San Mateo County 2005 Government Operations Greenhouse Gas Emissions Inventory

Prepared by ICLEI - Local Governments for Sustainability USA.

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Established in 1993, Joint Venture provides analysis and action on issues affecting the Silicon Valley economy and quality of life. The organization brings together established and emerging leaders—from business, government, academia, labor, and the broader community—to spotlight issues, launch projects, and work toward innovative solutions.

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Sustainable Silicon Valley (SSV) is a collaboration of businesses, governments, and non-governmental organizations that are identifying and addressing environmental and resource pressures in the Valley. As its first initiative, SSV is engaging prominent Valley organizations to work toward self-imposed goals of reducing regional carbon dioxide (CO_2) emissions. The SSV approach is to facilitate strategies to reduce CO_2 emissions through increased energy and fuel efficiency and through the use of renewable sources of energy. SSV envisions a thriving Silicon Valley with a healthy environment, a vibrant economy, and a socially equitable community. Sustainable Silicon Valley's mission is to lead the Silicon Valley community to create a more sustainable future by engaging and collaborating with local government agencies, businesses, and community organizations to identify and help address the highest priority environmental issues in the Valley.

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ICLEI-Local Governments for Sustainability is a membership association of more than 1,000 local governments worldwide—more than 500 in the United States—committed to advancing climate protection and sustainability. Through technical expertise, direct network engagement, and the innovation and evolution of tools, ICLEI strives to empower local governments to set and achieve their emissions reduction and sustainability goals.

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Executive Summary

County of San Mateo has recognized that human-caused climate change is a reality, with potentially disruptive effects to the County's residents and businesses. The County also recognizes that local governments play a leading role in both reducing greenhouse gas emissions and mitigating the potential impacts of climate change. Local governments can dramatically reduce the emissions from their government operations by such measures as increasing energy efficiency in facilities and vehicle fleets, utilizing renewable energy sources, sustainable purchasing, waste reduction, and supporting alternative modes of transportation for employees. The co-benefits of these measures may include lower energy bills, improved air quality, and more efficient government operations.

The County has begun its efforts to address the causes and effects of climate change with the assistance of the partners in the Silicon Valley Climate Protection Partnership. These partners include Joint Venture: Silicon Valley Network; Sustainable Silicon Valley; local governments in San Mateo, Santa Clara, and Santa Cruz counties; and ICLEI-Local Governments for Sustainability USA.

This greenhouse gas emissions inventory represents completion of an important first step in the County's climate protection initiative. As advised by ICLEI, it is essential to first quantify emissions to establish:

- A baseline emissions inventory, against which to measure future progress.
- An understanding of the scale of emissions from the various sources within government operations.

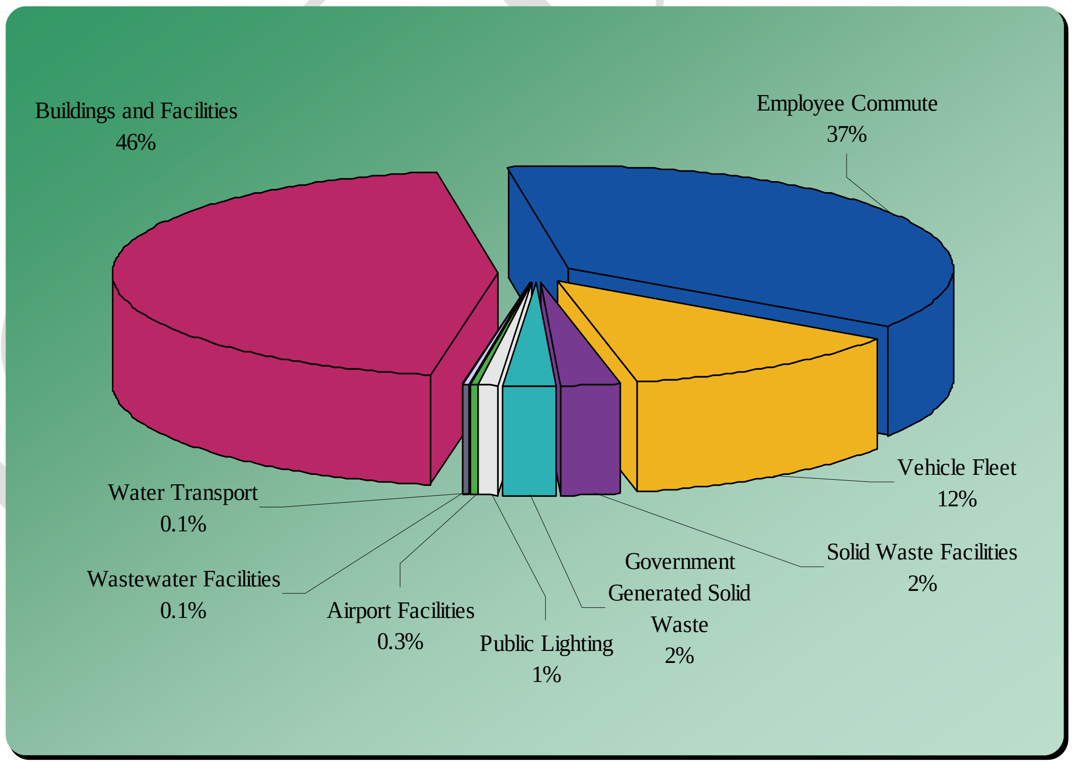
Presented here are estimates of greenhouse gas emissions in 2005 resulting from County of San Mateo's government operations. With one exception,[1] all emissions estimates in this report refer to emissions generated from

1 The exception is emissions from employee-owned vehicles that are used by employees during commuting.

sources over which the County has direct operational control, exclusive of physical location.[2] This includes all government-operated facilities, streetlights, and other stationary sources; vehicle fleet and off-road equipment; and waste generated by government operations. The inventory *does not* estimate emissions from the larger community—these will be addressed in the community-scale greenhouse gas emissions inventory. Therefore, this inventory should be considered to be an independent analysis relevant only to the County's internal operations.

This inventory is one of the first inventories to use a new national standard developed and adopted by the California Air Resources Board (ARB) in conjunction with ICLEI, the California Climate Action Registry, and The Climate Registry. This standard, called the Local Government Operations Protocol (LGOP), provides standard accounting principles, boundaries, quantification methods, and procedures for reporting greenhouse gas emissions from local government operations. To that end, LGOP represents a strong step forward in standardizing how inventories are conducted and reported, providing a common national framework for all local governments to establish their emissions baseline. This and all emissions inventories represent an estimate of emissions using the best available data and calculation methodologies. Emissions estimates are subject to change as better data and calculation methodologies become available in the future. Regardless, the findings of this inventory analysis provide a solid base against which the County can begin planning and taking action to reduce its greenhouse gas emissions.

Figure ES.1 2005 Government Operations Emissions by Sector



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2 Facilities, vehicles, or other operations wholly or partially owned by, but not operated by, the County are not included in this inventory. See Appendix A for more details on the boundaries of the inventory.

Inventory Results

In 2005, County of San Mateo's direct emissions, emissions from electricity consumption, and select indirect sources totaled 41,517 metric tons of CO_2e.[3] [4] Of the total emissions accounted for in this inventory, emissions from County buildings and facilities (including leased facilities) were the largest (46 percent of all inventoried emissions as shown in Figure ES.1 and Table ES.1). Estimated emissions from County employees commuting to and from work make approximately one-third of all inventoried emissions (37 percent), and emissions from the County's vehicle fleet and mobile equipment make up the majority of remaining emissions (12 percent). Collectively emissions from County-operated landfills, waste generated by County operations, public lighting, and other sources made up less than 10 percent of total inventoried emissions.

The County spent approximately $8.05 million on energy (gasoline, diesel, natural gas, electricity, and other fuels) for government operations in 2005. Of this total, 64 percent of energy expenses ($5.12 million) resulted from electricity consumption, and 22 percent ($1.78 million) from natural gas purchases from PG&E and ABAG Power (the Association of Bay Area Government's (ABAG) power pool purchasing program). Fuel purchases (gasoline, diesel, natural gas, propane) for the vehicle fleet and mobile equipment totaled $1.14 million, or 14 percent of total costs included in this inventory. Beyond reducing greenhouse gases, any future reductions in municipal energy consumption will have the potential to reduce these costs, enabling the County to reallocate limited funds toward other municipal services or leverage energy savings to support future climate protection activities.

Table ES.1: 2005 Government Operations Emissions by Sector

Sector	Greenhouse Gas Emissions (metric tons CO_2e)
Buildings and Facilities	18,558
Employee Commute	15,341
Vehicle Fleet	5,066
Solid Waste Facilities	1,011
Government-Generated Solid Waste	1,002
Public Lighting	340
Airport Facilities	125
Water Transport	47
Wastewater Facilities	26

[3] CO_2e stands for "carbon dioxide equivalent," the standard unit for measuring the global warming impact of different types of greenhouse gases (such as carbon dioxide, methane, and nitrous oxide).

[4] This number represents a "roll-up" of emissions, and is not intended to represent a complete picture of emissions from San Mateo County's operations. This roll-up number should not be used for comparison with other local government roll-up numbers without a detailed analysis of the basis for this total.

Key Findings

- The greatest source (46 percent) of greenhouse gas emissions from government operations in 2005 was County buildings and facilities (18,558 metric tons of CO_2e).
- More than 80 percent of emissions from County buildings came from Facilities, Maintenance and Operations (FM&O) operated buildings and the County Hospital combined.[5]
- The second largest source (37 percent) of emissions from government operations in 2005 was fuel use associated with employee commute patterns (15,341 metric tons of CO_2e), even when approximately 22 percent of employees lived within five miles of their work, and nearly 40 percent lived within ten miles of their work.[6]
- In 2005, the County vehicle fleet generated an estimated 5,066 metric tons of CO_2e (14 percent of total emissions).[7]
- Cumulatively, the County spent approximately $8.05 million on energy (electricity, natural gas, gasoline, diesel and other fuels) for its buildings, streetlights, water transport infrastructure, vehicles and off-road equipment in 2005.
- Sixty-four percent of total energy costs are attributed to electricity purchased from PG&E ($5.12 million).

[5] See Section 3.4.1 for more information on County buildings.
[6] See Section 3.4.9 for more information on employee commute.
[7] See Section 3.4.7 for more information on the County vehicle fleet.

Section One: Introduction

Introduction

Local governments play a fundamental role in addressing the causes and effects of human-caused climate change through their actions at both the community and government operations levels. While local governments cannot solve the problems of climate change by themselves, their policies can dramatically reduce greenhouse gas emissions from a range of sources and can prepare their communities for the potential impacts of climate change.

Within the context of government operations, local governments have direct control over their emissions-generating activities. They can reduce energy consumption and related water use in buildings and facilities, reduce fuel consumption by fleet vehicles and equipment, reduce the amount of government-generated solid waste that is sent to a landfill, and increase the amount of energy that is obtained through alternative energy sources. By quantifying the emissions coming from its operations, this report will enable the County to choose the most effective approach to reducing its contribution to climate change.

1.1 Climate Change Background

A balance of naturally occurring gases dispersed in the Earth's atmosphere determines its climate by trapping solar radiation. This phenomenon is known as the greenhouse effect. Overwhelming evidence suggests that modern human activity is artificially intensifying the greenhouse gas effect, causing global average surface temperatures to rise. This intensification is caused by activities that release carbon dioxide and other greenhouse gases into the atmosphere—most notably the burning of fossil fuels for transportation, electricity, and heat generation.

Rising temperatures affect local and global climate patterns, and these changes are forecasted to manifest themselves in a number of ways that might impact the County of San Mateo. For example, the San Francisco Bay may experience rising sea levels and the Sacramento Delta may experience changes in salinity, affecting land uses, water sources, and agricultural activity. Changing temperatures will also likely result in more frequent and damaging storms accompanied by flooding and landslides. Reduced snow pack in the Sierra Nevada mountains may lead to water shortages, and the disruption of ecosystems and habitats is likely to occur. Reduced snow pack also has an impact on the mix of electricity generation sources in California, which determines the carbon intensity of electricity use.

In response to this threat, many communities in the United States are taking responsibility for addressing climate change at the local level. Since many of the major sources of greenhouse gas emissions are directly or indirectly controlled through local policies, local governments have a strong role to play in reducing greenhouse gas emissions within their boundaries. Through proactive measures around sustainable land use patterns, transportation demand management, energy efficiency, green building, and waste diversion, local governments can dramatically reduce emissions in their communities. In addition, local governments are primarily responsible for the provision of emergency services and the mitigation of natural disaster impacts. As the effects of climate change become more common and severe, local government adaptation policies will be fundamental in preserving the welfare of residents and businesses.

1.2 Purpose of Inventory

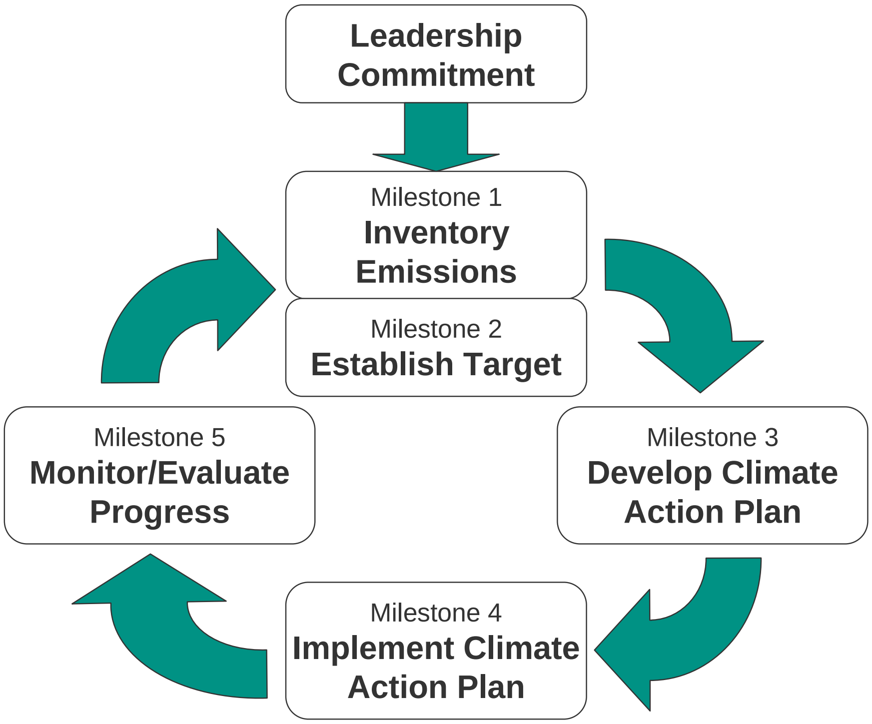
The objective of this greenhouse gas emissions inventory is to identify the sources and quantities of greenhouse gas emissions resulting from County of San Mateo government operations in 2005. This inventory is a necessary first step in addressing greenhouse gas emissions, serving two purposes:

- It creates an emissions baseline against which the County can set emissions reductions targets and measure future progress.
- It allows local governments to understand the scale of emissions from the various sources within their operations.

While the County has already begun to reduce greenhouse gas emissions through its actions (See Section 1.4 for more detail), this inventory represents the first step in a systems approach to reducing the County's emissions. This system, developed by ICLEI, is called the Five Milestones for Climate Mitigation. This Five-Milestone process involves the following steps:

Milestone One: Conduct a baseline emissions inventory and forecast
Milestone Two: Adopt an emissions reduction target for the forecast year
Milestone Three: Develop a local climate action plan
Milestone Four: Implement the climate action plan
Milestone Five: Monitor progress and report results

Figure 1.1 ICLEI Five-Milestone Process



1.3 Climate Change Mitigation Activities in California

Beginning in 2005, the State of California has responded to growing concerns over the effects of climate change by adopting a comprehensive approach to addressing emissions in the public and private sectors. This approach was officially initiated with the passage of the Global Warming Solutions Act of 2006 (AB 32), which required the state to reduce its greenhouse gas emissions to 1990 levels by 2020. It also required the California Air Resources Board (ARB) to regularly inventory emissions at the state level and to create a plan for reducing these emissions. The bill authorized ARB to adopt and enforce regulations targeted at greenhouse gas emissions reductions in the public and private sectors.

The resulting AB 32 Scoping Plan was adopted by ARB in December 2008. It established the following measures that the State will take to meet the greenhouse gas emissions reduction targets:

- Develop a California cap-and-trade program
- Expand energy efficiency programs
- Establish and seek to achieve reduction targets for transportation-related GHG emissions
- Support implementation of a high-speed rail system
- Expand the use of green building practices

- Increase waste diversion, composting, and commercial recycling toward zero-waste
- Continue water efficiency programs and use cleaner energy sources to move and treat water
- Implement the Million Solar Roofs Programs
- Achieve a statewide renewable energy mix of 33 percent
- Develop and adopt the low-carbon fuel standard
- Implement vehicle efficiency measures for light-, medium-, and heavy-duty vehicles
- Adopt measures to reduce high global warming potential gases
- Reduce methane emissions at landfills
- Preserve forest sequestration and encourage the use of forest biomass for sustainable energy generation
- Capture of methane through use of manure digester systems at dairies

Other measures taken by the state have included mandating stronger vehicle emissions standards (AB 1493, 2002), establishing a low-carbon fuel standard (EO # S-01-07, 2007), mandating a climate adaptation plan for the state (S-EO # 13-08, 2008), establishing a Green Collar Job Council, and establishing a renewable energy portfolio standard for power generation or purchase in the state. The state also has made a number of changes that will likely have potentially large effects on local governments:

- SB 97 (2007) required the Office of Planning and Research to create greenhouse gas planning guidelines for the California Environmental Quality Act (CEQA). In addition, ARB is tasked with creating energy-use and transportation thresholds in CEQA reviews, which may require local governments to account for greenhouse gas emissions when reviewing project applications.
- AB 811 (2007) authorized all local governments in California to establish special districts that can be used to finance solar or other renewable energy improvements to homes and businesses in their jurisdiction.
- SB 732 (2008) established a Strategic Growth Council charged with coordinating policies across state agencies to support a unified vision for land use development in the state. This vision will serve as a reference point for local land use policies.
- SB 375 (2008) mandated the creation of regional sustainable community strategies (SCS) by regional planning agencies. The SCS links regional housing and transportation planning processes in an attempt to meet regional greenhouse gas emissions targets.

1.4 Climate Change Mitigation Activities in San Mateo County

County of San Mateo has a long history of efforts to reduce greenhouse gas emissions from their operations, lessen their impact on the environment, and increase the sustainability of their operations. The following is a list of some County's accomplishments to date.

San Mateo: A Cool County

The San Mateo County Board of Supervisors adopted the Cool Counties Declaration on October 16, 2007. The declaration requires the County to calculate its carbon footprint, inventory its current conservation activities and develop and implement a carbon emissions reduction plan. The declaration also includes regional carbon dioxide emission reduction targets: flat emissions by 2010 and an 80% reduction from current levels by 2050.

In December 2008, the County Board of Supervisors adopted the San Mateo County Energy Strategy, a countywide guiding document that brings together the County and the cities in San Mateo County to work collaboratively on issues of energy and water conservation and climate change.

