

MEMORANDUM

DATE: November 18, 2008

TO: Patrick D. O’Keeffe, City Manager

FROM: Department of Public Works

SUBJECT: Resolution of the City Council of the City of Emeryville Approving and Adopting the City of Emeryville Climate Action Plan.

SUMMARY

The purpose of this item is to consider the proposed City of Emeryville Climate Action Plan. The Plan is recommended by the Climate Change Task Force (CCTF) and is estimated to achieve the City of Emeryville’s goal of reducing greenhouse gas emissions by 25% over 2004 levels by 2020.

BACKGROUND

State, National and International Background And Commitments

In February 2005, the world took a global step forward towards reducing green house emissions when 141 countries strengthened their countries’ current environmental laws by adopting the Kyoto Treaty, the international agreement to address climate disruption. As of May 2008, 181 countries have ratified the agreement representing over 61% of the developed countries emissions. The Kyoto Treaty sets binding legal commitments on participating countries to reduce emissions an average of 5.2% below 1990 levels. If the United States of America had ratified the Kyoto Treaty, we would have been required to reduce greenhouse gas emissions by 7% below 1990 levels by 2012.

In 2005, cities and counties took the lead at the U.S. Conference of Mayor’s developed the U.S. Mayors Climate Protection Agreement which urged the federal and state governments to enact policies and programs to meet the Kyoto Protocol target. The Agreement included a commitment to strive to meet the Kyoto Protocol target by taking local actions, such as conducting a baseline emissions inventory, setting reduction targets, and creating a climate action plan.

In September 2006, the State of California enacted AB 32, the Global Warming Act of 2006, which creates a statewide greenhouse gas emission limit that would reduce statewide emissions to 1990 levels by 2020. Reaching this target necessitates a reduction in greenhouse gas emissions by approximately 25-30% below the level of emissions that the State is forecasted to reach by 2020. It is not yet clear what measures the State plans to enact to achieve this reduction goal, but it is clear that the State will be looking to local governments for assistance. Hopefully, this will equate to financial assistance and other resources and incentives for local governments to implement emissions reduction programs.

Recent studies continue to reveal the impact humans have on their environment and that a change in human behavior is necessary.

- January of 2007, the International Committee on Climate Change found a certainty level of 90% that climate change is happening and is being caused by human action.
- February of 2007, The Stern Review, a report for the British Government, found that one percent of global gross domestic product (GDP) *per annum* is required to be invested in order to avoid the worst effects of climate change, and that failure to do so could risk global GDP being up to twenty percent lower than it otherwise might be.
- April of 2007, the US Supreme Court found that the EPA must regulate CO₂ as an air pollutant.

Local City of Emeryville Background and Commitments

The City of Emeryville has taken several actions concerning Climate Change over the last few years:

On September 7 1999, Council Member Harper asked and received the blessing of the Emeryville City Council to give signatory approval of the “Mayor and Local Official Statement on Global Warming” through the organization “Cities for Climate Protection.”

On June 5, 2005, in San Francisco at the United Nations World Environment Day proceedings, Emeryville signed as a charter member of the United Nations World Environmental Accords - the smallest city by population in the world to do so. The Accords ask the participating jurisdictions to take one of the 21 action steps each year; the Cities will be evaluated on their voluntary actions in 2012 by the United Nations at a follow-up conference. One of the key action steps of the Accords is to set a goal of reducing green house gas emissions by 25% by 2030 and developing a system to track Greenhouse Gas (GHG) emissions.

In May 2006, the City adopted a Resolution to participate in the Alameda County Climate Protection Project, an effort that now includes all the cities in the County.

On February 28, 2007, the first meeting of the CCTF was held. The Task Force discussed the next phases of the project and made recommendations for the goal and expansion of the Task Force membership.

