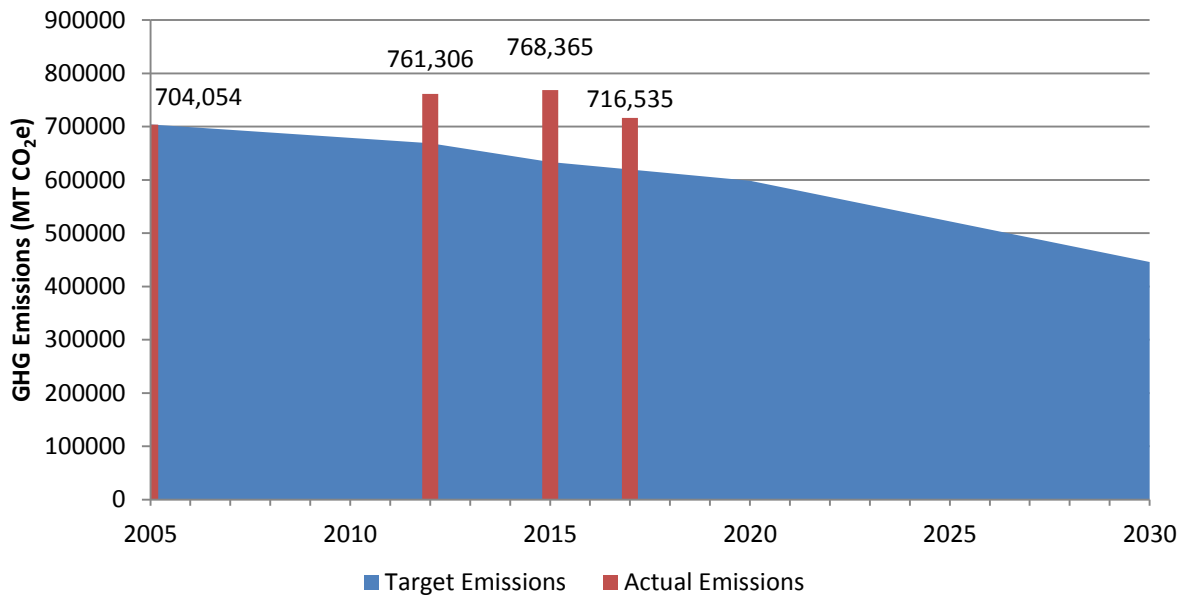
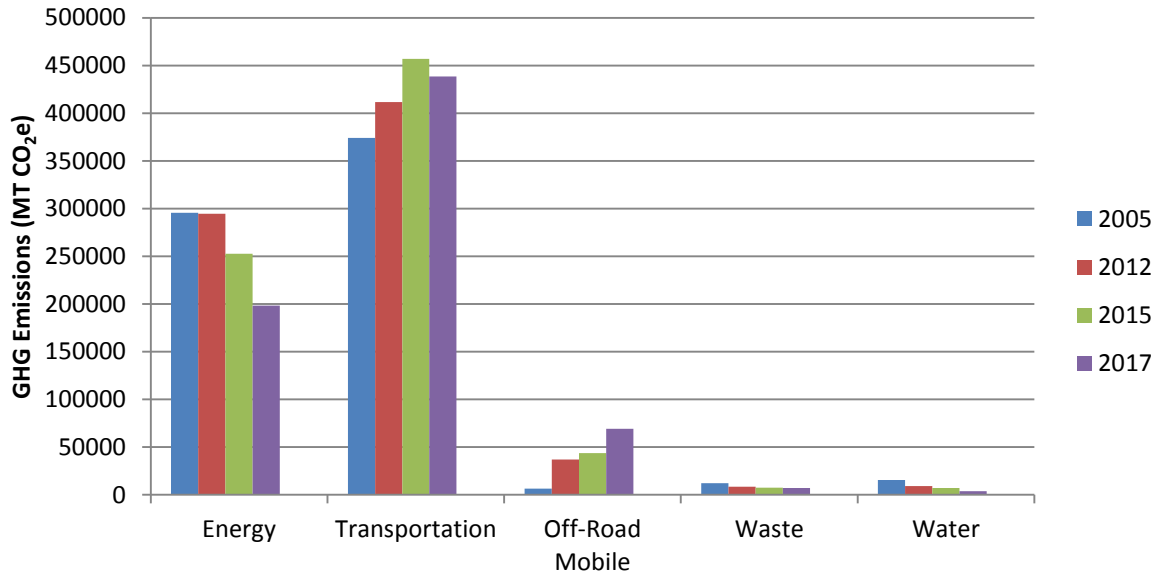