Employee Green Team

Reducing carbon emissions requires changing behaviors. To help the County meet the Cool Counties goals, the County created a Green Team with members from every Department. The Green Team has four committees: Waste Reduction, Transportation, Buildings and Grounds, and Outreach and Education. Each committee has inventoried steps the county has taken to be greener in their area and developed recommendations for additional actions.

Energy Conservation

Lighting Retrofits

In 1995, the County participated in the EPA Green Lights program to improve the energy efficiency of county buildings. Over the years the county has continued to replace lighting fixtures with more energy efficient fixtures and bulbs, in coordination with the ABAG Energy Watch program and currently the San Mateo County Energy Watch program:

- Lighting retrofits were completed for almost all County facilities including the Jail, Medical Center and office buildings in the County Center reducing carbon emissions by 517 tons. Estimated energy savings are in excess of 2 million kilowatt hours.
- Motion sensors and timed light switches have also been installed in many office buildings.

Other Energy Conservation Projects

The County worked with ABAG Energy Watch and PG&E on a number of other energy reduction programs and will continue to work with the new San Mateo County Energy Watch program:

- A computer system power management program has been installed that will reduce CO2 emissions by 200 tons and save 800,000 kilowatt hours of energy.
- Co-generation facilities have been installed at the Youth Service Center and the Maguire Jail.
- Other steps have been taken to improve the energy efficiency of elevators and HVAC systems in County facilities.
- Office temperatures are set between 68 and 75 degrees to conserve energy - office temperatures vary by season.
- All purchased and leased electronic equipment - copiers, faxes and kitchen appliances - must meet U.S. EPA energy efficiency standards.
- Installation of a solar energy project is being considered for the County campus.

Flex Your Power Award

The County's efforts to make our operations more energy-efficient was recognized with a 2008 "Energy Efficiency" award from Flex Your Power, California's statewide energy efficiency and marketing campaign.

Recycling and Waste Disposal

Recycling

- Voluntary paper, bottle and can recycling is available at all county facilities.
- A voluntary organics composting program is available to all facilities serviced by Allied Waste.
- RecycleWorks' County Facilities program offers waste audits for all County offices
- Double sided copying is recommended
- Reusable or refillable products that can be composted or recycled at the end of their useful life are given preferences by purchasing
- Organics recycling started at the Maguire Jail on April 7, 2008

Recycled Products

In 2000, the County adopted an environmental purchasing policy:

- All paper products must meet U.S.EPA guidelines for post-consumer recycled fiber content
- The motor pool uses oil products that are at least 25% re-refined and where practicable uses recycled antifreeze

- Carpets in county buildings are made of recycled materials and use installation compounds with the lowest available volatile organic content
- All playground equipment and rubberized surfacing must have the highest possible recycled content
- Products with recycled content receive a 10% price preference

Sustainable Building

- Since 2001, all new county facilities to be certified under the Leadership in Environmental and Environmental Design (LEED) program, which requires buildings to meet specific construction, energy use, water use and landscaping standards
- LEED certification submitted for the Youth Services Center and the Crime Lab

Deconstruction

- Since late in 2006, all county demolition projects over $5,000 must be deconstructed and materials recycled wherever possible.
- Hillcrest Juvenile Hall is being deconstructed
- The Harbormaster building and the Castaway Restaurant at Coyote Point have been deconstructed.

Transportation

Commute Alternative Program

In 1992, the County established the Commute Alternative Program (CAP) to encourage employees to use mass transit, walk or bike to work:

- About 1,000 county employees receive up to $75 a month toward train or bus tickets
- About 300 employees participate in the carpool program and receive $20 a month plus preferred parking spaces
- Employees vanpooling at least 80% of their workdays get $75 a month

Green Vehicle Procurement

- In 2002, the County adopted a policy requiring departments to consider acquisition of the lowest emission vehicles for the county fleet, with the exception of public safety and emergency vehicles. That policy was updated in 2008, to require departments wanting to purchase non-hybrid vehicles to justify why they are not selecting hybrids:

- The County fleet includes 134 hybrid vehicles plus 2 electric vehicles and 1 vehicle that runs on compressed natural gas.
- The County buys 15 to 20 new hybrids a year.
- The Roads Division received a $1.2 million grant from the State Air Quality Board to purchase 7 new pieces of heavy-duty clean diesel road equipment, which were delivered in the summer of 2008.

Green Fleet

- In 2005 the County adopted a policy to increase the average MPG of the county fleet to 30 MPG 2010.
- The current MPG for compact and mid-size vehicles is 28.5 MPG
- The 24 largest trucks in the county fleet have been retrofitted to be "clean diesel" vehicles
- Lawn mowers and other park and facility maintenance equipment has been retrofitted with emissions scrubbers to reduce air pollution

Water Conservation

Indoor and Outdoor Water Use

The County has taken steps to reduce both indoor and outdoor water use:

- Low flow faucets have been installed in all county facilities
- Flush control toilets have been installed in the jail and juvenile hall
- A vegetation management program has been adopted to use drought resistant, natives and less chemically dependent plants at county facilities

Outreach and Education

- Through RecycleWorks and the Employee Green Team, the County has sponsored a number of green outreach and education events.
- RecycleWorks developed and regularly updates the www.RecycleWorks.org website
- The County Manager’s Office developed a Green Portal for the County employee intranet.
- The County conducted a Green Leadership Forum open to all employees that highlighted the Cool County Commitment, County actions and included discussions on what staff can do at home and work to be more environmentally conscious.
- The County organized an eight-hour class open to all staff on global warming, environmental action and steps individuals and the community can take to address the issue.
- RecycleWorks and the Green Team developed and distributed a Green Event Guide.
- RecycleWorks and the Green Team developed a "green bag" lunch speakers series for 2009.

1.5 The Silicon Valley Climate Protection Partnership

The Silicon Valley Climate Protection Partnership is a joint effort between Joint Venture: Silicon Valley Network (JV:SVN); Sustainable Silicon Valley (SSV); local governments in San Mateo, Santa Clara and Santa Cruz counties (hereby referred to as the "Silicon Valley area"); and ICLEI. The Partnership was initiated in 2008 to provide a solid regional platform for local governments to follow ICLEI's Five-Milestone process (described in Section 1.2), as well as a shared learning experience.

In early 2008, JV:SVN contracted with ICLEI to conduct government operations emissions inventories for participating local governments, using the standards outlined in the then soon-to-be-released Local Government Operations Protocol (LGOP—see Appendix A for details). For this project, 27 local governments have signed on to this contract. SSV joined the Partnership to provide additional educational and other services to facilitate more rapid progress by participating governments through the Five Milestones. While ICLEI created these inventories concurrently using the same tools and methods, each inventory was conducted independently using data specific to each local government's operations. For this reason, inventories from different jurisdictions will involve different sources of data and emissions calculation methods.

Alongside the activities of the Partnership, JV:SVN and SSV have been facilitating regional climate dialogues to further emissions reductions goals in the Silicon Valley area. JV:SVN supports the work of the Climate Protection Task Force, a group that includes staff members from 44 jurisdictions in the Silicon Valley area, including cities, counties, and special districts. In this neutral forum, the partners learn from each other and from expert guests about climate protection programs. They then work to develop effective, collaborative programs for the reduction of greenhouse gas emissions from public agency operations. SSV holds quarterly conferences and monthly meetings that discuss specific approaches to addressing climate change, including the pros and cons of regional climate planning. SSV also puts out annual reports highlighting successes of businesses and local governments that have voluntarily pledged to set and work toward their own carbon dioxide reduction goals. JV:SVN and SSV, along with ICLEI, the City/County Association of Governments of San Mateo County, and the Bay Area Air Quality Management District[8], have dramatically pushed forward the pace and scale of climate actions by local governments in the Silicon Valley area.

8 C/CAG and the Air Quality District have funded regional climate-related efforts in San Mateo and Santa Clara Counties, and C/CAG provided funds to San Mateo County local governments to perform these government operations inventories through the Silicon Valley Climate Protection Partnership.

Section Two: Methodology

Methodology

This greenhouse gas emissions inventory follows the standard methodology outlined in LGOP, which was adopted in 2008 by ARB and serves as the national standard for quantifying and reporting greenhouse emissions from local government operations. By participating in the Silicon Valley Climate Protection Partnership, the County has the opportunity to be one of the first in the nation to follow LGOP when inventorying emissions from government operations.

This chapter outlines the basic methodology utilized in the development of this inventory to provide clarity to how the inventory results were reported. Specifically, this section reviews:

- What greenhouse gases were measured in this inventory.
- What general methods were used to estimate emissions.
- How emissions estimates can be reported (the scopes framework, roll-up numbers).
- How emissions estimates were reported in this inventory.

A more detailed account of LGOP and the methodology used in this inventory can be found in Appendices A and B.

2.1 Greenhouse Gases

According to LGOP, local governments should assess emissions of all six internationally recognized greenhouse gases regulated under the Kyoto Protocol. These gases are outlined in Table 2.1, which includes the sources of these gases and their global warming potential (GWP).[9]

9 Global warming potential (GWP) is a measure of the amount of warming a greenhouse gas may cause, measured against the amount of warming caused by carbon dioxide.

Table 2.1 Greenhouse Gases (Is the HFC range truly this wide?

Gas	Chemical Formula	Activity	Global Warming Potential (CO_2e)
Carbon Dioxide	CO_2	Combustion	1
Methane	CH_4	Combustion, Anaerobic Decomposition of Organic Waste (Landfills, Wastewater), Fuel Handling	21
Nitrous Oxide	N_2O	Combustion, Wastewater Treatment	310
Hydrofluorocarbons	Various	Leaked Refrigerants, Fire Suppressants	12–11,700
Perfluorocarbons	Various	Aluminum Production, Semiconductor Manufacturing, HVAC Equipment Manufacturing	6,500–9,200
Sulfur Hexafluoride	SF_6	Transmission and Distribution of Power	23,900

2.2 Calculating Emissions

LGOP outlines specific methods for quantifying emissions from local government activities. What methods a local government can use to quantify emissions vary largely by how it gathers data, and therefore what data were available. In general, emissions can be quantified in two ways.

1. Measurement-based methodologies refer to the direct measurement of greenhouse gas emissions from a monitoring system. Emissions measured this way may include those emitted from a flue of a power plant, wastewater treatment plant, landfill, or industrial facility. This method is the most accurate way of inventorying emissions from a given source, but is generally available for only a few sources of emissions.

2. Calculation-based methodologies refer to an estimate of emissions calculated based upon some measurable activity data and emission factors. Table 2.2 demonstrates some examples of common emissions calculations in this report. For a detailed explanation of the methods and emissions factors used in this inventory, see Appendix B.

Table 2.2 Basic Emissions Calculations

Activity Data	Emissions Factor	Emissions
Electricity Consumption (kilowatt hours)	CO_2 emitted/kWh	CO_2 emitted
Natural Gas Consumption (therms)	CO_2 emitted/therm	CO_2 emitted
Gasoline/Diesel Consumption (gallons)	CO_2 emitted /gallon	CO_2 emitted
Waste Generated by Government Operations (tons)	CH_4 emitted/ton of waste	CH_4 emitted

2.3 Reporting Emissions

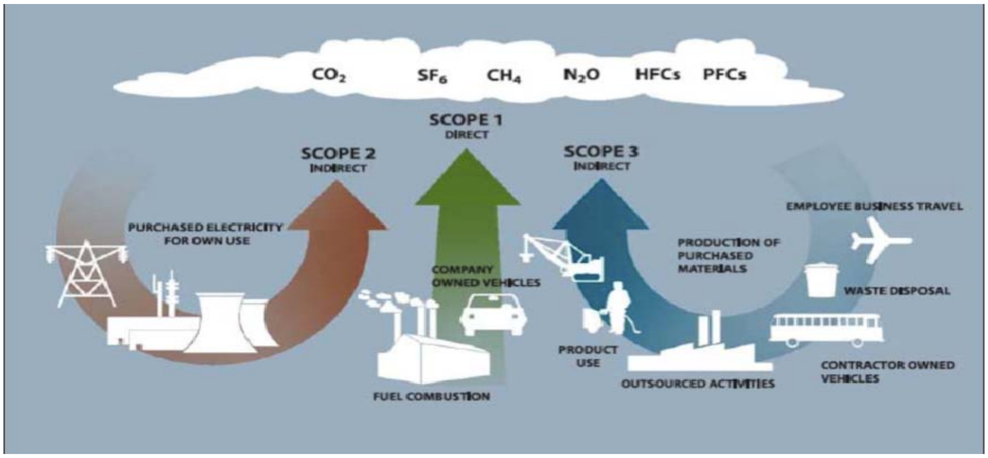
LGOP provides two reporting frameworks: reporting by scope and reporting by sector. This section defines the two reporting frameworks and discusses how they are used in this inventory. It also discusses the concept of “rolling up” emissions into a single number. This can assist local governments in communicating the results of the inventory and using the inventory to formulate emissions reductions policies.

2.3.1 The Scopes Framework

For local government operations, LGOP categorizes emissions according to what degree of control local governments have over the emissions sources. These categorizations (developed by the World Resources Institute and the World Business Council for Sustainable Development) are called *emissions scopes.* The scopes framework helps local governments to:

- Determine which emissions should be inventoried.
- Organize emissions by degree of control and therefore the potential for reduction of these emissions.
- Avoid “double counting” of emissions, i.e., summing up of different emissions sources that may result in reporting these emissions twice.

Figure 2.1 Emissions Scopes



Source: WRI/WBCSD GHG Protocol Corporate Accounting and Reporting Standard (Revised Edition), Chapter 4.

The emissions scopes are defined as follows:

Scope 1: Direct emissions from sources within a local government’s operations that it owns and/or controls. This includes stationary combustion to produce electricity, steam, heat, and power equipment; mobile combustion of fuels; process emissions from physical or chemical processing; fugitive emissions that result from production, processing, transmission, storage and use of fuels; leaked refrigerants; and other sources.

Scope 2: Indirect emissions associated with the consumption of electricity, steam, heating, or cooling that are purchased from an outside utility.

Scope 3: All other emissions sources that hold policy relevance to the local government that can be measured and reported. This includes all indirect emissions not covered in Scope 2 that occur as a result of activities within the operations of the local government. Sources over which the local government does not have any financial or operational control over would be accounted for here. Scope 3 emission sources include (but are not limited to) tailpipe emissions from employee commutes, employee business travel, and emissions resulting from the decomposition of government-generated solid waste.

Table 2.3 Inventoried Emission Sources by Scope[10]

Scope 1	Scope 2	Scope 3
Fuel consumed to heat/cool facilities	Purchased electricity consumed by facilities	Solid waste generated by government operations
Fuel consumed for vehicles and mobile equipment	Purchased electricity consumed by electric vehicles	Fuel consumed for employee vehicles used for commuting
Fuel consumed to generate electricity	Purchased steam for heating or cooling facilities	
Leaked refrigerants from facilities and vehicles		
Leaked/deployed fire suppressants		
Wastewater decomposition and treatment at a municipal wastewater treatment plant		
Solid waste in government landfills		

2.3.2 Double Counting and Rolling Up Scopes

Many local governments find it useful for public awareness and policymaking to use a single number (a "roll-up" number) to represent emissions in its reports, target setting, and action plan. A roll-up number allows local governments to determine the relative proportions of emissions from various sectors (e.g., 30 percent of rolled up emissions came from the vehicle fleet). This can help policymakers and staff identify priority actions for reducing emissions from their operations.

For these reasons, this report includes a roll-up number as the basis of the emissions analysis in this inventory. This roll-up number is composed of direct emissions (Scope 1), all emissions from purchased electricity (Scope 2), and indirect emissions from employee commutes and government-generated solid waste (Scope 3). While this report uses a standard roll-up number, these numbers should be used with caution, as they can be problematic for three reasons:

10 This only represents a list of emissions that were inventoried for the Silicon Valley Climate Protection Partnership inventories. This is not meant to be a complete list of all emissions that can be inventoried in a government operations inventory.

First, a roll-up number does not represent all emissions from the County's operations, only a summation of inventoried emissions using available estimation methods. Reporting a roll-up number can be misleading and encourage citizens, staff, and policymakers to think of this number as the local government's "total" emissions. Therefore, when communicating a roll-up number it is important to represent it only as a sum of inventoried emissions, not as a comprehensive total.

Second, rolling up emissions may not simply involve adding emissions from all sectors, as emissions from different scopes can be double-counted when they are reported as one number. For example, if a local government operates a municipal utility that provides electricity to government facilities, these are emissions from both the power generation and facilities sectors. If these sectors are rolled up into a single number, these emissions are double counted, or reported twice. For these reasons, it is important to be cautious when creating a roll-up number to avoid double counting; the roll-up number used in this report was created specifically to avoid any possible double counting.

Third, local governments often wish to compare their emissions to those of other local governments. But it is very difficult to use a roll-up number as a common measure between local governments, for a number of reasons. First, as of now there is no national or international standard for reporting emissions as a single roll-up number. In addition, local governments provide different services to their citizens, and the scale of the services (and thus the emissions) is highly dependent upon the size of the jurisdiction. For these reasons, comparisons between local government roll-up numbers should not be made without significant analysis of the basis of the roll-up number and the services provided by the local governments being compared.

2.3.3 Emissions Sectors

ICLEI recommends that local governments examine their emissions in the context of the part of their operations (sector) that is responsible for those emissions. This is helpful from a policy perspective, and will assist local governments in formulating sector-specific reduction measures and climate action plans. This inventory uses LGOP sectors as a main reporting framework, including the following sectors:

- Buildings and other facilities
- Streetlights, traffic signals, and other public lighting
- Water delivery facilities
- Wastewater facilities
- Solid waste facilities
- Airport Facilities
- Vehicle fleet and mobile equipment
- Government-generated solid waste
- Emissions from employee commutes

Section Three: Inventory Results

Inventory Results

This chapter provides a detailed description of County of San Mateo's emissions from government operations in 2005, rolling up and comparing emissions across sectors and sources as appropriate. This chapter also provides details on the greenhouse gas emissions from each sector, including a breakdown of emission types and, where possible, an analysis of emissions by department responsibility for overseeing facilities. This information identifies more specific sources of emissions (such as a particular building) that can help staff and policymakers in the County to best target emissions reduction strategies.

For a report of emissions by scope, and a detailed description of the methodology and emission factors used in calculating the emissions from the County's operations, please see Appendix B: LGOP Standard Report.

In 2005, the County's direct emissions, emissions from electricity consumption and select indirect sources totaled 41,517 metric tons of CO_2e.[11] In this report, this number is the basis for comparing emissions across sectors and sources (fuel types), and is the aggregate of all emissions estimates used in this inventory.

3.1 Summary by Sector

Reporting emissions by sector provides a useful way to understand the sources of the County's emissions. By better understanding the relative scale of emissions from each of the sectors, the County can more effectively focus emissions reductions strategies to achieve the greatest emissions reductions.

11 This number represents a roll-up of emissions, and is not intended to represent a complete picture of emissions from San Mateo County's operations. This roll-up number should not be used for comparison with other local government roll-up numbers without a detailed analysis of the basis for this total. See section 2.3.2 for more detail.