The Alameda County Climate Protection Project builds upon the “Cities for Climate Protection Campaign” from the International Council for Local Environmental Initiatives – Cities for Sustainability (ICLEI) and their 5-Milestone methodology to reduce both greenhouse gas and air pollution emissions. The 5-Milestone process that the City has committed to implement is as follows:

Milestone 1 – Conduct a baseline emissions inventory and forecast

Milestone 2 – Adopt an emissions reduction target

Milestone 3 – Develop a Climate Action Plan (CAP) for reducing emissions

Milestone 4 – Implement policies and measures

Milestone 5 – Monitor and verify results

The City has completed the first two milestones as discussed below in the background section. The third milestone is the subject of this agenda item.

Milestone 1 - Baseline Emission Inventory and Forecast Report

The purpose of the baseline emissions inventory is to determine the levels of greenhouse gas emissions that the City of Emeryville emitted in its base year, 2004, on a government level and on a community-wide level.

In December of 2006, The City and ICLEI completed the 2004 community-wide and government operations baseline greenhouse emissions inventory. Emissions were aggregated and measured in terms of equivalent carbon dioxide units or eCO₂ so that different greenhouse gases were considered in comparable terms. According to that first inventory, Community-wide, the City emitted approximately 128,918 tons of eCO₂. Government operations, which emitted approximately 1,283 tons, were responsible for approximately 1% of the overall eCO₂ production. Based upon the information contained in the inventory report from ICLEI, the City Council formed the City’s Climate Change Task Force and appointed to the task force, Councilmembers Atkin and Davis.

In the summer of 2008, ICLEI proposed a modification to the baseline inventories for all member agencies. Transportation emissions were recalculated to take into account a new methodology for measuring highway related emissions that were not included in the previous inventories. The result of the recalculation was an increase in Emeryville’s total emissions. However, the recalculation also brings Emeryville in-line with the county average for transportation related emissions. ICLEI and the CCTF are recommending the use of the new revised inventory as it is the new standard method for all the jurisdictions in Alameda County. The following tables summarize the new revised inventories for the Community and the Government sectors:

Community-wide Emissions Inventory Summary – 2004 – (Revised 2008)

2004 Community Emissions by Sector	Residential	Commercial/ Industrial	Transportation	Waste	TOTAL
CO ₂ e (metric tons)	9,380	76,204	87,447	5,801	178,832
% of Total CO ₂ e	5.2%	42.6%	48.9%	3.2%	100.0%
Energy Use (MMBtu)	160,562	1,267,105	262,451	0	1,690,118

Government Emissions Inventory Summary - 2004 – (Revised 2008)

2004 Government Emissions by Sector	Buildings	Vehicle Fleet	Public Lighting	Water/ Sewage	Waste	TOTAL
CO ₂ e (metric tons)	395	444	271	13	212	1,335
% of Total CO ₂ e	29.6%	33.3%	20.3%	1.0%	15.9%	100.0%
MMBtu	6,633	5,713	4,137	195	-	16,678
Cost (\$) per year	\$169,608	\$118,974	\$136,974	\$7,801	-	\$433,357

In order to create a historical record of the City's emissions trend, it is necessary to conduct subsequent emissions inventories on a regular basis. Staff recommends that a new inventory be conducted in 2010 to track progress made.

Milestone 2 – Adopt an Emissions Reduction Target

The City Council completed Milestone 2 by establishing the emissions reduction goal in May of 2007. The goal set by the City is to reduce emission levels by 25% over 2004 levels by the year 2020 in two areas: the community as a whole and for government operations.

DISCUSSION / ANALYSIS

Milestone 3 – Develop a Climate Action Plan (CAP) for reducing emissions

The CCTF had meetings in June, August, October of 2007 and January, March, May, June and July of 2008. During the last meeting in 2008 the draft plan was completed and recommended for adoption. The CAP is now being presented to the City Council for consideration.

The City will partner with other organizations that have committed to reducing greenhouse gas emissions. For example, the BAAQMD at their annual summit on November 10, 2006 allocated \$3 million to fund emissions reduction programs. Additionally, ABAG, in partnership with PG&E, is offering an energy watch program for communities and local governments which the City has participated in and can expand upon.

