



RICAPS
Regionally Integrated Climate Action Planning Suite

City of San Mateo

2010 Community Greenhouse Gas Inventory Report



April 17, 2014

Prepared by DNV GL through the RICAPS program of the City/County Association of Governments of San Mateo County

Acknowledgements

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1. Executive Summary

The City of San Mateo is pleased to present the following 2010 Community Greenhouse Gas (GHG) Inventory. This 2010 GHG inventory builds on the baseline inventory for 2005 that was previously completed, and helps San Mateo to evaluate progress made since the baseline inventory.

In the base year of 2005, the City of San Mateo emitted approximately 809,619 metric tons of carbon dioxide equivalent (MTCO_{2e}) from the residential, commercial, industrial, transportation, solid waste, and municipal sectors.¹ This 2005 inventory total does not include certain emissions from Agriculture (animal waste, soil management, and biomass burning), nor does it include emissions from Direct Access natural gas. Most of the Agriculture sector is excluded from the 2010 inventory, and is thus excluded from the 2005 baseline to improve the accuracy of the comparison of 2005 and 2010 results. One exception is that the emissions from agricultural equipment are included in the 2010 inventory under the category of Off-Road Vehicles (in the Transportation sector), so these emissions are still included in the 2005 baseline. Emissions from Direct Access natural gas were found to be double-counted in the 2005 baseline inventory, and are thus subtracted from the 2005 total to increase the accuracy of the 2005 baseline.

In comparison, the City of San Mateo emitted 738,022 MTCO_{2e} from these same sectors and sources in 2010, a decrease of 71,597 MTCO_{2e}, or 9 percent of 2005 baseline emissions.

Some sectors and sources were included in this 2010 GHG inventory that were not included in the baseline inventory; these emissions include: diesel emissions from Caltrain and freight Trains; water conveyance; and stationary sources. These emissions total 12,213 MTCO_{2e} and comprise 2 percent of the 2010 inventory. With these sources added, the total 2010 emissions are 750,235 MTCO_{2e}, which is a 7 percent decrease from 2005 emissions. Also, these new sources were added as a result of the development of a national protocol for inventorying community-scale GHG emissions adopted in 2012. Table 1 provides a summary of total citywide (i.e. community and municipal) GHG emissions.

The results of this 2010 inventory will be used to determine if the San Mateo is on the trajectory

¹ Carbon dioxide equivalent (CO_{2e}) is a unit of measure that normalizes the varying climate warming potencies of all six GHG emissions, which are carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆). For example, one metric ton of methane is equivalent to 21 metric tons of CO_{2e}. One metric ton of nitrous oxide is 310 metric tons of CO_{2e}.

needed to reach its 2020 GHG reduction target; if not, a new or changed set of policies or programs at the local level may be needed in order for San Mateo to reach the 2020 and future reduction targets.

Table 1: 2010 Community Emissions by Sector

Sectors Included in the Baseline Inventory	GHG Emissions (metric tons CO₂e)	Percentage of GHG Emissions
Residential	136,638	18%
Commercial/Industrial	131,710	18%
Transportation – Local roads	131,744	18%
Transportation – State highways	281,058	37%
Transportation – Off-road equipment	37,408	5%
Solid Waste – Disposed Waste	12,433	2%
Solid Waste – Landfills	5,000	1%
Wastewater	2,031	0.3%
SUBTOTAL	738,022	98%
New Sectors (not included in the Baseline Inventory)	GHG Emissions (metric tons CO₂e)	Percentage of GHG Emissions
Stationary Sources	6,095	0.8%
Transportation – CalTrain	3,922	0.5%
Transportation – Freight trains	481	0.1%
Water	1,715	0.2%
SUBTOTAL	12,213	2%
GRAND TOTAL OF 2010 EMISSIONS	750,235	MTCO₂e
Total of 2005 Baseline Emissions*	809,619	MTCO₂e
Total Decrease from the 2005 Baseline	-59,384 -7%	MTCO₂e

*Total 2005 baseline emissions exclude certain emissions from Agriculture, as well as previously-reported Direct Access natural gas. The Direct Access natural gas consumption was erroneously double-counted in the baseline 2005 inventory.

2. Why the City Has a Greenhouse Gas Inventory

Like local governments across the U.S. and the world, San Mateo has made a commitment to addressing the challenge of climate change. Many local governments have authority over land use and transportation patterns, as well as solid waste disposal, green building, and other key issues related to GHG emissions. Thus, local governments can help influence residents, businesses, public sector entities and other organizations within their boundaries to reduce emissions through local policies and programs designed to increase sustainability.

2.1 Objective of the Greenhouse Gas Inventory

In November 2009, all San Mateo County member jurisdictions completed their 2005 community and municipal GHG inventories as part of a joint effort with ICLEI, Joint Venture Silicon Valley Network, and the County of San Mateo, funded by C/CAG.

This 2010 GHG inventory builds upon the baseline inventory and will be used to continue to track sources and quantify the volumes of GHG emissions resulting from activities taking place throughout the community of San Mateo. While other emissions inventories have been completed for the City of San Mateo, this report uses the original 2005 inventory completed in January 2009 as the inventory baseline. Furthermore, this inventory helps San Mateo to evaluate progress made since the 2005 baseline inventory. The results of this 2010 inventory will be used to identify trends in emissions from 2005 to 2010, and to determine if the city is on track to meet GHG reduction targets.

The inventory was completed through RICAPS, the Regionally Integrated Climate Action Planning Suite. Climate action planning is a complex process that can be cost prohibitive for cities to undertake on their own. Because of this, the City and County Association of Governments (C/CAG) has developed RICAPS to aid cities and towns in San Mateo County in developing their own climate action plans and GHG inventories. RICAPS is a comprehensive program that includes climate action planning tools, technical assistance, and monthly meetings to discuss climate action plans, GHG emission inventories, tracking of data, and the implementation of sustainability programs at the local level. This inventory was completed by C/CAG and the RICAPS consultant on behalf of the City of San Mateo.

3. Inventory Methodology

3.1 Understanding a Greenhouse Gas Emissions Inventory

This report presents emissions from the San Mateo community as a whole. Emissions from government operations are a subset of the community inventory. For example, data on commercial energy use by the community includes energy consumed by municipal buildings, and community vehicle-miles-traveled estimates include miles driven by municipal fleet vehicles. Because emissions from municipal operations are under direct control of San Mateo and can be directly reduced through city actions, the details of these emissions (i.e. the amount of emissions

from the city's fleet, buildings, streetlights, etc.) are often presented in a separate inventory report.

3.2 New Community Emissions Protocol and New Emissions Sources

The Community Greenhouse Gas Emissions Protocol was released by ICLEI in October 2012, and represents a new national standard in guidance to help U.S. local governments develop effective community GHG emissions inventories. It establishes reporting requirements for all community GHG emissions inventories, provides detailed accounting guidance for quantifying GHG emissions associated with a range of emission sources and community activities. The new protocol also provides a number of optional reporting frameworks to help local governments customize their community GHG emissions inventory reports based on their local goals and capacities. The State of California Governor's Office of Planning and Research recommends that California local governments follow the new national Community Protocol when undertaking their GHG emissions inventories. To the greatest extent possible, this inventory follows the Protocol. This inventory also follows the standard outlined in BAAQMD's GHG Plan Level Quantification Guidance (dated May 2012).²

The 2005 baseline inventory included the following emissions sources, which are also recommended to be included by the new Protocol:

- Stationary fuel use (mostly natural gas);
- Electricity use;
- On-road and off-road transportation;
- Solid waste disposal;
- Wastewater treatment.³

² The following are emission sources mentioned in the BAAQMD GHG Plan Level Guidance, but were excluded from the City's inventory because they are not applicable in San Mateo, or because data were not available: airports and sea ports, non-road vehicle use for aircraft and marine vessels (planes, ships), and other water travel.

³ All of these emissions sources, with the exception of off-road transportation, are considered by the new Protocol to be among the **five basic emissions generating activities**, which should be included in any community-wide inventory. See footnote 4 for the fifth key emission source.

Some community-wide GHG emissions data as well as the new national Community GHG Protocol were not available at the time the baseline 2005 inventory was completed. Due to new data becoming available and due to the completion of the new Protocol, the following emission sources have been added to this inventory:

- Use of energy for potable water treatment and distribution⁴
- CalTrain (passenger rail)
- Freight rail
- Expanded stationary fuel use, including diesel and propane⁵

The following sector was included in the 2005 inventory, but is now not recommended for inclusion by the new national Community GHG Protocol, and has been excluded from this inventory:

- Agriculture – emissions from animal waste, soil management, and biomass burning.

However, Agriculture emissions from agricultural equipment are still included in the 2005 emissions baseline, as these emissions are also included in this 2010 inventory. Emissions from agricultural equipment are shown in this 2010 inventory in the Off-Road Vehicles category, which is a portion of the Transportation emissions sector.

3.3 Emission Sectors and Sources

Table 2 summarizes the sectors, emissions sources, and energy types included in this GHG inventory.

Table 2: Sectors and Emissions in the GHG Inventory

Sector	Emissions sources	Energy types
Residential	Energy and water use in residential buildings	Electricity Natural gas
Commercial	Energy and water use in commercial, government and institutional buildings	

⁴ This source is usually grouped with the emissions from wastewater treatment, and is the fifth of the **five basic emissions generating activities** that are recommended by the new Community Protocol. For the other four key emission sources, see footnote 4.

⁵ This data source includes stationary fuel use in facilities that are permitted by or otherwise must report emissions to the Bay Area Air Quality Management District (BAAQMD). Data were not available for this source for the 2005 inventory.

Sector	Emissions sources	Energy types
Industrial	Energy and water use in industrial facilities, and processes	
Transportation and Land Use*	All road vehicles Diesel fuel from commuter rail and freight trains Off-road vehicles/equipment	Gasoline Diesel
Waste	Landfills within the city's boundary Waste disposal	Landfill gas (methane)
Wastewater	Process and fugitive emissions from treating wastewater, and associated stationary emissions	Not applicable
Water	Use of electricity to treat and distribute potable water	Electricity
Stationary Sources	Stationary combustion of fuel in various equipment, such as boilers, backup generators, and industrial processing equipment	Various – may include natural gas, propane, and diesel

* Some sectors may be updated in a new version of the BAAQMD GHG Plan Level Quantification Guidance.⁶

3.4 Quantifying Greenhouse Gas Emissions

All emissions sources in this inventory are quantified using calculation based methodologies, which calculate emissions using activity data and emission factors. To calculate emissions accordingly, the basic equation below is used:

Activity Data x Emission Factor = Emissions.

