COUNCIL REPORT

CITY OF MOUNTAIN VIEW

DATE: December 3, 2019

CATEGORY: New Business

DEPT.: City Manager's Office

TITLE: **Community Greenhouse Gas Accounting, Reduction Targets, and Carbon Neutrality**

RECOMMENDATION

1. Measure and report on the consumption-based emissions reductions from SAP-4 actions.

2. Adopt the proposed absolute GHG reduction targets beginning in 2025.

3. Direct staff to develop a resolution adopting a carbon neutrality target of 2045 and requiring development of a carbon neutrality plan by 2025, including potential use of carbon offsets.

BACKGROUND

In November 2009, the City Council adopted voluntary GHG reduction targets for the community as a whole, with initial targets for 2012, 2015, 2020, and 2050. These targets set an absolute reduction in total emissions below a baseline year (2005), 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. Subsequently, through the Climate Protection Road Map, the City Council adopted additional interim targets, at five-year intervals, between 2020 and 2050, to more closely track the City's progress. Mountain View's current communitywide GHG emissions reduction targets are shown in Table 1.

Table 1: Current Community GHG Reduction Targets

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

Mountain View has conducted periodic GHG inventories to assess its progress towards these targets, using a national standard developed by the International Council for Local Environmental Initiatives (ICLEI). ICLEI assisted the City in conducting its baseline 2005 inventory, including identifying the sources for which emissions would be quantified.

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. ESTF-2 produced a Final Report[1] with 36 recommendations to reduce the City's GHG emissions through 2030, including several recommended changes to the emissions reduction targets and GHG accounting methods. Additionally, the report recommended the City conduct a consumption-based emissions inventory (CBEI) in addition to the official community GHG inventory, as well as implement policies and programs to reduce consumption-based emissions. Staff presented the ESTF-2 Final Report to the City Council in a Study Session on June 26, 2018.

Subsequently, staff performed a high-level analysis of the ESTF-2 recommendations to verify assumptions on cost and GHG emissions reductions, and presented these results to the City Council on December 4, 2018. The Council provided direction on next steps, including developing Sustainability Action Plan 4, completing the 2017 greenhouse gas inventories, installing additional electric vehicle chargers downtown, publicizing available building energy efficiency incentives, and developing a Building Baseline Study and Decarbonization Road Map.

[1] The Final Report of the Environmental Sustainability Task Force 2 can be found online at: https://www.mountainview.gov/council/bcc/environmental_sustainability_task_force_2.asp

In March 2019, the City Council directed staff to evaluate these ESTF-2-recommended changes to the City's GHG inventories and targets, including consideration of consumption-based emissions and the use of carbon offsets. The City Council Major Goals Work Plan for Fiscal Year 2019-20 through Fiscal Year 2020-21 includes Item 4.6 to "Develop alternative carbon offsets." In September 2019, the Council Sustainability Committee requested that staff evaluate carbon offsets, including the potential of offsetting the City's entire GHG inventory to achieve carbon neutrality.

ANALYSIS

This report analyzes recommendations from ESTF-2 and City Council direction in four major areas: (1) conducting a CBEI; (2) changes to the City's adopted GHG reduction targets; (3) consideration of carbon offsets in the City's GHG accounting methods; and (4) a carbon neutrality goal.

Official Community Greenhouse Gas Inventory

Mountain View's community GHG inventories use a national standard developed by ICLEI. This standard, the U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions, is intended to provide a consistent, transparent framework for communities to quantify and report their GHG emissions. The Protocol includes five Basic Emissions Generating Activities that must be included in community inventories:

- Use of electricity by the community.
- Use of fuel (such as natural gas) in residential and commercial stationary combustion equipment.
- On-road passenger and freight motor vehicle travel.
- Use of energy in potable water and wastewater treatment and distribution.
- Generation of solid waste by the community.

Local governments are also strongly encouraged to include certain other sources of emissions, including off-road equipment or transit, if they are sources over which the jurisdiction has significant influence.

1. CONSUMPTION-BASED EMISSIONS INVENTORY

ESTF-2 Recommendation: Conduct a consumption-based emissions inventory in addition to the City's official community GHG inventory.

The official community inventory focuses on emissions *generated* within the geographic boundary of a community, while a CBEI focuses on estimating the emissions associated with goods and services *consumed* in a given area. In a CBEI, all emissions are attributed to the end user/consumer. This type of "life cycle" analysis includes the emissions associated with all stages of a product or service, including "upstream" impacts from extraction or production and "downstream" impacts from recycling and/or disposal, even if those emissions do not occur within the community. For example, a CBEI includes the emissions associated with manufacturing a vehicle, vehicle maintenance, and emissions from extraction and refining of fuel, whereas the City's official GHG inventory only includes the emissions resulting from combustion of gasoline. How emissions are assigned to different categories of goods and services, or how end users are defined, may vary in different CBEIs. Unlike a traditional community inventory, there is no standardized scope or methodology for a CBEI, making it difficult to compare CBEIs across jurisdictions.

