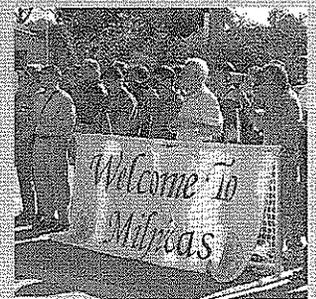
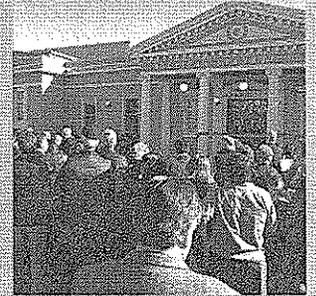


# City of Milpitas 2005 Government Operations Greenhouse Gas Emissions Inventory



6



# Credits and Acknowledgements

## **The City of Milpitas**

Diana Barnhart, Economic Development Manager

Christopher Schroeder, Purchasing Manager

Jeff Barron, Fleet Maintenance Supervisor

Eddie Loreda, Facilities Supervisor

Kathleen Phalen, Utility Engineer

Americo Silvi, Fire Battalion Chief

Stephan Smith, Utility Maintenance Supervisor

Janice Spuller, Assistant Transportation Planner

Leslie Stobbe, Public Information Specialist, Utility Engineering

Eric Weisler, Fleet Technician II

## **PG&E Contributors**

Corie Cheeseman, Program Manager

Lynne Galal, Senior Project Manager, Customer Energy Efficiency Third Party and Partnership Implementation Department

## **Joint Venture: Silicon Valley Network**

Kara La Pierre, Vice President

Rachel Massaro, Associate Director, Climate Initiatives

Seth Fearey, Former Vice President, Chief Operating Officer, Smart Valley Initiative Director

## **Sustainable Silicon Valley**

Marianna Grossman, President and Executive Director

Rick Row, Former Executive Director

## **Allied Waste**

Gil Chesio

## **ICLEI-Local Governments for Sustainability USA**

This report was prepared by Jonathan Strunin, Program Officer and Sarah Favrot, Program Intern at ICLEI-Local Governments for Sustainability USA. The authors gratefully acknowledge the dedication of the staff of Milpitas, who provided much of the insight and local information necessary for the completion of this report.

## Joint Venture: Silicon Valley Network



**Russell Hancock, President and Chief Executive Officer**

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.

<http://www.jointventure.org>

## Sustainable Silicon Valley

**Marianna Grossman, Executive Director**



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<sub>2</sub>) emissions. The SSV approach is to facilitate strategies to reduce CO<sub>2</sub> 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.

<http://www.sustainablesiliconvalley.org>

## ICLEI-Local Governments for Sustainability USA

**Michelle Wyman, Executive Director**



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.

<http://www.icleiusa.org>

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# CITY OF MILPITAS

## OFFICE OF MAYOR ROBERT LIVENGOOD

455 EAST CALAVERAS BOULEVARD, MILPITAS, CALIFORNIA 95035-5479 • [www.ci.milpitas.ca.gov](http://www.ci.milpitas.ca.gov)  
PH: 408.586.3051 FAX: 408.586.3056 TDD: 408.586.3013

June 8, 2009

Dear Milpitas Community:

I am proud to present you with Milpitas's Local Government Operations Greenhouse Gas Emissions Inventory Report for the year 2005. This report, which presents the emissions from Milpitas's operations, represents a culmination of a year of hard work by our staff in concert with ICLEI-Local Governments for Sustainability USA. This report illustrates the comprehensive efforts of our community to advance climate protection and make our community a more sustainable place to live and work.

The City is committed to reduce emissions from our operations, and this report represents an important first step in that process. The information from this report will help us to identify the sources of emissions from our operations, and will serve as the benchmark from which we can gauge our progress toward reducing those emissions. While we have made great strides in addressing our impact on the environment, climate change remains a significant challenge for our community. Meeting our emissions reduction goals means making changes in all areas of our government operations – from purchasing policies to equipment operations. As we reduce emissions from our operations, we will be providing leadership to our community, increasing the efficiency of our operations, and saving scarce resources.

In addition to our individual actions, Milpitas is proud to participate in the regional collaborations occurring in Santa Clara County and in the larger San Francisco Bay Area. This inventory, for example, was conducted as part of a partnership of 27 local governments in San Mateo, Santa Clara, and Santa Cruz Counties. We will continue to engage in this and other partnerships in the future as we seek to improve the sustainability and livability of our communities and our region.

Moving forward, Milpitas will continue to examine our operations to identify areas where further emissions reductions can be implemented. However, in order to have a more comprehensive response to climate change, the community's involvement is essential. We encourage every citizen to examine their own activities and search for ways that they can reduce their personal greenhouse gas emissions at home, work, school or while commuting. Working together, Milpitas can demonstrate our leadership and be an inspiration for others in the region, state and across the country.

Sincerely,

Robert Livengood  
Mayor  
City of Milpitas



# Executive Summary

The City of Milpitas recognizes that human-caused climate change is a reality, with potentially disruptive effects to the City's residents and businesses. Milpitas believes that local governments play a leading role in both reducing greenhouse gas emissions and mitigating the potential impacts of climate change by 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 include lower energy bills, improved air quality, and more efficient government operations.

The City started 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 Milpitas' 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 Milpitas' government operations. With one exception,<sup>1</sup> all emissions estimates in this report refer to emissions generated from sources over which the City has direct operational control, exclusive of physical location.<sup>2</sup> 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

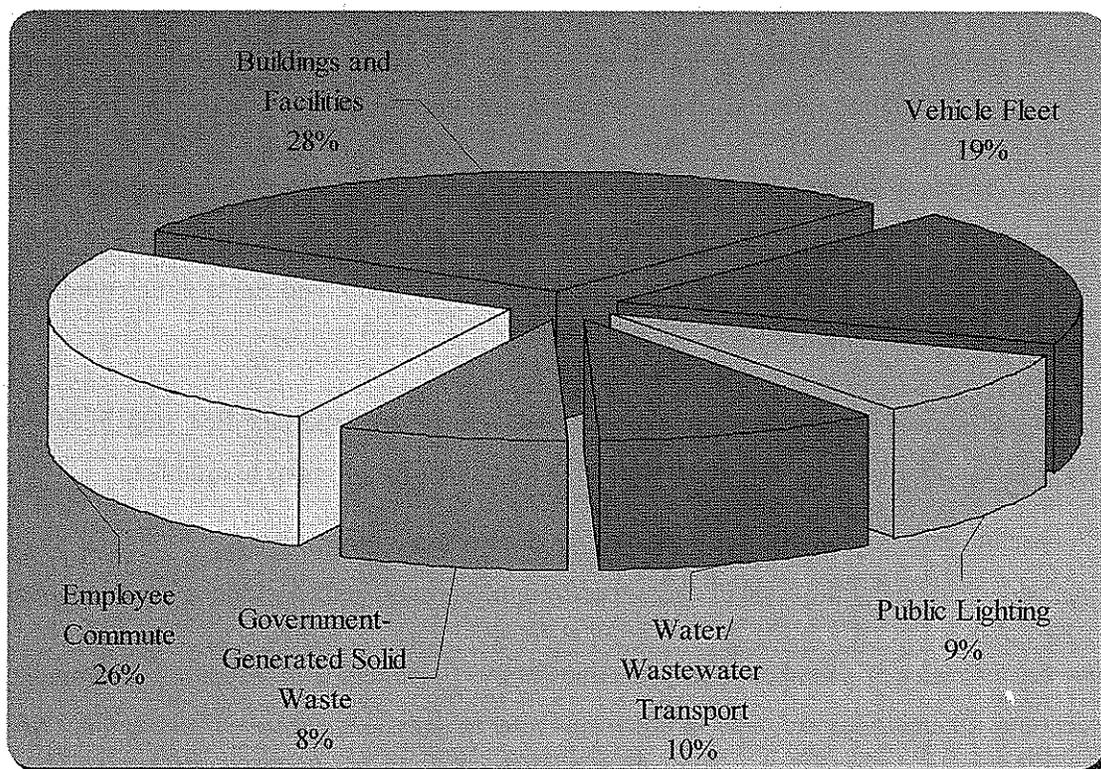
<sup>1</sup> The exception is emissions from employee-owned vehicles that are used by employees during commuting.

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

community-scale greenhouse gas emissions inventory. Therefore, this inventory should be considered to be an independent analysis relevant only to the City'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 Milpitas can begin planning and take action to reduce its greenhouse gas emissions.

**Figure ES.1 2005 Milpitas Government Operations Emissions by Sector**



## Inventory Results

In 2005, Milpitas' direct emissions, emissions from electricity consumption, and select indirect sources totaled 7,533 metric tons of CO<sub>2</sub>e.<sup>3</sup> Of the total emissions accounted for in this inventory, emissions from buildings and facilities were the largest (28 percent of inventoried emissions, as shown in Figure ES.1 and Table ES.1). Emissions from employee commutes produced the second highest quantity of emissions, resulting in 1,955 metric tons of CO<sub>2</sub>e (26 percent of inventoried emissions). The remaining emissions reported in this inventory came from the City's vehicle fleet (19 percent), water/sewage transport (10 percent), public lighting (9 percent), and government generated solid waste (8 percent).<sup>4</sup>

Cumulatively, Milpitas spent approximately \$1,701,526 on energy (electricity, natural gas, diesel, gasoline,) for government operations in 2005. Of this total, 75 percent of these energy expenses (\$1,282,172) resulted from electricity consumption, and 5 percent (\$91,361) from natural gas purchases from PG&E. Sectors which consumed the most electricity (and thus had the highest electricity expenses) were buildings and facilities (\$763,377) and public lighting (\$335,263). Fuel purchases (gasoline and diesel) for the pumping stations, the vehicle fleet and mobile equipment totaled approximately \$327,993, or 19 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 City to reallocate limited funds toward other municipal services or fund energy efficiency and other climate actions.

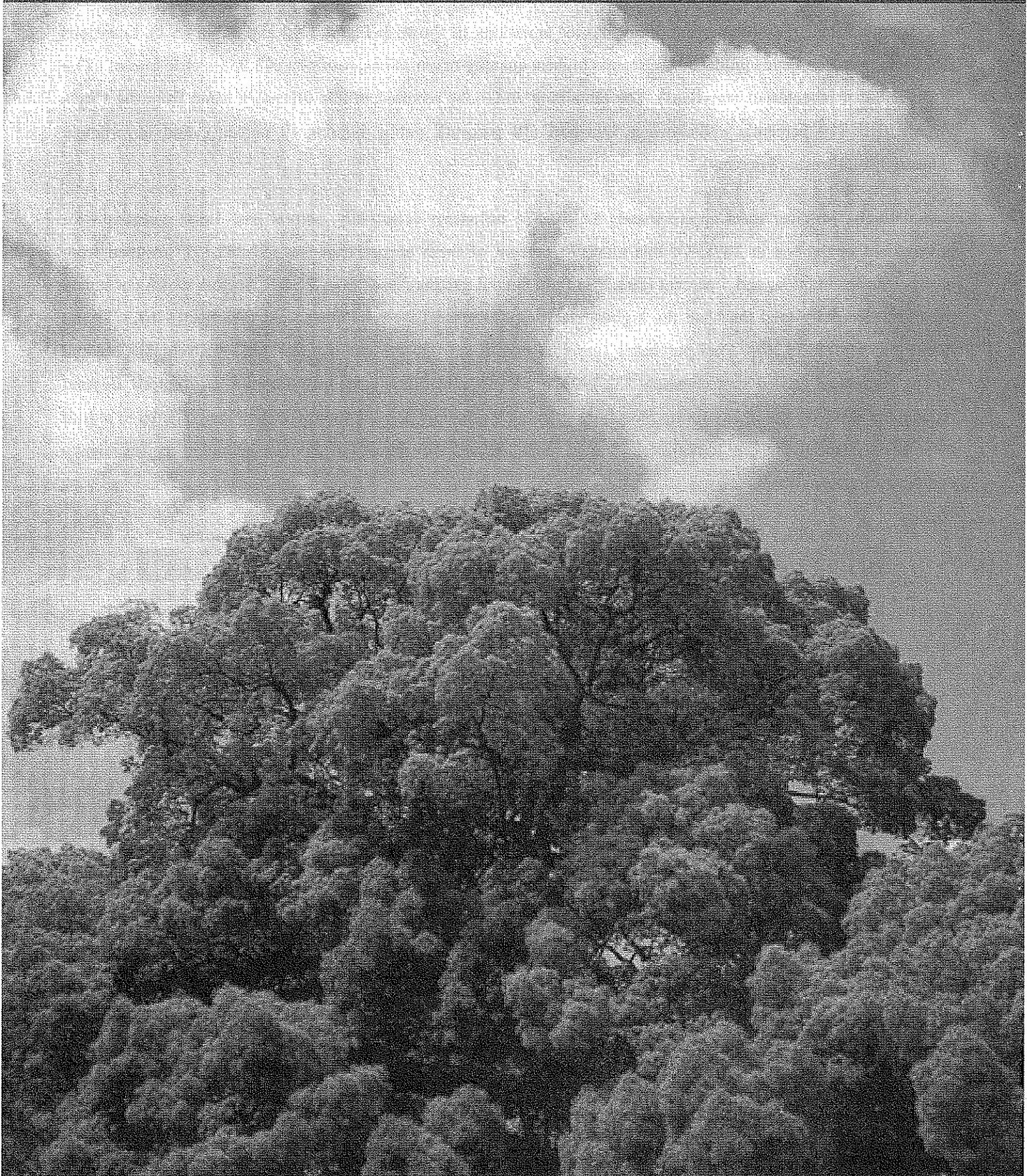
**Table ES.1 2005 Milpitas Government Operations Emissions by Sector**

Sector	Total (metric tons CO <sub>2</sub> e)
<b>Buildings and Facilities</b>	2,151
<b>Public Lighting</b>	666
<b>Water/Wastewater Transport</b>	761
<b>Vehicle Fleet</b>	1,406
<b>Government-Generated Solid Waste</b>	594
<b>Employee Commute</b>	1,955

<sup>3</sup> This number represents a "roll-up" of emissions, and is not intended to represent a complete picture of emissions from Milpitas' 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.