ICLEI, in partnership with Stopwaste.org, developed an Action Plan Template which includes a list of emissions reduction programs that the CCTF considered for the draft plan. The more detailed draft plan is attached and the measures are summarized as follows:

Community-Wide

Increase Transit Oriented Development
Adopt a Green Building and Bay-Friendly Ordinance
Enhance Transportation Demand Management Conditions
New Pedestrian, Cycling and Transit Programs & Incentives
Increase Transit Service and Ridership
Commercial and Residential Energy Conservation Ordinances
Develop and Incentivize Local Renewable Energy Production
Conserve Potable Water and Develop Rainwater Usage
Reduce 2004 Landfilled Waste Tons by 50% by 2020

Affected Sector

New Development Projects
New Development Projects
New Development Projects
All Sectors
All Sectors
Existing Buildings & Homes
All Sectors
All Sectors
All Sectors

Government Operations

Green Building and Bay-Friendly Landscaping for City buildings and landscapes
Fleet changes – fuel and vehicle types
Reduce 2004 Landfilled Waste Tons by 50% by 2020
Environmentally Preferable Purchasing
Alternative Transportation Incentives/Initiatives

FISCAL IMPACT

The Fiscal impact to the City is unknown at this time. To implement the plan there will be costs and savings that will vary for each action taken. Some actions may have upfront capital costs, or need additional staff time to implement and maintain. Funding will be needed for incentives to businesses or residents and informational campaigns to promote new programs. There are various sources of possible revenues for these expenses such as grants and fees. A better financial analysis will be developed upon future task prioritization.

RECOMMENDATION

Staff and the Climate Change Task Force recommend that the City Council consider the attached draft resolution adopting and approving the Climate Action Plan for the City and provide comments.

RECOMMENDED BY:

Maurice Kaufman
Director of Public Works

Peter Schultze-Allen
Environmental Analyst

**APPROVED FOR FORWARDING
TO THE CITY COUNCIL**

Patrick D. O’Keeffe,
City Manager

attachments: Resolution
Draft Climate Action Plan
2004 Baseline Inventory (revised in 2008)

RESOLUTION

RESOLUTION OF THE CITY COUNCIL OF THE CITY OF EMERYVILLE APPROVING AND ADOPTING THE CITY OF EMERYVILLE CLIMATE ACTION PLAN

WHEREAS, studies suggest that a global greenhouse gas emissions reduction of anywhere from 60-80% is needed to avert an ecological crisis; and

WHEREAS, on February 16, 2005, the Kyoto Protocol, an international agreement to address climate disruption, came into force and, as of May 2008, a total of 181 countries and other governmental entities, representing over 61% of emissions from developed countries, have ratified the agreement. The Agreement requires the countries to reduce greenhouse gas emissions 5.2%, on average, below 1990 levels by 2012. The objective is the stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system; and

WHEREAS, the United States of America, with less than five percent of the world's population, is responsible for producing approximately 25% of the world's global warming pollutants, yet is not a party to the Kyoto Protocol; and

WHEREAS, the Kyoto Protocol emission reduction target for the U.S., had it ratified the treaty, would have been 7% below 1990 levels by 2012; and

WHEREAS, Mayors from around the nation, have signed the U.S. Mayors Climate Protection Agreement which urges federal and state governments to enact policies and programs to meet the Kyoto Protocol target of a 7% reduction in emissions below 1990 levels and commits their local agencies to strive to take actions to meet the Kyoto Protocol targets; and

WHEREAS, in March of 2006, the City of Emeryville authorized participation in the Alameda County Climate Protection Project coordinated by the International Council for Local Environmental Initiatives - Local Governments for Sustainability (ICLEI); and

WHEREAS, in September 2006, the State of California adopted the Global Warming Act of 2006 which creates a statewide greenhouse gas emission limit that would reduce emissions to 1990 levels by 2020; and

WHEREAS, the City of Emeryville, with assistance from ICLEI and Stopwaste.org, completed a 2004 baseline Community-wide and Municipal Operations emissions inventory and in December of 2006, accepted the report, established the City of Emeryville Climate Change Task Force (CCTF) and appointed two council members to the CCTF; and

WHEREAS, on May 1, 2007, the City of Emeryville adopted a goal of reducing emissions by 25% over 2004 levels by 2020 and appointed additional community members to the CCTF; and