Official Community Versus CBEI Inventories

Community inventories and consumption-based inventories are intended to address different emissions sources and underlying factors, and to inform different decision-making processes. For this reason, a CBEI provides a complement to, but not a replacement for, a traditional community inventory. Table 2 below outlines the basic differences between a traditional community inventory and a CBEI.

Table 2: Comparison of Community and Consumption-Based Inventories

Factor	Official Community Inventory	Consumption-Based Inventory
Purpose	To inform local government policy, programs, and infrastructure	To inform individual behavior decisions
Focus	Emissions generated from activities in Mountain View	Upstream use, and downstream emissions generated by Mountain View residents
Scale	Most informative at the community scale	Most informative at the individual household level

Data Sources

A traditional community inventory and CBEI utilize some of the same data sets, including residential electricity and natural gas consumption, water use, and generation of solid waste. The emission sources included are ultimately the same across both types of inventories; what varies is how these emissions are geographically attributed (to the airport or the traveler, to the business providing the service or to the consumer, to the farm or to the consumer of food, etc.). Because of the way CBEIs attribute emissions associated with consumption of goods and services, they rely more on estimation methodologies than measured data, in contrast to a community inventory. A CBEI would require much more staff time to conduct than the City's current community inventory due to the large scale of data collection and calculations involved. As part of the analysis of the ESTF-2 recommendations presented to the City Council in December 2018, staff estimated the cost of conducting a CBEI at approximately $65,000 for consultant expenses.

In order to estimate consumption of goods and services, CBEIs require economic metrics that are not tracked at the city level. Therefore, city-level CBEIs must use regional, State, or national averages for data on consumption of goods and services and apply these values to a city's household demographics. This means a CBEI does not necessarily provide insight into differences in local consumption patterns beyond those that are a result of demographic factors (such as household income). As a result, a CBEI conducted at the city scale will not measure the effect of local programs intended to reduce consumption-based emissions, with the exception of sectors already included in a community inventory. However, the impact of these programs can still be estimated separately from emissions inventories.

Tools that calculate household-level CBEIs can provide a much more accurate profile of a household's carbon footprint. One such tool is available at: CoolCalifornia.arb.ca.gov. Rather than using assumptions about consumption habits according to regional or national averages, users can input their own information on vehicle ownership, energy use, travel habits, dietary preferences, and other factors that influence GHG emissions. Mountain View will leverage these types of calculators in community engagement programs such as Cool Block and Community Climate Solutions, which are planned for implementation over the current and next fiscal year. These tools help identify sources of household GHG emissions as well as recommend actions to reduce them in a way that is tailored to each household's specific consumption profile. Attachment 1 shows the types of questions that will be used by both Cool Block and Community Climate

Solutions to create tailored consumption-based emissions profiles for Mountain View residents.

CBEIs in Other Jurisdictions

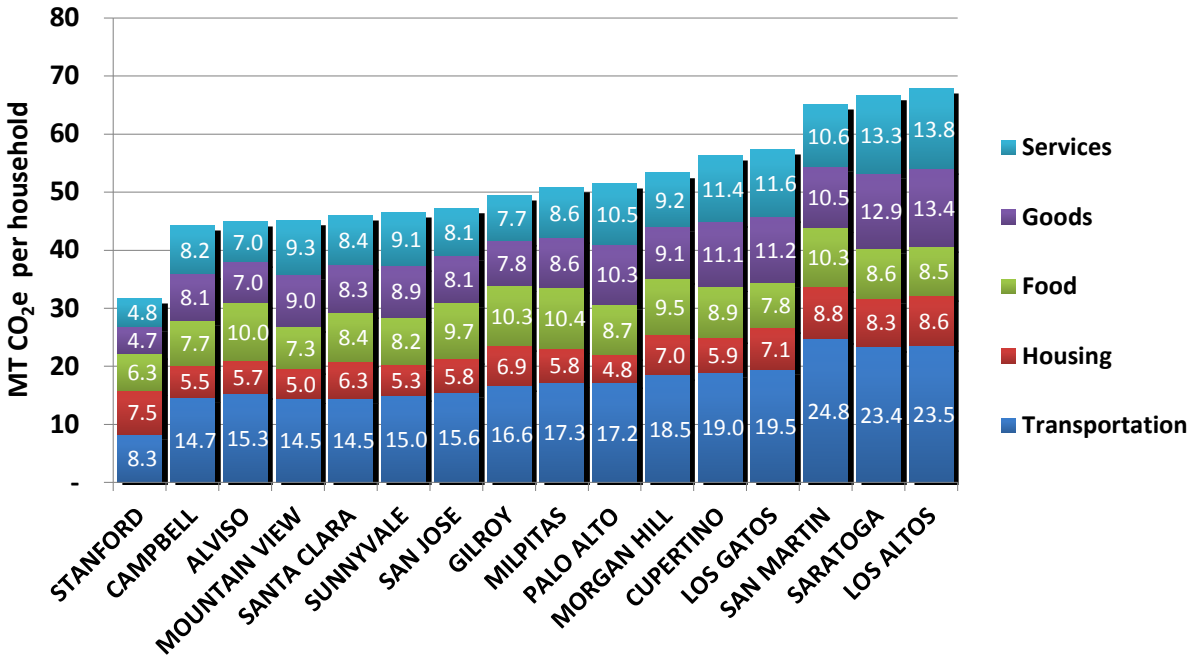
Staff surveyed other jurisdictions to find out if they conduct a CBEI and, if so, to gather information about the frequency and methodology. While communitywide CBEIs are not yet common practice, staff identified several cities that have incorporated them into GHG accounting, including San Francisco and Oakland. Due to the large scale of data collection and calculations involved, a CBEI is much more time-intensive to prepare than a traditional community inventory. Few cities surveyed conducted CBEIs regularly; several have done a single assessment, but with no current plans for a follow-up. Most jurisdictions that planned to conduct a CBEI regularly aimed for five-year intervals, with the exception of Oakland, which conducts both a community inventory and CBEI every two years. Attachment 2 contains the results of the staff survey of city and regional CBEIs.