Activity data refer to the relevant measurement of energy use or other GHG-generating processes such as fuel consumption by fuel type, metered annual electricity consumption, and annual vehicle miles traveled.

Known emission factors are used to convert energy usage or other activity data into associated quantities of emissions. Emissions factors are usually expressed in terms of emissions per unit of activity data (e.g. metric tons of CO₂ per kWh of electricity). Please see Appendix B for a detailed listing of the emission factors and the assumptions and methodologies used in composing this inventory. Key activity data are listed in Section 4: Inventory Results of this report.

⁶ For updates to the GHG Plan Level Quantification Guidance, check the BAAQMD website: <http://www.baaqmd.gov/Divisions/Planning-and-Research/CEQA-GUIDELINES/Tools-and-Methodology.aspx>

As per the new Community GHG Protocol, emissions can be considered in the context of sources located within the community, and activities in the community. Alternative frameworks are available to consider community GHG emissions. The emissions by sources and activities and these new frameworks are discussed in Appendix A.

3.5 Community Profile

To put emissions inventory data in context (and for comparison), it is helpful to review some basic information about community such as population and number of households. This information is provided in Table 3.

Table 3: 2005 and 2010 Community Information

Year	Population	Households	Jobs
2005	94,144	38,400	44,500
2010	97,207	38,700	45,450

4. Inventory Results

4.1 2010 Emissions Inventory Summary

In the base year of 2005, the City of San Mateo emitted approximately 809,619 metric tons of carbon dioxide equivalent (CO₂e) from the residential, commercial, industrial, transportation, waste, and municipal sectors.⁷ This 2005 inventory total does not include certain emissions from Agriculture (animal waste, soil management, and biomass burning), nor does it include emissions from Direct Access natural gas. Most of the Agriculture sector is excluded from the 2010 inventory, and is thus excluded from the 2005 baseline to improve the accuracy of the comparison of 2005 and 2010 results. The one exception is the emissions from agricultural equipment are included in the 2010 inventory under the category of Off-Road Vehicles (in the Transportation sector), so these emissions are still included in the 2005 baseline. Emissions from Direct Access natural gas were found to be double-counted in the 2005 baseline inventory, and are thus subtracted from the 2005 total to increase the accuracy of the 2005 baseline.

In comparison, the City of San Mateo emitted 738,022 metric tons of CO₂e from these same sectors and sources in 2010, a decrease of 71,597 metric tons of CO₂e, or 9 percent of 2005

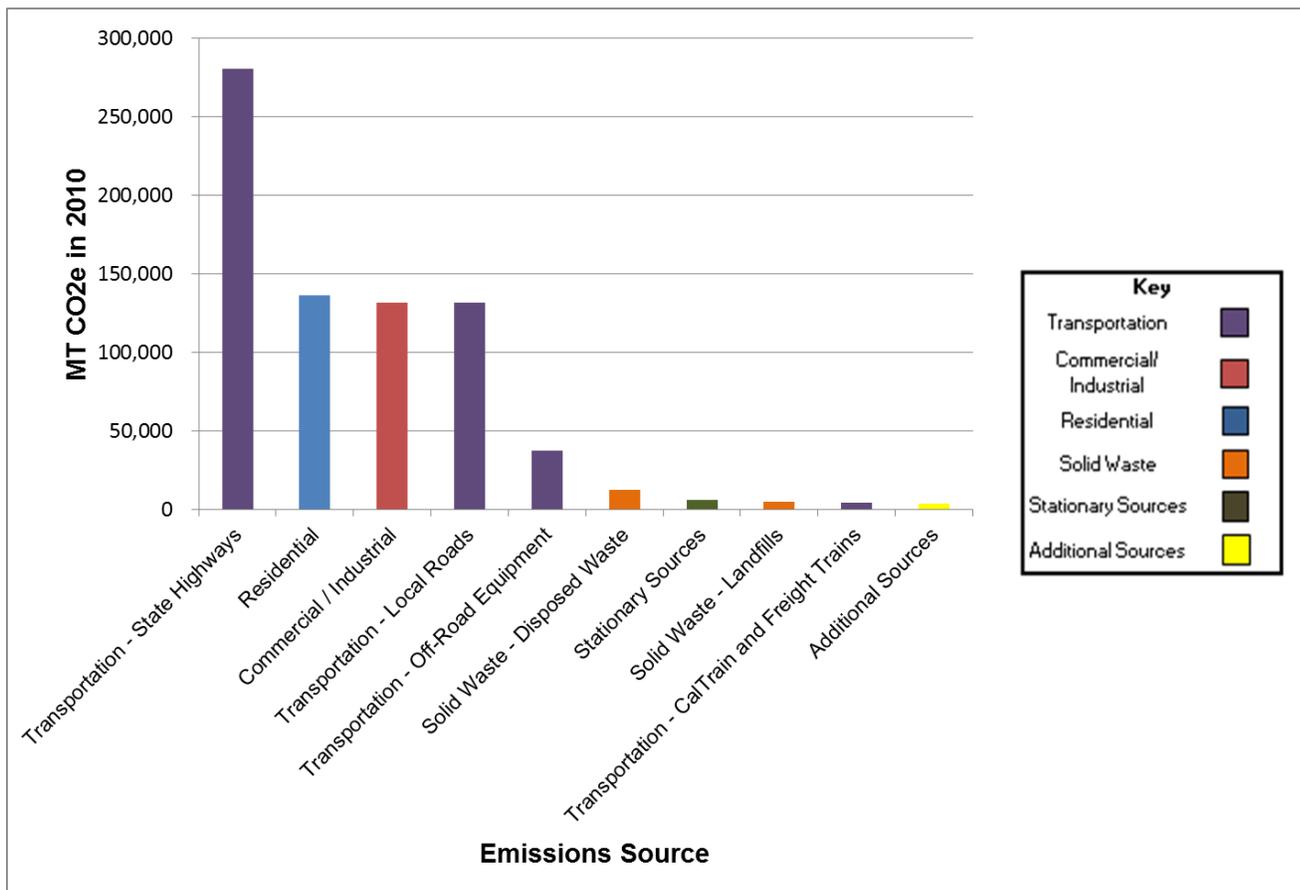
⁷ Carbon dioxide equivalent is a unit of measure that normalizes the varying climate warming potencies of all six GHG emissions, which are carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆). For example, one metric ton of methane is equivalent to 21 metric tons of CO₂e. One metric ton of nitrous oxide is 210 metric tons of CO₂e.

baseline emissions. While the emission sources and data sources have remained mostly unchanged, some of the methodologies used for calculating emissions have been updated since the 2005 inventory was completed. Thus, the comparison from 2005 to this 2010 inventory is not an exact comparison, but does show a general trend of the decrease of emissions.

Some sectors and sources were included in this 2010 GHG inventory that were not included in the baseline inventory; these emissions include: diesel emissions from Caltrain and freight trains; water conveyance; and stationary sources. These emissions make up 2 percent of the 2010 inventory. With these sources added, the total 2010 emissions are 750,235 MTCO₂e, which is a 7 percent decrease from 2005 emissions.

Table 4 provides a summary of total citywide (i.e. community and municipal) GHG emissions, and Figure 1 shows the proportion of San Mateo’s total GHG emissions from all major sources for 2010.

Figure 1: Community Emissions by Sector (2010)



As shown above, the largest category of emissions is from transportation on state highways. The second, third, and fourth largest sources are from building energy use in the residential sector, energy use in the commercial/industrial sector, and transportation on local roads.

Table 4: 2010 Community Emissions by Sector

Sectors Included in the Baseline Inventory	2005 GHG Emissions (metric tons CO ₂ e)	2010 GHG Emissions (metric tons CO ₂ e)	Increase or Decrease in GHG Emissions (metric tons CO ₂ e)	Percentage of 2010 GHG Emissions
Residential	137,214	136,638	-576	18%
Commercial/Industrial	145,231	131,710	-40,943	18%
Transportation – Local roads	137,786	131,744	-6,042	18%
Transportation – State highways	326,372	281,058	-45,314	37%
Transportation – Off-road equipment	35,799	37,408	1,609	5%
Solid Waste – Generated Waste	19,304	12,433	-6,871	2%
Solid Waste – Landfills	7,122	5,000	-2,122	1%
Wastewater	791	2,031	1,240	0.3%
SUBTOTAL	809,619	738,022	-99,019	98%
New Sectors (not included in the Baseline Inventory)	2005 GHG Emissions (metric tons CO ₂ e)	2010 GHG Emissions (metric tons CO ₂ e)	Increase or Decrease in GHG Emissions (metric tons CO ₂ e)	Percentage of 2010 GHG Emissions
Stationary Sources	Not available	6,095	Not applicable	0.8%
Transportation – CalTrain		3,922		0.5%
Transportation – Freight Trains		481		0.1%
Water		1,715		0.2%
SUBTOTAL		12,213		2%
GRAND TOTAL OF 2010 EMISSIONS		750,235	metric tons CO₂e	
Total of 2005 Baseline Emissions*		809,619	metric tons CO₂e	
Total Decrease		-59,384 -7%	metric tons CO₂e	

*Note that 2005 emission totals shown in Table 4 do not include 390 MTCO₂e from the Agriculture sector, nor do the 2005 emission totals include 29,186 MTCO₂e from Direct Access natural gas.

4.2 Understanding Emission Totals

As noted in the Community GHG Protocol, the potential for double counting in community inventories tends to occur for a number of reasons. Thus, although Table 4 and Figure 1 in the section above refer to emissions totals for 2010, there is some reduction of accuracy in the final totals. Any potential double-counting has been minimized to the greatest extent possible.

In this inventory, the following emission sectors should be considered carefully when reviewing emission totals. Issues of double counting have been addressed as follows:

Stationary Sources: The data source for stationary sources includes any fuel combustion in a stationary source, and may include the combustion of utility-supplied natural gas. (The data for stationary sources also includes the combustion of other fuels, such as propane or diesel fuel in backup generators.) Utility-supplied natural gas usage is also accounted for in the “Commercial/Industrial” sector, and there is no way to determine the quantity of natural gas fuel use that is double-counted. In some cases, large stationary sources were omitted from this inventory to avoid double counting of emissions.

Water: Emissions related to water consumption include electricity use for pumps and other equipment needed to treat and distribute the water, both inside and outside the city boundaries. Some of this electricity, if used within the city boundaries to pump water, is already included in the Commercial/Industrial sector. Most of the water in San Mateo is from the San Francisco Public Utilities Commission water system, which brings water from the Hetch Hetchy reservoir area to the San Francisco Peninsula. Therefore, it is assumed that most of this water-related energy use and associated emissions occur outside the city boundaries and that very little of the energy use and emissions are double-counted.