<sup>4</sup> Emissions from the consumption of diesel in the vehicle fleet, water/wastewater transport, and buildings and facilities sectors is based upon best estimates of Milpitas staff and diesel purchase records-calculated emissions from these sectors should therefore be considered broad estimates.

# Section One: Introduction





*Amgen Tour of California, 2008.*

# 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 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 City of Milpitas 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 Milpitas. 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.

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 government operations in Milpitas 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 City 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 City 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 Milpitas' 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

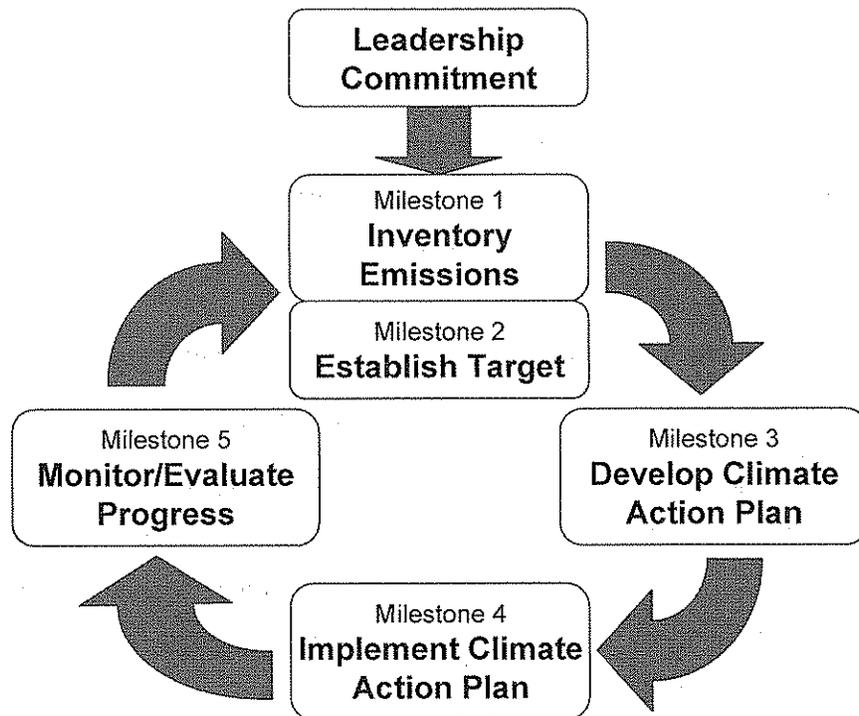
**Milestone Two:** Adopt an emissions reduction target for the forecast year

**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 The 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 Milpitas

Milpitas implemented a number of steps to reduce the emissions resulting from City operations, with a focus on reducing energy consumption in municipal facilities and the vehicle fleet. Specifically, the City has completed or is working on the following actions:

- Completed lighting retrofits in the Police/Public Works building, Corporation Yard building, the Community Center Auditorium, Sports Center Gym and two dance studios.
- Retro-commissioned (retiming) City Hall lighting and HVAC.
- Acquired four hybrid vehicles for fleet operations.
- Retro-commissioned (equipment repair and retiming) HVAC in the Police/Public Works building and Community Center.
- Installed three Variable Frequency Drives on the pool pumps in the Sports Center, reducing pump speeds during noncritical periods to conserve energy. The City of Milpitas installed the Tecogen cogenerator at the Sports Center in 1990, to more efficiently heat the center's three pools. The cogenerator is a combined heat and power generation system that simultaneously produces two useful outputs (electricity + heat) from a single fuel source, natural gas. Think of it as "a generator that makes free hot water" or "a boiler that makes free electricity". Either way the system has saved the City an estimated \$225,000 during its operation, currently netting the City approximately \$21,669 per year. The system has also reduced the City's carbon footprint by a total estimated 2,019 tons of CO<sub>2</sub> to date.

## 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.

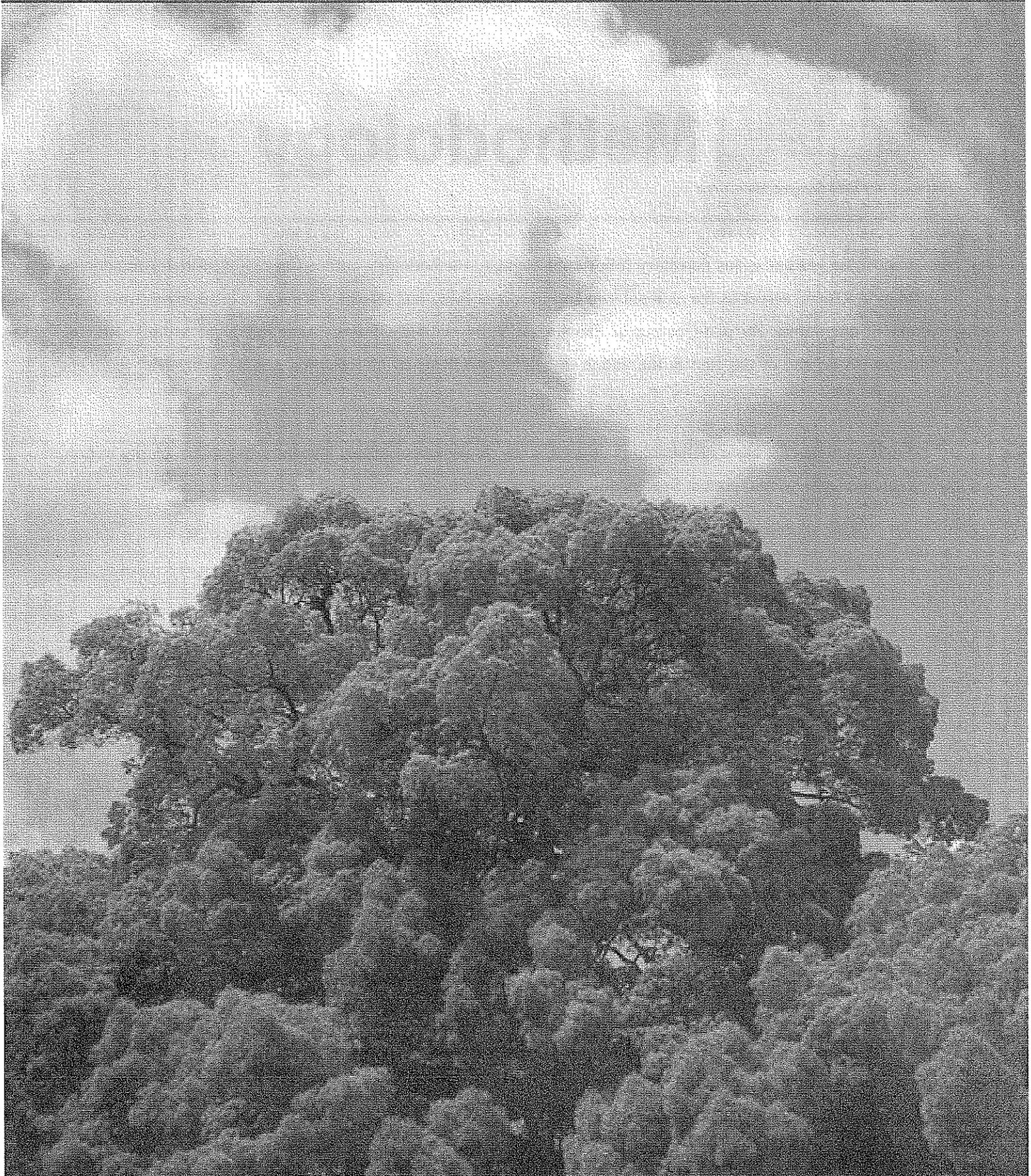
In early 2008, JV:SVN contracted with ICLEI to conduct government operations emissions inventories for participating local governments, using the standards outlined in the then soon-to-be-released Local Government Operations Protocol (LGOP—see Appendix A for details). For this project, 27 local governments have signed onto 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.

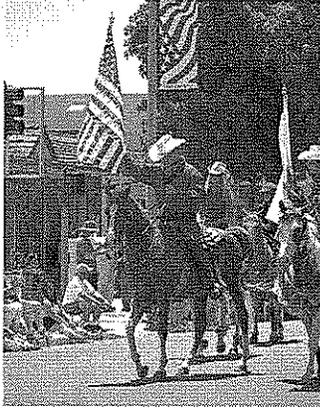
Alongside the activities of the Partnership, JV:SVN and SSV have been facilitating regional climate dialogues to further emissions reductions goals in the Silicon Valley area. JV:SVN supports the work of the Climate Protection Task Force, a group that includes staff members from 44 jurisdictions in the 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 San Mateo City/County Association of Governments, and the Bay Area Air Quality Management District<sup>5</sup>, have dramatically pushed forward the pace and scale of climate actions by local governments in the Silicon Valley area.

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<sup>5</sup> C/CAG and the Air Quality District have provided funding which have allowed a number of these inventories to occur and have been strong players in pushing forward local and regional actions on climate change.

# Section Two: Methodology





*Fourth of July Parade along Main Street*

# 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, Milpitas 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).<sup>6</sup>

<sup>6</sup> 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**

Gas	Chemical Formula	Activity	Global Warming Potential (CO <sub>2</sub> e)
Carbon Dioxide	CO <sub>2</sub>	Combustion	1
Methane	CH <sub>4</sub>	Combustion, Anaerobic Decomposition of Organic Waste (Landfills, Wastewater), Fuel Handling	21
Nitrous Oxide	N <sub>2</sub> O	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 <sub>6</sub>	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 <sub>2</sub> emitted/kWh	CO <sub>2</sub> emitted
Natural Gas Consumption (therms)	CO <sub>2</sub> emitted/therm	CO <sub>2</sub> emitted
Gasoline/Diesel Consumption (gallons)	CO <sub>2</sub> emitted /gallon	CO <sub>2</sub> emitted
Waste Generated by Government Operations (tons)	CH <sub>4</sub> emitted/ton of waste	CH <sub>4</sub> emitted

## 2.3 Reporting Emissions

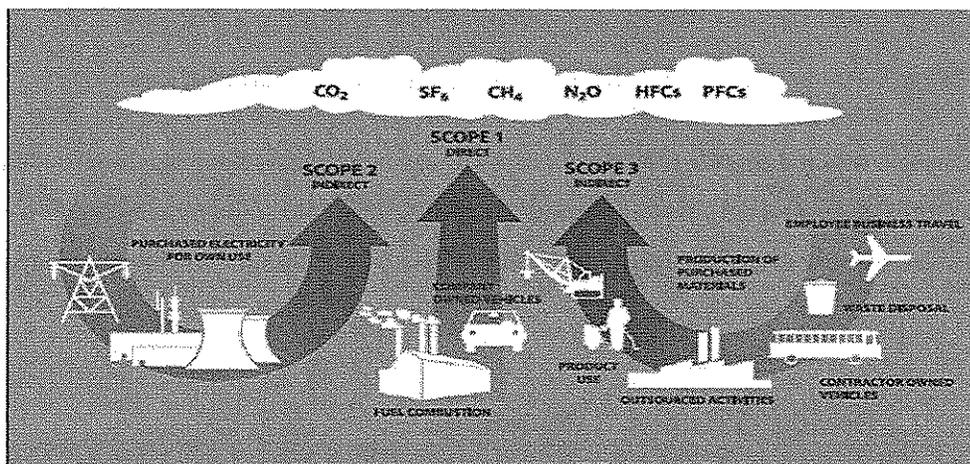
LGOP provides two reporting frameworks: reporting by scope and reporting by sector. This section defines the two reporting frameworks and discusses how they are used in this inventory. It also discusses the concept of “rolling up” emissions into a single number. This can assist local governments in communicating the results of the inventory and using the inventory to formulate emissions reduction 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 or steam 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 also 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<sup>7</sup>**

Scope 1	Scope 2	Scope 3
Fuel consumed to heat/cool all 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 used for heating or cooling facilities, or for generating electricity	
Leaked refrigerants from facilities and vehicles		
Leaked/deployed fire suppressants		
Wastewater decomposition and treatment in 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).