The CBEIs identified by staff used a variety of methodologies to both estimate and attribute emissions, making it difficult to compare results across jurisdictions. The State of Oregon had the most comprehensive approach due to the city-county government structure that allows better use of county economic data. Outside of Oregon, cities generally have had challenges in obtaining local data for consumption of goods and services, resulting in a reliance on regional or national averages. As a result, no city surveyed outside of Oregon has developed GHG reduction targets relative to consumption-based emissions as the methodologies used were considered insufficient to tie to an actionable goal. No jurisdiction surveyed used a CBEI as a replacement for a community inventory.

BAAQMD 2015 Regional Bay Area CBEI

The Bay Area Air Quality Management District (BAAQMD) collaborated with U.C. Berkeley to develop a CBEI for the Bay Area region for 2015. This inventory used a methodology that assigned all consumption-based emissions to households, meaning that commercial-=sector emissions were not quantified separately, but considered as part of the goods and services consumed by residents. Household emissions profiles were developed at the Census block group scale for the entire region, with detailed data tables available at the city level. Figure 1 provides the average annual household consumption-based emissions for cities in Santa Clara County.

Figure 1: Average GHG Emissions per Household for Santa Clara County Cities



Six factors were found to account for 92 percent of the variation in the household GHG footprints:

- Household size (number of people)
- Size of home (square footage of dwelling unit)
- Population density of neighborhood
- Carbon intensity of electricity
- Vehicle ownership rate
- Household income

Household income in particular was found to have a strong influence on both the magnitude and composition of emissions as spending on discretionary goods and services increased with income. As a result of the methodology used in this CBEI, the variation in consumption-based emissions is primarily reflective of the demographic differences in households across cities in the region. In particular, the methodology used to calculate emissions from food consumption uses the same average per-capita consumption profile regardless of income. Therefore,

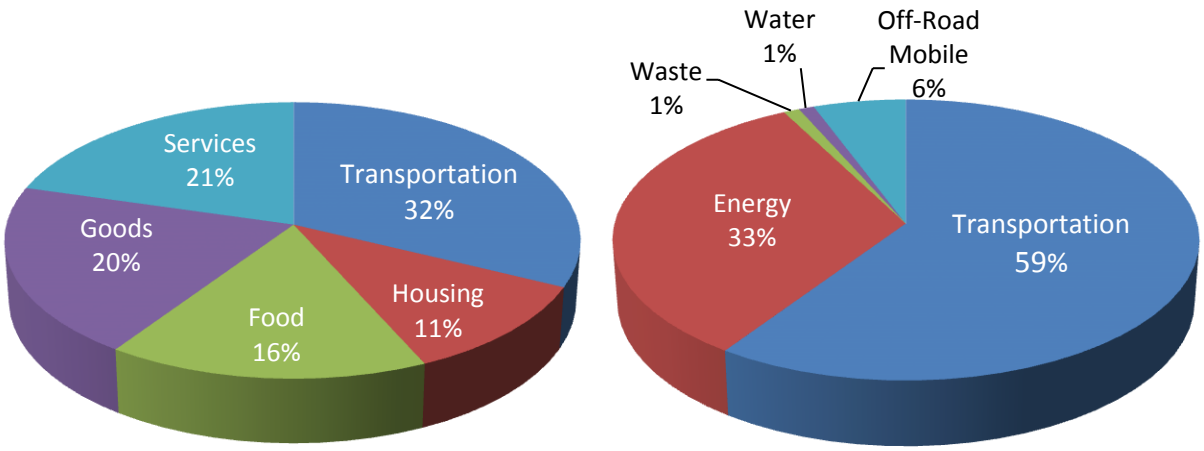
differences in household-level emissions from food in this CBEI are solely reflective of variations in average household size between Bay Area cities. This is a common challenge with city-level CBEIs as they do not directly measure local consumption.

The BAAQMD only conducted a Bay Area CBEI for 2015 and does not have plans to conduct such inventories in the future.