Wastewater: Because the city of San Mateo has a wastewater treatment plant located in the city boundary, double-counting of these emissions could occur. The natural gas and electricity use at the wastewater plant is already included in the Commercial/Industrial sector. However, energy use at the wastewater plant is also included in the Wastewater sector of this inventory. For this reason, some double counting of emissions from natural gas and electricity use at the plant is likely.

4.3 Commercial/Industrial and Residential Energy Emissions

Residential and Commercial/Industrial Energy emissions include all of the electricity and natural gas consumed within San Mateo’s boundaries in 2010. Most of this energy use occurs in buildings, although some energy use may occur in other equipment, such as outdoor lighting, traffic control signals, or sewer or water pumps. This sector includes energy use as reported by PG&E, as well as estimated use of Direct Access energy, which is energy purchased on the wholesale market, rather than from PG&E. Direct Access energy typically is used by large commercial and industrial customers; data on Direct Access energy use was provided by the

California Energy Commission for all of San Mateo County, and this energy use was estimated for San Mateo based on the ratio of Direct Access energy use to other commercial/industrial energy use in the County. This methodology is consistent with the 2005 baseline emissions inventory process.

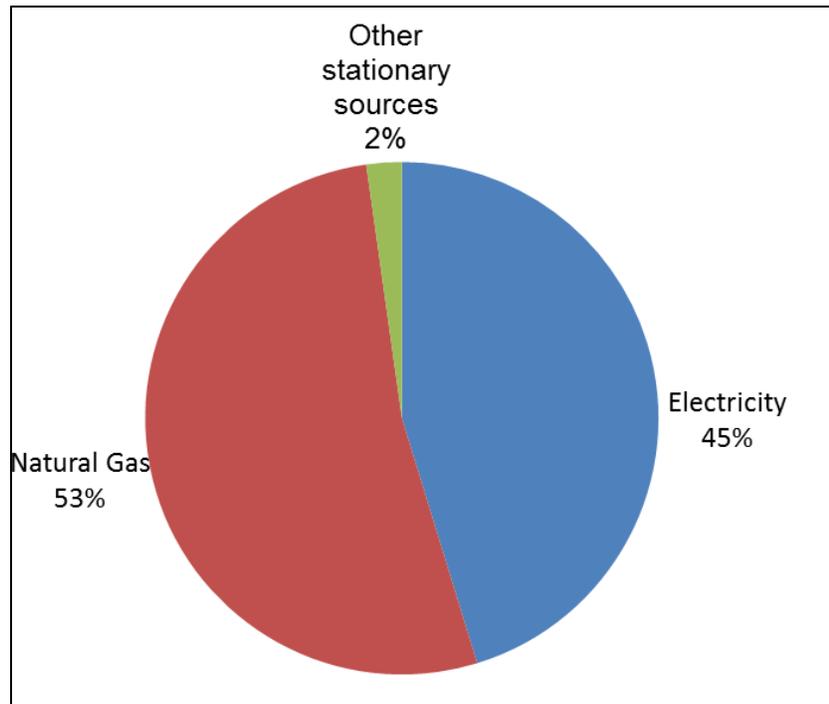
Stationary source emissions were added to the 2010 due to a new data source becoming available from the BAAQMD. These emissions are from stationary propane equipment, stationary diesel equipment (such as diesel generators) and other fuels. A summary of energy use in each sector in 2005 and 2010 and resulting emissions are shown in Table 5. Figure 2 shows a breakdown of emissions by energy use (electricity and natural gas). Electricity use is measured in kilowatt-hours (kWh), while natural gas use is measured in therms.

Table 5: 2010 Residential/Industrial Energy Use and Emissions, 2005 and 2010

Emissions Sector	Source	2005 Energy Use Data	2010 Energy Use Data	Increase or Decrease in Energy Use	2005 Emissions (in MTCO ₂ e)	2010 Emissions (in MTCO ₂ e)	Increase or Decrease in Emissions (in MTCO ₂ e)	
Residential	Electricity (kWh)	205,843,021	211,951,745	+6,108,724	46,018	43,139	-2,879	
	Natural Gas (therms)	17,051,116	17,589,558	+538,442	91,196	93,499	+2,303	
Commercial/Industrial	Electricity (kWh)	328,915,602	332,698,159	+3,782,557	73,531	67,714	-5,817	
	Natural Gas (therms)*	9,374,420	9,528,787	+154,367	50,138	50,647	+509	
	Direct Access Electricity (kWh)	49,387,450	44,427,370	-4,960,080	21,562	13,348	-8,214	
Stationary Sources	Multiple Fuels	Not available					6,095	Not available
TOTAL					282,445	274,443	-8,002	

* 2005 Commercial/Industrial Energy Use data and Emissions for natural gas exclude previously-reported Direct Access natural gas. The Direct Access natural gas consumption was erroneously double-counted in the baseline 2005 inventory.

Figure 2: Building Energy Use – Fuel Type



4.4 Transportation Emissions

Transportation emissions are from four key sources:

- Vehicle travel on roads
- Off-road equipment, such as construction equipment, airport ground support equipment, or lawn and garden maintenance equipment
- CalTrain (added in the new protocol)
- Freight trains (added in the new protocol)

Vehicle travel on roads includes emissions from private, commercial, and fleet vehicles driven within the City's geographical boundaries as well as the emissions from transit vehicles and the City-owned fleet and other public sector fleets. The key data collected for transportation emissions in vehicles is vehicle miles traveled (VMT). Vehicle travel on roads can be further broken down into travel on local roads, and travel on state highways.

Community-wide VMT estimates are highly dependent on the accounting rules and analytical tools used. Two general approaches are allowed in the Community GHG Protocol; the in-

boundary method, in which all VMT from within the limits of the jurisdiction are included; and the origin-destination method, in which trips are allocated to each jurisdiction based on whether they started or ended in the jurisdiction. Notably, the in-boundary method includes “pass-through” traffic, or trips that do not start or end in the jurisdiction, but the origin-destination method does not include these trips. All VMT from trips that start and end within the jurisdiction are included in both methods.

This inventory uses the in-boundary method, for the sake of consistency with the 2005 inventory, and because the data for this method are easily obtained and simpler to gather. For San Mateo, estimates of VMT for on-road vehicular transportation were obtained from the Caltrans Highway Performance Monitoring System (HPMS) database results for year 2010.⁸ The HPMS database provided VMT data for local roads and county-wide VMT for state highways; countywide state highway VMT is allocated to San Mateo based upon the proportional state highway roadway mileage located in the jurisdiction compared to the county as a whole.

Off-road equipment includes lawnmowers, garden equipment, and construction, industrial, and light commercial equipment. The California Air Resources Board OFFROAD 2007 model was used to calculate offroad emissions for San Mateo County and county-wide emissions were then allocated to San Mateo based on San Mateo’s portion of population and number of jobs.

CalTrain operates seven days a week and provides commuter train service from San Francisco to San Jose; some trains also go from San Jose to Gilroy. The City of San Mateo has three CalTrain stations: San Mateo, Hayward Park, and Hillside. Freight trains operate on the CalTrain tracks in the evenings, after CalTrain operations are done. For CalTrain, the emissions were calculated based on ridership. Total CalTrain ridership (in passenger boardings) was calculated from data in the 2010 CalTrain Annual Passenger Counts, and total CalTrain emissions were calculated based on publicly reported diesel fuel usage data from CalTrain. An average of the emissions per passenger boarding was calculated, and then applied to passenger boardings in the City of San Mateo to determine the portion of CalTrain emissions to allocate to San Mateo.

⁸ Caltrans HPMS, 2010 California Public Roads Data. Available at: <http://www.dot.ca.gov/hq/tsip/hpms/hpmslibrary/hpmspdf/2010PRD.pdf>

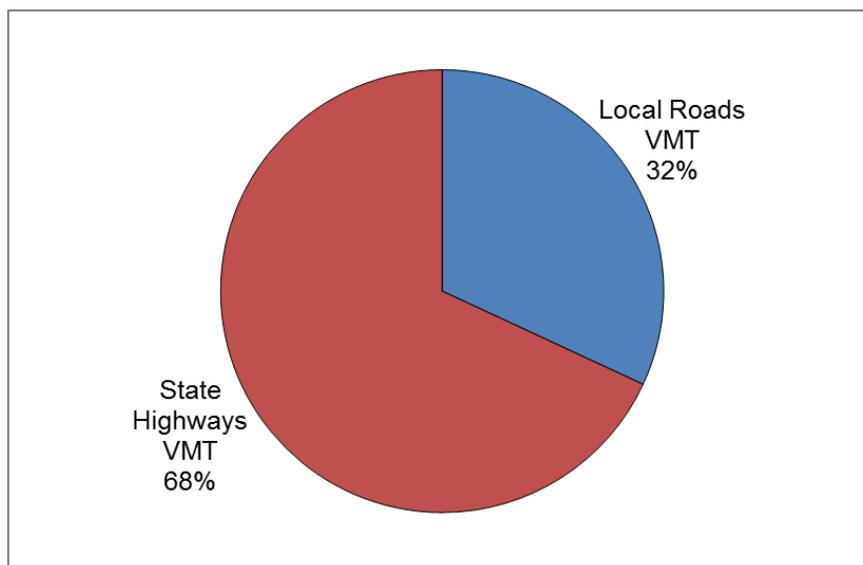
For freight train operations, the total countywide emissions were calculated, and then were allocated to San Mateo based on miles of track within the city boundaries. CalTrain and freight train emissions were not included in the 2005 baseline inventory, and thus are a new source of community emissions to be tracked henceforth.

A summary of transportation data and associated emissions from both 2005 and 2010 is included in Table 6. Figure 3 shows a breakdown of 2010 on-road emissions from vehicles based on whether the travel occurred on local roads or state highways.

Table 6: 2010 Transportation Data and Emissions, 2005 and 2010

Emissions Sector	Source	2005 Activity Data	2010 Activity Data	Increase or Decrease in Activity Data	2005 Emissions (in MTCO ₂ e)	2010 Emissions (in MTCO ₂ e)	Increase or Decrease in Emissions (in MTCO ₂ e)
Vehicle travel on roads	Local Roads VMT	282,210,700	282,305,600	+94,900	137,786	131,744	-6,042
	State Highways VMT	668,466,110	602,258,223	-66,207,887	326,372	281,058	-45,314
Offroad Equipment	Various	Not applicable; emissions are modeled and are not based on a single data source			35,793	37,408	+1,615
CalTrain	Passenger boardings per year	Not available	950,524	Not applicable	Not applicable	3,922	Not applicable
Freight Trains	Gallons of Diesel Fuel		481			481	
TOTAL					499,951	454,613	-45,338

Figure 3: Vehicle Transportation Emissions – Highways v. Local Travel



4.5 Solid Waste

Solid waste is divided into two similar but separate sources: landfills and generated solid waste.