<sup>7</sup> 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.

While this report uses a standard roll-up number, these numbers should be used with caution, as they can be problematic for three reasons:

**First**, a roll-up number does not represent all emissions from Milpitas' 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.

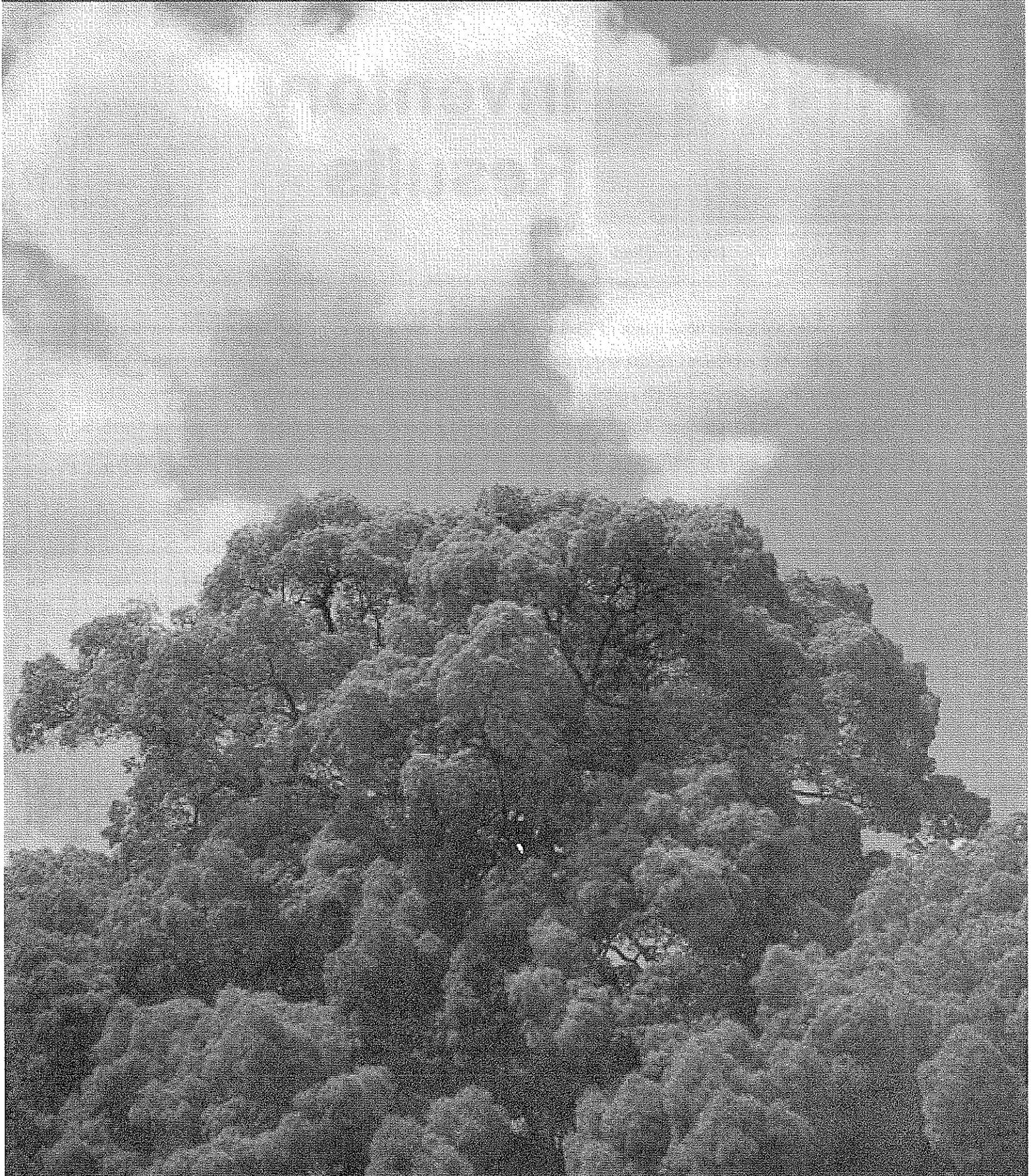
**Third**, local governments often wish to compare their emissions to those of other local governments. But it is very difficult to use a roll-up number as a common measure between local governments, for a number of reasons. First, as of now there is no national or international standard for reporting 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.

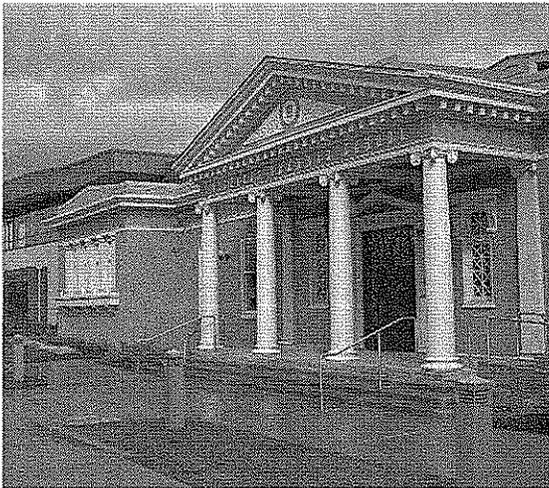
### **2.3.3 Emissions Sectors**

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
- Vehicle fleet and mobile equipment
- Government-generated solid waste
- Emissions from employee commutes

# Section Three: Inventory Results





*Historic Milpitas grammar school, now incorporated into the modern Milpitas Public Library, completed December 2008.*

# Inventory Results

This chapter provides a detailed description of the City of Milpitas' 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 emissions types and, where possible, an analysis of emissions by department. This information identifies more specific sources of emissions (such as a particular building) that can help staff and policymakers in Milpitas to best target emissions reduction activities in the future.

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

In 2005, Milpitas' direct emissions, emissions from electricity consumption and select indirect sources totaled 7,533 metric tons of CO<sub>2</sub>e.<sup>8</sup> 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

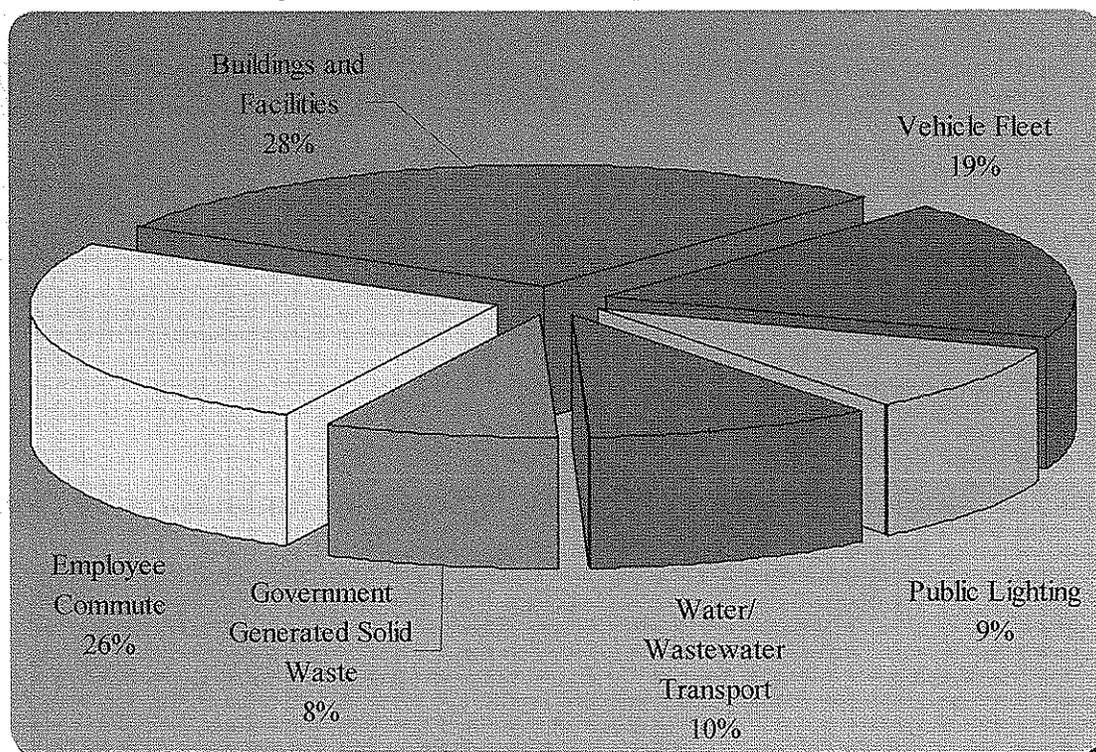
Reporting emissions by sector provides a useful way to understand the sources of Milpitas' emissions. By better understanding the relative scale of emissions from each of the sectors, the City can more effectively focus emissions reductions strategies to achieve the greatest emissions reductions.<sup>9</sup>

<sup>8</sup> This number represents a roll-up of emissions, and is not intended to represent a complete picture of emissions from Milpitas' 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.

<sup>9</sup> The sectors with the largest scale of emissions do not necessarily represent the best opportunity for emissions reductions. Cost, administration, and other concerns may affect the City's ability to reduce emissions from any one sector.

As shown in Figure 3.1 and Table 3.1, Milpitas' buildings and facilities produced the largest source of inventoried emissions in 2005 (2,151 metric tons CO<sub>2</sub>e, or 28 percent of inventoried emissions). Employees commuting in their vehicles produced the second largest source of emissions, resulting in 1,955 metric tons of CO<sub>2</sub>e, or 26 percent of inventoried emissions. The City's vehicle fleet produced 1,406 metric tons of CO<sub>2</sub>e of emissions,<sup>10</sup> with the remainder coming from water/wastewater transport equipment (761 metric tons CO<sub>2</sub>e), public lighting (666 metric tons CO<sub>2</sub>e) and government-generated solid waste (594 metric tons CO<sub>2</sub>e).

**Figure 3.1 2005 Milpitas Government Operations Emissions by Sector**



**Table 3.1 2005 Milpitas Government Operations Emissions by Sector**

Activity	CO <sub>2</sub> e emitted (metric tons)
<b>Buildings and Facilities</b>	2,151
<b>Public Lighting</b>	666
<b>Water/Wastewater Transport</b>	761
<b>Vehicle Fleet</b>	1,406
<b>Government-Generated Solid Waste</b>	594

<sup>10</sup> Emissions from the consumption of diesel in the vehicle fleet, water/wastewater transport, and buildings and facilities sectors is based upon best estimates of Milpitas staff and diesel purchase records-calculated emissions from these sectors should therefore be considered broad estimates.

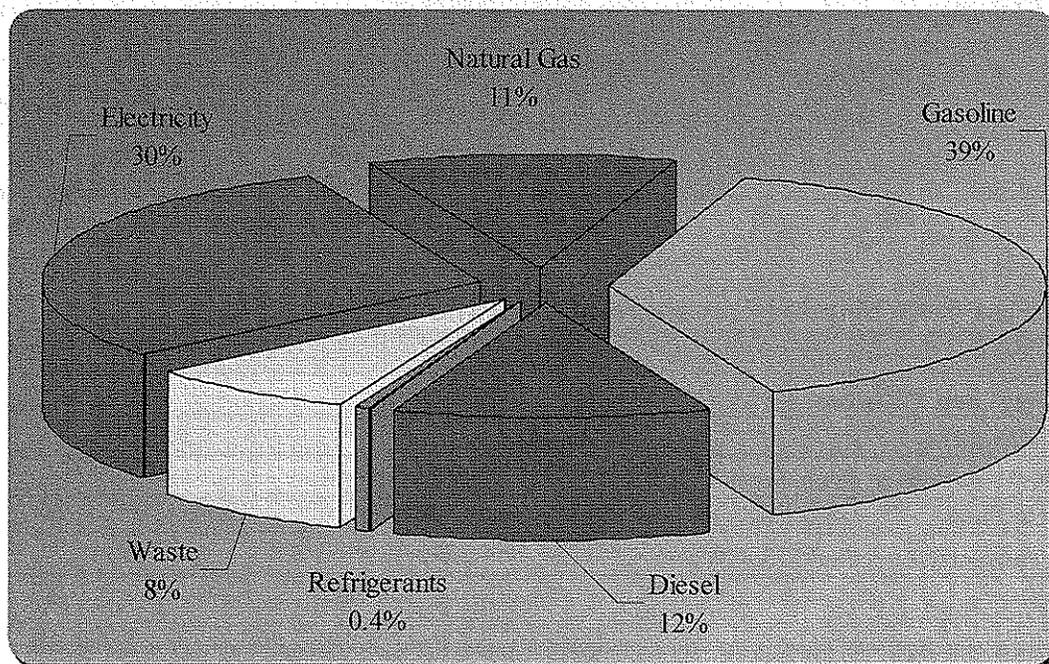
### 3.2 Summary by Source

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 Milpitas' government operations 2005 greenhouse gas emissions by fuel type or material.