Mountain View CBEI Compared to Official 2015 Community Inventory

Figure 2 provides the results of the BAAQMD 2015 CBEI alongside the City's official 2015 community inventory. Mountain View's consumption-based emissions total 1,318,140 MT CO_2e, 1.9 times the emissions reported in the official 2015 community inventory.

Figure 2: Comparison of 2015 Mountain View CBEI and Community Inventories



Consumption-Based Inventory
Total: 1,318,140 MT CO_2e

Official Community Inventory
Total: 704,054 MT CO_2e

As shown in Figure 2, Transportation comprises the largest percentage of emissions in both the official community inventory and CBEI. A breakdown of consumption-based emissions in each sector shows that private vehicle use is the largest contributor to emissions from a consumption-based perspective (including direct and indirect emissions from vehicle fuel as well as vehicle manufacturing and repair). Table 3 provides the details of household-level and communitywide consumption-based emissions for Mountain View from the BAAQMD regional CBEI.

Table 3: 2015 Consumption-Based Emissions in Mountain View by Category

Area	Category	MT CO_2e per household	Total MT CO_2e	%
Transportation	Vehicle Fuel Direct	6.62	214,533	16.3%
	Vehicle Fuel Indirect	1.52	49,345	3.7%
	Vehicle Manuf./Repair	1.35	43,832	3.3%
	Air Travel	3.65	118,190	9.0%
	Public Transit	0.04	1,331	0.1%
Housing	Natural Gas	1.47	47,646	3.6%
	Electricity	0.73	23,640	1.8%
	Fuel Oil/Other Fuel	0.07	2,187	0.2%
	Energy Indirect	0.39	12,747	1.0%
	Water	0.14	4,586	0.3%
	Waste	0.52	16,767	1.3%
	Construction	1.23	39,915	3.0%
Food	Meat	1.95	63,262	4.8%
	Dairy	1.07	34,629	2.6%
	Other Food	2.18	70,773	5.4%
	Fruits/Vegetables	0.63	20,546	1.6%
	Cereals	0.79	25,501	1.9%
Goods	Small Appliances/equip.	2.35	76,321	5.8%
	Clothing	1.81	58,742	4.5%
	Furnishings/Appliances	1.73	56,221	4.3%
	Other Goods	2.28	74,015	5.6%
Services	Services	8.41	272,552	20.7%
Composting	Composting	-0.25	-8,139	-0.6%
	TOTAL	**40.7**	**1,319,142**	**100%**

The primary differences in emissions profiles between the two inventories are the inclusion of categories such as food, goods, and services in the CBEI, as well as the attribution of commercial-sector emissions. In this CBEI methodology, the energy and transportation emissions from commercial uses are assigned to the consumption-based emissions profiles for their respective product or service categories. In this CBEI, "services" include categories such as health care, education, entertainment and recreation, financial services, and communications. One reason transportation emissions account for a smaller share of the CBEI (compared to the official inventory) is that it excludes emissions from employee commutes, and emissions from commercial vehicles are attributed to goods, services, or food rather than the transportation area. While this approach to

quantifying emissions can be helpful to consumers to better understand the impact of their actions, it can also hide the impact of local commercial-sector emissions, which local jurisdictions may be able to directly regulate or influence. In Mountain View's official community GHG inventory, the commercial sector is responsible for a greater share of both transportation and energy emissions than the residential sector.

Staff believes the most effective way to address consumption-based emissions is to use the results of the 2015 regional CBEI for Mountain View to identify key emissions sources and develop community engagement programs to address them. Most of the major sources of emissions in the 2015 CBEI are addressed by programs included in SAP-4. There are numerous initiatives in SAP-4 to address transportation, which comprises the largest share of consumption-based emissions, as well as business outreach programs that will help reduce the emissions associated with the goods and services categories. The Cool Block (S4.5) and Community Climate Solutions (S4.3) programs address emissions from food, air travel, household energy use, and transportation through household-level CBEI estimation tools. These programs help residents create personalized carbon footprint estimates, identify actions they can take to reduce their consumption-based emissions, and quantify the resulting emissions reductions. SAP-4 Item S4.7 further addresses emissions from food by developing a resolution supporting a plant-based diet and conducting outreach to residents and restaurants.

Staff does not recommend conducting ongoing city-level CBEIs for Mountain View, due to the challenges in obtaining necessary and accurate data, and the staff time and expense involved. The major sources of consumption-based emissions are unlikely to change from year to year, so the 2015 regional CBEI can be used to develop relevant programs to address these emissions. Since a CBEI would not measure the impact of initiatives in Mountain View, estimated changes in consumption-based emissions will need to be assessed separately as part of reporting on SAP-4 initiatives.

Staff Recommendation: Measure and report on the consumption-based emissions reductions from specific SAP-4 initiatives as part of the SAP-4 reporting process.

2. CHANGES TO THE CITY'S GHG REDUCTION TARGETS

ESTF-2 Recommendation: The ESTF-2 Final Report made several recommendations regarding the City's GHG reduction targets, including:

A. Adopt per-capita rather than absolute GHG reduction targets.

B. Adopt annual GHG reduction targets.

C. Adopt GHG reduction targets that decline by a constant percentage rather than a constant amount.

Staff has evaluated these three recommendations below.