Figure 2 displays the total emissions by sector for 2005-2017 and shows that emissions from both energy use and transportation declined in absolute terms between 2015 and 2017.

Figure 2: Comparison of 2005, 2012, 2015, and 2017 GHG Emissions by Sector



As shown in Figure 3, transportation and energy emissions remained the two largest sources in 2017, at 60.7 percent and 27.7 percent respectively. Table 3 provides the breakdown of emissions by sector between 2005 and 2017. Attachment 2 provides a more detailed table of total emissions by sector for all inventory years.

Figure 3: 2017 GHG Emissions by Sector (716,535 MT CO₂e Total)

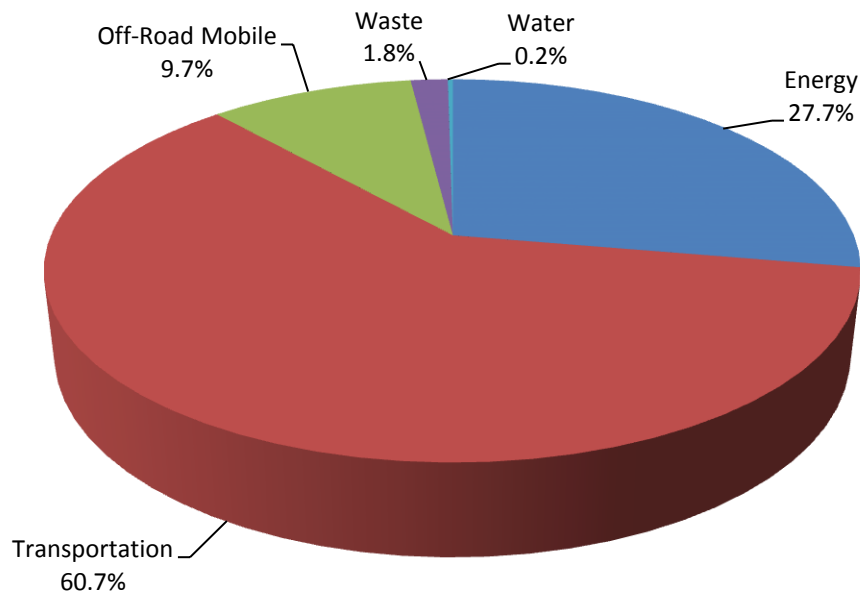
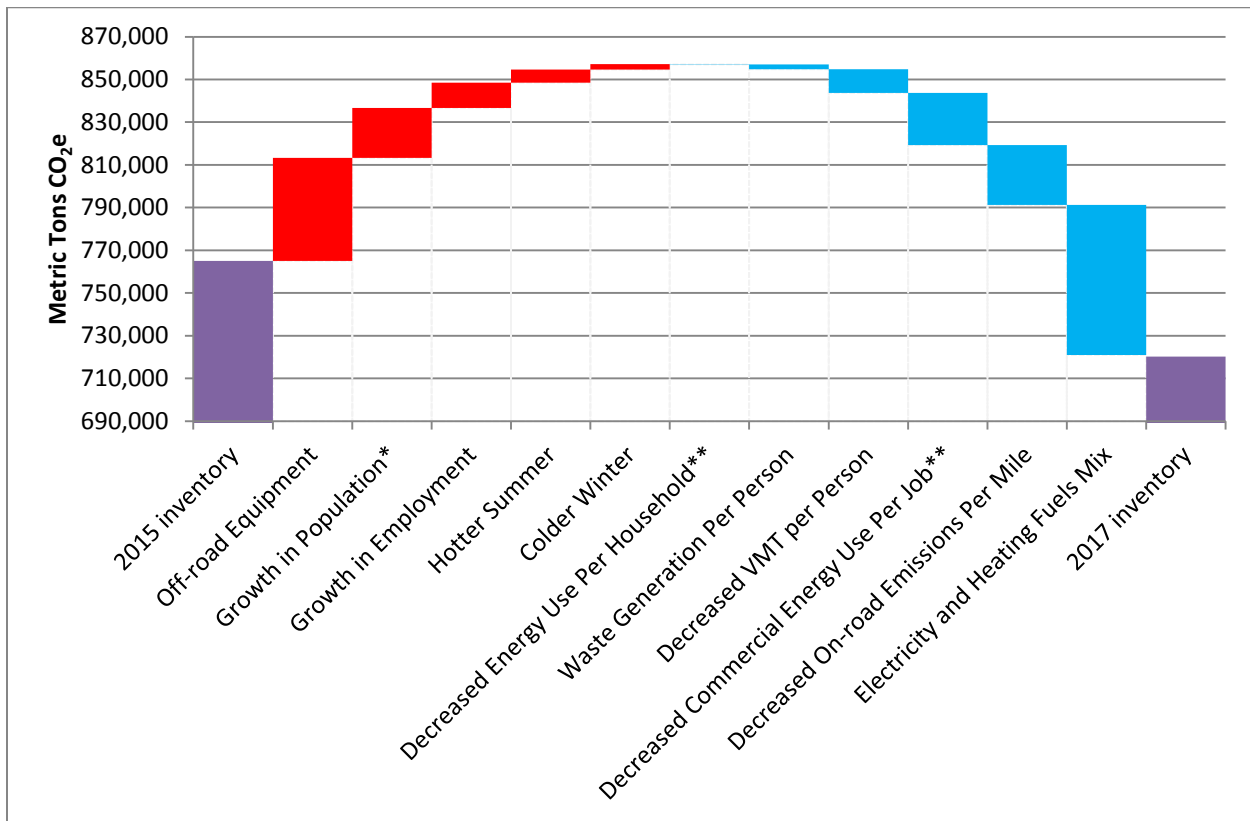