**Table 3.2 2005 Milpitas Government Operations Emissions by Source**

Fuel/Source	CO <sub>2</sub> e emitted (metric tons)
Gasoline	2,926
Electricity	2,249
Diesel	889
Natural Gas	849
Waste	594
Refrigerants	27

**Figure 3.2 2005 Milpitas Government Operations Emissions by Source**



### 3.3 Summary of Energy-Related Costs

In addition to tracking energy consumption and generating estimates on emissions per sector (see Table 3.3), ICLEI has calculated the basic energy costs of various government operations. During 2005, Milpitas spent approximately \$1,701,526 on energy (e.g., electricity, natural gas, gasoline, and diesel) for its operations. Eighty-one percent of these energy expenses (\$1,373,533) are the result of electricity and natural gas purchases from PG&E. The City spent approximately \$188,685 on gasoline for the municipal fleet and \$139,308 on diesel for the facilities, water/wastewater pumps, and fleet vehicles. Beyond reducing greenhouse gas emissions, any future reductions in energy use will have the potential to reduce these costs, enabling Milpitas to reallocate limited funds toward other municipal services or to support future climate protection activities.

**Table 3.3 2005 Milpitas Energy Costs by Sector**

Activity	Costs (\$)
<b>Buildings and Facilities</b>	\$855,271
<b>Public Lighting</b>	\$335,263
<b>Water/Wastewater Transport</b>	\$262,541
<b>Vehicle Fleet</b>	\$248,451
<b>Total Assessed Costs</b>	<b>\$1,701,526</b>

### 3.4 Detailed Sector Analyses

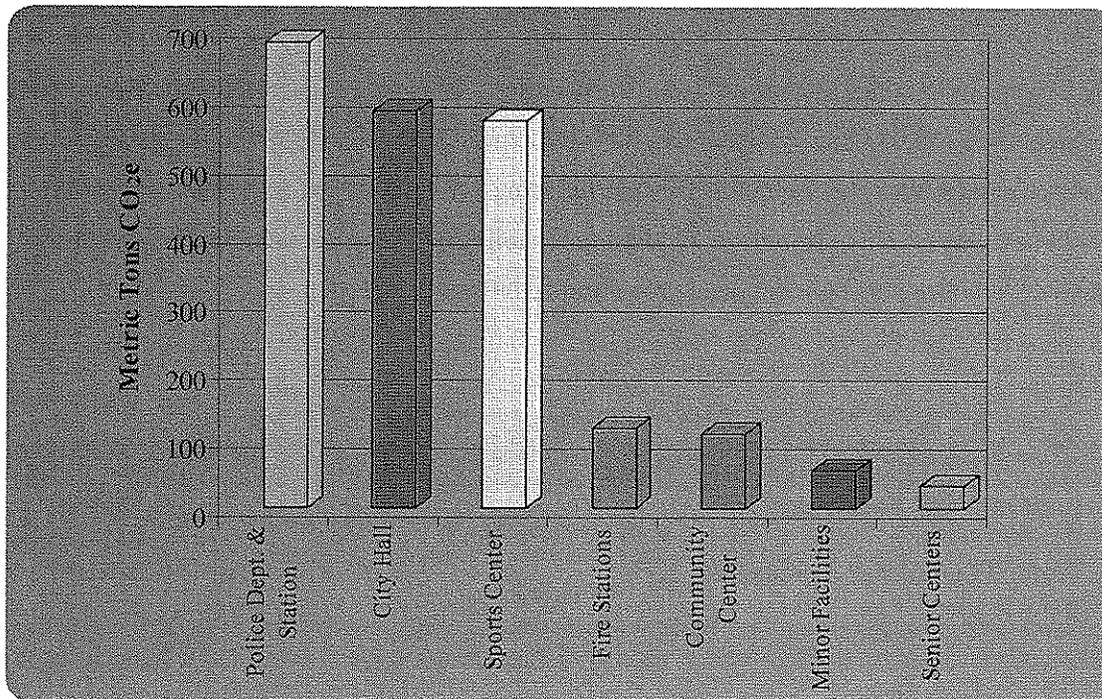
#### 3.4.1 Buildings and Other Facilities

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. Milpitas operates eleven facilities, including operational centers, emergency facilities, and a number of community centers (this does not include parks and other minor facilities). Facility operations contribute to greenhouse gas emissions in two major ways. First, facilities consume electricity and fuels such as natural gas and diesel, 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 through leakage or from the deployment of fire suppressants.

In 2005, the operation of City facilities produced approximately 2,151 metric tons of CO<sub>2</sub>e from the above sources. Figure 3.3 depicts 2005 emissions per facility, and Table 3.4 shows estimated costs associated with the activities that generated these emissions. Of total facility emissions, 61 percent came from the consumption of electricity, 39 percent came from the combustion of natural gas, and a minimal percentage (0.1 percent) came from the

combustion of diesel (see Figure 3.4). Milpitas spent approximately \$855,271 on the electricity, natural gas and diesel that were the cause of these emissions. No leaks of greenhouse gases from HVAC or refrigeration equipment was reported.<sup>11</sup>

**Figure 3.3: Emissions from Major Facilities**



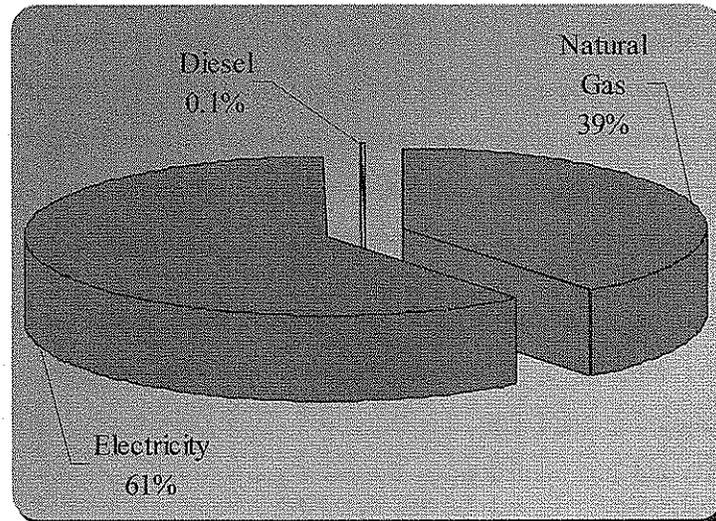
**Table 3.4: Energy Use and Emissions from Major Facilities**

Facility	Greenhouse Gas Emissions (metric tons CO <sub>2e</sub> )	Percent Emissions of All Facilities <sup>12</sup>	Electricity Use (kWh)	Natural Gas Use (therms)	Diesel Use (gallons)	Total Energy Cost
<b>Police Dept. &amp; Station</b>	683	32%	2,018,714	43,345	100	\$266,655
<b>City Hall</b>	583	27%	1,616,100	41,460	60	\$227,878
<b>Sports Center</b>	569	26%	1,176,880	57,479	n/a	\$188,729
<b>Fire Stations</b>	117	5%	317,431	8,260	156	\$53,739
<b>Community Center</b>	108	5%	314,080	7,177	n/a	\$64,180
<b>Minor Facilities*</b>	57	3%	254,882	0	n/a	\$36,726
<b>Senior Centers</b>	34	2%	108,160	1,837	n/a	\$17,364
<b>TOTAL</b>	<b>2,151</b>	<b>100%</b>	<b>5,806,247</b>	<b>159,558</b>	<b>316</b>	<b>\$855,271</b>

11 Milpitas uses only R-22, which is not included in greenhouse gas emissions inventories per LGOP. Estimated emissions from fire suppression equipment was not calculated, and leaks from CO<sub>2</sub> extinguishers in the City is likely very small.

12 Estimated emissions from leaked refrigerants and fire suppressants were not reported by facility and therefore are not included in the total emissions used to calculate these percentages.

**Figure 3.4: Emissions from Major Facilities by Source**



**3.4.2 Streetlights, Traffic Signals, and Other Public Lighting**

Like most local governments, Milpitas operates a range of public lighting, from traffic signals and streetlights to park lights and other outdoor lighting. Electricity consumed in the operation of this infrastructure is a significant source of greenhouse gas emissions.

In 2005, public lighting in Milpitas consumed a total of 2,975,899 kilowatt hours of electricity, producing approximately 666 metric tons CO<sub>2</sub>e. Table 3.5 depicts 2005 emissions per lighting type and estimated electricity consumption and costs associated with the activities that generated these emissions. Milpitas spent approximately \$335,263 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 <sub>2</sub> e)	Percent Emissions of All Lighting	Electricity Use (kWh)	Cost
<b>Streetlights</b>	611	92%	2,730,210	\$295,629
<b>Traffic Signals/ Controllers</b>	45	7%	200,123	\$32,557
<b>Park Lighting</b>	9	1%	40,013	\$6,172
<b>Other Outdoor Lighting</b>	1	0.2%	5,553	\$905
<b>TOTAL</b>	<b>666</b>	<b>100%</b>	<b>2,975,899</b>	<b>\$335,263</b>

### 3.4.3 Water and Wastewater Transport

This section addresses any equipment used for the distribution of water, stormwater, and wastewater.<sup>13</sup> Typical systems included in this section are water pumps/lifts and sprinkler and other irrigation controls. Milpitas operates a range of water transport equipment, including water pumps, sprinkler systems, stormwater pumps, and other water delivery equipment. Electricity consumption and the combustion of fuels such as diesel are the sources of greenhouse gas emissions from the operation of the City's water transport equipment.

In 2005, the operation of the City's water transport equipment produced approximately 761 metric tons of CO<sub>2</sub>e from the above sources. As mentioned in Section 3.1, this emissions estimate should be considered very approximate, as diesel consumption (and thus the emissions from diesel) was estimated based upon the best approximations of City staff, and not upon known diesel consumption by water/wastewater pumps. Table 3.6 depicts 2005 emissions per equipment type and shows estimated activities and costs associated with the operation of this equipment. Milpitas spent approximately \$262,541 in 2005 on the fuels and electricity that were the cause of these emissions.

**Table 3.6: Energy Use and Emissions from Water/Wastewater Transport Equipment**

Source	Greenhouse Gas Emissions (metric tons CO <sub>2</sub> e)	Percent Emissions of Water Transport Equipment	Electricity Use (kWh)	Diesel Use (gallons)	Cost
<b>Water Pumps</b>	514	68%	286,091	44,155	\$119,680
<b>Stormwater / Wastewater Pumps</b>	233	31%	920,082	2,643	\$131,361
<b>Other Water Delivery*</b>	11	1%	47,395	0	\$7,081
<b>Irrigation / Sprinkler Systems</b>	4	0.5%	15,654	0	\$4,419
<b>TOTAL</b>	<b>761</b>	<b>100%</b>	<b>1,269,222</b>	<b>46,798</b>	<b>\$262,541</b>

\*Includes Parks Irrigation

<sup>13</sup> While equipment that transports water, stormwater, and wastewater may be managed separately in Milpitas' operations, the types of equipment are similar, and therefore the ways to reduce emissions from this equipment, are similar. For this reason, this section groups equipment used for transporting water and wastewater.

### **3.4.4 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 results in 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.

In 2005, Milpitas operated a vehicle fleet with approximately 215 light trucks, motorcycles, passenger cars, and heavy trucks, and approximately 300 pieces of small and heavy mobile equipment. The City's vehicle fleet performed a number of essential services, from landscaping and facility maintenance to police patrol and fire response. In 2005, the majority of vehicles in the fleet (31 percent) were used in the police department for patrol and undercover operations, while the rest of the fleet was used for various tasks by different departments.

In 2005, the City's vehicle fleet emitted approximately a total of 1,406 metric tons of CO<sub>2</sub>e as a result of the combustion of fuels to power the City's vehicle fleet. As with water transport equipment, diesel consumption by fleet vehicles was unknown and therefore was approximated based upon fuel purchase invoices and estimated consumption of fuel from other sectors (facilities, water pumps). Emissions from diesel consumption by city vehicles are therefore highly approximated, and no analysis by department is possible.

Across all government operations, emissions from mobile sources represented 19 percent of rolled-up emissions from the City's operations in 2005. Of the estimated mobile emissions, 72 percent came from the consumption of gasoline, 26 percent came from the consumption of diesel, and the remaining 2 percent came from leaked refrigerants. Milpitas spent approximately \$248,451 in 2005 on the fuels that were the cause of these emissions.

### **3.4.5 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;<sup>14</sup> however, a portion escapes into the atmosphere, contributing to the greenhouse

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14 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<sub>2</sub> 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.

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 Milpitas' 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 on quantifying emissions from government-generated solid waste.