A. Absolute Versus Per-Capita GHG Reduction Targets

The City's GHG reduction targets are based on absolute emissions and the City's inventories report on progress towards achieving these targets. The inventories also report emissions on a per-capita basis.

The ESTF-2 recommended "…abandoning the idea that Mountain View should have absolute goals not linked to changes in population" and setting GHG reduction targets according to per-capita goals based on the service population. (The service population is the number of residents plus the number of employees.) The report cites the City's service population growth and increasing absolute GHG emissions through 2015 as the primary reasons for making this change. Staff has assessed the pros and cons associated with setting per-capita, rather than absolute, emissions reduction targets.

Because per-capita targets bring GHG emissions down to the individual level, they bring greater visibility to the increased challenge of reducing emissions when the population is increasing. Consequently, per-capita GHG reduction targets might be easier to meet in a city experiencing rapid growth. However, such relative targets would lead to unknown absolute reductions due to uncertainty in the future service population. Recent growth in Mountain View has outpaced the projections in the General Plan, which only contains service population projections through 2030. As a result, it is difficult to determine appropriate per-capita targets and estimate the resulting absolute emissions reductions, especially for years beyond 2030. Adding to the complexity in obtaining accurate service population counts is the high margin

of error in employee population estimates (5 percent to 8 percent in recent years) associated with Census Bureau data that uses statistical sampling. This margin of error would affect per-capita GHG emissions calculated using these employee population estimates.

Another challenge with per-capita targets is that they would be inconsistent with State and national GHG reduction goals, as well as those of other jurisdictions in the region. Both California's AB 32 and the national-level targets of the Paris Agreement, which the City Council pledged to support in June 2017, are in terms of absolute GHG reduction. Ensuring Mountain View's per-capita targets were consistent with these goals would require accurate service population projections. All other cities in Santa Clara County with official GHG reduction goals, as well as the benchmark cities from the Sustainability Program Assessment completed in April 2019, have absolute rather than per-capita targets.

Mountain View's progress in reducing GHG emissions significantly since 2015 demonstrates it is possible to reduce absolute emissions levels despite growth, as many other cities have done. Even with the amount of planned growth in Mountain View, the total emissions from new buildings will be very low compared to those from existing buildings, especially with the City Council's November 12, 2019 adoption of Reach Codes that require all-electric new construction. Additionally, the North Bayshore and East Whisman Precise Plans incorporate numerous strategies and guidelines that will enable both per-capita and absolute GHG reductions, such as transit-oriented development, complete neighborhoods, and addressing the jobs-housing imbalance. As a result, residential growth in Mountain View should not be an impediment to further GHG reductions.

Staff Recommendation: Keep the City's GHG reduction targets on an absolute basis, and continue to also track and present GHG emissions on a per-capita basis.

B. Annual GHG Reduction Targets

Mountain View currently has official GHG reduction targets at five-year intervals through 2050. For comparison, most other cities surveyed have between one and three long-term GHG reduction targets (often for 2020, 2030, and 2050 in alignment with California's targets). Attachment 1 includes a table of GHG reduction targets in nearby jurisdictions as well as the benchmark cities analyzed as part of the Sustainability Program Assessment

from early 2019. As this table shows, Mountain View already has shorter intervals between GHG reduction targets than all surveyed jurisdictions except for Asheville, North Carolina, which has annual reduction targets.

Managing GHG emissions on an annual basis is difficult at the community scale as the majority of emissions are not directly under the City's control (in contrast to the municipal operations inventory). Successful large-scale GHG reduction requires long-term policy planning and program implementation. In addition, there is generally a 1.5-year delay before a GHG inventory can be finalized due to the time needed to acquire the data from external sources. Consequently, the City cannot react quickly enough to warrant official annual GHG targets.

Staff Recommendation: Continue to assess progress on an annual basis by comparing annual community GHG inventories to interpolated annual targets, but not adopt official annual reduction targets. This would still give the City the ability to course-correct if it is off-track towards meeting its targets.

C. Constant Percentage Versus Linear Emissions Trajectory

Mountain View has adopted official GHG reduction targets that decline along a relatively linear path. The ESTF-2 recommended adopting targets based on a constant percentage decline in annual emissions levels. Adopting a constant percentage decline trajectory is consistent with the recommendations in the Special Report released by the United Nations' Intergovernmental Panel on Climate Change (IPCC) in late 2018, which emphasized the necessity of significant, near-term reductions by 2030 to avoid catastrophic climate change impacts.