Table 3: Percentage of GHG Emissions by Sector, 2005-2017

Sector	2005	2012	2015	2017
Energy	42.0%	38.7%	32.9%	27.7%
Transportation	53.1%	54.1%	59.5%	60.7%
Waste	1.8%	1.1%	1.0%	1.8%
Water	2.2%	1.2%	0.9%	0.2%
Off-Road Mobile	0.9%	4.9%	5.7%	9.7%

ICLEI developed a tool that allows cities to analyze the primary contributors to change in their emissions inventories. This analysis takes into account the effects of differences in weather, population, and other elements to identify the factors that increased or decreased emissions between any two inventory years. This type of analysis is more effective than analyzing sectors individually because factors such as population growth or employment growth can affect emissions across multiple categories. Figure 4 displays the primary drivers of change in GHG emissions between 2015 and 2017. The purple bars on either side of the chart represent the total communitywide GHG emissions for 2015 (left) and 2017 (right). The red bars represent factors that increased emissions between 2015 and 2017, while the blue bars represent factors that decreased emissions during this time period. The height of the bars reflects the magnitude of the impact. As Figure 4 shows, the net effect of these factors was a decline in overall emissions from 2015 to 2017.

Figure 4: GHG Emissions Drivers of Change: 2015-2017



As shown in Figure 4, overall GHG emissions declined despite growth in Mountain View’s population and employment, primarily because of a lower-carbon electricity supply, higher fuel efficiency standards, more electric vehicles on the road, and increased building energy efficiency. The largest factor increasing emissions was Off-Road Mobile equipment, which consists primarily of construction equipment, due to an increase in construction activity in Mountain View.