Figure 3.1 2005 Government Operations Emissions by Sector

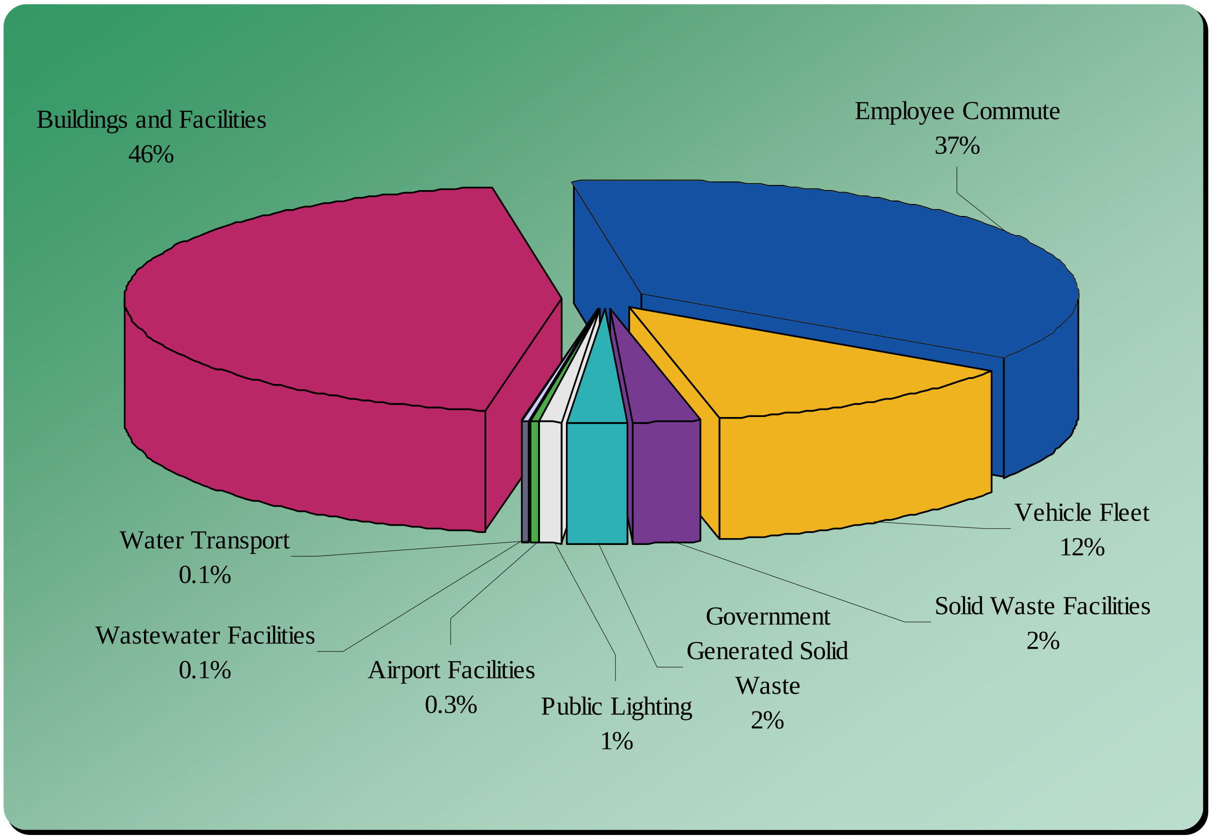


Table 3.1 2005 Government Operations Emissions by Sector

Sector	Greenhouse Gas Emissions (metric tons CO_2e)
Buildings and Facilities	18,558
Employee Commute	15,341
Vehicle Fleet	5,066
Solid Waste Facilities	1,011
Government-Generated Solid Waste	1,002
Public Lighting	340
Airport Facilities	125
Water Transport	47
Wastewater Facilities	26

As visible in Figure 3.1 and Table 3.1, County buildings and facilities produced the largest amount of emissions (18,558 metric tons CO_2e) in 2005. Emissions from employees commuting in their personal vehicles produced the second highest quantity of emissions, resulting in 15,341 metric tons of CO_2e. County of San Mateo's vehicle fleet and mobile equipment produced 5,066 metric tons of CO_2e of total emissions, with the majority of the remainder coming from County-operated landfills and the waste generated by County operations. Emissions from public lighting, County-operated airports (not including air travel), water transport equipment and wastewater facilities contributed relatively little to the County's overall emissions from operations.

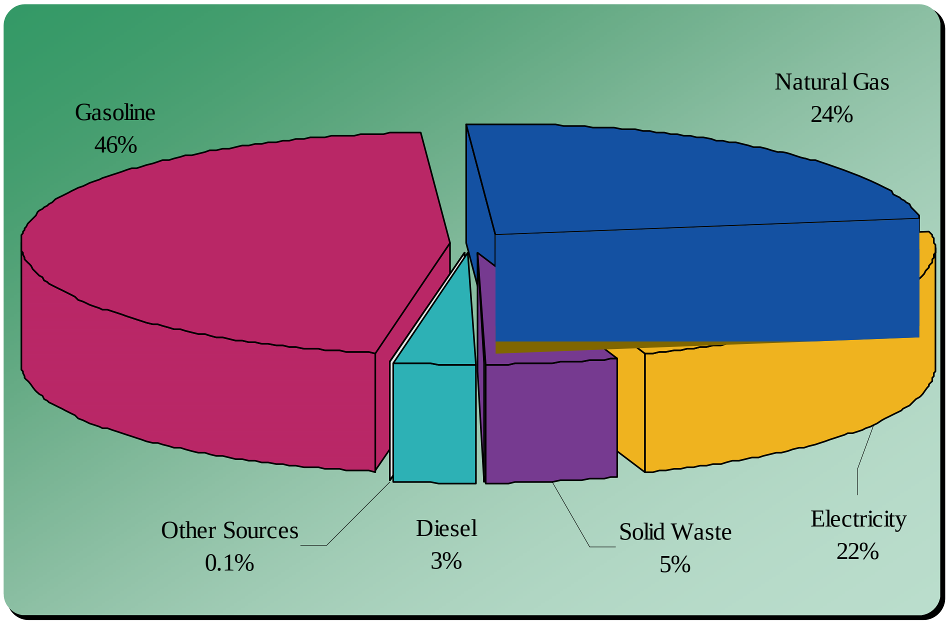
3.2 Summary by Source

When considering how to reduce emissions, it is helpful to look not only at which sectors are generating emissions, but also at the specific raw resources and materials (gasoline, diesel, electricity, natural gas, solid waste, etc.) whose use and generation directly result in the release of greenhouse gases. This analysis can help target resource management in a way that will successfully reduce greenhouse gas emissions. Table 3.2 and Figure 3.2 provide a summary of the County's 2005 greenhouse gas emissions by fuel type or material.

Table 3.2: 2005 Government Operations Emissions by Source

Source	Greenhouse Gas Emissions (metric tons CO_2e)
Gasoline	19,157[12]
Natural Gas	9,819
Electricity	9,286
Solid Waste	2,013
Diesel	1,206
Other Sources	37

Figure 3.2 2005 Government Operations Emissions by Source



[12] Both gasoline and diesel emissions include employee commute activities, as well as vehicle fleet and other activities. For example, gasoline use associated with employee commute generated an estimated 15,000 metric tons CO_2e in 2005 (nearly 75% of the total gasoline-related emissions portrayed above—a much smaller percentage of diesel emissions are related to employee commute).

3.3 Summary of Energy-Related Costs

In addition to tracking energy consumption and generating estimates on emissions per sector, ICLEI has calculated the basic energy costs of various government operations. During 2005, the County spent approximately $8.05 million on energy (e.g., electricity, natural gas, gasoline, and diesel) for its operations. Sixty-four percent of energy expenses ($5.12 million) resulted from electricity consumption, and 22 percent ($1.78 million) from natural gas purchases from PG&E and ABAG Power (the Association of Bay Area Government's (ABAG) power pool purchasing program). Fuel purchases (gasoline, diesel, natural gas, propane) for the vehicle fleet and mobile equipment totaled $1.14 million (14 percent of total costs). Beyond reducing harmful greenhouse gases, any future reductions in energy use will have the potential to reduce these costs, enabling the County to reallocate limited funds toward other municipal services or leverage savings to support future climate protection activities.

Table 3.3: 2005 Government Operations Costs by Sector

Sector	Cost
Buildings and Facilities	$6,629,736
Vehicle Fleet	$1,139,272
Public Lighting	$168,322
Airport Facilities	$77,984
Water Transport	$34,559
TOTAL	**$8,049,874**

3.4 Detailed Sector Analyses

3.4.1 Buildings and Other Facilities

Through their use of energy for heating, cooling, lighting, and other purposes, buildings and other facilities operated by local governments constitute a significant amount of their greenhouse gas emissions. In 2005, County of San Mateo operated approximately 70 large facilities, including 24 leased facilities, 2 airports, 2 county courthouses, 2 prison facilities, a hospital and numerous health centers. Facility operations contribute to greenhouse gas emissions in two major ways. First, facilities consume electricity and fuels such as natural gas and propane, and this consumption contributes the majority of greenhouse gas emissions from facilities. In addition, fire suppression, air conditioning, and refrigeration equipment in buildings can emit hydrofluorocarbons (HFCs) and other greenhouse gases when these systems leak.

In 2005, the operation of the County's facilities produced approximately 18,558 metric tons of CO_2e from the above sources. Table 3.4 shows estimated costs associated with the activities that generated these emissions, and Figure 3.3 depicts 2005 emissions per department. Of total facility emissions, 47 percent came from the consumption of electricity, 53 percent came from the combustion of natural gas, and 0.03 percent came from the combustion of propane (see Figure 3.4). The County spent approximately $6.63 million in 2005 on the fuels and electricity that were the cause of these emissions. Estimated emissions from refrigerants leaked from HVAC, refrigeration, or fire suppression systems were included only as information items (See Section A.1.5.3), as refrigerants used by the County are ozone-depleting chemicals and not included in greenhouse gas emissions inventories per LGOP.

Table 3.4: Energy Use and Emissions from Facilities

Facility	Greenhouse Gas Emissions (metric tons CO_2e)	Percent Emissions of All Facilities	Electricity Use (kWh)	Natural Gas Use (therms)	Total Energy Cost
FM&O*	9,157	49.3%	18,005,982	964,326	$3,196,918
Hospital	6,265	33.8%	12,404,130	656,103	$1,958,527
Leased Facilities	2,440	13.1%	6,577,699	182,048	$1,139,215
Parks	407	2.2%	1,663,738	6,604	$213,927
Human Services	124	0.7%	83,169	19,758	$35,495
ISD**	94	0.5%	263,525	5,536	$48,242
Other Facilities***	71	0.4%	224,737	3,823	$37,412
TOTAL	**18,558**	**100%**	**39,222,980**	**1,838,198**	**$6,629,736**

* Emissions estimate includes natural gas combustion at the cogeneration unit of the Macguire Jail.

** Emissions estimate includes consumption of 974 gallons of propane for back up generation of electricity in ISD facilities.

*** Includes Fire, Library, Housing, Mental Health, Public Works, and Sheriff Facilities.

Figure 3.3: Emissions from Facilities

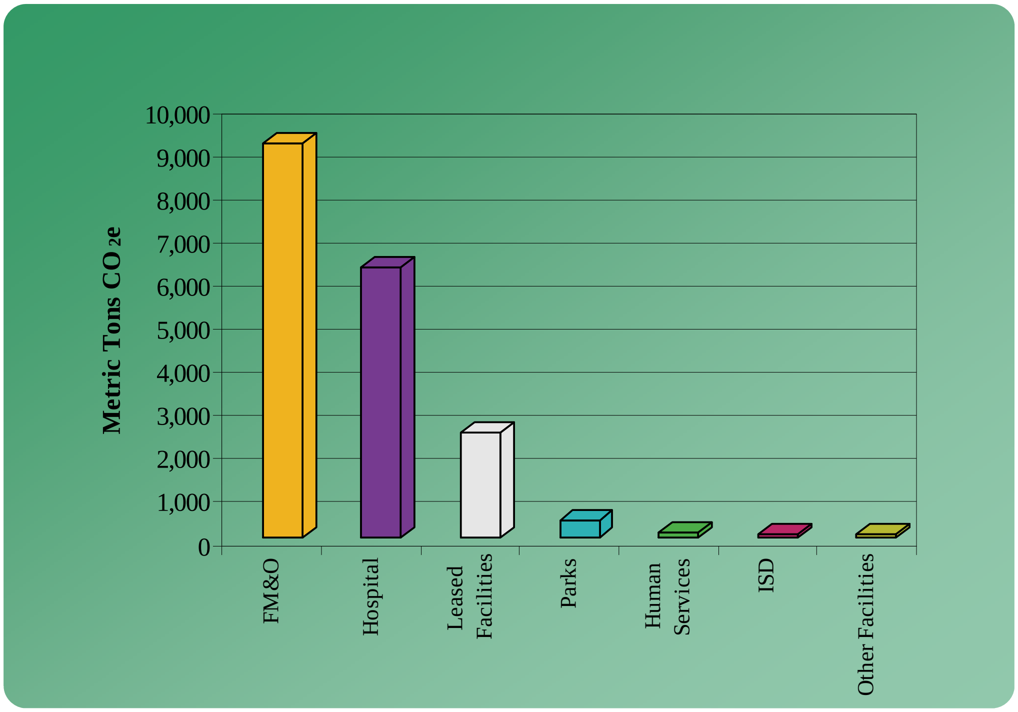
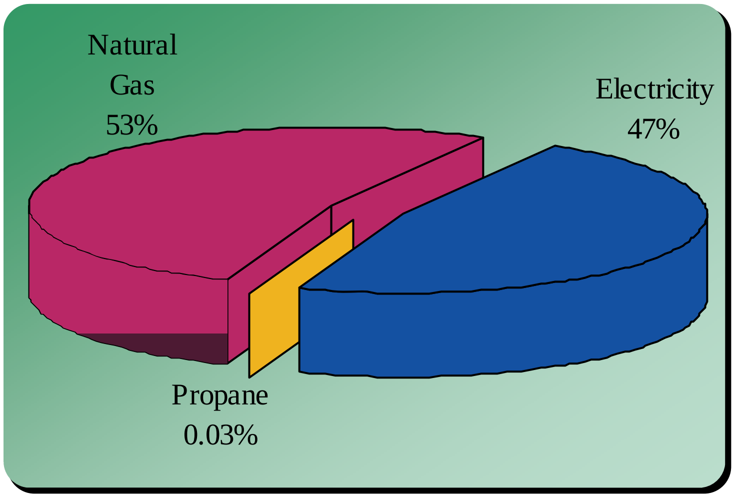


Figure 3.4: Emissions from Facilities by Source



3.4.2 Streetlights, Traffic Signals, and Other Public Lighting

Like most local governments, the County operates a range of public lighting, including traffic signals, streetlights, and parking lot lighting. Electricity consumed in the operation of this infrastructure is a significant source of greenhouse gas emissions.

In 2005, public lighting for County government operations consumed a total of 1.5 million kilowatt hours of electricity, producing approximately 340 metric tons CO_2e. Table 3.5 depicts 2005 emissions for public lighting per department and estimates electricity consumption and costs associated with the activities that generated these emissions. The County spent approximately $168,322 in 2005 on the fuels and electricity that were the cause of these emissions.

Table 3.5: Energy Use and Emissions from Public Lighting

Source	Greenhouse Gas Emissions (metric tons CO_2e)	Percent Emissions of All Lighting	Electricity Use (kWh)	Cost
Public Works	259	76.3%	1,159,706	$129,086
FM&O	81	23.7%	360,730	$39,236
TOTAL	**340**	**100.0%**	**1,520,436**	**$168,322**

3.4.3 Water Transport

This section addresses any equipment used for the storage and distribution of water, stormwater, and wastewater.[13] Typical systems included in this section are water pumps/lifts and sprinkler and other irrigation controls.[14] Electricity consumption and the on-site combustion of natural gas are the sources of greenhouse gas emissions from the operation of the County's water transport equipment.

In 2005, the operation of County of San Mateo water transport equipment produced approximately 47 metric tons of CO_2e from the above sources. Table 3.6 depicts 2005 emissions associated with water transport per department and shows estimated activities and costs associated with the operation of this equipment. The County spent approximately $34,559 in 2005 on the fuels and electricity that were the cause of these emissions.

Table 3.6: Energy Use and Emissions from Water Transport Equipment

Source	Greenhouse Gas Emissions (metric tons CO_2e)	Percent Emissions of Water Transport Equipment	Electricity Use (kWh)	Natural Gas Use (therms)	Cost ($)
Public Works	46	99.0%	205,043	69	$34,053
Parks	0.5	1.0%	2,072	N/A	$506
TOTAL	**47**	**100.0%**	**207,115**	**69**	**$34,559**

3.4.4 Wastewater Facilities

Wastewater coming from homes and businesses is rich in organic matter and has a high concentration of nitrogen and carbon (along with other organic elements). As wastewater is collected, treated, and discharged, chemical processes in aerobic and anaerobic conditions lead to the creation and emission of two greenhouse gases: methane and nitrous oxide. Local governments that operate wastewater treatment facilities, including wastewater pumps, treatment plants, septic systems, collection lagoons, and other facilities, must therefore account for the emission of these gases in their overall greenhouse gas emissions inventory.[15]

In 2005, County of San Mateo operated septic tank systems located at parks and two other County facilities. Fugitive methane emissions from these systems produced approximately 26 metric tons of CO_2e from the above sources. Table 3.7 breaks down emissions per facility.

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13 This emissions inventory report has groped wastewater pumps with other water pumps.
14 This section does not include emissions from decomposition or processing of wastewater in wastewater treatment facilities. These emissions are included in Section 3.4.4
15 These emissions should not be confused with the emissions described in Section 3.4.3—those emissions refer to the *transportation* of water and wastewater while this section refers exclusively to the decomposition and treatment of wastewater.

Table 3.7: Wastewater Emissions by Facility

Gas	Source	Greenhouse Gas Emissions (metric tons CO_2e)
CH_4	Park Septic Systems	21
CHfix	Half Moon Bay Airport Septic System	4
CH_4	Pescadero Fire Station Septic System	1

3.4.5 Solid Waste Facilities

There are a variety of emissions associated with solid waste management services including the collection, processing, and storage of solid waste generated from residents and businesses. The most prominent source of emissions from solid waste facilities is fugitive methane released by the decomposition of organic waste over time in landfills. The scale of these emissions depends upon the size and type of the landfill and the presence of a landfill gas collection system.

In 2005, the County operated two closed landfills with available waste-in-place data.[16] Half Moon Bay Landfill and Pescadero Landfill. These landfills were closed to service in 1978 and 1987 respectively. Both facilities are small, older landfills, and they are not equipped with landfill gas (LFG) recovery systems or any associated LFG flaring infrastructure. Emissions from these landfills were estimated using site-specific waste-in-place estimates and the First Order Decay (FOD) model provided by the California Air Resources Board and based upon guidelines from the Intergovernmental Panel on Climate Change (IPCC).[17]

Table 3.8: Solid Waste Facilities Emissions by Facility

Gas	Source	Greenhouse Gas Emissions (metric tons CO_2e)
CH_4	Pescadero Landfill	298
CH4	Half Moon Bay Landfill	713
TOTAL		1,011

[16] The County is also the owner of property at Memorial Park that was a solid waste disposal site years ago. The site is estimated to have been closed nearly 50 years ago, and no waste-in-place or emissions data were available related to this site. The site is not currently monitored by BAAQMD, and the emissions coming from it are assumed to be minimal.