4.5.1 Landfills

There are two landfills located in San Mateo: the 3rd Avenue Landfill/San Mateo Composting Site, and a landfill at the San Mateo County Memorial Park. The 3rd Avenue Landfill is a closed landfill owned by the City of San Mateo. The landfill at San Mateo County Memorial Park is owned by the County of San Mateo; no data is available for this landfill, and it is excluded from this analysis. Emissions from landfills are modeled based on a variety of factors, including whether it is open or closed; the amount of waste-in-place, the amount of rainfall in the area; and whether the landfill has a landfill gas collection system. For the 3rd Avenue Landfill, the emissions were calculated using the First-Order Decay model from the California Air Resources Board, based on data of the amount of waste in place at the landfill, and when the waste was deposited. The landfill was open from 1953 to 1982 and contains a total of 513,000 tons of waste. Because the year(s) that the waste-in-place was deposited are not known, emissions were calculated assuming the waste was deposited evenly throughout the years of the landfill's operation. This methodology is the same methodology that was used for the 2005 baseline inventory.

A summary of 2005 and 2010 data and emissions from the landfill(s) is shown in Table 7.

Table 7: 2010 Landfill Data and Emissions, 2005 and 2010

Landfill	2005 Activity Data	2010 Activity Data	Increase or Decrease in Activity Data	2005 Emissions (in MTCO ₂ e)	2010 Emissions (in MTCO ₂ e)	Increase or Decrease in Emissions (in MTCO ₂ e)
3 rd Avenue Landfill / Composting Site	Total waste in place: 513,000 tons deposited from 1953-1982 950,000 amount of landfill gas collected		Not applicable	7,122	5,000	-2,122

4.5.2 Generated Waste

Solid waste is generated by residents and visitors, businesses, public entities, and other organizations in the community. Emissions from waste result from organic materials decomposing in the anaerobic (non-oxygen) environment of a landfill and produces methane. Organic materials (e.g., paper, plant debris, food waste, and so forth) generate methane while

non-organic materials do not (e.g., metal, glass, and so forth). The majority of solid waste is disposed of at the Ox Mountain Landfill in Half Moon Bay; small amounts of waste are disposed of at the Potrero Hills Landfill, the Zanker Material Processing Facility, the Recology Hay Road Facility, the Altamont Landfill, and other regional landfills.

In addition to solid waste disposal, this category includes alternative daily cover, which is used to cover the landfill each day in order to control vectors, odors, fires, blowing litter, and scavenging. The total amount of solid waste generated and alternative daily cover is taken from the CalRecycle jurisdictional database for the 2010 calendar year. Emissions from the waste are modeled using the assumption that the waste will begin decomposing in the year it was deposited, and will continue to decompose and to generate methane emissions for 100 years.

A comparison of the total generated and landfilled solid waste as well as total alternative daily cover waste from 2005 and 2010 and associated emissions is shown in Table 8.

Table 8: 2010 Generated Waste Data and Emissions, 2005 and 2010

Emissions Sector	2005 Waste Amount (tons)	2010 Waste Amount (tons)	Increase or Decrease in Waste Amount (tons)	2005 Emissions (in MTCO₂e)	2010 Emissions (in MTCO₂e)	Increase or Decrease in Emissions (in MTCO₂e)
Disposed waste	104,268	69,298	-34,970	19,036	10,786	-8,250
Alternative Daily Cover	10,765	16,544	+5,779	268	1,647	+1,379
TOTAL:	115,033	85,842	-29,191	19,304	12,433	-6,871

4.6 Water

The emissions from water are a new source for the 2010 inventory. Consumption of water in the community is associated with GHG emissions due to the energy use that is needed to extract, treat, and distribute water to the end-user. In San Mateo, water is provided by the California Water Service (CWS) – Mid-Peninsula region, and the Estero Municipal Improvement District. A large percentage of the water consumed is purchased from the SFPUC, and the water source is the Hetch Hetchy reservoir in the Yosemite area of the Sierra Nevada mountains. This water is mostly transported in a gravity-based system, although a modest amount of energy is needed for water transportation, treatment and distribution.

In San Mateo County, water is provided by 17 different agencies or water districts. None of the agencies or districts provide water to a single jurisdiction. In other words, municipal jurisdictional

boundaries are not the same as the water district/agency boundaries. For example, the CWS – Mid-Peninsula water agency also provides water to San Carlos, Redwood City, and portions of unincorporated San Mateo County. Thus, water use data is not tracked by a city’s geographic boundary. As a result, this inventory utilizes an average water use factor, in gallons per capita per day, for the CWS – Mid-Peninsula region and the Estero Municipal Improvement District, and then apportions water use to San Mateo based on population. The water use factor used is gross gallons per capita per day, which includes both residential and nonresidential water usage. Once the water use for San Mateo is estimated, the total water use is multiplied by an energy emissions factor to estimate the energy usage associated with water extraction, treatment, and delivery. The emissions factor of 0.0035 kWh per gallon of water is used to estimate electricity use from water consumption, and this electricity use is then used to estimate emissions. This emissions factor is based on estimated energy consumed for water distribution in Northern California as reported by the California Energy Commission.

In addition, water data is reported by fiscal year, which runs from July to June. To estimate water use for calendar year 2010, this inventory uses an average of the gross per capita water use from FY2009-2010 and FY2010-2011.

As noted above, a small portion of emissions from water use are likely double-counted, to the extent that electricity for water distribution is consumed within the city’s boundaries. Also, emissions from water consumption were not included in the 2005 inventory. Table 9 shows a summary of the water consumption data and associated emissions.

Table 9: 2010 Water Data and Emissions, 2010

Emissions Sector	Water Use Factor, in gallons per capita per day	2010 Population	Estimated 2010 Water Consumption (gallons/year)	Estimated 2010 Embedded Energy in Water Use (kWh)	2010 Emissions (in MTCO_{2e})
Water	125.88	97,207	4,466,350,967	6,476,209	1,715

4.7 Wastewater

There is a wastewater treatment plant located in San Mateo, which is operated jointly by the City of San Mateo and the Estero Municipal Improvement District. Emissions from wastewater treatment plants are based on electricity and stationary fuel use, as well as the types of treatment in place for the wastewater. In addition to energy-related emissions, wastewater treatment leads to process and fugitive emissions of methane and/or nitrogen oxide. Natural gas

and electricity used at the wastewater treatment plant are also included in the Energy section of this inventory, and thus are likely double-counted.

Because the wastewater treatment plant serves multiple jurisdictions, this inventory includes an estimate of wastewater emissions allocated to San Mateo based on population.

A summary of 2005 and 2010 emissions from the wastewater treatment plant is shown in Table 10, along with the service population and the per capita emissions factor. The allocation of emissions by population is shown in Table 11.

Table 10: 2010 Wastewater Treatment Data and Emissions, 2005 and 2010

Wastewater Treatment Plant	2005 Emissions (in MTCO ₂ e)	2010 Emissions (in MTCO ₂ e)	Increase or Decrease in Emissions (in MTCO ₂ e)	Service Population	Wastewater Emissions Factor
City of San Mateo Wastewater Treatment Plant	791	2,031	+1,240	139,000	0.0209 MTCO ₂ e/person

Table 11: 2010 Wastewater Emissions Allocation, 2010

Emissions Sector	Wastewater Emissions Factor	2010 San Mateo Population	Estimated 2010 Allocated Wastewater Emissions (in MTCO ₂ e)
Wastewater	0.0209 MTCO ₂ e/person	97,207	2031

4.8 Stationary Sources

Stationary sources include boilers, generators, co-generation, and industrial processing equipment and may include a number of fuel types, including natural gas, propane, and diesel. As noted in the Section 4.2, some of these emission may be double-counted in this 2010 inventory. The data for stationary sources is from the BAAQMD; these emitting facilities receive a permit from or must otherwise report emissions to the BAAQMD. The data provided by the BAAQMD includes total GHG emissions from all fuel consumption, but does not include details on the amounts or types of fuel consumed.

One of the stationary sources listed in the BAAQMD data has been omitted from this inventory to avoid double counting; this source is the 3rd Avenue Landfill/Composting site, which is included in the Solid Waste – Landfills sector.

The remaining stationary sources include emissions from 58 sources totaling 6,095 MTCO₂e in 2010. This data was not available for the 2005 inventory so no comparison is presented.

5. Conclusion

Climate change is a global problem and only through local solutions designed to meet the needs of our community can we mitigate and adapt to its impacts and protect the environment. While the challenge of climate change is unprecedented, local-level solutions can reduce emissions, increase efficiency, promote economic development, and improve quality of life for residents.

The City of San Mateo has taken a significant step to tracking emissions in order to build a more sustainable future for its residents and businesses. The City has also adopted a GHG Reduction Strategy that includes a reduction target for 2020. The results of this inventory may be used to develop new policies and programs that may be needed to reach the 2020 target and other future GHG emission reduction targets. While the City appears to be on the correct reduction trajectory to reach its 2020 target, the City will continue to track emissions and monitor progress so that the 2020 reduction target and all future reduction targets are achieved.

Appendix A: Additional Ways to Look at GHG Emissions

Sources and Activities

Communities contribute to GHG emissions in many ways. Two central categorizations of emissions are used in the community inventory: 1) GHG emissions that are produced by “sources” located within the community boundary, and 2) GHG emissions produced as a consequence of community “activities”.

Source	Activity
Any physical process inside the jurisdictional boundary that releases GHG emissions into the atmosphere	The use of energy, materials, and/or services by members of the community that result in the creation of GHG emissions.

By reporting on both GHG emissions sources and activities, local governments can develop and promote a deeper understanding of GHG emissions associated with their communities. A purely source-based emissions inventory could be summed to estimate total emissions released within the community’s jurisdictional boundary. In contrast, a purely activity-based emissions inventory could provide perspective on the efficiency of the community, even when the associated emissions occur outside the jurisdictional boundary. The division of emissions into sources and activities replaces the scopes framework that is used in government operations inventories, but that does not have a clear definition for application to community inventories.

Significantly Influenced Emissions Frame

Following the Community Protocol, this inventory report organizes emissions in several frames. Each frame includes a particular set of emissions sources and activities, and each helps to tell a different story about community emissions. This report looks at San Mateo’s community emissions through the following frames:

- Local Government Significant Influence
- Household Consumption

San Mateo has chosen first to focus on emissions over which the City government has significant influence. This frame emphasizes policy relevance, highlighting a set of emission sources and activities that San Mateo has the greatest opportunity to address. This frame includes all of the five Basic Emissions Generating Activities required by the community protocol. Table 12 summarizes significantly influenced emissions by source and activity.