It is estimated that the waste disposed of by government facilities in 2005 will cumulatively produce 28 metric tons of methane gas, or 594 metric tons CO<sub>2</sub>e. Please see Table 3.7 for a breakdown of emissions per facility.

**Table 3.7: Emissions from Government-Generated Solid Waste**

Source	Greenhouse Gas Emissions (metric tons CO <sub>2</sub> e)	Estimated Landfilled Waste (Tons)
Public Works*	547	2,156
Fire Stations	11	44
City Hall	11	44
Sports Centers	7	29
Bus Stops	7	29
Senior Center	4	15
Library	3	10
Police Dept.	3	10
Parks	2	7
Community Center	0.03	0.1
<b>TOTAL</b>	<b>594</b>	<b>2,343</b>

\*Includes Public Works self-haul

### **3.4.6 Employee Commute**

Another important source of indirect emissions resulting from Milpitas' operations comes from employees commuting in vehicles to and from work. Similar to the vehicle fleet, these 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. The City therefore maintains only indirect control over how employees commute to and from work. LGOP encourages reporting these emissions, however, because local governments can influence how their employees commute to

work and therefore reduce emissions from this sector. For this reason, employee commute emissions were included in this report as an area where the City can make significant progress towards greenhouse gas emissions reductions.

To calculate emissions, City staff 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 City emitted an estimated 1,955 metric tons of CO<sub>2</sub>e. See Table 3.8 for estimated emissions from all employee commutes, as well as the total and average miles traveled to work by employees.

**Table 3.8: Emissions from Employee Commutes**

	Greenhouse Gas Emissions (metric tons CO <sub>2</sub> e)	Estimated Vehicle Miles Traveled to Work	Average Estimated Vehicle Miles Traveled to Work
<b>All Employees (Estimated)</b>	1,955	3,920,396	6,078

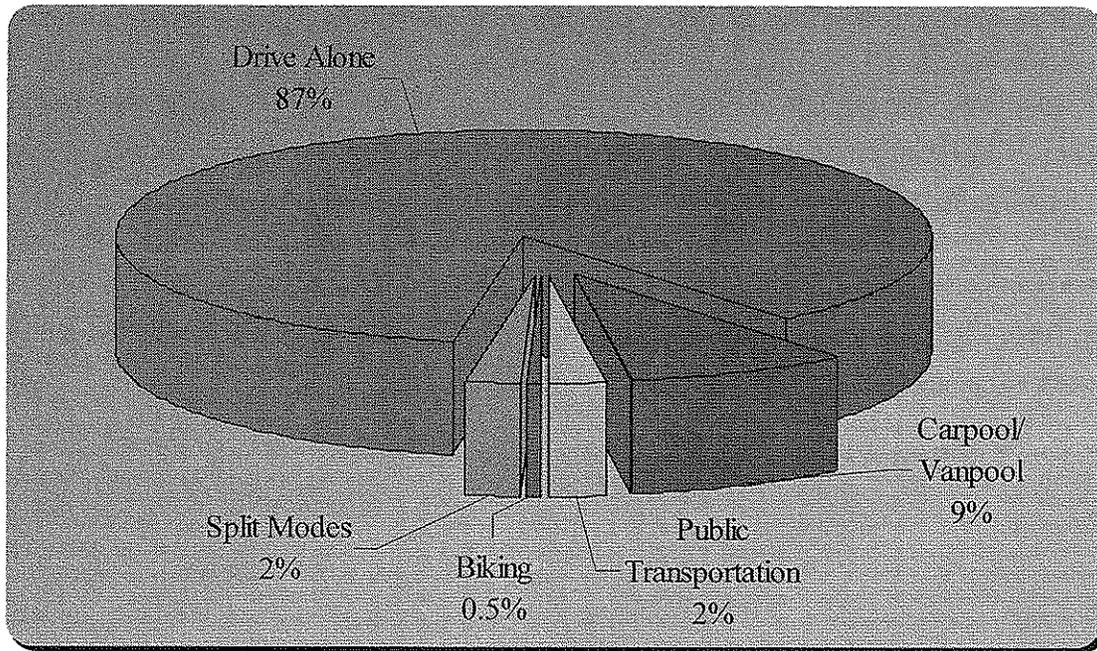
#### 3.4.6.1 Employee Commute Indicators

In addition to estimating greenhouse gas emissions resulting from employee commute, ICLEI examined other policy-relevant information that was extracted from the employee commute survey—in this way, City staff 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 respondents only.

##### Commute Modes

In 2008, the majority (87 percent) of respondents commuted to work using single occupancy vehicles. As shown in Figure 3.5, 12 percent of all respondents used some form of alternative transportation (such as bicycle, public transit, or carpool) to commute to work with carpool/vanpool being the most used form of alternative transportation (9 percent of total respondents), followed by public transportation (2 percent of total respondents), more than one mode (2 percent of total respondents), and biking (0.5 percent of total respondents).

**Figure 3.5: Employee Commute Modes**



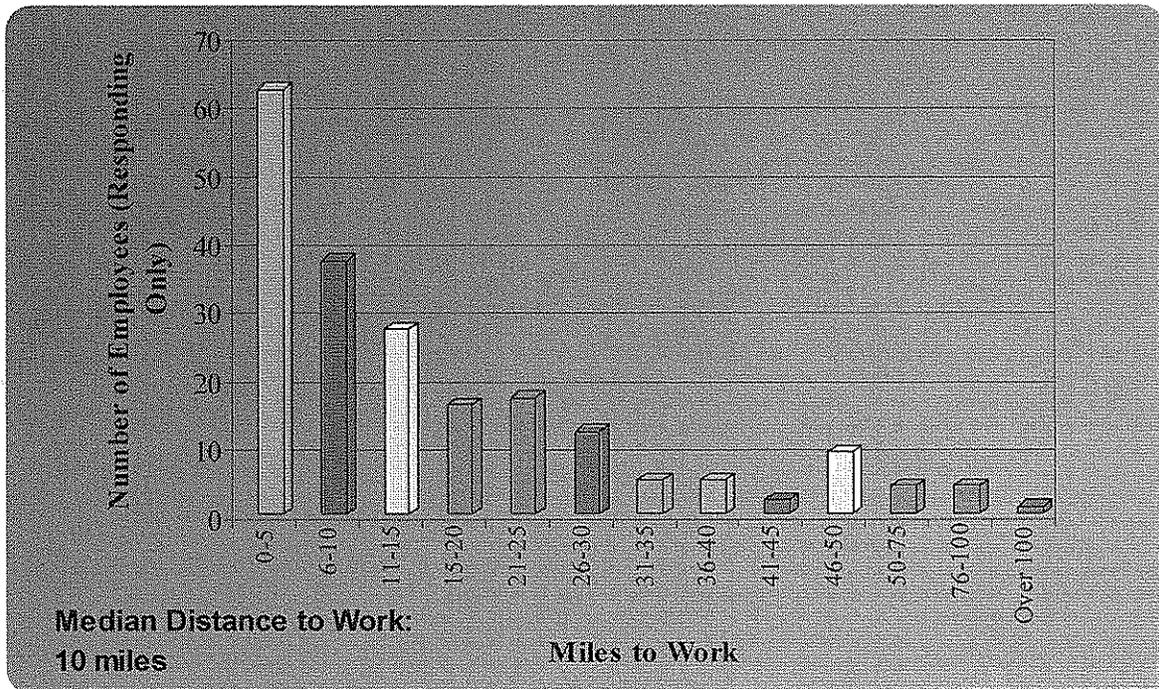
Commute Time and Costs

By understanding where employees live in relationship to their work, their employee commute costs, and commute times, the City can better focus policies to reduce emissions from commuting. Table 3.9 shows associated time and costs for employee commutes who responded to the employee survey, and Figure 3.6 shows the distance that responding employees live from their workplace. As can be seen, the majority of responding employees live within 10 miles, and more than one-quarter of respondents live within five miles of their workplace. Since so many employees live near their workplace, this suggests that there may be good opportunities for Milpitas to promote biking and carpooling, as well as other alternative transportation modes.

**Table 3.9: Distance and Time to Work and Cost of Employee Commutes (Responding Employees)**

Median Time to Work (daily minutes)	Median Cost of Commute (weekly)	Median Distance To Work (daily miles)
20	\$20	10

**Figure 3.6: Employee Commute Distance to Work**

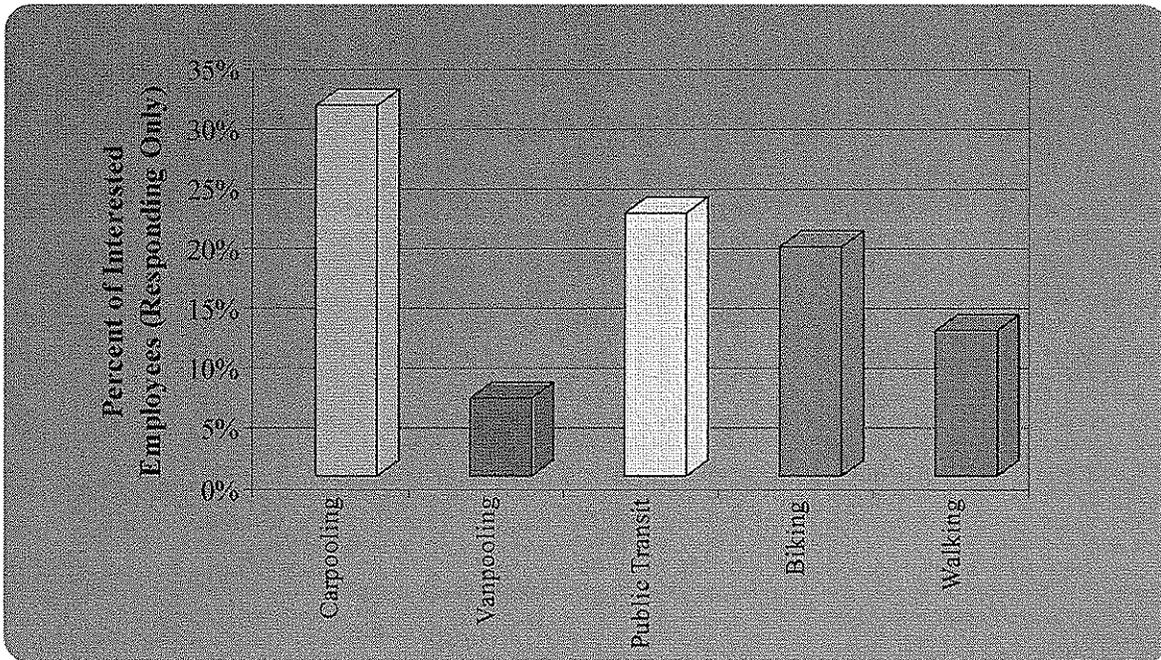


### Commuter Preferences

When asked if employees would consider taking a list of alternative transportation modes, more than one half of respondents were interested in some sort of alternative transportation. As shown in Figure 3.7, many employees expressed interest in carpooling (31 percent of respondents), public transit (22 percent), biking (19 percent) and walking (12 percent). Despite the fact that many respondents expressed an interest in public transit, only 29 percent of respondents indicated that there was a transit route available which they could take to and from work (see Figure 3.8). This suggests that the City would need to work with the Valley Transportation Authority and other potential transit operators to encourage public transit usage by employees.

When asked what policy measures the City could take to encourage alternative commuting, respondents indicated that a number of policies could encourage them to switch modes. Specifically, they would be more encouraged to take alternative modes if the City offered improved transit options (25 percent), telecommuting options (22 percent), vanpool/carpool incentives (21 percent), a free/inexpensive shuttle or public transit benefits (20 percent each, see Figure 3.9).