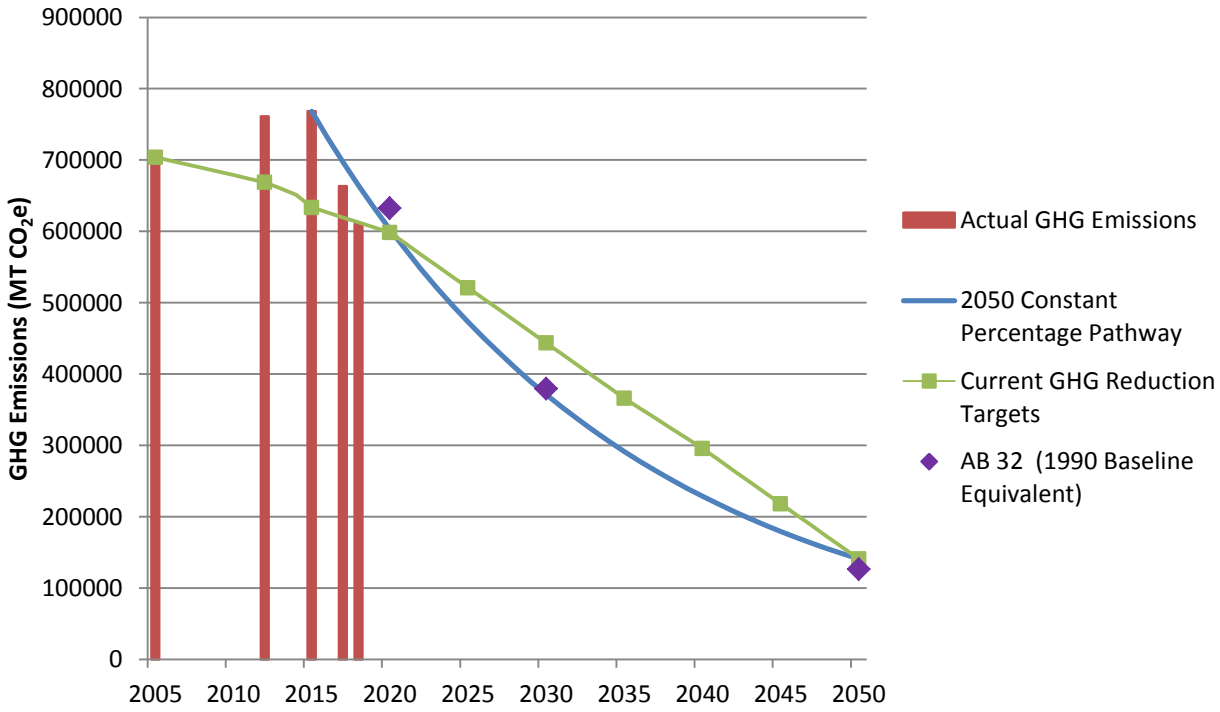
Staff recommends the City adopt new GHG reduction targets at five-year intervals following a curve that declines by a constant annual percentage from the emissions peak in 2015 to the long-term 2050 target (80 percent below 2005 levels). The proposed reduction pathway represents an annual reduction in GHG emissions of approximately 4.7 percent. Staff believes there are several benefits to this approach:

- It prioritizes larger near-term emissions reductions, in accordance with the recommendations of the IPCC report.

- It brings the City's GHG reduction targets into closer alignment with the State's AB 32 reduction goals.

- It represents a more consistent year-to-year effort to achieve emissions reductions as reduction efforts will become incrementally more difficult in later years.

Figure 3: Comparison of GHG Emissions Reduction Pathways



Staff does not propose updating the 2020 target as it is too close for programmatic changes to significantly affect emissions, and the current target is lower than the proposed reduction path. However, as shown in Figure 3 above, beginning in 2025, the proposed GHG reduction targets are more demanding than current targets in order to achieve greater GHG reduction by 2030, as recommended by the IPCC. Note that the proposed 2050 goal is the same as the current adopted target (80 percent by 2050). Table 4 compares the current and proposed new GHG reduction targets beginning in 2025.

Table 4: Current and Proposed New GHG Emissions Reduction Targets

Year	Current Targets		Proposed New Targets	
	% Reduction (below 2005 baseline)	Total Amount (MT CO_2e)	% Reduction (below 2005 baseline)	Total Amount (MT CO_2e)
2025	26%	521,000	33%	471,716
2030	37%	443,554	47%	373,149
2035	48%	366,108	59%	288,662
2040	58%	295,703	68%	225,297
2045	69%	218,257	75%	176,014
2050	80%	140,811	80%	140,811

While the proposed changes have some benefits, there are also some challenges in following a "constant percentage" GHG reduction trajectory. Prioritizing larger GHG reductions in the near term makes earlier targets harder to meet, and most actions resulting in larger-scale emissions reductions require years of planning. Any change in GHG reduction targets will require an update to the Climate Protection Road Map (CPR) as the measures in the CPR may no longer align with the adopted emissions reduction pathway. The need for a CPR update was incorporated into the Sustainability Action Plan 4 as Item S2.9: Develop a 2030 Community GHG Reduction Plan.

While staff does not recommend adopting official annual reduction targets for the reasons previously outlined, the City can continue to track its progress between the five-year goals using interpolated annual targets that follow the "constant percentage" reduction curve, as shown in Attachment 2.