Table 12: Significantly Influenced GHG Emissions by Sector, Source and Activity

Sector	Sources (MTCO₂e/year)	Activities (MTCO₂e/year)	Total (MTCO₂e/year)
Residential	93,499	43,139	136,638
Commercial / Industrial	56,742	81,063	137,805
Transportation and Mobile Sources	454,613	NA	454,613
Solid Waste	5,000	12,433	17,433
Wastewater Treatment Facility Process and Effluent	2,031	0	2,031
Water Use	NA	1,715	1,715
TOTALS	611,885	138,350	750,235
Percentage of Total CO ₂ e	82%	18%	100%

In Table 12, sources in the residential and commercial/industrial sector include natural gas consumption, while activities refer to electricity consumption. Also, sources in the solid waste sector include the landfill located in the city, while activities refer to solid waste generated in the city but disposed outside of the city.

San Mateo will focus on these emissions sources and activities in updating a climate action plan. The total significantly influenced emissions of 809,619 metric tons CO₂e also formed the baseline for setting an emissions reduction target and measuring future emissions reductions.

Household Consumption Frame

The second frame through which San Mateo has chosen to look at emissions is that of household consumption. The household consumption frame helps to illustrate the full, life cycle impacts of residents' activities. Household consumption includes lifecycle emissions associated with household electricity use, household natural gas use, household personal vehicle

transportation, household use of public transportation, household use of water and wastewater services, household production of garbage, and household use of materials and services. Many of these emissions overlap with those looked at through the local government influence and communitywide activities frames. But the household consumption frame also includes emissions that are not included in the other frames, in particular emissions from goods and services that are produced outside the community and consumed inside the community.

The Environmental Protection Agency (EPA) has undertaken significant effort to ensure that a consumption-based approach has been included in the new national community-level emissions inventory protocol. Consumption-based emissions for communities in the U.S. are often – but not always – higher than in-boundary emissions. Consumption based emissions are also larger than geographic emissions for the nation as a whole, although communities with small residential populations, limited government presence, and large industrial or tourism activities (businesses serving non-resident customers) would find their consumption-based emissions to be relatively small. But regardless of whether consumption based emissions are larger or smaller, some of the emissions are *different*, and they represent additional ways in which the community contributes to climate change and by extension, additional opportunities for the community to reduce its contribution to climate change. Table 13 shows total household consumption emissions for San Mateo, while Figure 4 shows household consumption emissions for an average household in San Mateo.

Table 13: Total Household Consumption Emissions for San Mateo (Source: Cool Climate Calculator)

Average Household Emissions (MTCO ₂ e/Year)	Number of Households	Total Household Consumption Emissions (MTCO ₂ e/Year)
48.7	38,700	1,884,690

Figure 4: Household Consumption Emissions for an Average Household in San Mateo



Looking at the household emissions frame shows that Car Fuel and Services are large contributors to emissions, comparable in size to Food, Home, and Goods categories. The EPA is promoting a range of actions that can help to reduce these emissions, including materials management (source reduction, durable transport packaging, materials and equipment sharing, including cars, bikes tools, etc.), reduction of wasted food, and sustainable purchasing practices by governments, businesses, and households.

Consumption emissions for an average household were obtained from the calculator at <http://coolclimate.berkeley.edu>. Residents who want to learn more about consumption-based emissions from their own household can use the calculator to obtain emissions based on their personal energy use, transportation and purchasing.

Appendix B. Detailed Data, Data Sources, and Methodologies

GHG emissions can be quantified in two ways:

- Measurement-based methodologies refer to the direct measurement of GHG emissions (from a monitoring system) emitted from a flue of a power plant, wastewater treatment plant, landfill, or industrial facility.
- Calculation-based methodologies calculate emissions using activity data and emission factors. To calculate emissions accordingly, the basic equation below is used: Activity Data x Emission Factor = Emissions

All emissions sources in this inventory are quantified using calculation based methodologies. Activity data refer to the relevant measurement of energy use or other GHG-generating processes such as fuel consumption by fuel type, metered annual electricity consumption, and annual vehicle miles traveled. Known emission factors are used to convert energy usage or other activity data into associated quantities of emissions. Emissions factors are usually expressed in terms of emissions per unit of activity data (e.g. metric tons of CO₂ per kWh of electricity).

All calculation methodologies in this inventory follow the guidance in the Community GHG Protocol to the greatest extent possible.⁹ Different methodologies are used only if the methodology in the Community GHG Protocol could not be used due to lack of data or lack of appropriate assumptions. All methodologies used are described in more detail in this Appendix.

As per the new Community GHG Protocol, emissions can also be considered in the context of sources located within the community, and activities of the community. Other new frameworks are also available to consider community GHG emissions. The emissions by sources and activities and these new frameworks are discussed in Appendix A: Additional Ways to Look at GHG Emissions.

This inventory calculates emissions for carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O). Each of these gases is then converted into carbon-dioxide equivalents (CO₂e) using the appropriate Global Warming Potential (GWPs), as per the guidance in the Community GHG Protocol. The GWPs used in this inventory are shown in Table 14.

⁹ Available for download from the following website: <http://www.icleiusa.org/tools/ghg-protocol/community-protocol>

Table 14: Global Warming Potentials

Greenhouse gas:	CO2	CH4	N2O
GWP:	1	21	310

Commercial/Industrial and Residential Energy Emissions

The emissions from electricity and natural gas were calculated based on guidance in the Community GHG Protocol, Appendix C: Built Environment Activities and Sources. Emissions from stationary combustion of natural gas were calculated based on method BE1.1, and emissions from electricity were calculated based on method BE.2.2.

Commercial/industrial and residential activity data for 2010 (utility-purchased electricity and natural gas use within the City) were obtained from PG&E.¹⁰ In addition, Direct Access electricity consumption was provided by the California Energy Commission (CEC).¹¹ The Direct Access data from the CEC included consumption by the entire County, which was then apportioned to San Mateo. More specifically, the ratio of countywide Direct Access electricity to utility-supplied nonresidential electricity is multiplied by the jurisdiction's utility-supplied nonresidential electricity use to determine the amount of Direct Access electricity in that jurisdiction. All the natural gas consumption, regardless of whether it was purchased from PG&E or not, was included in the data provided by PG&E.¹² However, Direct Access electricity consumption (which is not purchased from PG&E) was not included in the data provided by PG&E, which is why it was estimated based on County-wide data from the CEC.

Direct emissions from natural gas combustion were calculated using standard emission factors for natural gas based on the emission factors in the Community GHG Protocol. Indirect emissions from electricity generation were calculated using the verified emission factors reported by PG&E for its 2010 operations for CO₂.

For Direct Access CO₂ emissions, the 2009 eGRID electricity emission factor was used, as the 2010 emission factor was not yet available. This emission factor was taken from the Community GHG Protocol, Table B.10; specifically, this analysis used the emission factor for the Western Electricity Coordinating Council (WECC) CAMX subregion.

¹⁰ The contact person is: Sapna Dixit, sapna.dixit@pge.com. Data can also be requested by sending an email to: ghgdatarequests@pge.com

¹¹ Data obtained from Steven Mac at the California Energy Commission, Steven.Mac@energy.ca.gov

¹² Confirmed by email correspondence with Sapna Dixit of PG&E, December 11, 2013.

For all electricity CH₄ and N₂O emissions, the California grid-average electricity emission factors from 2007 were used, as 2010 emission factors were not available. The CH₄ and N₂O emission factors were taken from the Community GHG Protocol, Table B.9. This methodology of calculating emission factors for Direct Access CO₂ emissions, and all electricity-related CH₄ and N₂O emissions, was also used for the 2005 baseline inventory.

Table 15 summarizes the emission factors used for electricity, while Table 16 shows the emission factors used to calculate natural gas emissions.

Table 15: Electricity Emission Factors

Type of Electricity	Emission Factor	Source
PG&E-Supplied Electricity	CO ₂ : 0.445 lbs/kWh	PG&E Emission Factors White Paper: http://www.pge.com/includes/docs/pdfs/shared/environment/calculator/pge_ghg_emission_factor_info_sheet.pdf
All Electricity	CH ₄ : 0.029 lbs/MWh N ₂ O: 0.010 lbs/MWh	Community GHG Protocol, Table B9
Direct Access electricity	CO ₂ : 659 lbs/MWh	Community GHG Protocol, Table B10

Table 16: Natural Gas Emission Factors

Greenhouse Gas	Emission Factor	Source
CO ₂	53.02 kg/MMBtu	Table B.1, Community GHG Protocol, Appendix C, page 60.
CH ₄ – industrial sources	0.001 kg/MMBtu	Table B.3, Community GHG Protocol, Appendix C, page 64.
CH ₄ – residential and commercial sources	0.005 kg/MMBtu	
N ₂ O	0.0001 kg/MMBtu	

It is important to note that emissions associated with the generation of electricity, which make up a significant portion of the GHGs associated with building energy, can vary widely from year to year. The GHG emissions associated with electricity use purchased from PG&E is based on an emissions factor specific to PG&E's territory and is calculated annually by PG&E and then made available to cities. The source of the emission factor used for the 2010 baseline inventory

is the Greenhouse Gas Emission Factors white paper provided by PG&E.¹³ This factor varies year over year because PG&E's electricity sources change. For instance, the utility specific emissions factor for PG&E in 2006 was 455.81 lbs/MWh whereas in 2008 it was 641.35 lbs/MWh. For PG&E, the variance is typically dependent on the availability of hydroelectric resources. During low precipitation years, there is less water available to generate emissions-free hydropower. Because of this, PG&E must compensate by supplying more electricity generated from natural gas or coal.

Transportation

On-road Emissions

As with many Bay Area cities, vehicle travel in San Mateo is the largest single source of GHG emissions. Most methods for estimating transportation emissions are based on vehicle miles traveled (VMT). Community-wide VMT estimates are highly dependent on the accounting rules and analytical tools used. Two general approaches are allowed in the Community GHG Protocol; the in-boundary method, in which all VMT from within the limits of the jurisdiction are included; and the origin-destination method, in which trips are allocated to each jurisdiction based on whether they started or ended in the jurisdiction. Notably, the in-boundary method includes "pass-through" traffic, or trips that do not start or end in the jurisdiction, but the origin-destination method does not include these trips. Trips that start and end within the jurisdiction are included in both methods.