[17] Please see LGOP, Ch. 9 for more information on this model; or visit ARB website to download their FOD tool: http://www.arb.ca.gov/cc/protocols/localgov/pubs/pubs.htm

In 2005, the operation of County landfills produced approximately 1,011 metric tons of CO_2e from the above sources (Table 3.8). Of total waste facility emissions, 71 percent came from the Half Moon Bay landfill, and 29 percent came from the Pescadero landfill.

3.4.6 Airport Facilities

According to LGOP, emissions that must be estimated from airport facilities are the same as those for regular buildings and facilities; namely, they are emissions resulting from the consumption of electricity, natural gas and other fuels. Aircraft emissions are not included in this section, as emissions from County-operated aircraft would be included in the Mobile Emissions sector, and emissions from private aircraft do not fall within the operational boundary of this emissions inventory.

In 2005, San Mateo County operated two general aviation airports, the San Carlos Airport and the Half Moon Bay Airport. These airports house approximately 600 privately-owned aircraft, and provide vital services to residents of San Mateo County. In 2005, the operation of these airports produced approximately 125 metric tons of CO_2e. Airport emissions were aggregated, and therefore estimated emissions by airport is not available.

3.4.7 Vehicle Fleet and Mobile Equipment

The majority of local governments use vehicles and other mobile equipment as an integral part of their daily operations—from maintenance trucks used for parks and recreation to police cruisers and fire trucks. These vehicles and equipment burn gasoline, diesel, and other fuels, which produce greenhouse gas emissions. In addition, vehicles with air conditioning or refrigeration equipment use refrigerants that can leak from the vehicle. Emissions from vehicles and mobile equipment compose a significant portion of emissions within most local governments.

Table 3.9: Vehicle Fleet and Mobile Equipment Emissions

Function	GHG Emissions (metric tons CO_2e)	Percent of All Mobile Emissions	Gasoline Consumption (gal)	Diesel Consumption (gal)	Natural Gas Consumption (therms)	Cost
All Fleet Vehicles	4,838	95%	453,188	72,079	6,919	$1,092,097
Mobile Equipment*	226	4%	3,798	19,007	-	$47,175
Refrigerants	2	0.05%	N/A	N/A	N/A	N/A
TOTAL	**5,066**	**100%**	**456,986**	**91,086**	**6,919**	**$1,139,272**

* Emissions estimate includes six gallons of propane (LPG) consumption.

In 2005, the County of San Mateo operated a fleet of approximately 875 vehicles[18] and a range of off-road equipment. The County fleet emitted approximately 5,066 metric tons of CO_2e as a result of the combustion of fuels and the leaking of refrigerants. Table 3.9 shows estimated costs associated with the activities that generated these emissions. Of all mobile emissions calculated, emissions from the vehicle fleet made up 95 percent of total emissions, while emissions from mobile equipment made up 4 percent of total emissions, and leaked refrigerants made up a very small percent of total emissions.

Of total fleet emissions, 81 percent came from the consumption of gasoline, 18 percent came from the combustion of diesel, and the remaining percent came from the combustion of natural gas and propane and leaked refrigerants. The County spent approximately $1.14 million in 2005 on the fuels that were the cause of these emissions.

3.4.8 Government-Generated Solid Waste

Many local government operations generate solid waste, much of which is eventually sent to a landfill. Typical sources of waste in local government operations include paper and food waste from offices and facilities, construction waste from public works, and plant debris from parks departments. Organic materials in government-generated solid waste (including paper, food scraps, plant debris, textiles, wood waste, etc.) generate methane as they decay in the anaerobic environment of a landfill. An estimated 75 percent of this methane is routinely captured via landfill gas collection systems;[19] however, a portion escapes into the atmosphere, contributing to the greenhouse effect. As such, estimating emissions from waste generated by government operations is an important component of a comprehensive emissions inventory.

Inventorying emissions from government-generated solid waste is considered optional by LGOP for two reasons. First, the emissions do not result at the point of waste generation (as with fuel combustion), but in a landfill located outside of County of San Mateo's jurisdictional boundaries. In addition, the emissions are not generated in the same year that the waste is disposed, but over a lengthy decomposition period. Since inventorying these emissions is considered optional, LGOP does not provide guidance on recommended methods for quantifying these types of emissions. ICLEI therefore devised data collection and calculation methods based upon previous experience and national standards. See Appendix D for more information for more detail on quantifying emissions from government-generated solid waste.

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[18] Estimate provided by Kim Springer, Resource Conservation Programs Manager, Department of Public Works, County of San Mateo.

19 This is a default methane collection rate per LGOP. This rate can vary from 0 to 99 percent based upon the presence and extent of a landfill gas collection system at the landfill/s where the waste is disposed. Most commonly, captured methane gas is flared into the atmosphere, which converts the methane gas to CO_2 and effectively negates the human-caused global warming impact of the methane. Increasingly, landfill methane is being used to power gas-fired turbines as a carbon-neutral means of generating electricity.

It is estimated that the waste disposed by County of San Mateo government facilities in 2005 will cumulatively produce 48 metric tons of methane gas, or 1,002 metric tons $C0_2e$. Please see Table 3.10 for a breakdown of emissions per facility.

Table 3.10: Emissions from Government Generated Solid Waste

Source	Greenhouse Gas Emissions (metric tons CO_2e)	Estimated Landfilled Waste (Tons)
Burlingame Long Term Care	159	627
Maguire Correctional Facility	129	510
Women's Jail	127	502
SMC Health Center	98	386
Self-Haul, Parks and Recreation	85	334
Hillcrest Juvenile Hall	64	251
Work Center	53	209
Human Services Department	39	153
Hall of Justice	32	126
San Carlos Airport	32	125
All Other Facilities (20)	185	729
TOTAL	1,002	3,953

3.4.9 Employee Commute

Fuel combustion from employees commuting to work is another important emissions source from the County's operations. Similar to the County's vehicle fleet, personal employee vehicles use gasoline and other fuels which, when burned, generate greenhouse gas emissions. Emissions from employee commutes are considered optional to inventory by LGOP because the vehicles are owned and operated privately by the employees. However, LGOP encourages reporting these emissions because local governments can influence how their employees commute to work through incentives and commuting programs. For this reason, employee commute emissions were included in this report as an area where the County could achieve significant reductions in greenhouse gases.

To calculate emissions, the County administered a survey to all of its employees regarding their commute patterns and preferences. ICLEI then extrapolated the results of the survey to represent emissions from all employees. See Appendix C for a detailed description of the survey and methods used to calculate emissions.

In 2005, employees commuting in vehicles to and from their jobs at the County emitted an estimated 15,341 metric tons CO_2e. Table 3.11 shows estimated emissions and vehicle miles traveled for all County employees.

Table 3.11: Emissions from Employee Commutes

	Greenhouse Gas Emissions (metric tons CO_2e)	Estimated Annual Vehicle Miles Traveled to Work (staff total)	Estimated *Average* Annual Vehicle Miles Traveled to Work (per person)
All Employees (Estimated)	15,341	32,510,058	5,950

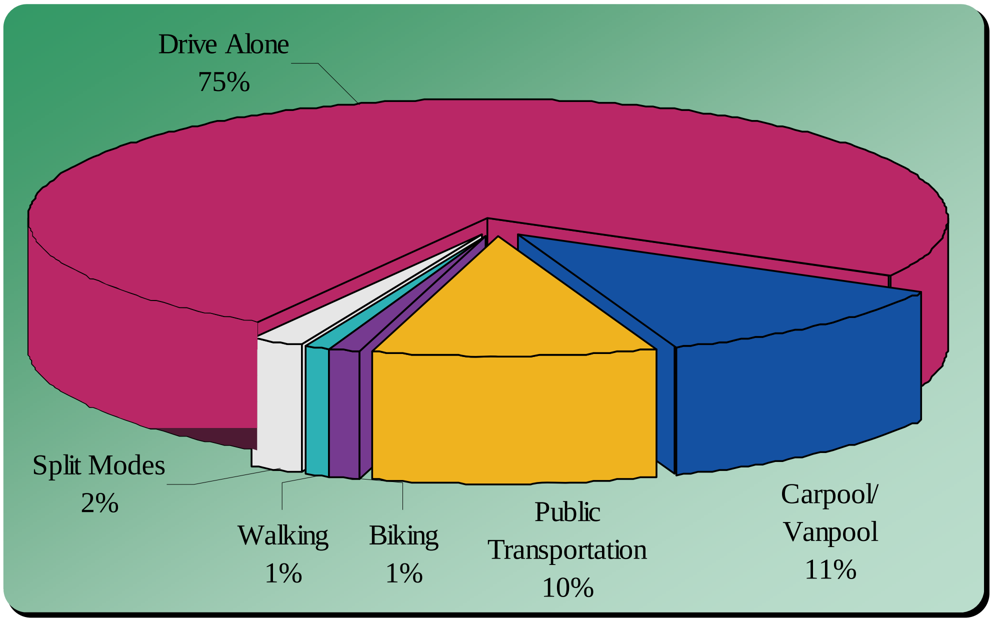
3.4.9.1 Employee Commute Indicators

In addition to estimating greenhouse gas emissions from employee commutes, ICLEI examined other policy-relevant information that was extracted from the employee commute survey. In this way, County staff and elected officials can develop the most effective policies to reduce emissions from employee commutes. These measures often have co-benefits including increased productivity, reduced commute times and costs, and improvement in the quality of life for employees. No extrapolation was done with the following data; analyses were done using data from survey respondents only.

Commute Modes

In 2005, the majority (75 percent) of respondents commuted to work by driving alone in their vehicles. One quarter of all respondents used some form of alternative transportation (bicycle, public transit, carpool, etc) to commute to work, with carpooling being the most used form of alternative transportation (11 percent of total respondents), followed by public transportation (10 percent of total respondents) and split modes (2 percent of total respondents). See Figure 3.5 for a break-down of the most common commute mode for employees who responded to the survey.

Figure 3.5: Employee Commute Modes



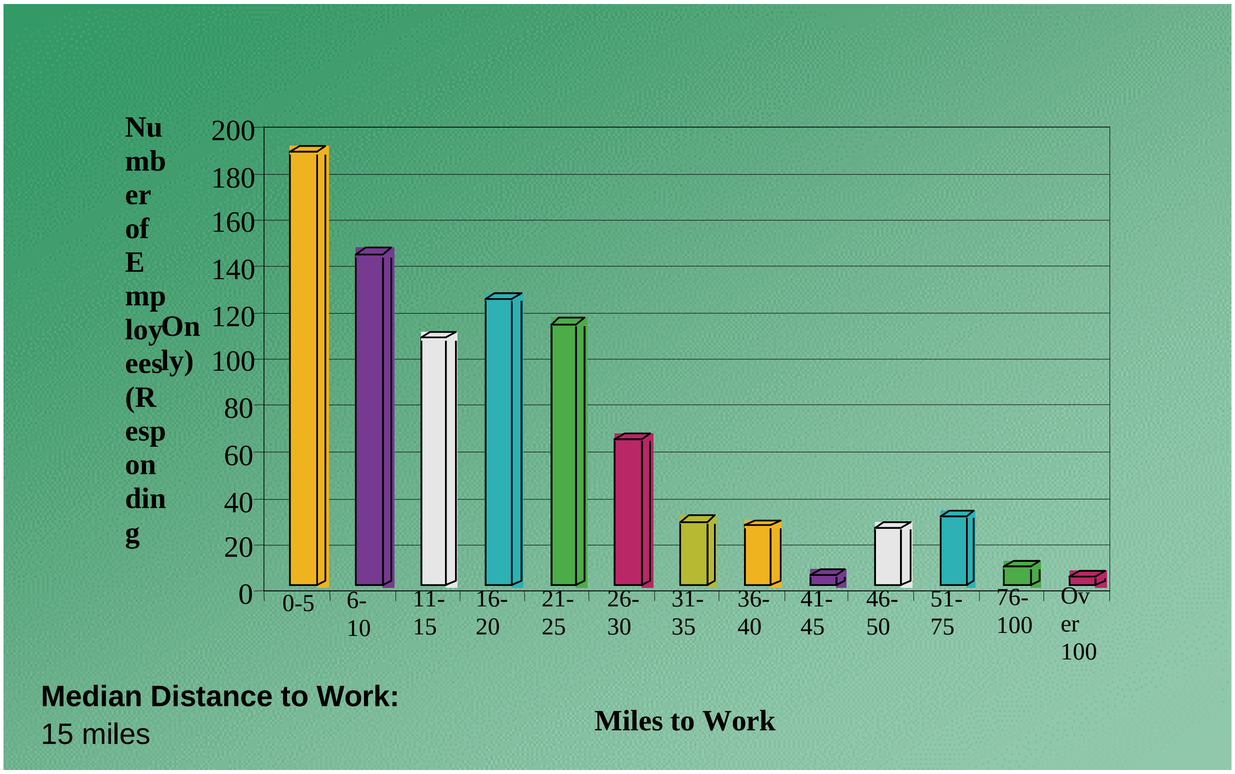
Commute Time and Costs

Table 3.12 represents the median time, cost, and distance of County employee commutes. Figure 3.6 shows that the majority of responding employees live within 20 miles of work, suggesting that there may be good opportunities for the County to effectively expand their carpool, vanpool and alternative transit incentive programs. A significant number of employees (22 percent) live within five miles of work, suggesting that a biking incentive program is also a viable option for the County.

Table 3.12: Median Distance and Time to Work and Cost of Employee Commutes (Responding Employees)

Median Time to Work (minutes)	Median Cost of Round-Trip Commute (per week)	Median Distance To Work (Miles)
25	$20	15

Figure 3.6: Employee Commute Distance to Work



Commuter Preferences

When asked if employees would consider taking a list of alternative transportation modes (Figure 3.7), 37 percent of respondents indicated they would be interested in public transportation, with carpooling following with 30 percent of all respondents. Only thirty-nine percent of respondents indicated that they had no interest in converting to any alternative mode of transportation.

Compared to many other local governments, a high number of respondents use public transit and many who didn't expressed an interest in using transit to commute. In addition, nearly half (43 percent) of respondents indicated that there was a transit route available which they could take to and from work, which again is comparably high (Figure 3.8). This further suggests that the County could reduce emissions from commutes by expanding their commute incentive program and working collaboratively with (BART, Caltrain, SamTrans) to provide better service for employees. Respondents also indicated that they would be more encouraged to take alternative modes of transit if (see Figure 3.9) the County offered expanded public transit benefits (32 percent), telecommuting options (30 percent), a commuter shuttle (29 percent), and expanded carpool/vanpool incentives (22 percent).