**Figure 3.7: Interest in Alternative Commute Modes**



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

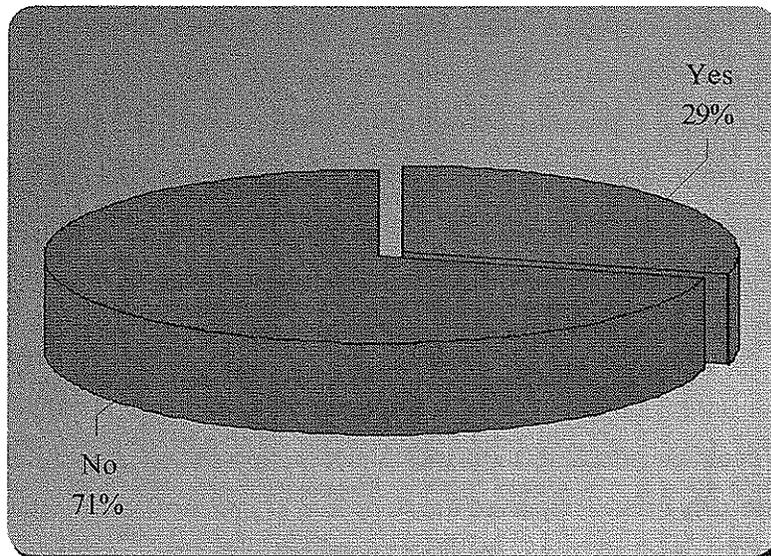
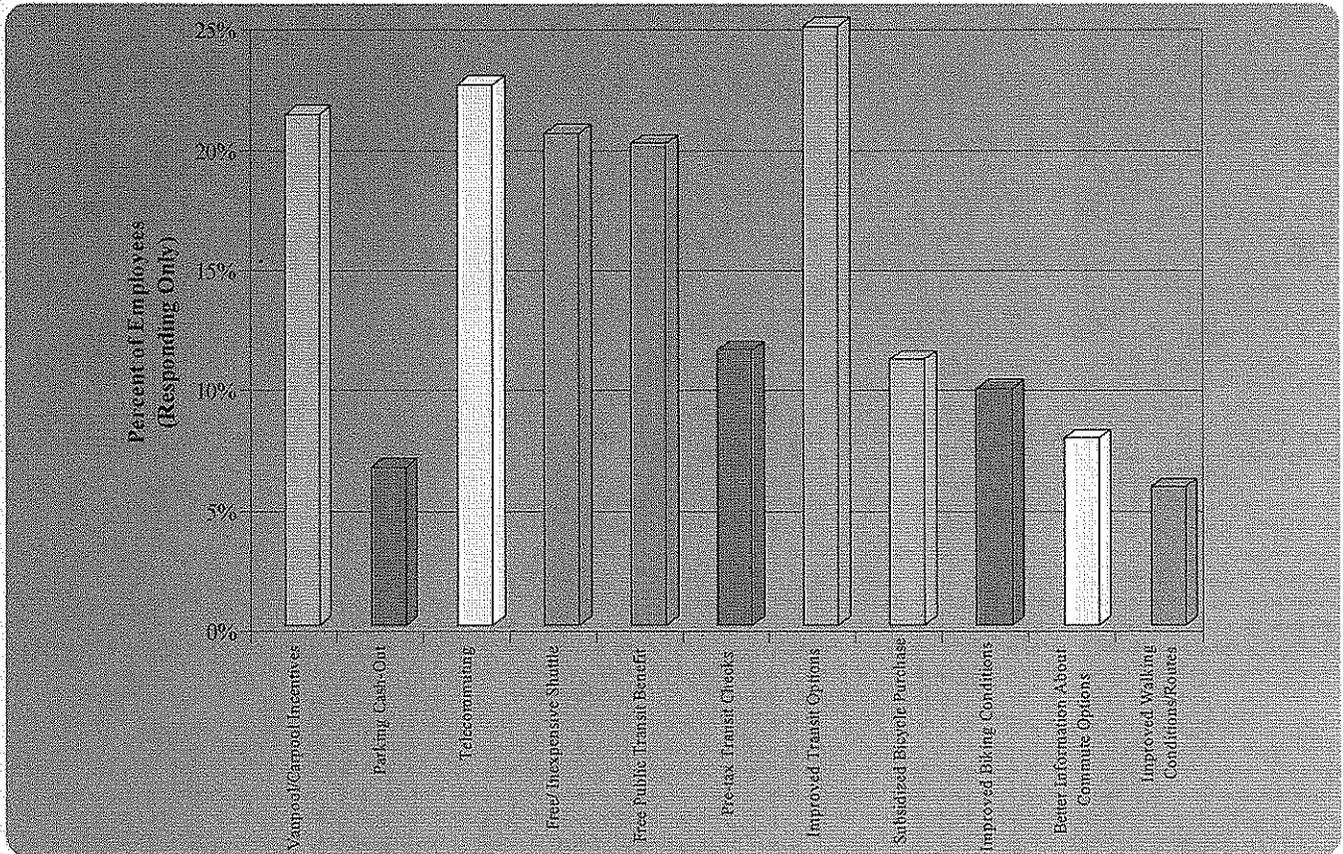
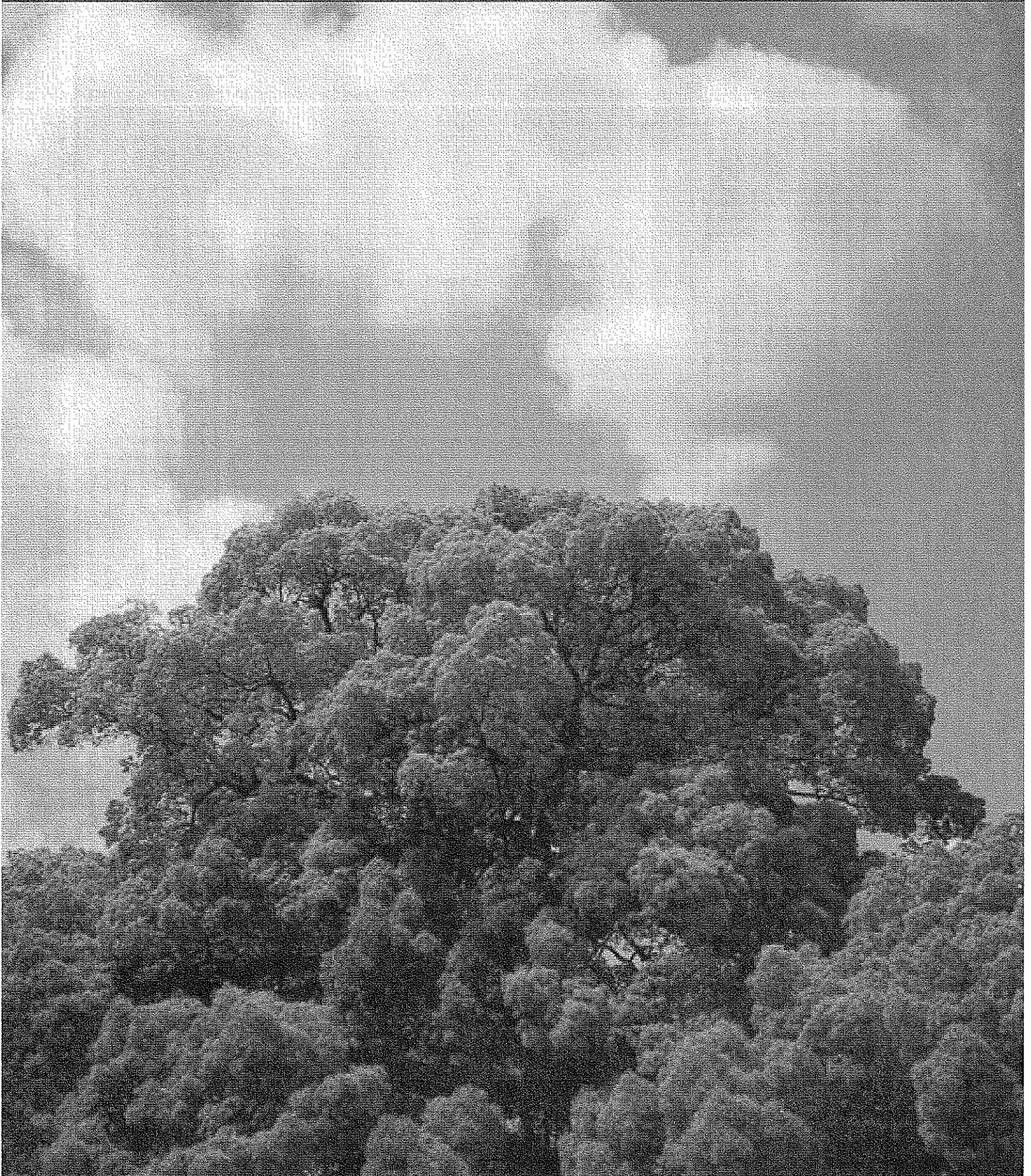
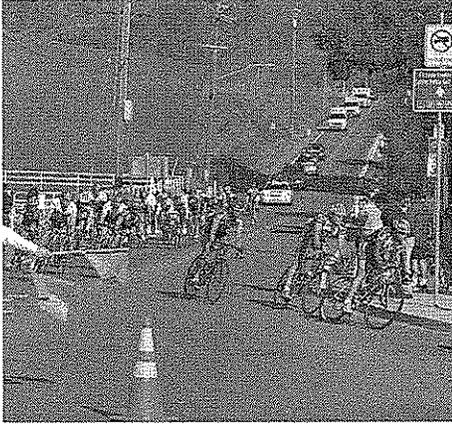


Figure 3.9: Employee Interest in Commute Benefits



# Section Four: Conclusion





*Amgen Tour of California, 2008.*

# Conclusion

By committing itself to the Silicon Valley Climate Protection Partnership and through its previous sustainability actions, the City of Milpitas 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 Milpitas 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 City 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 Milpitas' 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 City 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 Milpitas 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 City 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 jurisdiction 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. City staff will want to give enough time to implement chosen emissions reduction measures—but note that the farther out the target year is, the more that the City should pledge to reduce. ICLEI recommends that regardless of Milpitas’ 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 Milpitas’ local climate protection efforts.

#### **4.1.1 The Long-Term Goal**

ICLEI recommends that the Milpitas’ 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 City 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 City 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 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.

**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

### **4.1.3 Department Targets**

If possible, ICLEI recommends that the City consider department-specific targets for each of the departments that generate emissions within its operations. This allows Milpitas staff to do a more in-depth analysis of what is achievable in each sector in the near, mid and long-term, and also encourages department heads to consider their departments' impact on the climate and institute a climate-conscious culture in its operations.

## **4.2 Creating an Emissions Reductions Strategy**

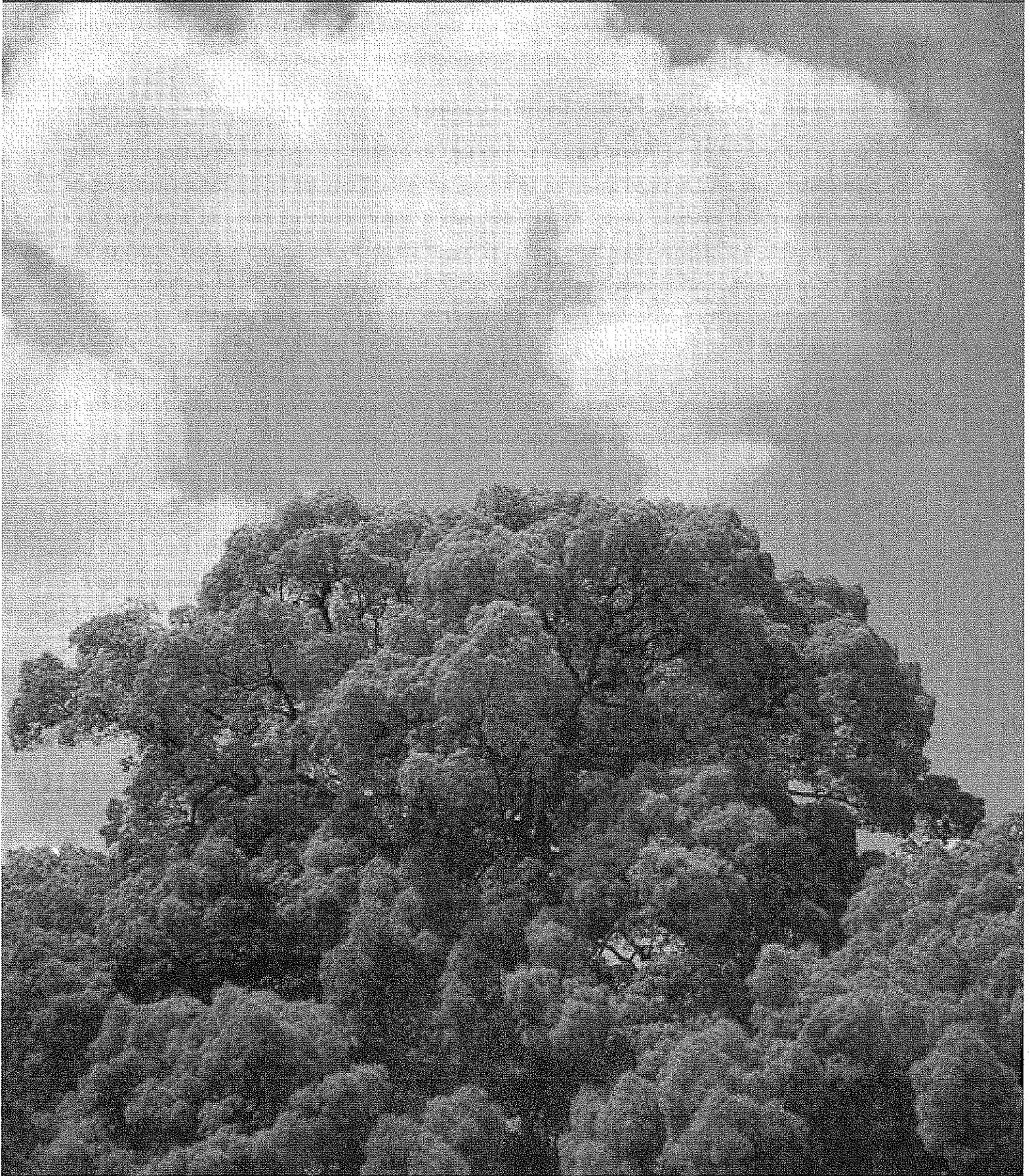
This inventory identifies the major sources of emissions from the City of Milpitas' operations and, therefore, where staff and policymakers will need to target emissions reductions activities if they are to make significant progress toward adopted targets. For example, since City facilities were a major source of emissions from the City's operations, it is possible that Milpitas 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 associated with employee commutes and the vehicle fleet, and the long term (2050) target will not be achievable without major reductions in all sectors.