This inventory uses the in-boundary method, for the sake of consistency with the 2005 inventory, and because the data for this method are easily obtained and simpler to gather. For San Mateo, estimates of VMT for on-road vehicular transportation were obtained from the Caltrans Highway Performance Monitoring System (HPMS) database results for year 2010.¹⁴ The HPMS database provided VMT data for local roads and county-wide VMT for state highways; countywide state highway VMT is allocated to San Mateo based upon the proportional state highway roadway mileage located in the jurisdiction compared to the county as a whole. San Mateo is estimated to have 14% of the state highways in San Mateo County, and thus was allocated 14% of the state highways VMT in San Mateo County.

¹³ The emission factor were found at the following webpage:

http://www.pge.com/includes/docs/pdfs/shared/environment/calculator/pge_ghg_emission_factor_info_sheet.pdf

¹⁴ Caltrans HPMS, 2010 California Public Roads Data. Available at:
<http://www.dot.ca.gov/hq/tsip/hpms/hpmslibrary/hpmspdf/2010PRD.pdf>

Outputs from ARB's EMFAC2011 model were used to calculate CO₂, CH₄, and N₂O emissions; emissions are calculated separately for local roads and for state highways. Emissions are also calculated separately for gasoline and diesel VMT and associated fuel consumption. Emission calculations are associated with local conditions and vehicle fleet information. Emission factors and certain other assumptions were provided by the BAAQMD;¹⁵ the following tables summarize the emission factors and other assumptions provided by the BAAQMD.

Table 17: Transportation Emission Factors

CO ₂ Emission Factors		CH ₄ Emission Factors		N ₂ O Emission Factors	
Gasoline	Diesel	Gasoline	Diesel	Gasoline	Diesel
8,370	10,079	0.058	0.046	0.07	0.05
Grams/gallon	Grams/gallon	Grams/mile	Grams/mile	Grams/mile	Grams/mile

Table 18: Transportation Assumptions

VMT Mix		Fuel Efficiency	
Gasoline	Diesel	Gasoline	Diesel
96.8%	3.2%	19.9 miles/gallon	8.7 miles/gallon

Additional assumptions are as follows: local Road and state highway VMT data is in Daily VMT (DVMT); Annual VMT = DVMT x 365. VMT is converted into gasoline VMT and diesel VMT, based on VMT mix shown in Table 18. Then gasoline VMT and diesel VMT are converted into gallons of fuel using fuel efficiencies in Table 18. CO₂ is calculated from resulting fuel consumption. Methane and nitrous oxide emissions are calculated directly from gasoline VMT and diesel VMT.

Off-Road Emissions

To estimate mobile off-road emissions, total countywide non-point source off-road emissions were obtained from CARB's Off-Road 2007 Vehicle Model.¹⁶ Off-road emissions sources include the following: agricultural equipment; airport ground support equipment; construction and mining equipment; entertainment equipment; industrial equipment; lawn and garden

¹⁵ The contact person is: Abby Young, ayoung@baaqmd.gov

¹⁶ The model can be downloaded from the following website: <http://www.arb.ca.gov/msei/categories.htm>

equipment; light commercial equipment; oil drilling; pleasure craft; railyard operations; recreational equipment; and transport refrigeration units. County-wide emissions were apportioned to San Mateo either as a proportion of the City's population to overall County population OR as a proportion of City's jobs to overall County jobs. The exceptions are the following sources: airport ground support equipment, which were allocated to San Mateo County, since all the airports in the county are in the unincorporated County areas; and railyard operations, which were evenly allocated to the 12 jurisdictions that have rail lines within their boundaries. A summary of the off-road emissions sources and the allocation methodology for each is provided in Table 19. San Mateo is estimated to have 14% of the total population in the County, and 13% of the total jobs in the County.

Table 19: Off-Road Emissions Sources and Allocation Methodology

Off-Road Emissions Source	Allocate by:
Agricultural Equipment	Number of Jobs
Airport Ground Support Equipment	100% of these emissions are allocated to San Mateo County.
Construction and Mining Equipment	Number of Jobs
Entertainment Equipment	Number of Jobs
Industrial Equipment	Number of Jobs
Lawn and Garden Equipment	Population
Light Commercial Equipment	Number of Jobs
Oil Drilling	Number of Jobs
Pleasure Craft	Population
Railyard Operations	Emissions will be evenly allocated to the following 12 jurisdictions with rail lines: Atherton, Belmont, Brisbane, Burlingame, Menlo Park, Millbrae, Redwood City, San Bruno, San Carlos, San Mateo (City), San Mateo (County), South San Francisco.
Recreational Equipment	Population
Transport Refrigeration Units	Number of Jobs

2010 population data is from the US Census¹⁷, while 2010 jobs data are from Association of Bay Area Governments (ABAG) projections.¹⁸

¹⁷ <http://www.census.gov/2010census/>

CalTrain Emissions

CalTrain is a commuter rail service that operates on diesel fuel, and runs from Gilroy to San Jose to San Francisco over 77 miles of track. Caltrain passes through 12 jurisdictions in San Mateo County on the portion of the rail line that goes from San Jose to San Francisco; of these 12 jurisdictions, 11 of them have one or more Caltrain stations. (Caltrain track passes through portions of unincorporated San Mateo County, but these portions of the Caltrain track do not have a station.)

The overall methodology used to calculate CalTrain diesel emissions is from the Community GHG Protocol, Appendix D, Transportation. As directed in the Community GHG Protocol, emission factors for diesel fuel use in locomotives were taken from Chapter 13 of The Climate Registry's General Reporting Protocol.¹⁹

Total diesel fuel usage by Caltrain was found in the 2010 National Transit Database²⁰, and then is used to calculate total GHG emissions from diesel fuel consumption by CalTrain. These total emissions are then allocated to the City of San Mateo based ridership. Total CalTrain ridership is calculated from the *Key Findings. February 2010 CalTrain Annual Passenger Counts* report published by CalTrain. Total weekday, Saturday, and Sunday ridership counts are taken from this report, and then multiplied by the number of weekdays, Saturdays, and Sundays in one year to find the total annual ridership.

Next, an emission factor per passenger boarding was calculated, using the total GHG emissions and total ridership (passenger boardings) numbers calculated above. Finally, emissions are estimated for the City of San Mateo by taking the total annual passenger boardings for the three CalTrain stations in San Mateo multiplied by the estimated emissions per passenger boarding.

Caltrain also reported gasoline and diesel use in busses for 2010 in the National Transit Database, but this fuel consumption and associated emissions are not calculated in this worksheet, but instead are included in the on-road vehicle emissions included elsewhere in this inventory.

¹⁸ <http://www.abag.ca.gov/planning/currentfcst/>

¹⁹ <http://www.theclimateregistry.org/resources/protocols/general-reporting-protocol/>

²⁰ National Transit Database (Energy Consumption table for 2010).

http://www.ntdprogram.gov/ntdprogram/dabase/2010_database/NTDdatabase.htm

A summary of the total CalTrain ridership is provided in Table 20 below, while City of San Mateo ridership is shown in Table 21. Emission factors used to estimate diesel emissions from CalTrain are shown in

Table 22.

Table 20: CalTrain Ridership

CalTrain Daily Ridership			Number of days per year:	CalTrain Annual Ridership
Average weekday ridership:	36,778	passenger boardings per weekday	261 weekdays per year	9,599,058 passenger boardings per year on weekdays
Average Saturday ridership	11,010	passenger boardings per Saturday	52 Saturdays per year	572,520 passenger boardings per year on Saturdays
Average Sunday ridership	7,393	passenger boardings per Sunday	52 Sunday per year	384,436 passenger boardings per year on Sundays
Total:				10,556,014 passenger boardings per year

Table 21: City of San Mateo Ridership

CalTrain Daily Ridership			Number of days per year:	CalTrain Annual Ridership
Average weekday ridership:	3,344	passenger boardings per weekday	261 weekdays per year	872,784 passenger boardings per year on weekdays
Average Saturday ridership	970	passenger boardings per Saturday	52 Saturdays per year	50,440 passenger boardings per year on Saturdays
Average Sunday ridership	525	passenger boardings per Sunday	52 Sunday per year	27,300 passenger boardings per year on Sundays
Total:				950,524 passenger boardings per year

Table 22: Emission Factors for Diesel Used for Trains

Greenhouse Gas	Emission Factor	Units
CO ₂	0.01021	MTCO ₂ per gallon
CH ₄	0.0000008	MTCH ₄ per gallon
N ₂ O	0.0000003	MTN ₂ O per gallon

Source: The Climate Registry General Reporting Protocol, Default Emission Factors and standard GWPs.²¹

Freight Train Emissions

The methodology for estimating freight train emissions is taken from the Community GHG Protocol, Appendix D, section TR.3. Specifically, the equation used to estimate emissions is TR.3.1. This methodology suggests finding the tonnage of freight moved and multiplying by the miles of track to estimate the ton miles of goods moved. However, the tonnage of freight moved is unavailable, so this analysis uses an estimate of ton miles per mile of track from the California State Rail Plan, and then multiplies the ton miles per mile of track by the miles of track in San Mateo County to find the ton miles moved in San Mateo County. The total ton miles are then used to estimate diesel fuel using a standard factor of 457 ton miles per gallon of diesel (provided in the Community GHG Protocol).

As directed in the Community GHG Protocol, emission factors for diesel fuel use in locomotives were taken from Chapter 13 of The Climate Registry's General Reporting Protocol; these emission factors are the same as those used to estimate emissions from CalTrain shown in Table 22.

The train track passes through 12 jurisdictions in San Mateo County; emissions from diesel fuel consumption in San Mateo County are then allocated to each jurisdiction based on their portion of the track in their boundaries.

Freight trains are operated on the Caltrain track line at night, after the Caltrain operations have ended. According to the 2013 California State Rail Plan, the volume of freight trains operating on the Caltrain track is unknown.²² However, freight trains are only operated at night. According to one observer, freight trains make up less than 5% of train traffic on the Caltrain track.²³ At the current 92 Caltrain trains per weekday, 5% would equal 4.6 trains/day, which is used in this analysis as a conservative estimate of freight trains operating on the line.

Thus, this analysis estimates that 4.6 million gross ton-miles per mile of freight are carried on the Caltrain tracks each year. This is the smallest number category in the 2013 California State

²¹ <http://www.theclimateregistry.org/resources/protocols/general-reporting-protocol/>

²² California State Rail Plan, Exhibit 6.8 on page 138. Webpage: http://californiastrailplan.dot.ca.gov/docs/Final_Copy_2013_CSRP.pdf

²³ <http://caltrain-hsr.blogspot.com/2009/08/effect-of-heavy-freight.html>

Rail Plan and reflects a light amount of freight operations on the Caltrain line, at an estimated 4.6 trains/day. A summary of these calculations are shown in Table 23.