Figure 3.7: Interest in Alternative Commute Modes

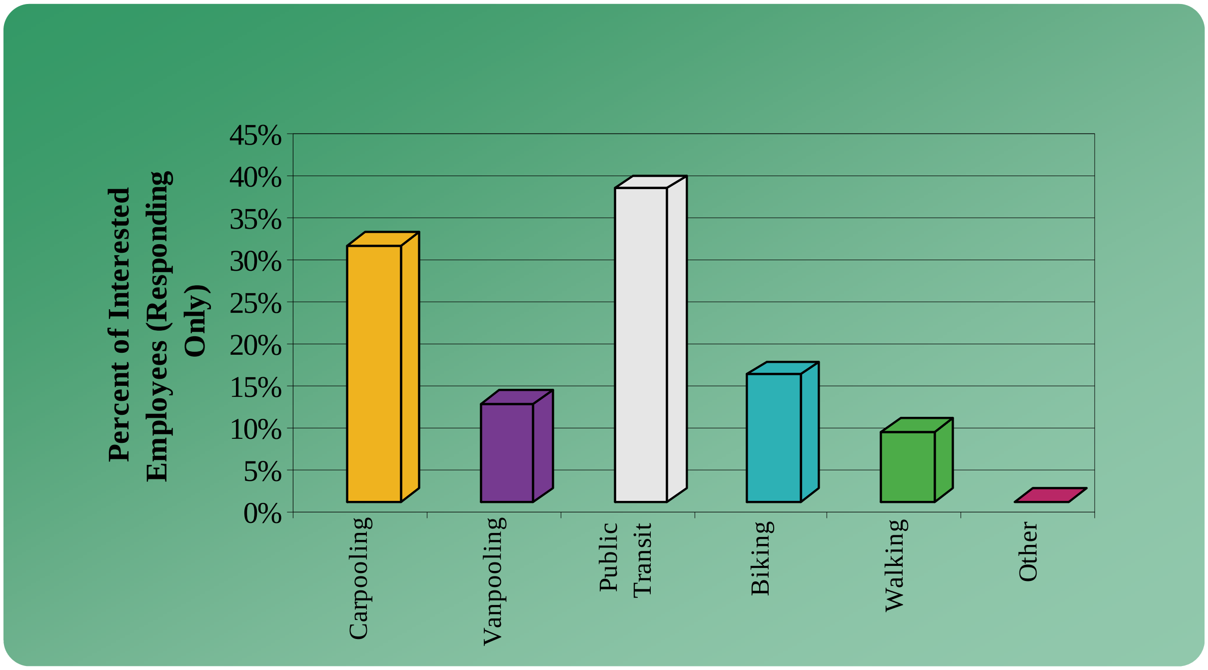


Figure 3.8: Employees with Available "Usable" Transit Route to Work

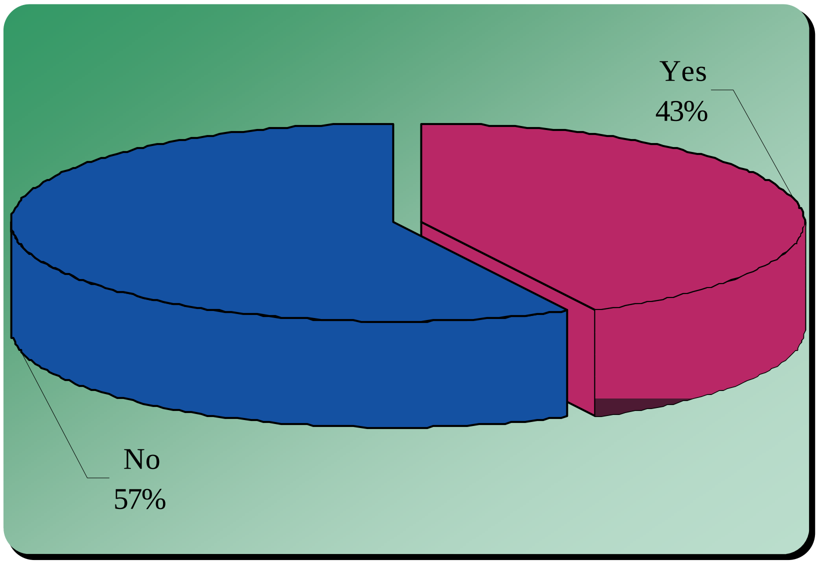
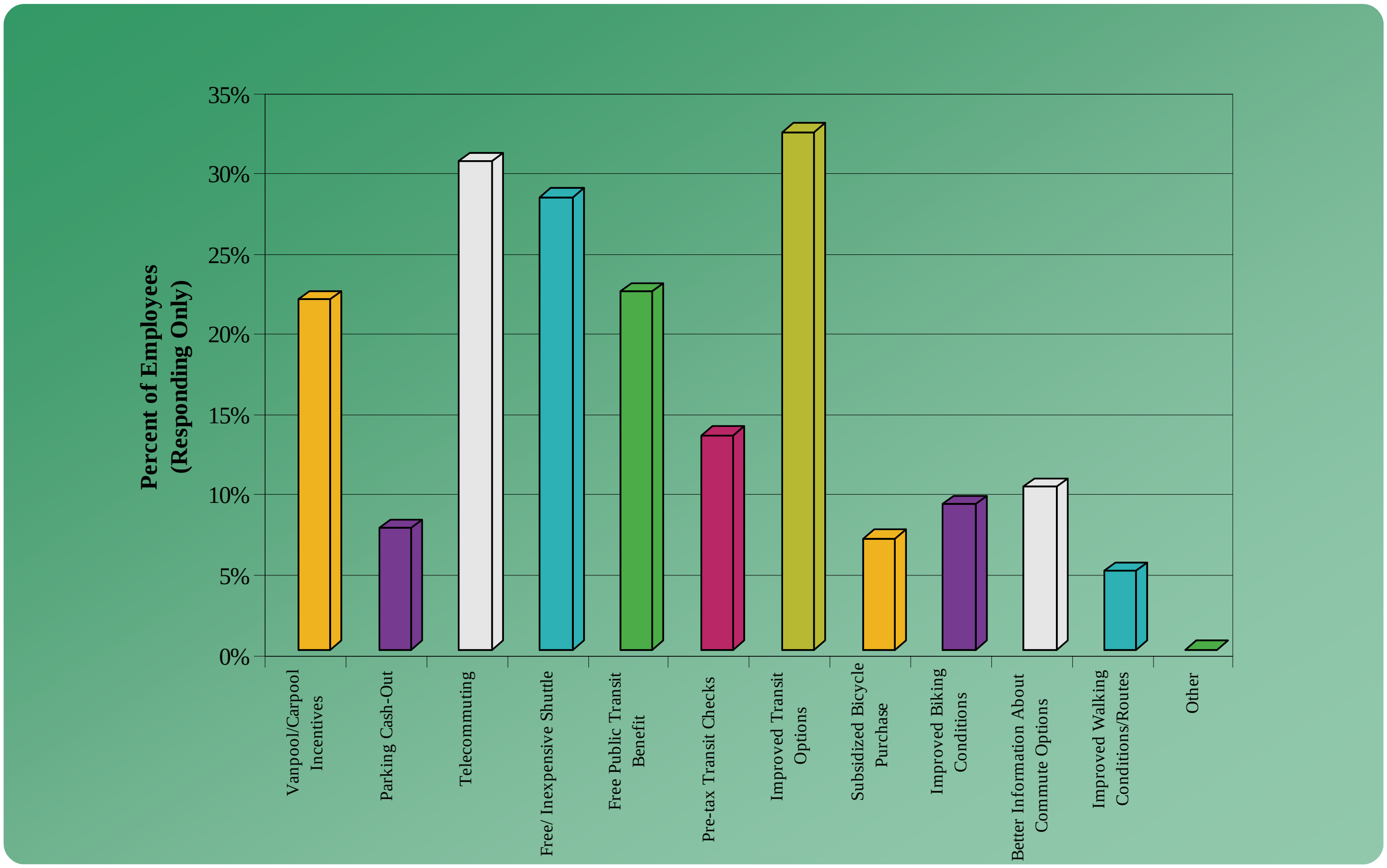


Figure 3.9: Employee Interest in Commute Benefits



Section Four: Conclusion

Conclusion

By committing itself to the Silicon Valley Climate Protection Partnership and through its previous actions on sustainability, the County of San Mateo has taken bold steps toward reducing its impacts on the environment. Staff and policymakers have chosen to take a leadership role in addressing climate change, and this leadership will allow the County to make tough decisions to create and implement innovative approaches to reduce its emissions. With increasing guidance and support from the state and the federal governments, the County should be increasingly empowered to make the necessary changes to promote its vision for a more sustainable future.

This inventory provides an important foundation for County of San Mateo's comprehensive approach to reducing the greenhouse gas emissions from its operations. Specifically, this inventory serves to:

- Establish a baseline for setting emissions reductions targets.
- Identify the largest sources of emissions from local government operations.

This conclusion discusses the inventory as a baseline for emissions targets and suggests steps for the County to move forward to reduce emissions from its internal operations.

4.1 Toward Setting Emissions Reduction Targets

This inventory provides an emissions baseline against which the County can move forward to Milestone Two of ICLEI's Five-Milestone process—setting emissions reduction targets for its municipal operations. The greenhouse gas emissions reduction target represents the percentage by which the County plans to reduce total greenhouse gas emissions in its government operations below base year levels by a chosen future target year. An example target might be a 30 percent reduction in emissions below 2005 levels by 2020. A target provides an objective toward which to strive and against which to measure progress. It allows a local government to quantify its commitment to fighting global warming—demonstrating that the County is serious about its commitment and systematic in its approach.

In selecting a target, it is important to strike a balance between scientific necessity, ambition, and what is realistically achievable. The County will want to give itself enough time to implement chosen emissions reduction measures—but note that the farther out the target year is, the more that the County should pledge to reduce. ICLEI recommends that regardless of the County's chosen long-term emissions reduction target (e.g., 15-year, 40-year), it should establish interim targets for every two- to three-year period. Near-term targets facilitate additional support and accountability, and help to ensure continued momentum around San Mateo County's local climate protection efforts. To monitor the effectiveness of its programs, the County should plan to re-inventory its emissions at least every five years and more frequently if possible. See Appendix E for more information on how to re-inventory the County's emissions.

4.1.1 The Long-Term Goal

ICLEI recommends that County of San Mateo's near-term climate work should be guided by the long-term goal of reducing its emissions by 80 percent to 95 percent from the 2005 baseline level by the year 2050. By referencing a long-term goal that is in accordance with current scientific understanding, the County can demonstrate that it intends to do its part towards addressing greenhouse gas emissions from its internal operations.

It is important to keep in mind that it will be next to impossible for local governments to reduce emissions by 80 to 95 percent without the assistance of state and federal policy changes that create new incentives and new sources of funding for emissions reduction projects and programs. However, in the next 15 years, there is much that local governments can do to reduce emissions independently. It is also important that the County works to reduce its emissions sooner, rather than later: the sooner a stable level of greenhouse gases in the atmosphere is achieved, the less likely we are to face some of the most dire climate change scenarios.

4.1.2 State of California Targets and Guidance

An integral component of the State of California's climate approach has been establishing three core emissions reduction targets at the community level. While these targets are specific to the community-scale, they can be used to

Figure 4.1: California Greenhouse Gas Reduction Targets

On June 1, 2005, California Governor Schwarzenegger signed Executive Order S-3-05 establishing climate change emission reductions targets for the State of California. The California targets are an example of near-, mid- and long-term targets:

-Reduce emissions to 2000 levels by 2010
-Reduce emissions to 1990 levels by 2020
-Reduce emissions to 80 percent below 1990 levels by 2050

inform emissions targets for government operations as well. Figure 4.1 highlights adopted emissions targets for the State. The AB 32 Scoping Plan also provides further guidance on establishing targets for local governments; specifically the Plan suggests creating an emissions reduction goal of 15 percent below “current” levels by 2020. This target has informed many local government’s emission reduction targets for municipal operations—most local governments in California with adopted targets have targets of 15 to 25 percent reductions under 2005 levels by 2020.

4.1.3 Department Targets

The County may benefit from considering department-specific targets for each of the departments that generate emissions within its operations. This allows County staff to do a more in-depth analysis of what is achievable in each sector in the near, mid and long-term, and also provides encourages each department head to consider their department’s impact on the climate and institute a climate-conscious culture in its operations.

4.1.4 Monitoring Progress

ICLEI encourages the County of San Mateo to monitor its progress towards achieving specific emission reduction targets, by re-inventorying emissions every two to three years. A re-inventory (or monitoring inventory) will allow the County to identify any increases in building energy efficiency and conservation, advancements in waste reduction, improvements to the vehicle fleet, etc. This will not only help the County track it’s progress towards reaching its emission reduction targets, but also to critique the success of any projects or policies that may be implemented to reduce emissions. For further information on conducting a monitoring inventory please see Appendix E.

4.2 Creating an Emissions Reduction Strategy

This inventory identifies the major sources of emissions from County of San Mateo’s operations and, therefore, where staff and policymakers will need to target emissions reductions activities if they are to make significant progress toward adopted targets. For example, since County facilities were a major source of emissions from the County’s operations, it is possible that the County could meet near-term targets simply by implementing a few major actions within this sector. In addition, medium-term targets could be met by focusing emissions reduction actions on the employees’ commutes and the County fleet. The long term (2050) target will not be achievable without major reductions in all of those sectors.

Given the results of the inventory, ICLEI recommends that the County focus on the following tasks in order to significantly reduce emissions from its government operations:

- Conduct an energy audit of County buildings and improve energy efficiency where possible;
- Implement energy conservation strategies, such as installing office occupancy sensors, establishing new office energy use policies, and launching fun & friendly energy savings competitions to transform staff energy use behavior;
- Consider installing renewable energy technologies, such as solar, wind or micro-hydro (only after energy efficiency improvements have been made);
- Offer increased public transit options; new shuttle, vanpool and carpool programs; and telecommuting scenarios to eligible employees to reduce emissions from employee commute;
- Continue to convert the fleet to more fuel-efficient vehicles on a replacement basis (retire older, less efficient vehicles);
- Consider using a higher percentage of low-carbon fuels (such as biodiesel and ethanol) in all fleet vehicles;[20]
- Consider purchasing electric vehicles and setting up a charging infrastructure;
- Replace streetlights and traffic signals with more energy efficient LED models; and
- Increase waste diversion by developing reuse, composting and recycling efforts.

Using these strategies as a basis for a more detailed emissions reductions strategy, the County should be able to reduce and reverse its impact upon global warming. In the process, it may also be able to improve the quality of its services, become more efficient with energy, and reduce long-term costs.

[20] A growing number of California local governments have developed biofuel production facilities (see http://www.sfgreasecycle.org/), by gathering waste vegetable and animal fats from local resources—such as restaurants. This may be a viable option for San Mateo County (perhaps in partnership with municipalities). There is growing critique of the overall sustainability of biofuels that are sourced from crop-lands that would have otherwise been used for food production or would have remained virgin forest (South America). It is important to consider the sourcing of your biofuels, and local production of waste oil is one of the best, most sustainable options. The California Air Resources Board will agree upon biofuel standards later this year, as part of the Low-Carbon Fuel Standard.

Appendices

Appendix A: The Local Government Operations Protocol

This inventory follows the standard outlined in the Local Government Operations Protocol, which was adopted in 2008 by the California Air Resources Board (ARB) and serves as the national standard for quantifying and reporting greenhouse emissions from local government operations. This and the other inventories conducted for the Silicon Valley Climate Protection partnership are the first to follow LGOP, representing a strong step toward standardizing how inventories are conducted and reported.

A.1 Local Government Operations Protocol

A.1.1 Background

In 2008, ICLEI, ARB, and the California Climate Action Registry (CCAR) released LGOP to serve as a U.S. supplement to the International Emissions Analysis Protocol. The purpose of LGOP is to provide the principles, approach, methodology, and procedures needed to develop a local government operations greenhouse gas emissions inventory. It leads participants through the process of accurately quantifying and reporting emissions, including providing calculation methodologies and reporting guidance. LGOP guidance is divided into three main parts: identifying emissions to be included in the inventory, quantifying emissions using best available estimation methods, and reporting emissions.

The overarching goal of LGOP is to allow local governments to develop emissions inventories using standards that are consistent, comparable, transparent, and recognized nationally, ultimately enabling the measurement of emissions over time. LGOP adopted five overarching accounting and reporting principles toward this end: relevance, completeness, consistency, transparency and accuracy. Methodologies that did not adhere to these principles were either left out of LGOP or included as Scope 3 emissions. LGOP was created solely to standardize how emissions inventories are conducted and reported; as such it represents a currently accepted standard for inventorying emissions but does not contain any legislative or program-specific requirements. Mandates by the State of California or any other legislative body, while possibly using LGOP as a standard, do not currently exist, and California local governments are not currently required to inventory their emissions. Program-specific requirements, such as ICLEI's Milestones or CCAR's reporting protocol, are addressed in LGOP but should not be confused with LGOP itself.

Also, while LGOP standardizes inventories from government operations, it does not seek to be a wholly accurate inventory of all emissions sources, as certain sources are currently excluded or otherwise impossible to accurately estimate. This and all emissions inventories therefore represent a best estimate of emissions using best available data and calculation methodologies; it does not provide a complete picture of all emissions resulting from San Mateo County's operations, and emissions estimates are subject to change as better data and calculation methodologies become available in the future.

A.1.2 Organizational Boundaries

Setting an organizational boundary for greenhouse gas emissions accounting and reporting is an important first step in the inventory process. The organizational boundary for the inventory determines which aspects of operations are included in the emissions inventory, and which are not. Under LGOP, two control approaches are used for reporting emissions: operational control or financial control. A local government has operational control over an operation if it has full authority to introduce and implement its operating policies at the operation. A local government has financial control if the operation is fully consolidated in financial accounts. If a local government has joint control over an operation, the contractual agreement will have to be examined to see who has authority over operating policies and implementation, and thus the responsibility to report emissions under operational control.[21] Local governments must choose which approach is the most applicable and apply this approach consistently throughout the inventory.

While both control approaches are acceptable, there may be some instances in which the choice may determine whether a source falls inside or outside of a local government's boundary. LGOP strongly encourages local governments to utilize operational control as the organization boundary for a government operations emissions inventory. Operational control is believed to most accurately represent the emissions sources that local governments can most directly influence, and this boundary is consistent with other environmental and air quality reporting program requirements. For this reason, all inventories in the Silicon Valley Climate Protection Partnership are being conducted according to the operational control framework.

A.1.3 Types of Emissions

The greenhouse gases inventoried in this report are described in Section 2.1 As described in LGOP, emissions from each of the greenhouse gases can come in a number of forms:

21 Please see Local Government Operations Protocol for more detail on defining your organizational boundary: http://www.icleiusa.org/programs/climate/ghg-protocol

Stationary or mobile combustion: These are emissions resulting from on-site combustion of fuels (natural gas, diesel, gasoline, etc.) to generate heat, electricity, or to power vehicles and mobile equipment.

Purchased electricity: These are emissions produced by the generation of power from utilities outside of San Mateo County.

Fugitive emissions: Emissions that result from the unintentional release of greenhouse gases into the atmosphere (e.g., leaked refrigerants, methane from waste decomposition, etc.).

Process emissions: Emissions from physical or chemical processing of a material (e.g., wastewater treatment).

A1.4 Quantifying Emissions

Emissions can be quantified two ways:

Measurement-based methodologies refer to the direct measurement of greenhouse gas emissions (from a monitoring system) emitted from a flue of a power plant, wastewater treatment plant, landfill, or industrial facility. This methodology is not generally available for most types of emissions and will only apply to a few local governments that have these monitoring systems.

The majority of the emissions recorded in the inventory can be and will be estimated using **calculation-based methodologies** to calculate their emissions using activity data and emission factors. To calculate emissions, the equation below is used:

Activity Data x Emission Factor = Emissions

Activity data refer to the relevant measurement of energy use or other greenhouse gas–generating processes such as fuel consumption by fuel type, metered annual energy consumption, and annual vehicle mileage by vehicle type. Emissions factors are calculated ratios relating emissions to a proxy measure of activity at an emissions source (e.g., CO_2 generated/kWh consumed). For a list of common emissions calculations see Table 2.2.

The guidelines in LGOP are meant to provide a common method for local governments to quantify and report greenhouse gas emissions by using comparable activity data and emissions factors. However, LGOP recognizes that local governments differ in how they collect data concerning their operations and that many are not able to meet the data needs of a given estimation method. Therefore, LGOP outlines both “recommended” and “alternative” methods to estimate emissions from a given source. In this system, recommended methods are the preferred method for estimating emissions, as they will result in the most accurate estimate for a given emission source. Alternative methods often require less intensive data collection, but are likely to be less accurate. This approach allows local governments to estimate emissions based on the data currently available to them. It also allows local governments that are unable to meet the recommended methods to begin developing internal systems to collect the data needed to meet these methods.

This inventory has used the recommended activity data and emissions factors wherever possible, using alternative methods where necessary. For details on the methodologies used for each sector, see Appendix B.

A.1.5 Reporting Emissions

A.1.5.1 Significance Thresholds

Within any local government's own operations there will be emission sources that fall within Scope 1 and Scope 2 that are minimal in magnitude and difficult to accurately measure. Within the context of local government operations, emissions from leaked refrigerants, backup generators and other septic tanks may be common sources of these types of emissions. For these small, difficult to quantify emission sources, LGOP specifies that up to 5 percent of total emissions can be reported using estimation methods not outlined in LGOP.[22]

In this report, the following emissions fell under the significance threshold and were reported using best available methods:

- Scope 1 CH_4 and N_2O emissions from vehicle fleet

A.1.5.2 Units Used in Reporting Emissions

LGOP requires reporting of individual gas emissions, and this reporting is included in Appendix B. In this narrative report, emissions from all gases released by an emissions source (e.g., stationary combustion of natural gas in facilities) are combined and reported in metric tons of carbon dioxide equivalent (CO_2e). This standard is based on the global warming potential (GWP) of each gas, which is a measure of the amount of warming a greenhouse gas may cause, measured against the amount of warming caused by carbon dioxide. For the GWPs of reported greenhouse gases, see Table 2.1.

A.1.5.3 Information Items

Information items are emissions sources that, for a variety of reasons, are not included as Scope 1, 2, or 3 emissions in the inventory. In order to provide a more complete picture of emissions from San Mateo County's operations, however, these emissions should be quantified and reported.

In this report, the following emissions are included as information items (emission quantities are reported in Appendix B):

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22 In the context of registering emissions with an independent registry (such as the California Climate Action Registry), emissions that fall under the significance threshold are called *de minimis*. This term, however, is not used in LGOP and was not used in this inventory.

- Scope 3 CO_2 emissions from biodiesel consumption to power employee's vehicles
- Ozone depleting chemical used as refrigerants (most notably R-22 and halons)

A common emission that is categorized as an information item are carbon dioxide emissions caused by the combustion of biogenic fuels. Local governments will often burn fuels that are of biogenic origin (wood, landfill gas, organic solid waste, biofuels, etc.) to generate power. Common sources of biogenic emissions are the combustion of landfill gas from landfills or biogas from wastewater treatment plants, as well as the incineration of organic municipal solid waste at incinerators.

Carbon dioxide emissions from the combustion of biogenic fuels are not included in Scope 1 based on established international principles. [23] These principles indicate that biogenic fuels (e.g., wood, biodiesel), if left to decompose in the natural environment, would release CO_2 into the atmosphere, where it would then enter back into the natural carbon cycle. Therefore, when wood or another biogenic fuel is combusted, the resulting CO_2 emissions are akin to natural emissions and should therefore not be considered as human activity-generated emissions. The CH_4 and N_2O emissions, however, would not have occurred naturally and are therefore included as Scope 1 emissions.