A breakdown of the results of the 2017 GHG inventory, as well as some implications of these results, are presented by sector below.

- **ENERGY (27.7 percent of total emissions):** Final emission factors for electricity from PG&E are not yet available for 2017, so 2016 PG&E emissions factors were used to conduct the preliminary inventory for 2017. Using the 2016 emissions factors, calculated energy emissions decreased by 21.5 percent from 2015 levels,

* Includes effects of population on residential energy, VMT, and waste generation.

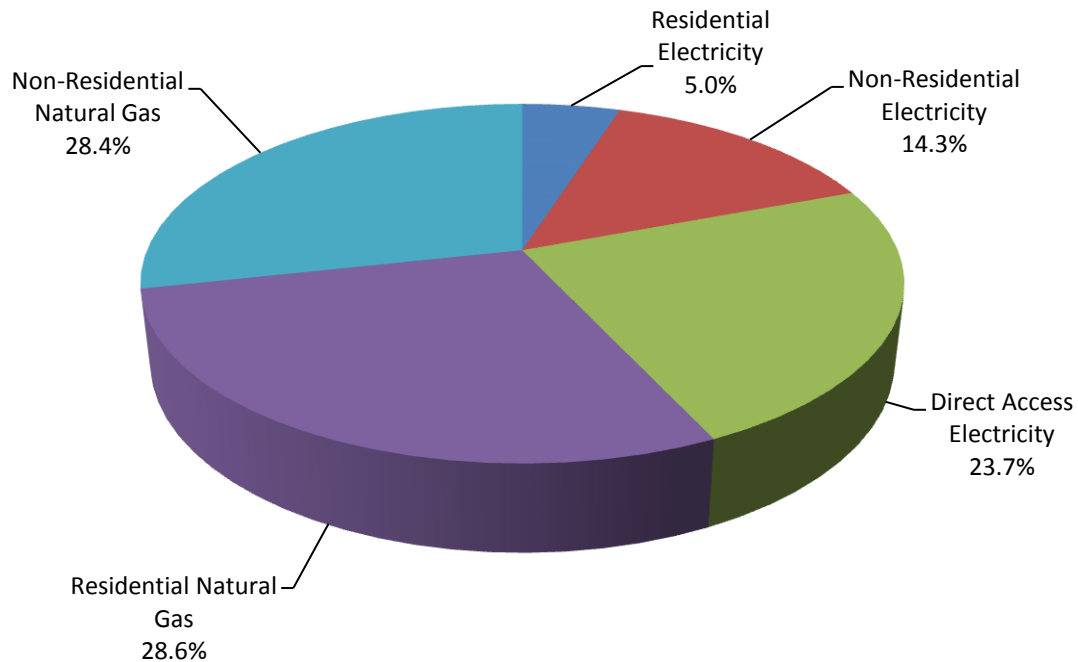
** After accounting for weather. This change is the net effect of factors that may include occupant behavior, changes to building types and uses, Federal appliance standards, utility programs, and new electronic devices.

and 32.9 percent from 2005 levels. As detailed in Figure 4, cleaner electricity (from Silicon Valley Clean Energy (SVCE)) drove the majority of energy sector and overall emissions reductions between 2015 and 2017. SVCE began providing carbon-free electricity to residential and commercial customers in Mountain View in April 2017 (on a rolling basis) and supplied 50.2 percent of the total residential utility-provided electricity and 51.9 percent of the total nonresidential utility-provided electricity for Mountain View in 2017. Conversely, PG&E supplied 49.8 percent of the residential electricity load, and 48.1 percent of the nonresidential electricity load, that year. Electricity emissions are expected to decline further in 2018, which will represent the first full calendar year of SVCE's operations. SVCE currently provides electricity to more than 97 percent of residential and commercial customers that had been served by PG&E, and SVCE's opt-out rate has remained very stable.

With the transition of most of the community's residential and commercial electricity accounts to SVCE, the two largest contributors to energy GHG emissions are natural gas and Direct Access (DA)⁶ electricity, neither of which is controlled by SVCE. As shown in Figure 5, natural gas represents the majority (57 percent) of energy-related emissions in the community, and 15.8 percent of total communitywide emissions. Reducing natural gas use will be critical to meeting long-term GHG reduction goals.