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

- Institute further energy retrofits and renewable energy projects in facilities, especially in City Hall, Police Department/Corporation Yard, and Sports Center
- Continue promoting and providing incentives for carpool/vanpool, biking, walking and transit
- Instituting a policy whereby vehicles are replaced with fuel efficient and alternative fuel vehicles on a replacement basis
- Institute streetlight energy reduction policies, including limiting hours of operation and/or replacing lights with LED or energy efficient bulbs
- Energy audits of water, stormwater, and wastewater pumps, leading to replacement of pumps with appropriately-sized pumps

Using these strategies as a basis for a more detailed emissions reductions strategy, Milpitas 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.

# Appendices



# Appendix A: The Local Government Operations Protocol

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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 Milpitas' 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.<sup>15</sup> 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:

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<sup>15</sup> 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 the jurisdiction.

**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** using activity data and emission factors to estimate emissions. 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<sub>2</sub> 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.<sup>16</sup>

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

- Scope 1 fugitive emissions from leaked refrigerants from vehicle fleet
- Scope 1 CH<sub>4</sub> and N<sub>2</sub>O 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<sub>2</sub>e). 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 Milpitas' operations, however, these emissions should be quantified and reported.

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<sup>16</sup> 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.

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

- Ozone depleting chemical used as refrigerants (most notably R-22 and halons)
- Biogenic CO<sub>2</sub> emissions from biodiesel-consuming vehicles used for employee commutes

A common emissions source that is categorized as an information item is carbon dioxide released 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.<sup>17</sup> These principles indicate that biogenic fuels (e.g., wood, biodiesel), if left to decompose in the natural environment, would release CO<sub>2</sub> 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<sub>2</sub> emissions are akin to natural emissions and should therefore not be considered as human activity-generated emissions. The CH<sub>4</sub> and N<sub>2</sub>O 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.

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<sup>17</sup> 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

## 1. Local Government Profile

Jurisdiction Name:	City of Milpitas
Street Address:	455 East Calaveras Boulevard
City, State, ZIP, Country:	Milpitas, California 95035
Website Address:	<a href="http://www.ci.milpitas.ca.gov/">http://www.ci.milpitas.ca.gov/</a>
Size (sq. miles):	13.6
Population:	69,419
Annual Budget:	\$151,287,000 (FY 08/09)
Employees (Full Time Equivalent):	645
Climate Zone:	CA Climate Zone 3 ( <a href="http://www.energycodes.gov/implement/pdfs/climate_paper_review_draft_rev.pdf">www.energycodes.gov/implement/pdfs/climate_paper_review_draft_rev.pdf</a> )
Annual Heating Degree Days:	3649 ( <a href="http://www7.ncdc.noaa.gov/CDO/CDODivisionalSelect.jsp#">www7.ncdc.noaa.gov/CDO/CDODivisionalSelect.jsp#</a> )
Annual Cooling Degree Days:	292 ( <a href="http://www7.ncdc.noaa.gov/CDO/CDODivisionalSelect.jsp#">www7.ncdc.noaa.gov/CDO/CDODivisionalSelect.jsp#</a> )
Lead Inventory Contact Name:	Chris Schroeder
Title:	Purchasing Manager
Department:	Purchasing
Email:	<a href="mailto:cschroeder@ci.milpitas.ca.gov">cschroeder@ci.milpitas.ca.gov</a>
Phone Number:	(408) 586-3161

### Services Provided:

<input type="checkbox"/> Water treatment	<input type="checkbox"/> Mass transit (buses)	<input type="checkbox"/> Hospitals
<input type="checkbox"/> Water distribution	<input type="checkbox"/> Mass transit (light rail)	<input type="checkbox"/> Airport
<input type="checkbox"/> Wastewater treatment	<input type="checkbox"/> Mass transit (ferries)	<input type="checkbox"/> Seaport/shipping terminal
<input type="checkbox"/> Wastewater collection	<input type="checkbox"/> Schools (primary/secondary)	<input type="checkbox"/> Marina
<input type="checkbox"/> Electric utility	<input type="checkbox"/> Schools (colleges/universities)	<input type="checkbox"/> Stadiums/sports venues
<input checked="" type="checkbox"/> Fire Protection	<input type="checkbox"/> Solid waste collection	<input type="checkbox"/> Convention center
<input checked="" type="checkbox"/> Police	<input type="checkbox"/> Solid waste disposal	<input checked="" type="checkbox"/> Street lighting and traffic signals

## 2. GHG Inventory Details

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

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

Note: CO<sub>2</sub>e 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 <sub>2</sub> e	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	HFC	PFC	SF <sub>6</sub>
	Stationary Combustion	852.009	849.820	0.08	0.002			
	Fugitive Emissions	0.00				0.00		
	<b>Total Direct Emissions from Buildings &amp; Facilities</b>	<b>852.009</b>	<b>849.820</b>	<b>0.08</b>	<b>0.002</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
SCOPE 2		CO <sub>2</sub> e	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O			
	Purchased Electricity	1,298.87	1,288.286	0.076	0.029			
	<b>Total Indirect Emissions from Buildings &amp; Facilities</b>	<b>1,298.87</b>	<b>1,288.286</b>	<b>0.076</b>	<b>0.029</b>			

STREETLIGHTS AND TRAFFIC SIGNALS					
SCOPE 2		CO <sub>2</sub> e	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O
	Purchased Electricity	665.715	660.29	0.039	0.015
	<b>Total Indirect Emissions from Streetlights and Traffic Signals</b>	<b>665.715</b>	<b>660.29</b>	<b>0.039</b>	<b>0.015</b>

WATER DELIVERY FACILITIES									
SCOPE 1		CO <sub>2</sub> e	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	HFCs	PFCs	SF <sub>6</sub>	
	Stationary Combustion		477.43	474.724	0.071	0.004			
	<b>Total Direct Emissions from Water Delivery Facilities</b>		<b>477.43</b>	<b>474.724</b>	<b>0.071</b>	<b>0.004</b>	<b>0.00</b>	<b>0.00</b>	
SCOPE 2		CO <sub>2</sub> e	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O				
	Purchased Electricity		283.928	281.614	0.017	0.006			
	<b>Total Indirect Emissions from Water Delivery Facilities</b>		<b>283.928</b>	<b>281.614</b>	<b>0.017</b>	<b>0.006</b>			

VEHICLE FLEET								
SCOPE 1		CO <sub>2</sub> e	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	HFC	PFC	SF <sub>6</sub>
	Mobile Combustion		1,378.321	1,366.003	0.031	0.038		
	Fugitive Emissions		27.216				0.005	
	<b>Total Direct Emissions from Vehicle Fleet</b>		<b>1,405.536</b>	<b>1,366.003</b>	<b>0.031</b>	<b>0.038</b>	<b>0.005</b>	<b>0.000</b>
INDICATORS								
	Number of Vehicles	215						
	Vehicle Miles Traveled	953,599						

WASTE GENERATION					
SCOPE 3		CO <sub>2</sub> e	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O
	Waste All Facilities	594.133	0.000	28.292	0.00
INDICATORS	Short tons of solid waste accepted for disposal	2,343			
	Short tons of recyclable materials accepted for processing				

EMPLOYEE COMMUTE					
SCOPE 3		CO <sub>2</sub> e	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O
	Mobile Combustion	1,955.408	1,911.248	0.118	0.134
INDICATORS	Vehicle Miles Traveled	3,920,396			

INFORMATION ITEMS		CO <sub>2</sub> e
Employee Commute-Biogenic CO <sub>2</sub> from Biodiesel Combustion		0.511
Ozone Depleting Refrigerants		3.859
Total Information Items		4.370

Total Emissions							
	CO <sub>2</sub> e	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	HFCs	PFCs	SF <sub>6</sub>
SCOPE 1	2,734.975	2,690.547	0.183	0.043	0.005		
SCOPE 2	2,248.513	2,230.190	0.132	0.050			
SCOPE 3	2,549.541	1,911.248	28.410	0.134			
INFORMATION ITEMS	4.370						

### 3. Activity Data Disclosure

#### BUILDINGS & OTHER FACILITIES (Chapter 6)

##### SCOPE 1

##### Stationary Combustion Emissions Source Name

GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit	Data Sources and References
CO <sub>2</sub> e					
CO <sub>2</sub>	Primary	Known fuel use	159,558	therms	PG&E
CH <sub>4</sub>	Primary	Known fuel use	159,558	therms	PG&E
N <sub>2</sub> O	Primary	Known fuel use	159,558	therms	PG&E
HFCs					
PFCs					
SF <sub>6</sub>					

CO <sub>2</sub> e					
CO <sub>2</sub>	Alternate	Average year data	316	gallons	Eddie Loredo, Facilities Supervisor, Eric Weisler
CH <sub>4</sub>	Alternate	Average year data	316	gallons	
N <sub>2</sub> O	Alternate	Average year data	316	gallons	
HFCs					
PFCs					
SF <sub>6</sub>					

##### SCOPE 2

##### Purchased Electricity Emissions Source Name

GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit	Data Sources and References
CO <sub>2</sub> e					
CO <sub>2</sub>	Primary	Known Electricity Use	5,806,247	kWh	PG&E
CH <sub>4</sub>	Primary	Known Electricity Use	5,806,247	kWh	PG&E
N <sub>2</sub> O	Primary	Known Electricity Use	5,806,247	kWh	PG&E
HFCs					
PFCs					
SF <sub>6</sub>					

**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	Data Sources and References
Electricity	CO <sub>2</sub> e					
	CO <sub>2</sub>	Primary	Known Electricity Use	2,975,899	kWh	PG&E
	CH <sub>4</sub>	Primary	Known Electricity Use	2,975,899	kWh	PG&E
	N <sub>2</sub> O	Primary	Known Electricity Use	2,975,899	kWh	PG&E
	HFCs					
	PFCs					
	SF <sub>6</sub>					

**WATER DELIVERY FACILITIES (Chapter 6)**

**SCOPE 1**

**Stationary Combustion**

Diesel	CO <sub>2</sub> e					
	CO <sub>2</sub>	Alternate	Estimated run time and fuel efficiency	46,798	gallons	Stephan Smith; Jeff Baron
	CH <sub>4</sub>	Alternate		46,798	gallons	
	N <sub>2</sub> O	Alternate		46,798	gallons	
	HFC					
	PFC					
	SF <sub>6</sub>					

**SCOPE 2**

**Purchased Electricity**

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit	Data Sources and References
Electricity	CO <sub>2</sub> e					
	CO <sub>2</sub>	Primary	Known Electricity Use	1,269,222	kWh	PG&E
	CH <sub>4</sub>	Primary	Known Electricity Use	1,269,222	kWh	PG&E
	N <sub>2</sub> O	Primary	Known Electricity Use	1,269,222	kWh	PG&E
	HFCs					
	PFCs					
	SF <sub>6</sub>					

**VEHICLE FLEET (Chapter 7)**

**SCOPE 1**

**Mobile Combustion**

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit	Data Sources and References
Gasoline	CO <sub>2</sub> e					
	CO <sub>2</sub>	Primary	Known Fuel Use	114,355	gallons	Jeff Baron; Fleet Maintenance Supervisor
	CH <sub>4</sub>	Alternate	Annual mileage by vehicle type and fuel type	864,632	miles	
	N <sub>2</sub> O	Alternate		864,632	miles	
	HFCs					
	PFCs					
SF <sub>6</sub>						
Diesel	CO <sub>2</sub> e					
	CO <sub>2</sub>	Alternate	Fuel consumption estimates	35,400	gallons	Jeff Baron; Fleet Maintenance Supervisor
	CH <sub>4</sub>	Alternate	Annual mileage by vehicle type and fuel type	88,967	miles	
	N <sub>2</sub> O	Alternate		88,967	miles	
	HFCs					
	PFCs					
SF <sub>6</sub>						

**Fugitive Emissions**

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit	Data Sources and References
Refrigerants	R-134	Alternate	Estimating based upon equipment inventory and use	5	kg	Jeff Baron; Fleet Maintenance Supervisor

**WASTE GENERATION (Scope 3)**

**SCOPE 3**

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit	Data Sources and References
Generated Waste	CH <sub>4</sub>	Alternate	Estimated waste weight based upon volume and number of containers	2,343	tons	Leslie Stobbe, Public Information Specialist; Gill Cheso, Allied Waste