Table 23: Freight Train GHG Calculations

Ton-miles in all of San Mateo County	Ton-miles per gallon of diesel	Gallons of diesel used in San Mateo County	Total GHG emissions from diesel fuel use (MTCO ₂ e/year)	Percentage of San Mateo County rail that is located in San Mateo	Estimated GHG emissions in San Mateo (MTCO ₂ e/year)
114,333,333	457	250,182	2,579	19%	481

It is unknown whether there are switching yards in San Mateo County; thus, the emissions from switching yards are excluded from this analysis.

Solid Waste

Landfills

Currently, the only open landfill in San Mateo County is located in the unincorporated County area. Therefore, there is little chance of double-counting landfill emissions for the jurisdictions in San Mateo County, with the exception of the County of San Mateo. This section of the inventory includes estimated GHG emissions from closed or otherwise inactive landfills in San Mateo County.

Some GHG emissions from landfills are also provided by the BAAQMD, but their methodologies differ from those in the LGOP and in the Community GHG Protocol, so BAAQMD landfill emissions data are not used in this analysis.

Landfills for which no data was available were excluded from this inventory, including the landfill located in San Mateo County Memorial Park. Also, this analysis uses the methodologies in the Community GHG Protocol, Appendix E, in particular calculation method SW.1.1, which uses the California First Order Decay (FOD) model. When data are not available to use calculation methodology SW.1.1, this analysis is based on methodologies in the Local Government Operations Protocol.

This inventory includes emissions from the 3rd Avenue Landfill/Composting Site. Some GHG emissions from landfills are also provided by the BAAQMD, but their methodologies differ from

those in the LGOP and in the Community GHG Protocol, so BAAQMD landfill emissions data are not used in this analysis.

This landfill does not have landfill gas collection, but information is available regarding the waste-in-place for this landfill. This information was used in the Air Resources Board First-Order Decay model to estimate 2010 emissions from waste decomposition.

Solid Waste Disposal

Emissions were calculated using equation SW.4.1 of the Community GHG Protocol, Appendix E (page 24), as well as emission factors from Table SW.5 from the same document. In general, waste disposal to the landfill and the amount of Alternative Daily Cover is provided for each jurisdiction in the CalRecycle Disposal Reporting System database.²⁴ Waste characterization data from the California Waste Characterization Study of 2008²⁵ are used to determine what percentages of materials are in the disposed waste stream. For Alternative Daily Cover, the waste characterization is provided in the CalRecycle Disposal Reporting System by jurisdiction.

Tonnages of each waste material disposed are summed, and then multiplied by emission factors in the Community GHG Protocol to determine total emissions from disposed waste. A summary of the waste characterization results used for landfilled waste is shown in Table 24.

Table 24: Waste Characterization for Landfilled Waste

Waste Type	Percentage of All Waste Disposed in the Landfill
Corrugated Containers	4.8%
Newspaper	1.3%
Office Paper	1.9%
Magazines/Third Class Mail	0.7%
Food Scraps	15.5%
Grass	1.9%
Leaves	1.9%
Branches	0.60%
Dimensional Lumber	14.5%

²⁴ CRiS: CalRecycle Countywide, Regionwide, and Statewide Jurisdiction Diversion Progress Report

²⁵ <http://www.calrecycle.ca.gov/Publications/Documents/General/2009023.pdf>

Source: Waste Characterization is based on the California 2008 Statewide Waste Characterization Study.²⁶

- Used the subcategory of "Uncoated Corrugated Cardboard" in the Waste Characterization Study for "Corrugated Containers" in the table above.
- Used the subcategory of "Newspaper" in the Waste Characterization Study for "Newspaper" in the table above.
- Used the subcategories of "White Ledger Paper" and "Other Office Paper" in the Waste Characterization Study for "Office Paper" in the table above.
- Used the subcategory of "Magazines and Catalogs" in the Waste Characterization Study for "Magazines/Third Class Mail" in the table above.
- Used the subcategory of "Food" in the Waste Characterization Study for "Food Scraps" in the table above.
- Used half of the subcategory of "Leaves and Grass" for "Grass" in the table above. The other half of the subcategory of "Leaves and Grass" was assigned to "Leaves" in the table above.
- The subcategory of "Branches and Stumps" was also assigned to "Branches" in the table above.
- Used the subcategory of "Lumber" for "Dimensional Lumber" in the table above.

For ADC, this inventory only calculates emissions from the ADC category of "Green Waste," and assumes that 50% of Green Waste is Grass, and 50% of Green Waste is Branches.

The emission factors used in this inventory are shown in Table 25.

²⁶ Used Table 7 on page 24 showing the composition of California's Overall Disposed Waste Stream. <http://www.calrecycle.ca.gov/Publications/Documents/General/2009023.pdf>

Table 25: Emission Factors for Disposed Waste

Corrugated Containers (MT CH ₄ per wet short ton of waste)	Newspaper (MT CH ₄ per wet short ton of waste)	Office Paper (MT CH ₄ per wet short ton of waste)	Magazines /Third Class Mail (MT CH ₄ per wet short ton of waste)	Food Scraps (MT CH ₄ per wet short ton of waste)	Grass (MT CH ₄ per wet short ton of waste)	Leaves (MT CH ₄ per wet short ton of waste)	Branches (MT CH ₄ per wet short ton of waste)	Dimensional Lumber (MT CH ₄ per wet short ton of waste)
0.120	0.043	0.203	0.049	0.078	0.038	0.013	0.062	0.062

Water Conveyance

As per the Community GHG Protocol, this inventory includes energy-related emissions associated with water delivery and treatment. Some of these emissions may occur within the community boundaries; as explained in the Community GHG Protocol, there is risk of some double-counting in this emissions sector.

Water is provided by 17 different agencies or water districts in San Mateo County. None of the agencies or districts provides water to a single jurisdiction. In other words, municipal jurisdictional boundaries are not the same as the water district/agency boundaries. Thus, water use data is not tracked on a city jurisdictional level. As a result, the community inventories for the jurisdictions in San Mateo County will use an average water use factor, in gallons per capita per day, for all of the water agencies that serve their jurisdiction, and then will apportion estimated water use to each city based on population. The water use factor used is gross gallons per capita per day, which includes both residential and nonresidential water usage. Once the water use for each jurisdiction is estimated, the total water use is multiplied by an energy emissions factor to estimate the energy usage associated with water extraction, treatment, and delivery.

The energy emissions factor used is: 1,450 kWh/million gallons of water, and is taken from the Community GHG Protocol, Appendix F, Table WW.16.1. The emissions factor for Northern California was used. This emissions factor was adapted from California's Water-Energy Relationship, Final Staff Report, California Energy Commission, 2005.²⁷

In addition, water data is reported by fiscal year, which runs from July to June. To estimate water use for calendar year 2010, this inventory uses an average of the gross per capita water

²⁷ <http://www.energy.ca.gov/2005publications/CEC-700-2005-011/CEC-700-2005-011-SF.PDF>, Table 1-3.

use from FY2009-2010 and FY2010-2011. The source of the retailer water use information is the BAWSCA Annual Survey, FY2009-2010,²⁸ and BAWSCA Annual Survey, FY 2010-2011.²⁹ Emissions emitted were then calculated using the verified 2010 PG&E emission factor for CO₂ and California grid-average emission factors for CH₄ and N₂O, as described in the Energy section above.

Wastewater

This sector incorporates emissions from the City of San Mateo Wastewater Treatment Plant.

The data regarding emissions from this plant is from the 2010 Municipal Operations Inventory. Sources of emissions include stationary fuel consumption, discharged effluent, and incomplete combustion of digester gas. Emissions were estimated for the City using a percentage of the San Mateo population served by the plant as a proportion of overall population served by the Plant. A summary of these calculations is shown in Table 26.

Table 26: Wastewater GHG Calculations

Total GHG emissions from the wastewater treatment plant (MTCO ₂ e/year)	Service population of the wastewater treatment plant	Average emissions per capita (MTCO ₂ e/person/year)	City of San Mateo 2010 population	Estimated San Mateo emissions from wastewater treatment (MTCO ₂ e/year)
2,905	139,000	0.0209	97,207	2,031

Stationary Sources

Total stationary source emissions were provided by the Bay Area Air Quality Management District, and are also available publicly on the agency's website.³⁰ Facilities only report total biogenic and non-biogenic emissions, in MTCO₂e; this data does not include raw fuel use. It is assumed that activity data and emission factors are used to calculate stationary fuel use emissions.

Total non-biogenic emissions were summed for each jurisdiction. However, stationary source emissions from wastewater treatment plants were subtracted from the total stationary source

²⁸ http://bawasca.org/docs/0910SurveyDraft_041511.pdf

²⁹ http://bawasca.org/docs/BAWSCASurvey10-11_final-v3.pdf

³⁰ Website:

http://www.baaqmd.gov/~media/Files/Planning%20and%20Research/Emission%20Inventory/2010_GHG_Facilities.ashx

emissions to avoid double counting, since the wastewater treatment emissions are included in the Wastewater sector of this inventory. Emissions from landfills are also subtracted from the stationary source totals in this section to avoid double counting, since those emissions are included in the Landfill sector of this inventory. Please see Appendix C for a full listing of all sources and emissions included in the Stationary Source sector of this inventory.

Agriculture

The methodology for estimating agricultural emissions in the Community GHG Inventory (Appendix G) is centered around the number and type of livestock in each jurisdiction. The only jurisdiction expected to have significant amounts of livestock raised for commercial purposes (including dairy cows, beef cows, swine, sheep, goats, or horses) is San Mateo County. Due to the difficulty of obtaining data on livestock counts, the agriculture sector was excluded from this analysis.

Appendix C. Detailed Stationary Sources Emissions Information

The following stationary source emissions data are reported by the BAAQMD and are included in this inventory.