⁶ Direct Access electricity is electricity provided to individual customers from competitive electric service providers rather than a local utility.

Figure 5: 2017 Energy-Related GHG Emissions (198,346 MT CO₂e)



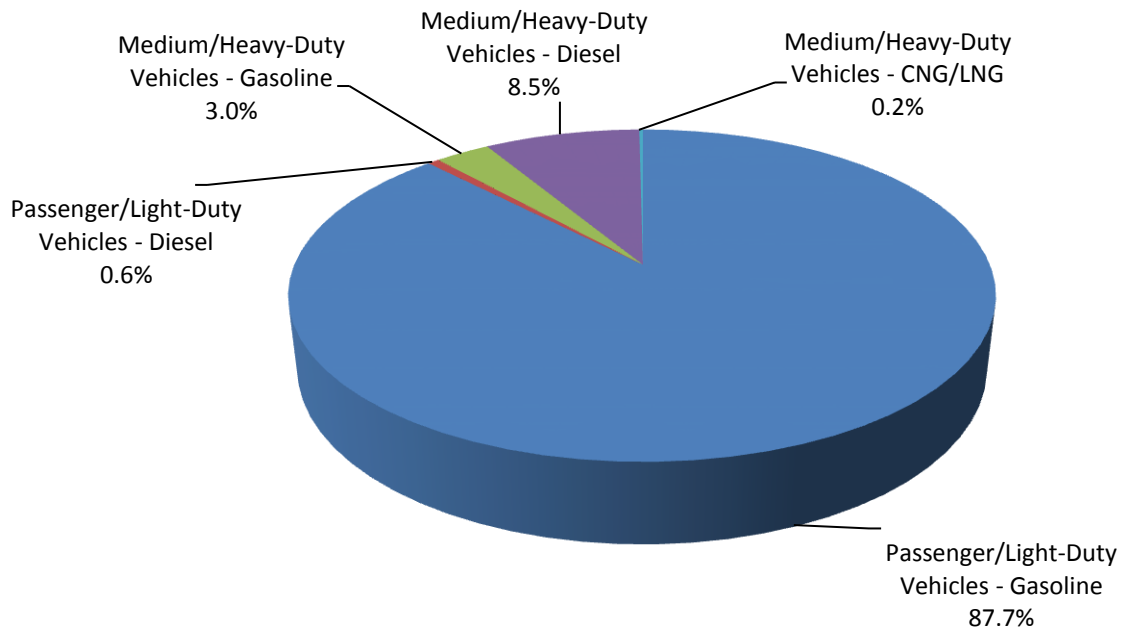
Currently, DA electricity use accounts for an estimated 23.7 percent of energy sector emissions and 6.6 percent of communitywide emissions. There is a large margin of error in estimating emissions from DA electricity, as DA customers do not purchase their electricity from a local utility, but instead from competitive electric service providers. While the City is generally able to obtain total aggregate energy usage data for all DA customers in the service area, we do not know the source of this electricity and, therefore, cannot directly calculate its emissions. The GHG inventory Protocol specifies that a regional electricity factor be used for estimating DA emissions, which is generally more carbon-intensive than electricity provided by other local utilities. Effectively, the DA electricity emissions estimates represent the worst-case emissions scenario in the absence of better data. The numbers used in this inventory represent the results of this estimation methodology (which uses the regional emissions factor), as was done in all previous community inventories.

However, SVCE estimates that 40.3 percent of the DA electricity used in its service territory is carbon-free, based on several large DA customers that publicly report purchasing 100 percent carbon-free electricity. SVCE does not provide estimates of the percentage of carbon-free DA electricity at the City level due to privacy concerns, however, so it is difficult to know how accurate it is for Mountain View's DA emissions. **Note:** While the City does not use SVCE's adjusted number due to its inconsistency with previous estimation methods, if SVCE's regional estimates

were applied to Mountain View's DA emissions factors, it would represent a 9.6 percent decrease in energy sector emissions, and a 2.6 percent decrease in total 2017 emissions.