WHEREAS, the CCTF having met several times in 2007 and 2008 approved the draft Climate Action Plan at its meeting in July of 2008 and voted to recommend to the City Council that the Climate Action Plan be adopted; therefore, now, be it

RESOLVED, by the City Council of the City of Emeryville that the City of Emeryville Climate Action Plan, attached hereto as Exhibit A, is hereby approved and

ADOPTED by the City Council of the City of Emeryville at a regular meeting held Tuesday, November 18, 2008 by the following vote:

AYES: _____

NOES: _____ **ABSTAINED:** _____

EXCUSED: _____ **ABSENT:** _____

MAYOR

ATTEST:

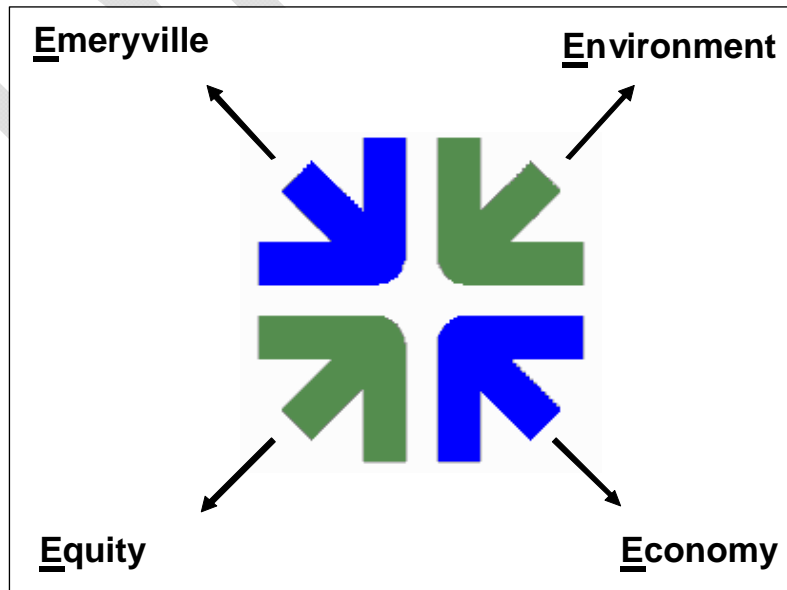
APPROVED AS TO FORM:

CITY CLERK

CITY ATTORNEY



City of Emeryville Climate Action Plan November 2008



Acknowledgements

City of Emeryville Climate Change Task Force Members:

Council Members

Ruth Atkin
Nora Davis

Residents

Deborah Badhia
Sam Foushee
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Pat Hooper
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John Scheuerman

Emery Unified School District Board Member

Cheryl Webb

Emeryville Chamber of Commerce Member

Denise Pinkston

Emeryville Planning Commission Member

Gail Donaldson

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Table of Contents

Executive Summary

Background: The Alameda County Climate Protection Project

1. Introduction

- 1.1 Introduction to Climate Change Science
- 1.2 Effects & Impacts of Climate Change
- 1.3 Action Being Taken on Climate Change

2. Emissions Inventory

- 2.1 Reasoning, Methodology & Model
 - 2.1.1 Software
 - 2.1.2 Inventory Sources and Data Collection Process
- 2.2 Alameda County Inventory Results
- 2.3 Emeryville Inventory Results
 - 2.3.1 Community Emissions Inventory Summary 2004
 - 2.3.2 Community Emissions Inventory Detail 2004
 - 2.3.3 Government Operations Emissions Inventory 2004

3. Forecast for Greenhouse Gas Emissions

4. Greenhouse Gas Emissions Reduction Target

5. Existing Measures & Policies

- 5.1 Community-wide Measures
- 5.2 Government Operations Measures
- 5.3 Summary of Existing Emissions Reduction Measures

6. Proposed Measures & Policies

- 6.1 Community-wide Energy and Transportation/Land-use
- 6.2 Government Energy and Transportation
- 6.3 Community-wide Solid Waste
- 6.4 Government Solid Waste

Appendix A – Implementation Table

Appendix B – Baseline Inventory Report (December 2006, Revised August 2008)

Executive Summary

The debate is over. The overwhelming scientific consensus is that human-induced climate change is among the most pressing environmental and social problems facing this generation and those to come.