**EMPLOYEE COMMUTE (Scope 3)**

**SCOPE 3**

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit	Data Sources and References
Gasoline	CO <sub>2</sub> e	Alternate	Proxy Year Estimated Fuel Use-based upon daily vehicle miles traveled for all respondents extrapolated to represent all local government employees	211,504	gallons	Online and paper surveys of all employees; see Appendix C of Narrative report for examples; Data in possession of Chris Schroeder, Purchasing Manager
	CO <sub>2</sub>	Alternate				
	CH <sub>4</sub>	Alternate				
	N <sub>2</sub> O	Alternate				
	HFCs					
	PFCs					
SF <sub>6</sub>						
Diesel	CO <sub>2</sub> e	Alternate	Proxy Year Estimated Fuel Use-based upon daily vehicle miles traveled for all respondents extrapolated to represent all local government employees	4,825	gallons	Online and paper surveys of all employees; see Appendix C of Narrative report for examples; Data in possession of Chris Schroeder, Purchasing Manager
	CO <sub>2</sub>	Alternate				
	CH <sub>4</sub>	Alternate				
	N <sub>2</sub> O	Alternate				
	HFCs					
	PFCs					
SF <sub>6</sub>						
Biodiesel	CO <sub>2</sub> e	Alternate	Proxy Year Estimated Fuel Use-based upon daily vehicle miles traveled for all respondents extrapolated to represent all local government employees	54	gallons	Online and paper surveys of all employees; see Appendix C of Narrative report for examples; Data in possession of Chris Schroeder, Purchasing Manager
	CO <sub>2</sub>	Alternate				
	CH <sub>4</sub>	Alternate				
	N <sub>2</sub> O	Alternate				
	HFCs					
	PFCs					
SF <sub>6</sub>						

**INFORMATION ITEMS**

Emissions Source Name	GH G	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit	Data Sources and References
Ozone Depleting Refrigerants	R-22	Alternate	Simplified Mass Balance Method	2	kg	Eddie Loredo, Facilities Supervisor
Biogenic CO <sub>2</sub> from Mobile Combustion	GH G	Alternate	Methodology Name and Description Proxy Year Estimated Fuel Use-based upon daily vehicle miles traveled for all respondents extrapolated to represent all local government employees	54	gallons	Data Sources and References Online and paper surveys of all employees; see Appendix C of Narrative report for examples; Data in possession of Chris Schroeder, Purchasing Manager

## 4. Calculation Methodology Disclosure

### BUILDINGS & OTHER FACILITIES (Chapter 6)

#### SCOPE 1

##### Stationary Combustion

Emissions Source Name GHG Default/Alternate Emission Factor Emission Factor Sources and References

Emissions	Source Name	GHG		Emission Factor	Emission Factor Sources and References
		Default/Alternate			
Natural Gas	CO <sub>2</sub> e				
	CO <sub>2</sub>	Default	53.06 kg/MMBtu	LGOP v1 Table G.1	
	CH <sub>4</sub>	Default	5 g/MMBtu	LGOP v1 Table G.3	
	N <sub>2</sub> O	Default	0.1 g/MMBtu	LGOP v1 Table G.3	
	HFCs				
	PFCs				
	SF <sub>6</sub>				

Emissions	Source Name	GHG		Emission Factor	Emission Factor Sources and References
		Default/Alternate			
Generators-Diesel	CO <sub>2</sub> e				
	CO <sub>2</sub>	Default	73.15 kg/MMBtu	LGOP v1 Table G.1	
	CH <sub>4</sub>	Default	11 g/MMBtu	LGOP v1 Table G.3	
	N <sub>2</sub> O	Default	.6 g/MMBtu	LGOP v1 Table G.3	
	HFCs				
	PFCs				
	SF <sub>6</sub>				

#### SCOPE 2

##### Purchased Electricity

Emissions Source Name GHG Default/Alternate Emission Factor Emission Factor Sources and References

Emissions	Source Name	GHG		Emission Factor	Emission Factor Sources and References
		Default/Alternate			
Electricity	CO <sub>2</sub> e				
	CO <sub>2</sub>	Default	489.2 lbs/mWh	PG&E (2005); LGOP v1 Table G.5	
	CH <sub>4</sub>	Default	0.029 lbs/mWh	PG&E (2004 proxy); LGOP v1 Table G.6	
	N <sub>2</sub> O	Default	0.011 lbs/mWh		
	HFCs				
	PFCs				
	SF <sub>6</sub>				

### STREETLIGHTS AND TRAFFIC SIGNALS (Chapter 6.2)

#### SCOPE 2

##### Purchased Electricity

Emissions Source Name GHG Default/Alternate Emission Factor Emission Factor Sources and References

Emissions	Source Name	GHG		Emission Factor	Emission Factor Sources and References
		Default/Alternate			
Electricity	CO <sub>2</sub> e				
	CO <sub>2</sub>	Default	489.2 lbs/mWh	PG&E (2005); LGOP v1 Table G.5	
	CH <sub>4</sub>	Default	0.029 lbs/mWh	PG&E (2004 proxy); LGOP v1 Table G.6	
	N <sub>2</sub> O	Default	0.011 lbs/mWh		
	HFCs				
	PFCs				
	SF <sub>6</sub>				

**WATER DELIVERY FACILITIES (Chapter 6)**

**SCOPE 1**

**Stationary Combustion**

Emissions Source Name	GHG	Default/ Alternate	Emission Factor	Emission Factor Sources and References
Diesel	CO <sub>2</sub>	Default	73.15 kg/MMBtu	LGOP v1 Table G.1
	CH <sub>4</sub>	Default	11 g/MMBtu	LGOP v1 Table G.3
	N <sub>2</sub> O	Default	6 g/MMBtu	LGOP v1 Table G.3
	HFC			
	PFC			
	SF <sub>6</sub>			

**SCOPE 2**

**Purchased Electricity**

Emissions Source Name	GHG	Default/ Alternate	Emission Factor	Emission Factor Sources and References
Electricity	CO <sub>2</sub> e			
	CO <sub>2</sub>	Default	489.2 lbs/mWh	PG&E (2005); LGOP v1 Table G.5
	CH <sub>4</sub>	Default	0.029 lbs/mWh	PG&E (2004 proxy); LGOP v1 Table G.6
	N <sub>2</sub> O	Default	0.011 lbs/mWh	
	HFC			
	PFC			
SF <sub>6</sub>				

**VEHICLE FLEET (Chapter 7)**

**SCOPE 1**

**Mobile Combustion**

Emissions Source Name	GHG	Default/ Alternate	Emission Factor	Emission Factor Sources and References
Gasoline	CO <sub>2</sub> e			
	CO <sub>2</sub>	Default	8.81 kg/gallon	LGOP v1 Table G.9
	CH <sub>4</sub>	Default	Varies by vehicle type	LGOP v1 Table G.10, G.13; Table G.12 for other equipment
	N <sub>2</sub> O	Default		
	HFC			
	PFC			
SF <sub>6</sub>				

Diesel	CO <sub>2</sub> e			
	CO <sub>2</sub>	Default	10.15 kg/gallon	LGOP v1 Table G.9
	CH <sub>4</sub>	Default	Varies by vehicle type	LGOP v1 Table G.10, G.13; Table G.12 for other equipment
	N <sub>2</sub> O	Default		
	HFC			
	PFC			
SF <sub>6</sub>				

**Fugitive Emissions**

Emissions Source Name	GHG	Default/ Alternate	Emission Factor	Emission Factor Sources and References
Refrigerants	R-134	None	GWP-1000	LGOP v1 Table E.1&E.2

**WASTE GENERATION (Scope 3)**

**SCOPE 3**

Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Generated Waste	CH <sub>4</sub>	Alternate	Varies by waste type	EPA Waste Reduction Model <a href="http://www.epa.gov/climatechange/wycd/waste/calculators/Warm_home.html">http://www.epa.gov/climatechange/wycd/waste/calculators/Warm_home.html</a> ; Public Administration waste characterization provided by CIWMB

**EMPLOYEE COMMUTE (Scope 3)**

**SCOPE 3**

Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Gasoline	CO <sub>2</sub> e			
	CO <sub>2</sub>	Default	8.81 kg/gallon	LGOP v1 Table G.9
	CH <sub>4</sub>	Default	0.0299 g/mi	LGOP v1 Table G.13
	N <sub>2</sub> O	Default	.03413 g/mi	LGOP v1 Table G.13
	HFC			
	PFC			
	SF <sub>6</sub>			
Diesel	CO <sub>2</sub> e			
	CO <sub>2</sub>	Default	10.15 kg/gallon	LGOP v1 Table G.9
	CH <sub>4</sub>	Default	.00098 g/mi	LGOP v1 Table G.13
	N <sub>2</sub> O	Default	.00148 g/mi	LGOP v1 Table G.13
	HFCs			
	PFCs			
	SF <sub>6</sub>			
Biodiesel	CO <sub>2</sub> e			
	CO <sub>2</sub>			
	CH <sub>4</sub>	Default	.00098 g/mile	LGOP v1 Table G.13
	N <sub>2</sub> O	Default	.00148 g/mile	LGOP v1 Table G.13
	HFCs			
	PFCs			
	SF <sub>6</sub>			

**INFORMATION ITEMS**

Emissions	Source Name	GHG	Default/ Alternate	Emission Factor	Emission Factor Sources and References
Ozone Depleting Refrigerants		R-22	None	GWP-1700	<a href="http://www.epa.gov/ozone/science/ods/classone.html">http://www.epa.gov/ozone/science/ods/classone.html</a>
Biogenic CO <sub>2</sub> from Mobile Combustion	CO <sub>2</sub> e				
	CO <sub>2</sub>	Default		.0262 kg/scf	LGOP v.1 Table G.2
	CH <sub>4</sub>				
	N <sub>2</sub> O				
	HFCs				
	PFCs				
	SF <sub>6</sub>				

# Appendix C: Employee Commute

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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.<sup>18</sup> 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 Milpitas 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 Milpitas 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 City 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 City administered the employee commute survey to 645 current employees working for the City, and 245 employees responded to the survey (a response rate of 38 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.

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<sup>18</sup> 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.

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 carpoled 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<sub>2</sub>e 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

ICLEI then extrapolated estimated fuel consumption to represent all 645 of Milpitas' 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.

## 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. 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.
 

<input type="checkbox"/> Full size auto	<input type="checkbox"/> Compact/hybrid	<input type="checkbox"/> Heavy truck
<input type="checkbox"/> Mid size auto	<input type="checkbox"/> SUV/Pickup	<input type="checkbox"/>
Other _____		
- \* 4. What year was your vehicle manufactured?  
\_\_\_\_\_
- \* 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 <i>to work</i> by this mode (max 7)							
Miles Traveled <i>to work per day</i> 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. Current Commute Preference Information**

1. Why have you chosen your current 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?

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# Appendix D: Government-Generated Solid Waste Methodology

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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 Milpitas' Operations

Like most local governments, Milpitas does not directly track the amount of waste generated from its operations. Therefore, to estimate the amount of waste generated, ICLEI worked with Gil Cheso at Allied Waste, the hauler of waste for the City in 2005. The amount of waste was estimated by compiling pick-up accounts owned by the City of Milpitas. Garbage trucks do not weigh waste at each pick-up; 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 the California Integrated Waste Management Board (CIWMB). 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.<sup>19</sup>

Most landfills in the Bay Area capture methane emissions either for energy generation or for flaring. EPA estimates that 60 percent to 80 percent<sup>20</sup> of total methane emissions are recovered at the landfills to which Milpitas 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.<sup>21</sup> 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<sub>2</sub>e emissions from waste disposal were calculated using the methane commitment method outlined in the EPA WARM model. This model has the following general formula:

$$\text{CO}_2\text{e} = W_t * (1-R)A$$

Where:

$W_t$  is the quantify of waste type "t"

R is the methane recovery factor,

A is the CO<sub>2</sub>e 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."

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19 CIWMB Waste Characterization Study-Public Administration Group available at <http://www.ciwmb.ca.gov/WasteChar/BizGrpCp.aspx>.

20 AP 42, section 2.4 Municipal Solid Waste, 2.4-6, <http://www.epa.gov/ttn/chief/ap42/index.html>

21 "Upstream" emissions include emissions that may not occur in your jurisdiction resulting from manufacturing or harvesting virgin materials and transportation of them.

# Appendix E: Conducting a Monitoring Inventory

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The purpose of this appendix is to assist City 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 Christopher Schroeder, Purchasing Manager at the City of Milpitas, 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 Milpitas 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 Milpitas to meet the recommended methods outlined in LGOP in future inventories.

- Fuel consumption by individual vehicles
- Fuel consumption by mobile equipment
- Fuel consumption by pumps and generators
- Direct tracking of refrigerants recharged into HVAC and refrigeration equipment
- Direct tracking of fire suppressants recharged into fire suppression equipment

- Direct tracking of refrigerants recharged into vehicles

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 jurisdiction'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 city/town/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 communicates 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<sub>2</sub> emissions and CH<sub>4</sub>/N<sub>2</sub>O 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 alternative 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.