- **TRANSPORTATION (60.7 percent of total emissions):** Emissions from on-road transportation declined 4.9 percent between 2015 and 2017. Estimated per-capita vehicle miles traveled (VMT) for the service population declined from 18.7 miles to 18.1 miles daily, but a larger service population still drove an increase in overall communitywide VMT. However, these increases in overall VMT were offset by a larger decline in on-road per-mile emissions, driven by increased vehicle fuel efficiency standards and an increase in purchases of electric vehicles.

Gasoline-powered passenger vehicles and light-duty trucks generated the vast majority (87.7 percent) of the City's transportation-related emissions (see Figure 6), and 53.2 percent of total emissions for 2017. As a greater percentage of passenger vehicles become plug-in electric vehicles, these emissions will continue to decline. Medium- and heavy-duty diesel vehicles were the next greatest contributor to transportation emissions. It is important to note that the jobs ratio used to downscale County-level freight transportation data is based on 2015 data from the Census Bureau (most recent available). This means that the 2015 and 2017 inventories are currently using the same factors, which does not accurately reflect year-to-year change. Updated jobs counts are expected to be released by the Census Bureau at some point, but the timing is unknown.

Figure 6: 2017 Transportation-Related GHG Emissions (434,711 MT CO₂e)

2017 is the first year since the baseline of 2005 that GHG emissions from the transportation sector have declined and illustrates that it is possible to reduce transportation emissions even while the service population increases. Census Bureau data shows a decline in the percentage of people commuting to Mountain View by single-occupancy vehicle, and a significant increase in carpooling, public transit use, and walking, which is likely contributing to reduced per-capita VMT. Further decreases in per-capita VMT can be expected in the future as the housing units allowed through the North Bayshore and East Whisman Precise Plans are developed. A list of current City efforts to reduce transportation-related GHG emissions is provided in Attachment 3.

The City will need to pursue additional strategies to support and encourage travel by nonvehicle modes in order to maintain the declining trend in per-capita VMT. Because passenger vehicle travel from residents and employees accounts for the majority of emissions (53.2 percent), the City should focus primarily on both reducing this source of vehicle miles traveled and accelerating the transition to cleaner vehicles. These strategies have significant related benefits for the Mountain View community, including improved air quality, safer streets, a vibrant downtown, and more widespread active commuting through improved bicycle and pedestrian infrastructure.

- **OFF-ROAD MOBILE (9.7 percent of total emissions):** The off-road mobile sector consists of construction equipment and lawn and garden equipment. Emissions from this sector increased 58 percent from 2015 to 2017 and have risen to more than 10 times the City's 2005 levels. These emissions are estimated by downscaling County-level data. Construction equipment emissions are downscaled using the ratio of City to County building permits, and lawn and garden equipment emissions are downscaled using the relative number of total households in the City and County. The primary driver of the increase in off-road emissions is the increase in construction, because construction equipment accounts for 97 percent of off-road emissions. The percentage of Countywide building permits issued in Mountain View continues to increase sharply, causing off-road mobile emissions to be the largest source of increased emissions from 2015 to 2017.
- **WASTE (1.8 percent of total emissions):** Previous inventories from 2012 and 2015 omitted certain categories of waste that contribute to GHG emissions, making it impossible to accurately compare 2015 and 2017 waste emissions. This is the reason solid waste emissions appeared to dramatically decline between 2005 and 2012 despite an increase in the amount of waste generated. The differences between inventory methodologies and resulting GHG emissions are discussed in Attachment 4. Inputting the raw data from the 2015 inventory into ClearPath (including the previously omitted categories) allows for a direct comparison. This shows that emissions from solid waste declined about 14.6 percent from 2015 to 2017. As noted in Figure 4, this is due to a decrease in per-capita waste generation, as well as a decrease in the amount of organic waste sent to the landfill. Organic waste, such as yard trimmings, food scraps, and compostable paper, is the primary contributor to GHG emissions from solid waste. The City's single-family food scraps collection program began in July 2017 and allowed residents with curbside collection of yard trimmings to dispose of their food scraps and other compostable waste in order to divert it from landfill. As a result of the food scraps program, there was a 15 percent decrease in the amount of trash collected from single-family homes. Staff anticipates a continued decline in per-capita waste generation rates as the food scraps program expands to multi-family residences in 2019, which will further reduce GHG emissions.
- **WATER (0.2 percent of total emissions):** This sector includes emissions from the energy used in extracting, conveying, treating, and distributing potable water and the wastewater treatment process. In both cases, previous inventories used average estimates for the energy intensity of each step of the water and wastewater process. For the 2017 inventory, values specific to the local water supply were used, which resulted in significantly lower reported emissions for this sector, because Mountain View's water comes from sources with a relatively low energy