The time to act is now. Never in the past 1000 years has the planet warmed at a faster rate than during the 20th century, and the most recent decade has been the warmest ever on record. Allowing this trend to continue could result in decreased agricultural output, increased catastrophic weather events such as forest fires, drought and floods and displacement of entire populations due to rising sea levels.

The City of Emeryville must do its part. Although the United States accounts for a mere 4% of the world's population, it produces 20.4% of the world's greenhouse gases, according to Table No. 1 on page 5. The City of Emeryville released an estimated 178,832 tons of carbon dioxide equivalent (CO₂e) in 2004 and, if steps are not taken to achieve reductions, is projected to emit 33% more in 2020. However, in March of 2006 the City of Emeryville pledged to take action against this destructive trend by passing a resolution to join more than 230 U.S. local governments and 770 local governments worldwide in ICLEI's Cities for Climate Protection[®] (CCP) campaign. In so doing, Emeryville committed to ICLEI's 5-Milestone methodology for combating global warming. In December of 2006, the City approved the baseline inventory report from ICLEI and established a Climate Change Task Force to develop a Climate Action Goal and Plan. Then on May 1st, 2007, the City of Emeryville committed to reducing community-wide greenhouse gas emissions by 25% below 2004 levels by 2020.

Summary of Proposed Actions:

Community-Wide

Increase Transit Oriented Development

Adopt a Green Building and Bay-Friendly Ordinance

Enhance Transportation Demand Management Conditions

New Pedestrian, Cycling and Transit Programs & Incentives

Increase Transit Service and Ridership

Commercial and Residential Energy Conservation Ordinances

Develop and Incentivize Local Renewable Energy Production

Conserve Potable Water and Develop Rainwater Usage

Reduce 2004 Landfilled Waste Tonnage by 50% by 2020

Affected Sector

New Development Projects

New Development Projects

New Development Projects

All Sectors

All Sectors

Existing Buildings and Homes

All Sectors

All Sectors

All Sectors

Government Operations

GB/BFL for buildings and landscapes

Fleet changes – fuel and vehicle types

Reduce 2004 Landfilled Waste Tonnage by 50% by 2020

Environmentally Preferable Purchasing

Background: The Alameda County Climate Protection Project

In June 2006 eleven local governments in Alameda County, CA committed to becoming members of ICLEI – Local Governments for Sustainability (ICLEI) and participating in the **Alameda County Climate Protection Project (ACCPP)**. The participating jurisdictions include:

Alameda	Berkeley	Newark	San Leandro
Alameda County	Emeryville	Oakland	Union City
Albany	Hayward	Piedmont	

The project was launched by ICLEI in partnership with the Alameda County Waste Management Authority & Recycling Board (StopWaste.Org) and the Alameda County Conference of Mayors. In committing to the project, the jurisdictions embarked on an ongoing, coordinated effort to reduce the emissions that cause global warming, improve air quality, reduce waste, cut energy use and save money. Toward that end, ICLEI and StopWaste.Org assisted each participating jurisdiction to conduct a baseline greenhouse gas emissions inventory, set a community-wide emissions reduction target, and develop a climate action plan that consists of policies and measures that, when implemented, will enable each jurisdiction to meet its target.

A model climate action plan was developed for use by the 11 participating local governments to create tailored climate action plans for their communities. Its purpose is to save participants' time and resources by providing a useful action plan format, background information on the science and impacts of global warming, and detailed suggestions on the types of policies that municipalities can implement to achieve the desired emissions reductions. In developing this resource, ICLEI relied on the expertise of StopWaste.Org staff as well as the experiences of the nationwide network of ICLEI member cities, each of which is working toward similar climate protection goals.