Staff Recommendation: Adopt the proposed new GHG reduction targets in Table 4.

3. CARBON OFFSETS

ESTF-2 Recommendation: In years where the City's GHG emissions exceed the target, the City should purchase enough carbon offsets to make up for the difference.

Carbon offsets can take the form of various types of projects, including renewable energy, methane capture, or forestry. Carbon offsets do not reduce GHG emissions in Mountain View but, instead, "offset" local emissions by funding equivalent reductions elsewhere. These GHG reductions may not be in the same sector, or even occur in the same year, as the emissions they are intended to offset.

In order to ensure a carbon offset project results in a net decrease in GHG emissions, the reductions must:

- Be quantifiable and verifiable using a transparent calculation methodology.
- Be new and "additional," meaning the project would not have otherwise occurred (i.e., the project does not create reductions required by regulations).
- Not result in negative impacts, including "leakage" (increasing emissions outside the project boundary).
- Be permanent, meaning the reductions cannot be reversed.

There are several third-party organizations that verify whether carbon offsets meet these criteria and ensure there is no double-counting of emissions reduction measures (e.g., an offset project is not also being used to comply with a regulatory mechanism such as cap-and-trade, and multiple entities are not receiving credit for the same offset).

Palo Alto was the only city identified by staff that currently uses carbon offsets on a large scale. Since 2017, Palo Alto has added a surcharge of $0.04 per therm on natural gas use to purchase carbon offsets for the purpose of making community-wide natural gas use carbon-neutral. This is possible because Palo Alto operates a municipal utility, giving it more control over rates and fees for natural gas use. Currently, Mountain View does not have the ability to set different Utility User Tax rates for electricity and natural gas and, therefore, would be unable to pass along these costs directly to users. If the City of Mountain View were to purchase offsets for communitywide natural gas use, assuming a similar cost of $0.04 per therm, the cost would be $861,723 for 2018.

In terms of GHG inventories, the ICLEI protocol used by Mountain View and other cities is clear that local governments can choose to include information on carbon offsets or carbon sequestration (which involves capturing and removing carbon dioxide from the atmosphere through artificial or biological processes, such as tree planting or wetland restoration), "so long as this information is presented separately from gross GHG emissions data calculated using the methods provided by this Protocol. It is not Protocol-compliant to solely report net GHG emissions numbers." Therefore, while carbon offsets do reduce emissions globally, they do not contribute toward the City's official GHG reduction targets. However, they can contribute toward a carbon neutrality goal, which is discussed later in this report.

The ESTF-2 Final Report includes a recommendation that the City purchase carbon offsets for years when GHG emissions exceed adopted targets. On September 16, 2019, the Council Sustainability Committee recommended that staff determine the cost of offsetting the City's entire GHG inventory. Staff surveyed several organizations that offer verified carbon offsets for purchase to determine potential costs. Additionally, staff calculated the cost of Palo Alto's carbon offset program to determine the cost per metric ton of carbon dioxide equivalent (MT CO_2e) as this provides an example of likely costs for offsets procured through a public bidding process. While the funding mechanism used by Palo Alto is not available to Mountain View, the City could choose to purchase offsets through a similar process using a different funding source. The results are shown in Table 5.

Table 5: Sample Costs of Verified Carbon Offsets

Carbon Offset Source	Cost per MT CO_2e
Palo Alto Offset Program	$7.52
Carbon Offsets to Alleviate Poverty (COTAP)	$9.90
Carbon Fund	$10.00
Terrapass	$11.00
Native Energy	$15.50

Staff used the information in Table 5 to calculate the estimated cost of offsetting the City's emissions for: (1) the amount exceeding the reduction targets; and (2) the entire emissions inventory, for the last three final inventories (2012, 2015, and 2017). While there is not an official adopted GHG target for 2017, staff used an interpolated annual target to assess how far the City exceeded its emissions goal that year. The estimated costs were calculated using a lower bound of the $7.52/MT CO_2e price of Palo Alto's offset program (representing a likely cost from a public bidding process) and an upper bound of $10.00/MT CO_2e (representing a likely cost if purchased at face value from a third-party organization). The resulting cost ranges are presented in Table 6.

Table 6: Cost of Offsets for Emissions Overshoot and Entire Inventory, 2012-2017

Year	GHG Target (MT CO_2e)	Total Emissions (MT CO_2e)	Excess Emissions (MT CO_2e)	Cost of Offsetting Excess	Cost of Offsetting Entire Inventory (Carbon Neutrality)
2012	668,851	761,306	92,455	$695,262 - $924,550	$5.7M - $7.6M
2015	633,649	768,365	134,716	$1.0M - $1.3M	$5.8M - $7.7M
2017	619,568	663,327	43,759	$329,068 - $437,590	$5.0M - $6.6M

While the cost of purchasing offsets for the City's entire GHG inventory at current levels is high, there are other paths to carbon neutrality in the longer term. In addition, it is important to note that the City Council has approved an ambitious SAP-4 with 81 new initiatives. Funds and staff time used to purchase carbon offsets would not be available to invest in ongoing emissions reduction measures to meet the City's adopted targets.