A.2 Baseline Years

Part of the local government operations emissions inventory process requires selecting a "performance datum" with which to compare current emissions, or a base year. Local governments should examine the range of data they have over time and select a year that has the most accurate and complete data for all key emission sources. It is also preferable to establish a base year several years in the past to be able to account for the emissions benefits of recent actions. A local government's emissions inventory should comprise all greenhouse gas emissions occurring during a selected *calendar* year.

For the Silicon Valley Climate Protection Partnership inventories, 2005 was chosen as the baseline year, since this year is increasingly becoming the standard for such inventories; the 1990 baseline year for California is usually difficult for most local governments to meet and would not produce the most accurate inventory.

After setting a base year and conducting an emissions inventory for that year, local governments should make it a practice to complete a comprehensive emissions inventory on a regular basis to compare to the baseline year. ICLEI recommends conducting an emissions inventory at least every five years.

23 Methane and nitrous oxide emissions from biogenic fuels are considered Scope 1 stationary combustion emissions and are included in the stationary combustion sections for the appropriate facilities.

Appendix B: LGOP Standard Report

Local Government Operations Standard Inventory Report

1. Local Government Profile

Jurisdiction Name:	County of San Mateo
Street Address:	400 County Center
City, State, ZIP, Country:	Redwood City, CA 94063
Website Address:	www.co.sanmateo.ca.us
Size (sq. miles):	741
Population:	720042
Annual Budget:	$1.45 billion
Employees (Full Time Equivalent):	5464
Climate Zone:	CA Climate Zone 3
Annual Heating Degree Days:	3649*
Annual Cooling Degree Days:	292**
Lead Inventory Contact Name:	Kim Springer
Title:	Resource Conservation Programs Manager
Department:	Public Works
Email:	kspringer@co.sanmateo.ca.us
Phone Number:	(650) 599-1412

* www.energycodes.gov/implement/pdfs/climate_paper_review_draft_rev.pdf
** www7.ncdc.noaa.gov/CDO/CDODivisionalSelect.jsp#

Services Provided:

- [x] Water treatment
- [x] Water distribution
- [x] Wastewater treatment
- [x] Wastewater collection
- [ ] Electric utility
- [x] Fire Protection
- [x] Police
- [ ] Mass transit (buses)
- [ ] Mass transit (light rail)
- [ ] Mass transit (ferries)
- [ ] Schools (primary/secondary)
- [ ] Schools (colleges/universities)
- [x] Solid waste collection
- [x] Solid waste disposal
- [x] Hospitals
- [x] Airport
- [ ] Seaport/shipping terminal
- [x] Marina
- [ ] Stadiums/sports venues
- [ ] Convention center
- [x] Street lighting and traffic signals
- [ ] Natural gas utility
- [ ] Other (Specify below)

Local Government Description:

Our Mission: San Mateo County government protects and enhances the health, safety, welfare and natural resources of the community, and provides quality services that benefit and enrich the lives of the people of this community. We are committed to: the highest standards of public service, a common vision of responsiveness, the highest standards of ethical conduct, treating people with respect and dignity.

2. GHG Inventory Details

Reporting Year:	2005
Protocol Used:	Local Government Operations Protocol, Version 1.0 (September 2008)
Control Approach:	Operational Control

GHG Emissions Summary (All Units in Metric Tons Unless Stated Otherwise)

Note: CO_2e totals listed here are summed totals of the estimated emissions of each inventoried gas based upon their global warming potentials (Appendix E of LGOP)

BUILDINGS & OTHER FACILITIES

SCOPE 1	CO_2e	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6
Stationary Combustion	9,783.650	9,759.071	0.898	0.018			
Fugitive Emissions							
Total Direct Emissions from Buildings & Facilities	9,783.650	9,759.071	0.898	0.018	0.000	0.000	0.000

SCOPE 2	CO_2e	CO_2	CH_4	N_2O
Purchased Electricity	8,774.268	8,702.765	0.516	0.196
Purchased Steam				
District Heating & Cooling				
Total Indirect Emissions from Buildings & Facilities	8,774.268	8,702.765	0.516	0.196

STREETLIGHTS AND TRAFFIC SIGNALS

SCOPE 2	CO_2e	CO_2	CH_4	N_2O
Purchased Electricity	340.125	337.353	0.020	0.008
Total Indirect Emissions from Streetlights and Traffic Signals	340.125	337.353	0.020	0.008

WATER DELIVERY FACILITIES

SCOPE 1	CO_2e	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6
Stationary Combustion	0.367	0.366	0.000	0.000			
Total Direct Emissions from Water Delivery Facilities	0.367	0.366	0.000	0.000	0.000	0.000	0.000

SCOPE 2	CO_2e	CO_2	CH_4	N_2O
Purchased Electricity	46.332	45.955	0.003	0.001
Purchased Steam				
District Heating & Cooling				
Total Indirect Emissions from Water Delivery Facilities	46.332	45.955	0.003	0.001

WASTEWATER FACILITIES

SCOPE 1	CO_2e	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6
Stationary Combustion							
Fugitive Emissions	25.822	0.000	1.230	0.000			
Process Emissions							
Total Direct Emissions from Wastewater Facilities	25.822	0.000	1.230	0.000	0.000	0.000	0.000

AIRPORT FACILITIES

SCOPE 2	CO_2e	CO_2	CH_4	N_2O
Purchased Electricity	125.000	123.981	0.007	0.003
Purchased Steam				
District Heating & Cooling				
Total Indirect Emissions from Buildings & Facilities	125.000	123.981	0.007	0.003

VEHICLE FLEET

SCOPE 1	CO_2e	CO_2	CH_4	N_2O	HFCs	PFCs
Mobile Combustion	5,064.048	4,984.639	0.244	0.240		
Fugitive Emissions	2.431				0.002	
Total Direct Emissions from Vehicle Fleet	5,066.479	4,984.639	0.244	0.240	0.002	0.000

SOLID WASTE FACILITIES

SCOPE 1	CO_2e	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6
Stationary Combustion							
Fugitive Emissions	1,010.940	0.000	48.140	0.000			
Total Direct Emissions from Solid Waste Facilities	1,010.940	0.000	48.140	0.000	0.000	0.000	0.000

WASTE GENERATION

SCOPE 3	CO_2e
Waste All Facilities	1,002.345

INDICATORS	
Short tons of solid waste accepted for disposal	
Short tons of recyclable materials accepted for processing	

EMPLOYEE COMMUTE		
SCOPE 3		CO_2e
	Mobile Combustion	15,341.494
INDICATORS	Vehicle Miles Traveled	
	Number of Vehicles	

INFORMATION ITEMS	
	CO_2e
Employee Commute B100 - Biogenic CO_2	21.266
Employee Commute E100 - Biogenic CO_2	42.439
Refrigerant - R-22	115.668
Total Information Items	179.374

Total Emissions	CO_2e	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6
SCOPE 1	15,887.257	14,744.077	50.512	0.258	0.002	0.000	0.000
SCOPE 2	9,285.725	9,210.054	0.546	0.207			
SCOPE 3	16,343.839	0.000	0.000	0.000			
INFORMATION ITEMS	179.374						

POSSIBLE SOURCES OF OPTIONAL SCOPE 3 EMISSIONS
Employee Commute
Employee Business Travel
Emissions From Contracted Services
Upstream Production of Materials and Fuels
Upstream and Downstream Transportation of Materials and Fuels
Waste Related Scope 3 Emissions
Purchase of Electricity Sold to an End User
Transmission and Distribution Losses from Consumed Electricity
Other Scope 3

POSSIBLE INFORMATION ITEMS
Biogenic $C0_2$ from Combustion
Carbon Offsets Purchased
Carbon Offsets Sold
Renewable Energy Credits (Green Power) Purchased
Renewable Energy Credits Sold (GreenPower)
Ozone-depleting Refrigerants/Fire Suppressants not in LGOP
Other Information Items

Local Government Operations Standard Inventory Report

3. Activity Data Disclosure

Every emission source must be accompanied by a reference for the activity data. This worksheet is meant to assist in recording activity data and the methods used to gat operations. Activity data represent the magnitude of human activity resulting in emissions; data on energy use, fuel consumtion, vehicle miles traveled, and waste genera that are used to compute GHGs. Detailed disclosure should be made of the activity data used and at what quantities. This disclosure should also cite the source(s) of the including whether that methodology is a recommended method or an alternate method.

Deviations from the primary methodology should be explained in detail. All assumptions and estimations should be cited as such. Local governments may also use this spa the rationale for the inclusion or exclusion of optional inventory components. It is good practice to include appropriate citations (such as website URL, report title, etc) and necessary to verify the source and accuracy of the activity data.

BUILDINGS & OTHER FACILITIES (Chapter 6)

SCOPE 1

Stationary Combustion

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit
Natural Gas	CO_2e	Primary	Application of GWP to CH4 and N2O calculations listed below; sum of three primary GHGs (CO2, CH4 and N2O.)	1,838,198	therms
	CO_2	Primary	Known fuel use	1,838,198	therms
	CH_4	Primary	Known fuel use	1,838,198	therms
	N_2O	Primary	Known fuel use	1,838,198	therms
	HFCs				
	PFCs				
	SF_6				
Propane (Generators)	CO_2e	Primary	Application of GWP to CH4 and N2O calculations listed below; sum of three primary GHGs (CO2, CH4 and N2O.)	974	gallons
	CO_2	Primary	Known fuel use	974	gallons
	CH_4	Primary	Known fuel use	974	gallons
	N_2O	Primary	Known fuel use	974	gallons
	HFCs				
	PFCs				
	SF_6				

SCOPE 2

Purchased Electricity

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit
Electricity	CO_2e	Primary	Application of GWP to CH4 and N2O calculations listed below; sum of three primary GHGs (CO2, CH4 and N2O.)	39,222,980	kWh
	CO_2	Primary	Known Electricity Use	39,222,980	kWh
	CH_4	Primary	Known Electricity Use	39,222,980	kWh
	N_2O	Primary	Known Electricity Use	39,222,980	kWh
	HFCs				
	PFCs				
	SF_6				

STREETLIGHTS AND TRAFFIC SIGNALS (Chapter 6.2)

SCOPE 2

Purchased Electricity

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit
Electricity	CO_2e	Primary	Application of GWP to CH4 and N2O calculations listed below; sum of three primary GHGs (CO2, CH4 and N2O.)	1,520,436	kWh
	CO_2	Primary	Known Electricity Use	1,520,436	kWh
	CH_4	Primary	Known Electricity Use	1,520,436	kWh
	N_2O	Primary	Known Electricity Use	1,520,436	kWh
	HFCs				
	PFCs				
	SF_6				

WATER DELIVERY FACILITIES (Chapter 6)

SCOPE 1

Stationary Combustion

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit
Natural Gas	CO_2e	Primary	Application of GWP to CH4 and N2O calculations listed below; sum of three primary GHGs (CO2, CH4 and N2O.)	69	therms
	CO_2	Primary	Known Fuel Use	69	therms
	CH_4	Primary	Known Fuel Use	69	therms
	N_2O	Primary	Known Fuel Use	69	therms
	HFCs				
	PFCs				
	SF_6				

SCOPE 2

Purchased Electricity

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit
Electricity	CO_2e	Primary	Application of GWP to CH4 and N2O calculations listed below; sum of three primary GHGs (CO2, CH4 and N2O.)	207,115	kWh
	CO_2	Primary	Known Electricity Use	207,115	kWh
	CH_4	Primary	Known Electricity Use	207,115	kWh
	N_2O	Primary	Known Electricity Use	207,115	kWh
	HFCs				
	PFCs				
	SF_6				

WASTEWATER FACILITIES (Chapters 6 and 10)

SCOPE 1

Fugitive Emissions

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit
Septic Systems	CO_2e	Primary	Application of GWP to CH4	124	people
Septic Systems	CH_4	Alternate	Population Served	124	people

AIRPORT FACILITIES (Chapter 6)

SCOPE 2

Purchased Electricity

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit
Electricity	CO_2e	Primary	Application of GWP to CH4 and N2O	558,779	kWh
	CO_2	Primary	Known Electricity Use	558,779	kWh
	CH_4	Primary	Known Electricity Use	558,779	kWh
	N_2O	Primary	Known Electricity Use	558,779	kWh
	HFCs				
	PFCs				
	SF_6				

VEHICLE FLEET (Chapter 7)

SCOPE 1

Mobile Combustion

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit
Gasoline	CO_2e	Primary	Application of GWP to CH4 and N2O calculations listed below; sum of three primary GHGs (CO2, CH4 and N2O.)	456,986	gallons
	CO_2	Primary	Known Fuel Use	456,986	gallons
	CH_4	Primary (Off-Road) Alternate (On-Road)	Known Fuel Use	456,986	gallons
	N_2O	Primary (Off-Road) Alternate (On-Road)	Known Fuel Use	456,986	gallons
	HFCs				
	PFCs				
	SF_6				
Diesel	CO_2e	Primary	Application of GWP to CH4 and N2O calculations listed below; sum of three primary GHGs (CO2, CH4 and N2O.)	91,086	gallons
	CO_2	Primary	Known Fuel Use	91,086	gallons
	CH_4	Primary (Off-Road) Alternate (On-Road)	Known Fuel Use	91,086	gallons
	N_2O	Primary (Off-Road) Alternate (On-Road)	Known Fuel Use	91,086	gallons
	HFCs				
	PFCs				
	SF_6				
Compressed Natural Gas (CNG)	CO_2e	Primary	Application of GWP to CH4 and N2O calculations listed below; sum of three primary GHGs (CO2, CH4 and N2O.)	6,919	therms
	CO_2	Primary	Known Fuel Use	6,919	therms
	CH_4	Alternate	Known Fuel Use	6,919	therms
	N_2O	Alternate	Known Fuel Use	6,919	therms
	HFCs				
	PFCs				
	SF_6				
Propane (OFF ROAD)	CO_2e	Primary	Application of GWP to CH4 and N2O calculations listed below; sum of three primary GHGs (CO2, CH4 and N2O.)	6	gallons
	CO_2	Primary	Known Fuel Use	6	gallons
	CH_4	Primary	Known Fuel Use	6	gallons
	N_2O	Primary	Known Fuel Use	6	gallons
	HFCs				
	PFCs				
	SF_6				

Fugitive Emissions

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit
Refrigerants	R-134a	Primary	Mass Balance Method	2	kg

SOLID WASTE FACILITIES (Chapters 6 and 9)

SCOPE 1

Fugitive Emissions

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit
Waste In Place	CH_4	Primary	No LFG Collection System (FOD model)	88,018	tons waste

WASTE GENERATION (Scope 3)

SCOPE 3

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit
Generated Waste	CH_4	Primary/Alternate	Combination of known waste weight (primary) and estimated waste weight based upon volume and number of containers and pick-up frequency (alternate)	3,953	tons

EMPLOYEE COMMUTE (Scope 3)

SCOPE 3

Stationary Combustion

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit
Gasoline	CO_2e	Primary	Application of GWP to CH4 and N2O calculations listed below; sum of three primary GHGs (CO2, CH4 and N2O.)	1,670,600	gallons
	CO_2	Alternate	Proxy Year Estimated Fuel Use-based upon daily vehicle miles traveled for all respondents extrapolated to represent all local government employees	1,670,600	gallons
	CH_4	Alternate	Proxy Year Estimated Fuel Use-based upon daily vehicle miles traveled for all respondents extrapolated to represent all local government employees	1,670,600	gallons
	N_2O	Alternate	Proxy Year Estimated Fuel Use-based upon daily vehicle miles traveled for all respondents extrapolated to represent all local government employees	1,670,600	gallons
	HFCs				
	PFCs				
	SF_6				
Diesel	CO_2e	Primary	Application of GWP to CH4 and N2O calculations listed below; sum of three primary GHGs (CO2, CH4 and N2O.)	27,649	gallons
	CO_2	Alternate	Proxy Year Estimated Fuel Use-based upon daily vehicle miles traveled for all respondents extrapolated to represent all local government employees	27,649	gallons
	CH_4	Alternate	Proxy Year Estimated Fuel Use-based upon daily vehicle miles traveled for all respondents extrapolated to represent all local government employees	27,649	gallons
	N_2O	Alternate	Proxy Year Estimated Fuel Use-based upon daily vehicle miles traveled for all respondents extrapolated to represent all local government employees	27,649	gallons
	HFCs				
	PFCs				
	SF_6				

Biodiesel (B100)	CO_2e	Primary	Application of GWP to CH4 and N2O calculations listed below; sum of three primary GHGs (CO2, CH4 and N2O.)	2,248	gallons	Online and paper surveys of all employees; see Appendix C of Narrative report for examples; Data in possession of Kim Springer, Public Works.
	CO_2	Alternate	Proxy Year Estimated Fuel Use-based upon daily vehicle miles traveled for all respondents extrapolated to represent all local government employees	2,248	gallons	Online and paper surveys of all employees; see Appendix C of Narrative report for examples; Data in possession of Kim Springer, Public Works.
	CH_4	Alternate	Proxy Year Estimated Fuel Use-based upon daily vehicle miles traveled for all respondents extrapolated to represent all local government employees	2,248	gallons	Online and paper surveys of all employees; see Appendix C of Narrative report for examples; Data in possession of Kim Springer, Public Works.
	N_2O	Alternate	Proxy Year Estimated Fuel Use-based upon daily vehicle miles traveled for all respondents extrapolated to represent all local government employees	2,248	gallons	Online and paper surveys of all employees; see Appendix C of Narrative report for examples; Data in possession of Kim Springer, Public Works.
	HFCs					
	PFCs					
	SF_6					

Ethanol (E100)	CO_2e	Primary	Application of GWP to CH4 and N2O calculations listed below; sum of three primary GHGs (CO2, CH4 and N2O.)	7,633	gallons	Online and paper surveys of all employees; see Appendix C of Narrative report for examples; Data in possession of Kim Springer, Public Works.
	CO_2	Alternate	Proxy Year Estimated Fuel Use-based upon daily vehicle miles traveled for all respondents extrapolated to represent all local government employees	7,633	gallons	Online and paper surveys of all employees; see Appendix C of Narrative report for examples; Data in possession of Kim Springer, Public Works.
	CH_4	Alternate	Proxy Year Estimated Fuel Use-based upon daily vehicle miles traveled for all respondents extrapolated to represent all local government employees	7,633	gallons	Online and paper surveys of all employees; see Appendix C of Narrative report for examples; Data in possession of Kim Springer, Public Works.
	N_2O	Alternate	Proxy Year Estimated Fuel Use-based upon daily vehicle miles traveled for all respondents extrapolated to represent all local government employees	7,633	gallons	Online and paper surveys of all employees; see Appendix C of Narrative report for examples; Data in possession of Kim Springer, Public Works.
	HFCs					
	PFCs					
	SF_6					

INFORMATION ITEMS

Fugitive Emissions

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit	Data Sources and References
Ozone Depleting Refrigerants	R-22	Primary	Mass Balance Method	68	kg	Kim Springer, Public Works, (650) 599-1412, kspringer@co.sanmateo.ca.us

Mobile Combustion (Employee Commute)

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit	Data Sources and References
Biogenic Emissions - Biodiesel (B100)	CO_2	Alternate	Proxy Year Estimated Fuel Use-based upon daily vehicle miles traveled for all respondents extrapolated to represent all local government employees	2,248	gallons	Online and paper surveys of all employees; see Appendix C of Narrative report for examples; Data in possession of Kim Springer, Public Works.
Biogenic Emissions - Ethanol (E100)	CO_2	Alternate	Proxy Year Estimated Fuel Use-based upon daily vehicle miles traveled for all respondents extrapolated to represent all local government employees	7,633	gallons	Online and paper surveys of all employees; see Appendix C of Narrative report for examples; Data in possession of Kim Springer, Public Works.