Table 27: Stationary Source Emissions Data

Plant #	Plant Name	Plant Address	CO2 Equivalent Emissions (Metric Tons/ Year)
19291	Akamai Technologies	3125 Clearview Way	2.13
8341	All Car Auto Painting & Body Repair	501 9th Ave.	10.59
19479	Astound Broadband	2841 El Camino Real	0.61
13539	AT&T	23 28th Ave.	10.31
20001	Atlantic Richfield Comp. c/o Stantec	230 South El Camino Real	11.79
14550	California Casualty Mgnt. Comp.	1900 Alameda, de las Pulgas	0.02
14479	California Water Service Comp.	End of BRd.view Court	0.09
15250	Casiopea Bovet, LLC	155 Bovet Rd.	0.44
18758	CB Bayview Plaza LLC c/o Sares Regis Group	2121 South El Camino Real	2.03
16265	Century Centre II, LLC	1400 Fashion Island Blv.	0.51
14785	City of San Mateo	330 West 20th Ave.	149.85
20185	City of San Mateo	545 Bransn St. Suite #25	0.32
13390	City of San Mateo	120 South Ellsworth Ave.	0.08
14981	City of San Mateo	1500 Marina Court	0.03
14783	City of San Mateo City Hall	330 West 20th Ave.	0.85
17658	City Of San Mateo Fire Sta. #23	31 27th Ave.	0.16
14782	City of San Mateo Police Dept.	2000 South Delaware St.	5.08
19125	City of San Mateo Public Work Dept.	200 Franklin Pkwy	0.09
8148	City of San Mateo Public Works	655 Mariners Island Blv.	0.91
14781	City of San Mateo/3rd & Detroit Stormwater Pump Sta.	2002 Detroit Dr.	0.25
17347	College of San Mateo	1700 West Hillsdale Blv., Bldg 7	33.50
15933	Comcast of California IX, Inc.	83 21st Ave.	4.57
14873	County of San Mateo	40 Tower Rd.	0.24
14883	County of San Mateo	20 Tower Rd.	0.18
16028	Cross Roads/Clock Tower Inc..	1875 South Grant St.	0.08
17604	Downtown Properties V,LLC c/o Spectrum Interests	181 2nd Ave.	0.37
16529	EOP - Peninsula Office Park, LLC - a Delaware LLC	2955 Campus Dr.	0.12
12936	Franklin Templeton Companies Inc.	1 Franklin Pkwy	0.57
17328	Glenborough Realty Trust	400 South El Camino Real	721.70
15049	Glenborough Realty Trust Inc.orporated	101 South Ellsworth St.	0.42
17591	Global Power Group Inc. (Toys "R" Us)	2270 Bridgepointe Pkwy	4.16

Plant #	Plant Name	Plant Address	CO2 Equivalent Emissions (Metric Tons/ Year)
14226	Hines Properties	1900 Alameda De Las Pulgas	0.25
13330	Keynote Systems c/o Orchard Commercial, Inc.	777 Mariners Island Blv.	5.94
14369	L3 Communications Randtron Antenna Systems	10700 Cahill Ridge Rd.	6.56
16244	Macys Hillsdale	115 Hillsdale Mall	0.24
10327	Mills-Peninsula Health Services	100 South San Mateo Dr.	564.75
18585	Norfolk Atrium	1900 South Norfolk St.	3.05
19061	Oracle America, Inc.	2211th & 2215 Bridgepoint Pkwy	1.58
14174	Pacific Gas and Electric	1600 East Poplar	2.42
5388	Palm Ave. Motors Inc..	2180 Palm Ave.	21.77
14749	San Mateo County	50 Tower Rd.	0.03
15349	San Mateo County Community College Dist.	1700 West Hillsdale Blv.	15.71
16930	San Mateo County Youth Services Center	70 Loop Rd.	1,640.14
19568	San Mateo Fire Dept.	Dale Ave.	0.04
13646	San Mateo Marriott	1770 South Amphlett Blv.	1.42
3887	San Mateo Medical Center	222 West 39th Ave.	2,399.53
17308	San Mateo Public Library	55 West 3rd Ave.	0.05
16803	Sears	40 Hillsdale Mall	0.10
19644	Shank/Balfour Beatty	525 Polhemus Rd.	18.99
13219	Siebel Systems Inc.	1825 South Grant St.	6.07
1299	Skylawn Memorial Park	10600 Skyline Blv.	44.79
19396	SOMA Environmental Engineering, Inc.	335 South Norfolk St.	58.13
16857	Sprint, Envrn Health & Safety	1850 Gateway	1.52
14182	State of California Dept. of Transportation	280th & Pumphouse 92	2.54
15877	Target Corp.	2220 Bridgepointe Pkwy	0.10
15872	The Home Depot c/o 3EComp.	2001 Chess Dr.	7.87
19403	USPS San Mateo Info. Technology and Acct Svc	2700 Campus Dr.	329.51
Total:			6,095

Appendix D: Community Inventory Scoping and Reporting Tool

Table 28 provides a summary of the community inventory scoping and reporting tool, which is recommended for use in the new Community GHG Protocol. The table shows emissions sources and activities that are included in the community inventory, as well as those potential sources that are excluded.

The following abbreviations are used in this table:

IE – Included Elsewhere: Emissions for this activity are estimated and presented in another category of the inventory. The category where these emissions are included should be noted in explanation.

NE – Not Estimated: Emissions occur but have not been estimated or reported (e.g., data unavailable, effort required not justifiable).

NA – Not Applicable: The activity occurs but does not cause emissions; explanation should be provided.

NO – Not Occurring: The source or activity does not occur or exist within the community.

SI – Local Government Significant Influence

CA – Community-Wide Activities

HC – Household Consumption

Table 28: Summary of Included and Excluded Emissions

Emissions Type		Source or Activity?	Required Activities	Included under reporting frameworks:			Excluded (IE, NA, NO, or NE)	Explanatory Notes	Emissions (MTCO _{2e})
				SI	CA	HC			
Built Environment									
Use of fuel in residential and commercial stationary combustion equipment		Source AND Activity	x	x				Includes natural gas supplied by PG&E and other fuels. Also includes emissions from other fuels supplied by the BAAQMD.	150,241
Industrial stationary combustion sources		Source		x				Some of these sources are likely included in the data provided by the BAAQMD.	
Electricity	Power generation in the community	Source					NO	There are no large power plants in the community.	
	Use of electricity by the community	Activity	x	x				Includes data from PG&E and estimated Direct Access electricity	124,202
District Heating/Cooling	District heating/cooling facilities in the community	Source					NO	No known district heating/cooling in the community.	
	Use of district heating/cooling by the community	Activity					NO	No known district heating/cooling use in the community.	
Industrial process emissions in the community		Source					NE	No data available	
Refrigerant leakage in the community		Source					NE	No data available	
Transportation and Other Mobile Sources									
On-road Passenger Vehicles	On-road passenger vehicles operating within the community boundary	Source	x	x				Included in the Transportation sector.	412,802

Emissions Type	Source or Activity?	Required Activities	Included under reporting frameworks:			Excluded (IE, NA, NO, or NE)	Explanatory Notes	Emissions (MTCO ₂ e)
			SI	CA	HC			
	On-road passenger vehicle travel associated with community land uses	Activity				NE	These are upstream emissions; specific data not available.	
On-road Freight Vehicles	On-road freight and service vehicles operating within the community boundary	Source	x				Included in the Transportation sector.	
	On-road freight and service vehicle travel associated with community land uses	Activity				NE	These are upstream emissions; specific data not available.	
On-road transit vehicles operating within the community boundary		Source	x				Included in the Transportation sector. Data specific to transit vehicles not available but are aggregated with the rest of the community-wide vehicle use.	
Transit Rail	Transit rail vehicles operating within the community boundary	Source	x				Includes CalTrain emissions	3,922
	Use of transit rail travel by the community	Activity				NE	No data available	
Inter-city passenger rail vehicles operating within the community boundary		Source				NO	This source would include Amtrak, which does not pass through the jurisdiction.	
Freight rail vehicles operating within the community boundary		Source	x				Includes freight train emissions	481
Marine	Marine vessels operating within the community boundary	Source				NE	No data available	
	Use of ferries by the community	Activity				NE	No data available	

Emissions Type		Source or Activity?	Required Activities	Included under reporting frameworks:			Excluded (IE, NA, NO, or NE)	Explanatory Notes	Emissions (MTCO ₂ e)
				SI	CA	HC			
Off-road surface vehicles and other mobile equipment operating within the community boundary		Source		x				Included in the Transportation sector.	37,408
Use of air travel by the community		Activity				x		Included in Appendix A Household Emissions totals, but data not available separately for this source.	
Solid Waste									
Solid Waste	Operation of solid waste disposal facilities in the community	Source		x				There is one landfill in the jurisdiction that is included.	5,000
	Generation and disposal of solid waste by the community	Activity	x	x				Included in the Solid Waste sector.	12,433
Water and Wastewater									
Potable Water - Energy Use	Operation of water delivery facilities in the community	Source					IE	These emissions are included in the Water sector and are not shown separately.	
	Use of energy associated with use of potable water by the community	Activity	x	x				Included in the Water sector.	1,715
Use of energy associated with generation of wastewater by the community		Activity	x	x			IE	Included in the Wastewater sector.	
Centralized Wastewater Systems - Process Emissions	Process emissions from operation of wastewater treatment facilities located in the community	Source		x				Included in the Wastewater sector.	2,031

Emissions Type		Source or Activity?	Required Activities	Included under reporting frameworks:			Excluded (IE, NA, NO, or NE)	Explanatory Notes	Emissions (MTCO ₂ e)
				SI	CA	HC			
	Process emissions associated with generation of wastewater by the community	Activity	x	x				Included in the Wastewater sector.	
Use of septic systems in the community		Source AND activity					NE		
Agriculture									
Domesticated animal production		Source					NE		
Manure decomposition and treatment		Source					NE		
Upstream Impacts of Community-Wide Activities									
Upstream impacts of fuels used in stationary applications by the community		Activity					NE		
Upstream and transmission and distribution (T&D) impacts of purchased electricity used by the community		Activity					NE		
Upstream impacts of fuels used for transportation in trips associated with the community		Activity					NE		
Upstream impacts of fuels used by water and wastewater facilities for water used and wastewater generated within the community boundary		Activity					NE		
Upstream impacts of select materials (concrete, food, paper, carpets, etc.) used by the whole community		Activity				x	NE	Some sources included in Appendix A Household Emissions totals, but data not available separately for this source.	
Independent Consumption-Based Accounting									
Household Consumption (e.g., gas & electricity, transportation, and the purchase of all other food, goods and services by all households in the community)		Activity				x		Included in Appendix A Household Emissions totals, but data not available separately for this source.	

Emissions Type	Source or Activity?	Required Activities	Included under reporting frameworks:			Excluded (IE, NA, NO, or NE)	Explanatory Notes	Emissions (MTCO ₂ e)
			SI	CA	HC			
Government Consumption (e.g., gas & electricity, transportation, and the purchase of all other food, goods and services by all governments in the community)	Activity					NE	Not estimated separately at this time.	
Life cycle emissions of community businesses (e.g., gas & electricity, transportation, and the purchase of all other food, goods and services by all businesses in the community)	Activity					NE	Not estimated at this time.	
TOTAL:								750,235