Staff Recommendation: Consider use of carbon offsets in the context of carbon neutrality (as outlined in the next section), but do not purchase offsets at this time.

4. CARBON NEUTRALITY

Council Sustainability Committee Direction: Investigate the possibility of offsetting the City's entire GHG inventory to achieve carbon neutrality.

Carbon neutrality refers to balancing GHG emissions with carbon removal projects to achieve net zero GHG emissions. This requires a combination of reducing direct GHG emissions and strategies such as purchasing carbon offsets, utilizing forests and wetlands as "carbon sinks," or investing in other carbon sequestration projects. California adopted a Statewide carbon neutrality target of 2045, established by Governor Brown's Executive Order B-55-18 in September 2018.

Several local jurisdictions in the U.S. have adopted carbon neutrality goals in addition to their GHG reduction targets. While most cities surveyed by staff have a carbon neutrality target of 2050, some California jurisdictions have adopted a target of 2045 in alignment with the State's goal. Table 7 lists the jurisdictions in California for which staff was able to identify a carbon neutrality target.

Table 7: Carbon Neutrality Targets of California Jurisdictions

Jurisdiction	Carbon Neutrality Target
Berkeley	2050
Fremont	2045
Los Angeles	2050
San Francisco	2050
San Mateo County	2045
Santa Clara County	2045
Santa Monica	2050
Sunnyvale	2050

If Mountain View were to adopt a carbon neutrality target, the next step would be developing a plan to assess the City's options for achieving this goal. Most cities that have adopted carbon neutrality goals prioritize direct emissions reduction efforts to meet adopted GHG reduction targets and reduce the amount of emissions that must be sequestered or offset. Local options for carbon sequestration include increasing the City's tree canopy and restoring wetlands, both of which are aligned with current City programs. As part of developing a carbon neutrality plan, staff would analyze expected emission reductions through the target neutrality date of 2045, investigate potential local sequestration projects to quantify the carbon reduction potential, and assess the need for offsets or other measures to address any remaining emissions reduction gap.

Staff Recommendation: Adopt a carbon neutrality target of 2045 and direct staff to develop a carbon neutrality plan by 2025, including the potential use of carbon offsets.

FISCAL IMPACT

There is no fiscal impact from continuing to leverage the regional CBEI data and household-level CBEI calculators to inform sustainability programs. If the City Council directs staff to conduct a CBEI, staff estimates the cost at $65,000 per inventory, in addition to staff resources.

There is no direct cost from changing the City's GHG reduction targets or adopting a carbon neutrality goal. Adopting the proposed new reduction targets will require staff time to prepare an update to the City's Climate Protection Road Map, which has been approved as Item S2.9 in SAP-4. There will be additional costs to develop and implement projects/programs to achieve the new reduction targets and carbon neutrality goal, but these costs will be included as part of future Sustainability Action Plans or other proposals for City Council approval.

CONCLUSION

Staff believes the 2015 regional CBEI conducted by BAAQMD is sufficient to develop appropriate programs to reduce consumption-based emissions as the sources of these emissions are unlikely to significantly change from year to year. Staff recommends measuring and reporting on the consumption-based emissions reductions from specific SAP-4 initiatives as part of the SAP-4 reporting process.

Staff reviewed the proposed changes to Mountain View's GHG reduction targets in the ESTF-2 Final Report and recommends adopting new targets (shown in Table 4)

beginning in 2025 that guide the City along a steeper emissions reduction pathway toward its long-term 2050 target. This pathway would meet the State's AB 32 targets, exceed the commitments of the Paris Climate Agreement, and achieve greater GHG reductions by 2030, which the IPCC report states is necessary to avoid catastrophic climate change impacts. Additionally, staff recommends setting a carbon neutrality target of 2045 to further Mountain View's leadership in climate action and support the State's 2045 carbon neutrality goal.

ALTERNATIVES

1. Direct staff to work with BAAQMD and other regional partners to explore their conducting additional CBEIs.

2. Do not change Mountain View's current absolute GHG reduction targets or suggest other absolute targets.

3. Adopt per-capita targets.

4. Set official annual GHG reduction targets.

5. Propose the purchase of carbon offsets.

6. Do not direct staff to adopt a carbon neutrality target of 2045 or a carbon neutrality plan, or propose a different carbon neutrality target.

7. Provide other direction.

PUBLIC NOTICING

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

Prepared by:

Erin Brewster
Sustainability Analyst II

Steve Attinger
Sustainability Coordinator

Approved by:

Daniel H. Rich
City Manager

Reviewed by:

Audrey Seymour Ramberg
Assistant City Manager/
Chief Operating Officer

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Attachments:
1. Cool Block and Community Climate Solutions Questions
2. Survey of Consumption-Based Emissions Inventories (CBEI)
3. Greenhouse Gas Reduction Targets in Santa Clara County and Benchmark Cities
4. Proposed New Community Greenhouse Gas Emissions Reduction Targets and Levels, 2005-2050