intensity. These 2017 values provide a more accurate picture of the community's water-related emissions, but they make it difficult to compare water emissions between 2017 and previous inventories. *While reported emissions from water dropped significantly from 7,281 MT CO₂e in 2015 to 1,725 MT CO₂e in 2017, this is primarily due to the use of more accurate data and not representative of an actual drop in emissions.* The differences between the data sources used and resulting GHG emissions are discussed in Attachment 4. Accounting for these differences in inputs, emissions from potable water use and wastewater treatment remained relatively constant between 2015 and 2017, with only small changes in the volume of potable water delivered and wastewater treated. Increased conservation efforts have been the primary driver of water emissions reductions since 2005 and have enabled total water use to decrease 30 percent despite the increasing population. Efforts to reduce emissions associated with water treatment at the Regional Water Quality Control Plant in Palo Alto have also contributed to this longer-term emissions decline. Continued use of the locally specific energy intensity values in future inventories will enable the City to more accurately assess GHG reductions resulting from water-related programs.

Characterizing Per-Resident and Per-Service Population Emissions

Mountain View experienced significant growth between 2005 and 2017: the resident population increased by 14.5 percent, while the number of employees increased by 77.6 percent, as shown in Table 4. **While the population has increased, per-capita emissions have decreased both on a per-resident and per-service population basis.** These per capita declines are relatively recent; before 2015, per-capita emissions remained relatively flat. Even without growth in the residential or service populations, Mountain View would need to make significant reductions in per-capita emissions to reach its GHG reduction goals.

As shown in Figure 4, the primary drivers of emissions reductions were cleaner sources of electricity, more efficient and cleaner-fuel vehicles, and lower VMT per capita. While the growth in service population does mean that greater per-capita emissions reductions will be required to meet our absolute GHG reduction goals, many of these effects are mitigated by the sizeable per-capita reductions that are predicted to occur by addressing the jobs-housing imbalance. Furthermore, the types of initiatives that will continue to reduce per-capita emissions (e.g., creating more walkable neighborhoods, improving bicycle infrastructure, an enhanced community shuttle program, improving bicycle and pedestrian access to the Transit Center, and supporting increased adoption of electric vehicles in the community) have significant related benefits for both residents and employees. These co-benefits, such as improved air quality, reduced congestion, expanded and safer bicycle networks, and increased access to a range of convenient and

affordable transportation options, will improve the health of Mountain View's population and environment and positively impact quality of life for our community.

Table 4: GHG Emissions Relative to Population and Employment

	2005	2015	2017	% Change 2005-2017	% Change 2015-2017
Total Emissions (MT CO₂e)	704,054	768,365	716,535	1.8%	-6.7%
Population/Employment					
Residential	70,629	77,250	80,897	14.5%	2.4%
Employees	54,071	89,125	96,026	77.6%	7.7%
Service Population ⁷	124,700	166,375	176,923	41.9%	6.3%
Per Capita Emissions (MT CO₂e)					
Per Resident	9.97	9.95	8.86	-11.1%	-11.0%
Per Service Population	5.65	4.62	4.05	-28.3%	-12.3%

Recommended Actions Related to the GHG Inventory

2017 represents the first year that communitywide GHG emissions have begun to decline since the City first began conducting emissions inventories. This key turning point represents an opportunity for Mountain View to build on this momentum toward its GHG reduction goals by focusing primarily on the largest contributors, transportation and natural gas. Staff will return to Council on April 30 with a Strategic Plan for the Sustainability Program, seeking Council direction on a range of strategic options and recommendations. In the meantime, staff recommends pursuing the following actions related to the development of GHG inventories.