POSSIBLE SOURCES OF OPTIONAL SCOPE 3 EMISSIONS

Employee Commute
Employee Business Travel
Emissions From Contracted Services
Upstream Production of Materials and Fuels
Upstream and Downstream Transportation of Materials and Fuels
Waste Related Scope 3 Emissions
Purchase of Electricity Sold to an End User
Transmission and Distribution Losses from Consumed Electricity
Other Scope 3

POSSIBLE INFORMATION ITEMS

Biogenic CO_2 from Combustion
Carbon Offsets Purchased
Carbon Offsets Sold
Renewable Energy Credits (Green Power) Purchased
Renewable Energy Credits Sold (GreenPower)
Ozone-depleting Refrigerants/Fire Suppressants not in LGOP
Other Information Items

Local Government Operations Standard Inventory Report

4. Calculation Methodology Disclosure

In addition to activity data, every emission source must be accompanied by the emission factor used, a reference for each emission factor, and the calculation methodology used to quantify emissions. The use of default emission factors from this Protocol should be identified as an *alternate* emission factor.

Deviations from the default emission factors should be explained. All assumptions and estimations should be cited as such. Local governments may also use this space in the reporting format to discuss the rationale for selecting an alternate emission factor. Local governments must include the value of the alternate emission factor (emissions per unit) and identify the year (or range of years) for which the emission factors are specifically applicable. It is good practice to include appropriate citations (such as website URL, report title, etc) and all contact and information that is necessary to verify the source and accuracy of the emission factors so that consistent emission factors can be obtained in the future.

BUILDINGS & OTHER FACILITIES (Chapter 6)

SCOPE 1

Stationary Combustion

Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Natural Gas	CO_2e	Default	Various Global Warming Potentials (GWP)	LGOP v1 Table E.1
	CO_2	Default	53.06 kg/MMBtu	LGOP v1 Table G.1
	CH_4	Default	5 g/MMBtu	LGOP v1 Table G.3
	N_2O	Default	0.1 g/MMBtu	LGOP v1 Table G.3
	HFCs			
	PFCs			
	SF_6			

Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Propane (Generators)	CO_2e	Default	Various Global Warming Potentials (GWP)	LGOP v1 Table E.1
	CO_2	Default	5.74 kg / gallon	LGOP v1 Table G.1
	CH_4	Default	11 g/MMBtu	LGOP v1 Table G.3
	N_2O	Default	.6 g/MMBtu	LGOP v1 Table G.3
	HFCs			
	PFCs			
	SF_6			

SCOPE 2

Purchased Electricity

Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Electricity	CO_2e	Default	Various Global Warming Potentials (GWP)	LGOP v1 Table E.1
	CO_2	Default	489.2 lbs/MWh	PG&E (2005); LGOP v1 Table G.5
	CH_4	Default	0.029 lbs/MWh	CA Grid Average (2004 proxy); LGOP v1 Table G.6
	N_2O	Default	0.011 lbs/MWh	CA Grid Average (2004 proxy); LGOP v1 Table G.6
	HFCs			
	PFCs			
	SF_6			

STREETLIGHTS AND TRAFFIC SIGNALS (Chapter 6.2)

SCOPE 2

Purchased Electricity

Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Electricity	CO_2e	Default	Various Global Warming Potentials (GWP)	LGOP v1 Table E.1
	CO_2	Default	489.2 lbs/MWh	PG&E (2005); LGOP v1 Table G.5
	CH_4	Default	0.029 lbs/MWh	CA Grid Average (2004 proxy); LGOP v1 Table G.6
	N_2O	Default	0.011 lbs/MWh	CA Grid Average (2004 proxy); LGOP v1 Table G.6
	HFCs			
	PFCs			
	SF_6			

WATER DELIVERY FACILITIES (Chapter 6)				
SCOPE 1				
Stationary Combustion				
Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Natural Gas	CO_2e	Default	Various Global Warming Potentials (GWP)	LGOP v1 Table E.1
	CO_2	Default	53.06 kg/MMBtu	LGOP v1 Table G.1
	CH_4	Default	5 g/MMBtu	LGOP v1 Table G.3
	N_2O	Default	0.1 g/MMBtu	LGOP v1 Table G.3
	HFCs			
	PFCs			
	SF_6			
SCOPE 2				
Purchased Electricity				
Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Electricity	CO_2e	Default	Various Global Warming Potentials (GWP)	LGOP v1 Table E.1
	CO_2	Default	489.2 lbs/MWh	PG&E (2005); LGOP v1 Table G.5
	CH_4	Default	0.029 lbs/MWh	CA Grid Average (2004 proxy); LGOP v1 Table G.6
	N_2O	Default	0.011 lbs/MWh	CA Grid Average (2004 proxy); LGOP v1 Table G.6
	HFCs			
	PFCs			
	SF_6			

WASTEWATER FACILITIES (Chapters 6 and 10)				
SCOPE 1				
Fugitive Emissions				
Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Septic Systems	CO_2e	Default	Various Global Warming Potentials (GWP)	LGOP v1 Table E.1
Septic Systems	CH_4	Alternate	See LGOP v1 Equation 10.6	LGOP v1 Equation 10.6

AIRPORT FACILITIES (Chapter 6)				
SCOPE 2				
Purchased Electricity				
Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Electricity	CO_2e	Default	Various Global Warming Potentials (GWP)	LGOP v1 Table E.1
	CO_2	Default	489.2 lbs/MWh	PG&E (2005); LGOP v1 Table G.5
	CH_4	Default	0.029 lbs/MWh	CA Grid Average (2004 proxy); LGOP v1 Table G.6
	N_2O	Default	0.011 lbs/MWh	CA Grid Average (2004 proxy); LGOP v1 Table G.6
	HFCs			
	PFCs			
	SF_6			

VEHICLE FLEET (Chapter 7)				
SCOPE 1				
Mobile Combustion				
Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Gasoline	CO_2e	Default	Various Global Warming Potentials (GWP)	LGOP v1 Table E.1
	CO_2	Default	8.81 kg/gallon	LGOP v1 Table G.9
	CH_4	Default	Varies by model year	LGOP v1 Table G.10; Table G.12 for other equipment
	N_2O	Default	Varies by model year	LGOP v1 Table G.10; Table G.12 for other equipment
	HFCs			
	PFCs			
	SF_6			

Diesel	CO_2e	Default	Various Global Warming Potentials (GWP)	LGOP v1 Table E.1
	CO_2	Default	10.15 kg/gallon	LGOP v1 Table G.9
	CH_4	Default	Varies by model year	LGOP v1 Table G.10; Table G.12 for other equipment
	N_2O	Default	Varies by model year	LGOP v1 Table G.10; Table G.12 for other equipment
	HFCs			
	PFCs			
	SF_6			

Compressed Natural Gas (CNG)	CO_2e	Default	Various Global Warming Potentials (GWP)	LGOP v1 Table E.1
	CO_2	Default	0.054 kg / standard cubic ft.	LGOP v1 Table G.9
	CH_4	Default	1.966 g / mile (Heavy Duty Vehicles)	LGOP v1 Table G.11
	N_2O	Default	0.175 g / mile (Heavy Duty Vehicles)	LGOP v1 Table G.11
	HFCs			
	PFCs			
	SF_6			

Propane (OFF ROAD)	CO_2e	Default	Various Global Warming Potentials (GWP)	LGOP v1 Table E.1
	CO_2	Default	5.788 kg/gallon	LGOP v1 Table G.9
	CH_4	Default	0.066 g / mile (Heavy Duty Vehicles)	LGOP v1 Table G.11
	N_2O	Default	0.175 g / mile (Heavy Duty Vehicles)	LGOP v1 Table G.11
	HFCs			
	PFCs			
	SF_6			

Fugitive Emissions

Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Refrigerants	R-134a	None	GWP-1,300	LGOP v1 Table E.1

SOLID WASTE FACILITIES (Chapters 6 and 9)

SCOPE 1

Fugitive Emissions

Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Waste in Place	CO_2e	Default	Various Global Warming Potentials (GWP)	LGOP v1 Table E.1
	CO_2			
	CH_4	Default/Alternate	FOD model factors	LGOP v1 Tables 9.3-9.7; LGOP v1 Equation 9.2
	N_2O			
	HFCs			
	PFCs			
	SF_6			

WASTE GENERATION (Scope 3)

SCOPE 3

Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Generated Waste	CH_4	Alternate	Varies by waste type	EPA Waste Reduction Model http://www.epa.gov/climatechange/wycd/waste/calculators/Warm_home.html; Public Administration waste charaterization provided by CIWMB

EMPLOYEE COMMUTE (Scope 3)

SCOPE 3

Mobile Combustion

Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Gasoline	CO_2e	Default	Various Global Warming Potentials (GWP)	LGOP v1 Table E.1
	CO_2	Default	8.81 kg/gallon	LGOP v1 Table G.9
	CH_4	Default	0.02990 g/mi (cars)	LGOP v1 Table G.13
	N_2O	Default	.03413 g/mi (cars)	LGOP v1 Table G.13
	HFCs			
	PFCs			
	SF_6			
Diesel	CO_2e	Default	Various Global Warming Potentials (GWP)	LGOP v1 Table E.1
	CO_2	Default	10.15 kg/gallon	LGOP v1 Table G.9
	CH_4	Default	.00098 g/mi (trucks)	LGOP v1 Table G.13
	N_2O	Default	.00148 g/mi (trucks)	LGOP v1 Table G.13
	HFCs			
	PFCs			
	SF_6			
Biodiesel (B100)	CO_2e	Default	Various Global Warming Potentials (GWP)	LGOP v1 Table E.1
	CO_2	Default	SEE INFORMATION ITEMS BELOW	
	CH_4	Default	.00098 g/mi (trucks)	CACP Software
	N_2O	Default	.00148 g/mi (trucks)	CACP Software
	HFCs			
	PFCs			
	SF_6			
Ethanol (E100)	CO_2e	Default	Various Global Warming Potentials (GWP)	LGOP v1 Table E.1
	CO_2	Default	SEE INFORMATION ITEMS BELOW	LGOP v1 Table G.9
	CH_4	Default	.055 g/mi (trucks)	LGOP v1 Table G.13
	N_2O	Default	.067 g/mi (trucks)	LGOP v1 Table G.13
	HFCs			
	PFCs			
	SF_6			

INFORMATION ITEMS

Fugitive Emissions

Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Ozone Depleting Refrigerants	R-22	None	GWP-1,700	http://www.epa.gov/ozone/science/ods/classone.html

Mobile Combustion (Employee Commute)

Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Biogenic Emissions - Biodiesel (B100)	CO_2	None	9.46 kg / gallon	LGOP v1 Table G.9
Biogenic Emissions - Ethanol (E100)	CO_2	None	5.56 kg / gallon	LGOP v1 Table G.9

POSSIBLE SOURCES OF OPTIONAL SCOPE 3 EMISSIONS	POSSIBLE INFORMATION ITEMS
Employee Commute	Biogenic C02 from Combustion
Employee Business Travel	Carbon Offsets Purchased
Emissions From Contracted Services	Carbon Offsets Sold
Upstream Production of Materials and Fuels	Renewable Energy Credits (Green Power) Purchased
Upstream and Downstream Transportation of Materials and Fuels	Renewable Energy Credits Sold (GreenPower)
Waste Related Scope 3 Emissions	Ozone-depleting Refrigerants/Fire Suppressants not in LGOP
Purchase of Electricity Sold to an End User	Other Information Items
Transmission and Distribution Losses from Consumed Electricity	
Other Scope 3	

Appendix C: Employee Commute

Emissions from employee commutes make up an important optional source of emissions from any local government's operations. The scale of emissions from employee commutes is often large in comparison with many other facets of local government operations, and local governments can affect how their employees get to and from work through a variety of incentives. For this reason, ICLEI recommends estimating emissions from employee commutes as part of a complete government operations greenhouse gas emissions inventory.

To assist in the data collection process, ICLEI provided the jurisdictions with both an online and a paper copy of an employee commute survey.[24] The questions in the survey were aimed at finding three categories of information:

- **Activity data** to calculate emissions from employee commute (vehicles miles traveled, vehicle type, vehicle model year) both current and in 2005.
- **Indicator data** to help the County understand how much time and money employees spend as they commute, as well as how many employees use alternative modes of transportation to get to work.
- **Policy data** that will serve as guidance for the County as it adopts policies aimed at reducing emissions from employee commutes. These questions asked employees for their interest in alternative modes of transportation as well as what policies would be most effective in allowing them to switch modes of transportation away from driving alone.

This section provides the emissions estimation methodology and both surveys. Individual survey results are in the possession of San Mateo County staff.

C.1 Methodology Summary

The methodology for estimating the employee commute emissions portion of the inventory is similar to the mobile emissions methodology outlined in the mobile emissions section of Appendix B. The County administered the employee commute survey to 5,464current employees working for the City, and 1,086 employees responded to the

24 The paper survey was administered only to employees that do not have access to a computer. The survey asked slightly different questions but was aimed at garnering the same emissions and policy-relevant data as the electronic survey.

survey (a response rate of 20 percent). The survey was administered in 2008 and current data was used as a proxy for 2005 data. Both full time and part-time employee data were included.

To calculate emissions, the survey collected the following information:

- The number of days and number of miles employees drive alone to work (one-way) in an average week
- The number of days they carpooled and how often they drove the carpool in an average week
- The vehicle type of their vehicle and the type of fuel consumed

These weekly data were then converted into annual VMT estimates by the following equation:

Number of days driven to work/week x to-work commute distance x 2 x 48 weeks worked/year

Actual CO_2e emissions from respondents' vehicles were calculated by converting vehicle miles traveled per week by responding employees into annual fuel consumption by fuel type (gasoline, diesel). The VMT data collected were converted to fuel consumption estimates using fuel economy of each vehicle type.[25]

ICLEI then extrapolated estimated fuel consumption to represent all 5,464 of San Mateo County's employees in 2005. This was a simple extrapolation, multiplying the estimated fuel consumption number by the appropriate factor to represent all current employees. For example, if 33.3 percent of employees responded, fuel consumption numbers were tripled to estimate fuel consumption for all employees. This is not a statistical analysis and no uncertainty has been calculated as there is uncertainty not only at the extrapolation point but also in the calculation of actual emissions. Therefore, the resulting calculated emissions should be seen as directional and not as statistically valid.

25 Fuel efficiency estimates from www.fueleconomy.gov, EPA *Green Fleets Guide* and other national sources.

C.2 Electronic Employee Commute Survey

1. Introduction
The purpose of this survey is to gather information on your commute to work so your employer can offer the best transportation options to you while reducing the jurisdiction's impact on the environment. The survey should take no more than 15 minutes.

Unless otherwise indicated, all questions refer to a ONE-WAY commute TO WORK only. Please do not include any traveling you do during work hours (meetings, site visits, etc). Any question with an asterisk (*) next to it requires an answer in order to proceed.

Please note that this survey is completely anonymous. We will not collect or report data on any individuals who respond to the survey.

Thank you very much.

2. Workplace
Please provide the following information regarding your workplace. Click "Next" at the bottom when finished or click "Prev" to go back.

*1. What local government do you currently work for?
Atherton
Belmont
Brisbane
Burlingame
Campbell
Colma
Cupertino
Daly City
East Palo Alto
Foster City
Gilroy
Half Moon Bay
Los Altos
Los Gatos
Milpitas
Mountain View
Pacifica
Portola Valley
Redwood City
San Bruno
San Carlos
San Mateo County
Santa Clara
Santa Clara County
Santa Cruz County
Saratoga
South San Francisco
Woodside

*2. What department do you work in?

3. Commuter Background Information
Please provide the following information regarding your background. Click "Next" at the bottom when finished or click "Prev" to go back.

*1. What city/town do you live in?

*2. How many miles do you live from your place of work?
(please enter a whole number)

3. How many minutes does your commute to work typically take?
(please enter a whole number)

4. In a typical week, how much money do you spend on your ROUND TRIP commute? (transit fees, gas, tolls, etc-please enter a number)

5. If you drive to work, what type of vehicle do you usually drive?
Full-size auto
Mid-size auto
Compact/hybrid
Light truck/SUV/Pickup
Van
Heavy Truck
Motorcycle/scooter

6. What year is your vehicle?
(please enter a four digit year)

7. What type of fuel does your vehicle use?
Gas
Diesel
Biodiesel (B20)
Biodeisel (B99 or B100)
Electric
Other (please specify-if Ethanol please indicate grade)

4. Employment Information
Please provide the following information regarding your employment. Click "Next" at the bottom when finished or click "Prev" to go back.

1. Do you typically travel to work between 6-9 am Monday-Friday?
Yes
No
If No, please specify what time of day you commute:

2. Does your position allow you to have flexible hours or to telecommute?
Yes
No

*3. Are you a full time employee or part time employee?
Full
Part

5. Part Time Employees
Please provide the following information regarding your part time employment. Click "Next" at the bottom when finished or click "Prev" to go back.

*1. What is the average number of days you work per week?
(please enter a number)

6. Current Daily Commute
Please provide the following information regarding your current daily commute. Click "Next" at the bottom when finished or click "Prev" to go back.

*1. In a typical week, do you drive to work alone at least once?
Yes
No

7. Drive Alone
Click "Next" at the bottom when finished or click "Prev" to go back.

*1. How many DAYS a week do you drive alone to work?
(please enter a number)

*2. How many MILES PER DAY do you drive TO WORK ONLY?
(please enter a number)

8. Carpool
Click "Next" at the bottom when finished or click "Prev" to go back.

*1. In a typical week, do you carpool to work at least once?
Yes
No

9. Carpool
*1. How many DAYS a week do you carpool?
(please enter a number)

*2. How many MILES do you drive TO WORK ONLY when you carpool?
(please enter a number)

3. How many PEOPLE are in your carpool?
(please enter a number)

*4. How many DAYS a week are you the driver of the carpool?
(please enter a number)

10. Public Transit
*1. In a typical week, do you take public transit to work at least once?
Yes
No

11. Public Transit
*1. How many DAYS a week do you take public transit TO WORK?
(please enter a number)

2. What type of public transit do you take TO WORK?
SamTrans
BART
Caltrain
VTA Bus
VTA Rail
ACE Train
Capitol Corridor
City Operated Transit
Paratransit
Other (please specify)

12. Bike/Walk
*1. In a typical week, do you bike or walk to work at least once?
Yes
No

13. Bike/Walk
1. How many DAYS a week do you bike to work?
(please enter a number)

2. How many DAYS a week do you walk to work?
(please enter a number)

14. Telecommute

1. If you telecommute:
How many DAYS do you telecommute in a typical week?
(please enter a number)
If you do not telecommute, leave this question blank.

15. Commute in Base Year
Please provide the following information regarding your commute in 2005.

*1. Did you work for us in 2005?
Yes
No

16. Commute in Base Year
Please provide the following information regarding your commute in your base year.

*1. In 2005, did you typically commute by the same mode(s) as you do now?
Yes
No

17. Commute in Base Year
Please provide the following information regarding your commute change.

1. Why did you change your commute mode?

18. 2005 Daily Commute
Please provide the following information regarding your 2005 daily commute.

