Community Greenhouse Gas Emissions Inventory Methodology

All of Mountain View's greenhouse gas emissions (GHG) inventories have been prepared using a national standard developed by ICLEI—Local Governments for Sustainability (formerly International Council for Local Environmental Initiatives). This standard, the U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions (the Protocol), establishes reporting requirements and accounting guidance for quantifying GHG emissions. Staff used the Protocol to examine emissions in five sectors: energy use, transportation (on-road vehicles), waste, water (potable water use and wastewater treatment), and off-road mobile sources (construction and commercial/industrial equipment). Staff estimates Metric Tons of Carbon Dioxide-equivalent (MT CO2e) resulting from energy and water use and waste and wastewater generation. For mobile-source emissions, such as transportation and off-road equipment, where measured data is not available, staff uses standardized GHG accounting methodologies to estimate emissions at the County level and then adjusts them to a City scale.

Although the Protocol provides a common framework for calculating community emissions, any GHG inventory represents an estimate that is subject to change as better data and calculation methodologies become available. Global warming potentials represent one set of metrics subject to change over time and are used to convert the quantity of methane and nitrous oxide emissions to MT CO_2e. When conducting the preliminary 2020 inventory, staff updated the emissions in recent inventories (2017, 2018, and 2019) based on the global warming potential data from the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report, which reflects the best available science. Previously, inventories have used the IPCC Second Assessment, which specified a lower global warming potential for methane and a higher warming potential for nitrous oxide. Updates based on the new global warming potentials had minimal impacts on overall emissions, increasing 2017, 2018, and 2019 emissions by less than 1%. The emissions from the early inventories (2005, 2012, and 2015) continue to be based on the IPCC Second Assessment since these early inventories were calculated by consultants and are more difficult to update.

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

The following sections provide additional information on methodology used to estimate emissions from each sector as well as explanations for any differences in methodology across inventory years.

TRANSPORTATION

To estimate emissions from on-road transportation, staff uses standardized GHG accounting methodologies to estimate emissions at the County level and then adjusts them to a City scale. The California Air Resources Board's (CARB) provides a tool, referred to as EMFAC2021 (EMissions FACtor) that calculates air pollution emissions factors for passenger cars, trucks, motorcycles, motor homes, and buses. The City receives county level EMFAC2021 emissions data that is downscaled based on Mountain View's per capita vehicle miles traveled (VMT), service population, and share of the County's freight jobs.

Estimating vehicles miles traveled (VMT) is a complicated process and is one of the few emissions sources that the City does not estimate annually. Recent inventories (2017-2021) used a per-capita VMT metric calculated from the City's 2018 travel demand model, created by Fehr & Peers, that uses many inputs on land use and population changes, and does not consider the impacts of the COVID-19 pandemic.

For the Final 2021 and Preliminary 2022 inventories, staff used per-capita VMT metrics from the Metropolitan Transportation Commission (MTC), adjusted with a reduction factor based on Caltrans traffic data to reflect post COVID-19 conditions. For consistency, staff also updated 2020 emissions based on MTC's data. Staff also continues to evaluate opportunities to use Big Data(vehicle navigation data from built-in GPS and location-based services data from cell phones) to validate transportation emission results and travel demand model outputs. For the charts within the "Transportation" section of the CSC memo, the total emissions from previous inventories were updated using CARB's newly released tool, referred to as EMFAC2021. Previous inventories had used EMFAC2017. The Preliminary 2022 Inventory uses the 2021 jobs ratio data because it is the most recent data available from the Census Bureau.

ENERGY

Emissions from building energy use, which includes electric vehicle charging, are estimated by applying emission factors associated with type of energy provided (e.g. natural gas and electricity). Silicon Valley Clean Energy (SVCE) provides the City with the aggregate electricity use emissions and provides total natural gas usage (therms) for residential and nonresidential sectors. Residential and nonresidential natural gas is currently combined for 2021 and 2022 due to the California Public Utility Commission's 15/15 rule regarding customer confidentially. This rule requires that any publicly disclosed energy usage data must be aggregated so that it has 15 or more customers, with no single customer's usage constituting more than 15 percent of the total consumption reported.

For previous inventories, staff has used a statewide average emissions factor published by the U.S. Environmental Protection Agency to calculate emissions from Direct Access customers. Direct Access electricity is any electricity that is purchased directly from competitive electric service providers rather than from a utility, and typically they are customers that fall under the 15/15 rule. For 2020, 2021 and 2022, SVCE adjusted the Direct Access emissions factors based on the knowledge that SVCE territory has several large Direct Access customers that publicly report purchasing 100% carbon-free electricity. The electricity emission estimates for these years assume that about 40.3% of the Direct Access load is carbon-free.

OFF-ROAD MOBILE EQUIPMENT

Emissions from off-road mobile equipment are estimated by downscaling County-level data provided by CARB's tool, EMFAC2021. Staff downscaled County-level emissions data by using three scale factors: the ratio of new housing permits (to calculate construction equipment emissions), the households' ratio (to calculate lawn and garden equipment emissions), and the jobs ratio (to calculate commercial, industrial, and other equipment emissions). The City's estimated off-road emissions are, therefore, correlated with the amount of housing construction, job growth, and population growth in Mountain View. Inventories from 2019 and earlier used CARB's earlier tool, EMFAC2017, which has been discontinued. The Preliminary 2022 Inventory uses the 2021 jobs ratio data because it is the most recent data available from the Census Bureau.

WASTE

Solid waste emissions are dependent on both the total amount of solid waste sent to landfills and the percentage of organic material in the waste stream. Organic material, such as yard trimmings, food scraps, and food-soiled paper, is the primary contributor of emissions from solid waste due to the release of methane as these materials decompose.

The 2017-2021 inventories use the same 2017 waste characterization study data to estimate the percentage of organic material sent to landfill after trash has been sorted at the SMaRT® Station. Therefore, these inventories do not capture any additional organic waste diversion from the City's residential food scraps collection program, implemented in July 2017 and expanded to multi-family residences in 2021. The 2022 inventory uses updated waste characterization data from October 2022.

WATER

This sector includes emissions from the energy used to treat wastewater and extract, convey, treat, and distribute potable water. These emissions are estimated by applying energy intensity values, specific to the local water supply, to each step of the water and wastewater process. Inventories prior to 2017 used average estimates for energy intensity, which were higher than those specific to the local water supply. For the charts within the "Water" section of the CSC memo, the total emissions from water and wastewater have been updated to reflect current methodology.