1. **Secure Final Data and Present a Final 2017 Community GHG Inventory.** Staff is waiting for final data from PG&E and the Census Bureau. Staff will present a final 2017 community GHG inventory to the Council as soon as this data is available, which will likely be in 2019 but is unknown.
2. **Conduct Annual Community Greenhouse Gas Emissions Inventories.** Previously, the City has conducted community GHG inventories every three to five years. Conducting annual inventories would bring Mountain View in line with best practices in GHG accounting and management that have been adopted by many neighboring jurisdictions, and help the City track its progress more closely, enabling it to adjust its strategy and programs more quickly. Given the rapid pace of change, accurately tracking long-term trends requires taking more frequent "snapshots" of emissions-related activities. Due to the collaboration with

⁷ Service population equals residents plus employees. Population estimates are obtained from the California Department of Finance, and number of employees is obtained from the Census Bureau's American Community Survey 1-year estimates.

Google's Civic Leadership Program in 2018, the GHG inventory process has been significantly streamlined, reducing the necessary staff time by an estimated 80 percent. Based on current staffing levels and prior Council direction recommending annual inventories if staff capacity can support doing them, staff recommends conducting annual communitywide GHG inventories going forward.

3. **Direct Staff to Evaluate the GHG Emissions Reduction Targets.** The ESTF-2 report made several recommendations regarding how the City should set its GHG emissions reduction targets and create a system of accountability for meeting them, including: (a) purchasing carbon offsets each year the City does not achieve its reduction target (*Recommendation M1*); (b) changing from absolute to per-capita targets (*Recommendation M2*); and (c) adopting reduction targets that decline by a constant percentage rather than a linear reduction year-over-year (*Recommendation M13*). Staff can evaluate these options and any proposed revisions would be presented to Council for consideration.

FISCAL IMPACT

Other than staff time, there was no cost to conduct the 2017 community GHG emissions inventory. Going forward, staff anticipates a cost of up to \$10,000 for transportation consultant services to provide staff with appropriate data inputs for each inventory.

CONCLUSION

The 2017 GHG inventory represents an important turning point for Mountain View as emissions began to decline after many years of increases. However, there is still work to be done to address the gap between the community's GHG emissions and adopted reduction targets. While there are many efforts under way to address various sources of emissions, the City would need to increase its efforts to address emissions from transportation in order to meet its adopted GHG reduction goals. The recommendations listed above will help the City track its progress more regularly and increase the likelihood of reaching its 2020 reduction target. Recent reports, including those from the IPCC and U.S. government, emphasize the severity of the threat posed by global climate change, including impacts that are already being felt by communities, and the importance of quick action to address these impacts. Mountain View has the opportunity to address its contribution to the GHG emissions driving climate change, which will be discussed in more detail on April 30 as part of the Sustainability Strategic Plan Council item.

PUBLIC NOTICING

Agenda posting and e-mails sent to the Environmental Sustainability Task Force 2 and community members interested in sustainability.

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- Attachments:
1. Greenhouse Gas Emissions Reduction Targets and Levels, 2005-2050
 2. Total Greenhouse Gas Emissions and Percent Change in Emissions, 2005, 2012, 2015, and 2017
 3. Current Efforts to Reduce Transportation-Related Greenhouse Gas Emissions
 4. Explanation of Differences in Inventory Methodology, 2005-2017

cc: CDD, PWD, ACDD, APWD—Cameron, APWD—Hosfeldt, PP, ZA, TM—Lo, SWPM, WRM, TP—Baird, TP—Kim, SP—Anderson