*1. In 2005, did you typically drive to work alone at least once a week?
Yes
No

19. Drive Alone
*1. In 2005, how many DAYS a week did you typically drive alone?
(please enter a number)

*2. In 2005, how many MILES a day did you typically drive TO WORK ONLY?
(please enter a number)

20. Carpool
*1. In 2005, did you carpool at least once in a typical week?
Yes
No

21. Carpool
*1. In 2005, how many DAYS did you typically carpool in a week?
(please enter a number)

*2. In 2005, how many MILES did you typically drive TO WORK when you carpooled?
(please enter a number)

*3. In 2005, how many DAYS in a typical week were you the driver of your carpool?
(please enter a number)

22. Public Transit
*1. In 2005, did you typically take public transit to work at least once a week?
Yes
No

23. Public Transit
*1. In 2005, how many days in a typical week did you take public transit TO WORK?
(please enter a number)

2. In 2005, what type of public transit did you take TO WORK?
SamTrans
BART
VTA Bus
VTA Rail
ACE Train
Capitol Corridor
City Operated Transit
Paratransit
Other (please specify)

24. Bike/Walk
*1. In 2005, did you typically bike or walk to work at least once a week?
Yes
No

25. Bike/Walk
1. In 2005, how many DAYS did you typically bike to work in a week?
(please enter a number)

2. In 2005, how many DAYS did you typically walk to work in a week?
(please enter a number)

26. Telecommute
1. If you telecommuted in 2005:
How many DAYS in a typical week in 2005 did you telecommute?
(please enter a number)
If you did not telecommute in 2005, leave this question blank.

27. Commute Preference Information
Please answer the following questions regarding your CURRENT commute.

1. Why have you chosen your current commute mode?

2. Would you consider taking any of the following transportation modes? (check all that apply):
Public Transportation
Carpooling
Vanpooling
Bicycling
Walking
Other (please specify)

*3. Is there a transit route that you would use to commute by public transit?
Yes
No

4. If no to question 3, please explain why not.

5. If you drive alone, which, if any, of the following benefits would encourage you to take alternative forms of transportation? (check all that apply)
Vanpool/carpool incentives
Pre-tax transit checks
Parking cash-out (reimbursement to give up your parking spot)
Improved transit options
Improved walking routes/conditions
Telecommuting option
Free/inexpensive shuttle
Free public transit benefit
Subsidizing bicycle purchase
Improved bike routes/conditions
Better information about my commute options
None of the above
Other (please specify)

28. Comments

1. If you have other concerns or issues related to your commute, or if something we should know about was not captured in any survey questions, please describe below.

29. Thank You
Thank you for responding to this survey!

C.3 Paper Employee Commute Survey

<Insert Logo Here>

< *Jurisdiction name*> Employee Commute Survey

<*Date*>*:*

To all of our employees:

As you may be aware, <*local government name*> is actively working to reduce its impact on the environment. As part of this effort, we are collecting information on our employee's commuting patterns and preferences. This will help us to better understand what impact our employees' commutes are having on climate change *and* to provide ways to make your commute easier and less expensive.

Please take 15 minutes to fill out this survey created by ICLEI-Local Governments for Sustainability. **Please complete the survey by <*due date*> and return to <*name*> in the <*department*>*.***

This survey is completely anonymous. We will not be collecting or reporting any individual responses.

If you have any questions regarding the survey, please feel free to contact me at <*phone number*>*.*

Thank you very much,

<*Your name*>

< *Jurisdiction name*> Employee Commute Survey

Unless otherwise indicated, all questions refer to a one-way commute to work only. Please do not include any traveling you do during work hours (e.g., meetings, site visits, etc). Asterisks (*) indicate questions that require an answer.

A. Commuter Background Information

1. About how many miles do you live from work?
   ____
2. What city/town do you live in?
   ____
3. * *3.* If you drive to work, what type of vehicle do you usually drive? (check one) If you don't drive to work, skip to Section B*.*

   ❑ Full size auto ❑ Compact/hybrid ❑ Heavy truck

   ❑ Mid size auto ❑ SUV/Pickup ❑ Other_______________
4. * 4. What year was your vehicle manufactured?
   ____
5. * 5. What type of fuel does your vehicle use? (if biodiesel or ethanol, specify grade)_____________

B. Estimate Your Current Commute for a typical work week.

* 1. Please enter below the number of days per week you use each type of commute mode and the number of miles you travel each day ***to work only*** in a typical week:

Commute Mode	Drive Alone	Carpool	Vanpool	Public Transit	Bike	Walk	Other (specify)
Days per week you travel *to work* by this mode (max 7)							
Miles Traveled *to work per day* in this mode							

2. How much does your ***round trip*** commute cost per week?
   $____________________________
3. How many minutes does your commute to work typically take?
   ____
4. If you take public transit, what transit agency do you use?
   ____

*5. If you carpool to work, how many days in a typical week are you the driver?
   ____

6. How many days do you telecommute in a typical week?

____

C. Employment Information (check one answer for each question)

1. Are you a full time or part time employee? ❑ Full ❑ Part
2. Do you typically travel to work between 6-9 a.m.? ❑ Y ❑ N
3. Does your position allow you to have flexible hours or to telecommute? ❑ Y ❑ N
4. What department do you work for?

____

5. **D. Your Commute *in 2005***

*1. Did you work for us in 2005? ❑ Y ❑ N

*2. If yes to Q.1, did you typically commute by the same mode(s) as you do now? ❑ Y ❑ N

*3. If no to Q.2, please enter the number of miles you traveled (*to work only*) in a typical week in 2005 below*:*

Commute Mode	**Drive Alone**	**Carpool**	**Vanpool**	**Public Transit**	**Bike**	**Walk**	**Other**
Days per Week (max 7)							
Miles Traveled *to Work* per Day							

If you commute differently now than in 2005, why did you change your commute mode?

____

E. <u>Current</u> Commute Preference Information

1. Why have you chosen your <u>current</u> commute mode?

____

2. Would you consider taking any of the following transportation modes?(check all that apply):

❑ Carpooling ❑ Vanpooling ❑ Bicycling

❑ Public transit ❑ Walking ❑ Other__________

3. a. Is there a transit route that you would use to commute by public transit? ❑ Y ❑ N

b. If not, please explain:

____

____

4. If you drive alone, which, if any, of the following benefits would encourage you to take alternative forms of transportation? (check all that apply)

- ❑ Vanpool/carpool incentives
- ❑ Free/inexpensive shuttle
- ❑ Pre-tax transit checks
- ❑ Free public transit benefit
- ❑ Parking cash-out (reimbursement to give up your parking spot)
- ❑ Subsidized bicycle purchase
- ❑ Improved transit options
- ❑ Improved bike routes/conditions
- ❑ Improved walking routes/conditions
- ❑ Better information about my commute options
- ❑ Telecommuting option
- ❑ Other______________________

5. Other comments?

____

____

Appendix D: Government-Generated Solid Waste Methodology

Emissions from the waste sector are an estimate of methane generation that will result from the anaerobic decomposition of all organic waste sent to landfill in the base year. It is important to note that although these emissions are attributed to the inventory year in which the waste is generated, the emissions themselves will occur over the 100+ year timeframe that the waste will decompose. This frontloading of emissions is the approach taken by EPA's Waste Reduction Model (WARM). Attributing all future emissions to the year in which the waste was generated incorporates all emissions from actions taken during the inventory year into that year's greenhouse gas release. This facilitates comparisons of the impacts of actions taken between inventory years and between jurisdictions. It also simplifies the analysis of the impact of actions taken to reduce waste generation or divert it from landfills.

D.1 Estimating Waste Tonnages from County of San Mateo's Operations

To estimate the amount of waste generated by County operations in 2005, ICLEI worked with Kim Springer at Recycleworks, within the County Public Works Department. The amount of waste was estimated by compiling pick-up accounts operated by the County. At all accounts other than those serviced by roll-off debris boxes/compactors waste by weight data were not available. This is because garbage trucks do not weigh smaller and mid-size waste bins at each pick-up; and therefore, it is not possible to directly track disposal figures in mass per facility. Mass of waste generation was estimated using volumetric container size (gallons, yards, etc.) data, along with pick-up frequency and average fill of containers. These data produced a comprehensive annual volumetric figure, which was then converted to mass using standard conversion factors supplied by Recycleworks. Estimated waste *generation* was converted to final *disposal* (quantity sent to landfill) by applying average waste diversion percentages for each account. Where applicable, self-haul waste (waste brought directly from the local government to landfills) was included as part of this total.

D.2 Emissions Calculation Methods

As some types of waste (e.g., paper, plant debris, food scraps, etc.) generate methane within the anaerobic environment of a landfill and others do not (e.g., metal, glass, etc.), it is important to characterize the various components of the waste stream. Waste characterization for government-generated solid waste was estimated using the CIWMB's 2004 statewide waste characterization study.[26]

Most landfills in the Bay Area capture methane emissions either for energy generation or for flaring. EPA estimates that 60 percent to 80 percent[27] of total methane emissions are recovered at the landfills to which the County sends its waste. Following the recommendation of LGOP, ICLEI adopted a 75 percent methane recovery factor.

Recycling and composting programs are reflected in the emissions calculations as reduced total tonnage of waste going to the landfills. The model, however, does not capture the associated emissions reductions in "upstream" energy use from recycling as part of the inventory.[28] This is in-line with the "end-user" or "tailpipe" approach taken throughout the development of this inventory. It is important to note that, recycling and composting programs can have a significant impact on greenhouse gas emissions when a full lifecycle approach is taken. Manufacturing products with recycled materials avoids emissions from the energy that would have been used during extraction, transporting and processing of virgin material.

D.2.1 Methane Commitment Method

CO_2e emissions from waste disposal were calculated using the methane commitment method outlined in the EPA WARM model. This model has the following general formula:

$\mathbf{CO_2e = W_t * (1\text{-}R)A}$, where:

$\mathbf{W_t}$ is the quantify of waste type "t"

R is the methane recovery factor,

A is the CO_2e emissions of methane per metric ton of waste at the disposal site (the methane factor)

While the WARM model often calculates upstream emissions, as well as carbon sequestration in the landfill, these dimensions of the model were omitted for this particular study for two reasons:

This inventory functions on an end-use analysis, rather than a life-cycle analysis, which would calculate upstream emissions), and this inventory solely identifies emissions sources, and no potential sequestration "sinks."

26 CIWMB Waste Characterization Study-Public Administration Group available at http://www.ciwmb.ca.gov/WasteChar/BizGrpCp.asps.
27 AP 42, section 2.4 Municipal Solid Waste, 2.4-6, http://www.epa.gov/ttn/chief/ap42/index.html
28 "Upstream" emissions include emissions that may not occur in your San Mateo County resulting from manufacturing or harvesting virgin materials and transportation of them.

Appendix E: Conducting a Monitoring Inventory

The purpose of this appendix is to assist County of San Mateo staff in conducting a monitoring inventory to measure progress against the baseline established in this inventory report. Conducting such an inventory represents milestone five of the Five- Milestone Process, and allows a local government to assess how well it is progressing toward achieving its emissions reduction targets.

This inventory was conducted by ICLEI in conjunction with Kim Springer, Resource Conservation Program Manager at the County, who served as the lead data gathering coordinator for the inventory. To facilitate a monitoring inventory, ICLEI has documented all of the raw data, data sources, and calculation methods used in this inventory. Future inventories should seek to replicate or improve upon the data and methods used in this inventory. Wherever possible, however, ICLEI strongly recommends institutionalizing internal data collection in order to be able to meet the recommended methods outlined in LGOP.

E.1 ICLEI Tools for Local Governments

ICLEI has created a number of tools for the County to use to assist them in future monitoring inventories. These tools were designed specifically for the Silicon Valley Climate Protection Partnership, and comply with the methods outlined in LGOP. These tools are designed to work in conjunction with LGOP, which is, and will remain, the primary reference document for conducting an emissions inventory. These tools include:

- A “master data sheet” that contains most or all of the raw data (including emails), data sources, emissions calculations, data templates, notes on inclusions and exclusions, and reporting tools (charts and graphs and the excel version of LGOP reporting tool).
- A copy of all electronic raw data, such as finance records or Excel spreadsheets.
- LGOP reporting tool (included in the master data sheet and in Appendix B) that has all activity data, emissions factors, and methods used to calculate emissions for this inventory.
- Sector-specific instructions that discuss the types of emissions, emissions calculations methods, and data required to calculate emissions from each sector, as well as instructions for using the data collection tools and calculators in the master data sheet.
- The appendices in this report include detailed methodologies for calculating emissions from Scope 3 employee commute and government-generated solid waste, as well as two versions of the employee commute survey.

It is also important to note that all ICLEI members receive on-demand technical assistance from their ICLEI liaison, which local staff should feel free to contact at any point during this process.

E.2 Relationship to Other Silicon Valley Climate Protection Partnership Inventories

While the emissions inventories for the 27 participating local governments were conducted simultaneously using the same tools, a local government operations inventory is based on data specific to each local government's operations. For this reason, data must be collected internally within each local government, and the availability of data (and thus emissions estimation methods) will vary between local governments.

That said, local governments in the Silicon Valley Climate Protection Partnership may benefit by cooperating during the re-inventorying process. For example, by coordinating inventories, they may be able to hire a team of interns to collectively perform the inventories – saving money in the process. In addition, local staff may be able to learn from each other during the process or conduct group training sessions if necessary. As a whole, the Silicon Valley Climate Protection Partnership provides the basis for a continuing regional platform for climate actions, and ICLEI recommends taking advantage of this opportunity during all climate actions, including conducting future greenhouse gas emissions inventories.

E.3 Improving Emissions Estimates

One of the benefits of a local government operations inventory is that local government staff can identify areas in their current data collection systems where data collection can be improved. For example, a local government may not directly track fuel consumption by each vehicle and instead will rely upon estimates based upon VMT or purchased fuel to calculate emissions. This affects both the accuracy of the emissions estimate and may have other implications for government operations as a whole.

During the inventory process, ICLEI and local government staff identified the following gaps in data that, if resolved, would allow the County to meet the recommended methods outlined in LGOP in future inventories.

- Direct tracking of refrigerants recharged into HVAC and refrigeration equipment
- Direct tracking of fire suppressants recharged into fire suppression equipment
- Odometer readings of individual vehicles
- Fuel consumption by back-up generators

ICLEI encourages staff to review the areas of missing data and establish data collection systems for this data as part of normal operations. In this way, when staff are ready to re-inventory for a future year, they will have the proper data to make a more accurate emissions estimate.

E.4 Conducting the Inventory

ICLEI recommends the following approach for Silicon Valley Partnership local governments that wish to conduct a monitoring inventory:

Step 1: Identify a Climate Steward

This steward will be responsible for the County's climate actions as a whole and could serve as an ICLEI liaison in all future climate work. In the context of a monitoring inventory, the steward will be responsible for initiating discussions on a new inventory.

Step 2: Determine which Sectors to Inventory

There are many ways to determine which sectors apply to a local government's operations, but the easiest to review will be LGOP Standard Report, which is located both in Appendix B and in the master data sheet. This document clearly delineates which sectors will need to be inventoried within a local government's operations and which LGOP sectors do not apply to a jurisdiction.

Step 3: Gather Support: Identify Data Gathering Team and Leads

Coordination and acceptance among all participating departments is an important factor in coordinating a successful inventory. To that end, the inventory coordinator should work with the county administrator to identify all staff who will need to be part of the inventory. To facilitate this process, ICLEI has documented all people associated with the inventory in the master data sheet—these names are located in the final completed data form for each sector. Once this team has been identified, the inventory coordinator should hold a kickoff meeting with the administrator, all necessary staff, and relevant department heads, which clearly communicate the priority of the inventory in relationship to competing demands. At this meeting, the roles of each person, including the inventory coordinator, should be established.

Step 4: Review Types of Emissions and Available Methodologies for Applicable Sectors

Local staff should then review LGOP and the instructions documents provided through this inventory to better understand the types of emissions for each sector (for example, within Mobile Emissions, CO_2 emissions and CH_4/N_2O emissions represent two different data requirements and emissions calculations methodologies). Each emissions type may have more than one possible estimation methodology, and it is important that the inventory coordinator understands all possible methodologies and be able to communicate this to all parties assisting in the data gathering.

Step 5: Review Methodologies Used for the 2005 Inventory to Determine Data to Collect

In order to duplicate or improve upon the methods used in this inventory, local staff should again review the methods used for this inventory—these methods are again located in Appendix B—and within the master data sheet. These methods reflect the data limitations for each local government (as many local governments could not obtain data necessary to meet the recommended methods in LGOP). Wherever possible, these methods should be duplicated or, if it is possible, replaced with the recommended methods outlined in LGOP. Using these methodologies, staff will determine what data needs to be collected and communicate this effectively to the data gathering team.

Step 6: Begin Data Collection

With the exception of electricity and natural gas for stationary sources, all data collection will be internal. To obtain stationary source energy consumption data, staff will need to contact the ICLEI representative to determine who the contact is for PG&E data (other utilities will need to be contacted directly).

Step 7: Use the Data Forms as a Resource During Data Gathering

A number of questions will come up during the data gathering process that may be difficult to answer. ICLEI has attempted to capture all of the questions that arose during the 2005 inventory and how they were addressed through the master data sheet. Within the master data sheet, staff should review the raw data, working data, and completed data forms to review how raw data was converted to final data, and also to review any notes taken by ICLEI staff during the 2005 inventory process.

For example, reviewing the stationary sources PG&E data within the master data sheet will allow local staff to review how individual accounts were separated into each category and which counts may have been excluded from the inventory.

Step 8: Use Emissions Software to Calculate Emissions

ICLEI has provided the staff lead on the 2005 inventory with a backup of the software used to calculate many of the emissions included in this report. Staff should use this (or more current ICLEI software) to calculate emissions by inputting the activity data into the software. ICLEI staff and ICLEI trainings are available to assist local government staff in calculating emissions.

Step 9: Report Emissions

The master data sheet also contains the LGOP Standard Reporting Template, which is the template adopted by ARB as the official reporting template for government operations emissions inventory. This tool, as well as the charts and graphs tool provided by ICLEI can be used to report emissions from government operations. Also, local government staff should utilize this narrative report as guide for a narrative report if they so choose.

Step 10: Standardize and Compare to Base Year

Conducting a monitoring inventory is meant to serve as a measuring point against the baseline year represented in this report. In order to make a more accurate comparison, it is necessary to standardize emissions from stationary sources based upon heating and cooling degree days (staff can use a ratio of heating /cooling degree days to standardize across years).

In addition, it is important, when comparing emissions across years, to clearly understand where emissions levels may have changed due to a change in methodology or due to excluding an emissions source. For example, if the default method was used to estimate refrigerant leakage in 2005 (this method highly overestimates these emissions), and the recommended method was available in a monitoring year, this would appear as a dramatic reduction in these emissions even though actual leaked refrigerants may be similar to the base year. Changes such as these should not be seen as progress toward or away from an emissions reduction target, but emissions estimates should be adjusted to create as much of an apples-to-apples comparison as possible. If such an adjustment is not possible, staff should clearly note the change in methodology between years when comparing emissions.