About Alameda County, California

Alameda County is a metropolitan region of the San Francisco Bay Area. The 2005 census estimates the County's population at 1.45 million, the 7th most populous county in the State of California. Like other metropolitan areas, inhabitants of the county and the cities therein contribute to the problem of global warming, while also holding immense potential to contribute to the solution. The energy consumed and the waste produced within the county's boundaries result in thousands of tons of heat-trapping greenhouse gas emissions. But, as is evidenced by the widespread municipal involvement in the Alameda County Climate Protection Project, the local government participants are firmly committed to building on existing efforts to reduce the emissions that cause global warming.

Regional governments and nations across the world can only manage what they measure. The first step in managing greenhouse gas emissions, therefore, is to establish an inventory of those emissions. Below is a chart of global greenhouse gas emissions, which includes the amount of short tons of carbon dioxide equivalent (tons CO₂e) that is generated worldwide, within the United States, the State of California, and in Alameda County. For context, California is the 16th largest emitter in the world - if it were considered a country of its own - second only to Texas in the US. Per capita emissions in California, however, are among the lowest in the US. Further, emissions in Alameda County are significantly less than the California average.

Table (1) World Greenhouse Gas Emissions Scenarios

Locations	GHG – Tons of CO₂e per year	Percent of World GHG Emissions	Percent of U.S.A Emissions	Percent of California Emissions
World (2000)	33,712,900,000	100.0%		
United States (2000)	6,871,700,000	20.4%	100%	
California (2004)	542,184,000	1.6%	7.9%	100.0%
ACCPP Region (2005) ^{1,2,3}	5,710,393		0.083%	1.105%
ACCPP Governments (2005)	80,532			0.015%

Source: (2000) World and United States emissions from World Resources Institute – Climate Analysis Indicators tool (<http://cait.wri.org/>). (2004) California emissions from California Energy Commission (<http://www.energy.ca.gov/2006publications/CEC-600-2006-013/CEC-600-2006-013-SF.PDF>). Figures exclude land use related emissions.

Note: All units in this report are reported in short tons (tons). When source data is found in metric tonnes (MT or tonnes) to convert it into short tons (tons) a conversion factor of 1.102 short ton per metric ton is applied.

Per Capita Fast Facts

2000 Worldwide per capita GHG emissions **5 tons CO₂e**
 2004 US per capita GHG emissions **23 tons CO₂e**
 2004 California per capita GHG emissions **17 tons CO₂e**

Additional source: 2004, U.S.A. GHG Emissions from EPA
 (<http://www.epa.gov/climatechange/emissions/downloads06/06ES.pdf>)

<u>Fast Facts</u>	<u>Alameda County</u>	<u>Emeryville⁵</u>
Population (2005):	1.45 Million	8,650
Number of Employees (2005):		20,000
Number of Autos (2000):	4.5 Million	4000
Annual Electricity Usage per Capita (2004):	6,738 kWh	
Annual Natural Gas Usage per Capita (2004):	330 therms	
Annual Water Usage per Capita (2004):	46,000 gallons	
Average Waste per person (2004):	1.03 tons	
Average Waste per Business ⁶ (2004):	35.0 tons	24.0 tons
Average Waste Diversion Rate (2004):	60%	64%
Per capita GHG emissions ⁴ :	5.86 tons CO₂e	

¹ Data includes the 10 cities in the ACCPP only (Alameda City, Albany, Berkeley, Emeryville, Hayward, Newark, Oakland, Piedmont, San Leandro and Union City).

² The Baseline year is 2005 for all cities, except for Albany and Emeryville which inventoried 2004 emissions.

³ GHG emissions for ACCPP cities are based on ICLEI GHG Emissions Protocol for Local Governments, which includes end use energy, transportation and waste sector within city boundaries. World and U.S.A emissions are based on national GHG inventories which additionally include fugitive emissions, industrial process emissions, and other modes of transportation.

⁴ Based on the emissions inventories conducted for the 11 participating local governments.

⁵ Per Capita data for the City of Emeryville is not applicable in a predominantly commercial city.

⁶ Average Business Waste calculated on estimated 600 businesses with 90% of 2004's 16,000 MSW tons

Source: StopWaste.org and City of Emeryville

About the Sponsor: StopWaste.Org

This Alameda County Climate Protection Project was financially sponsored by StopWaste.Org in an effort to support its member agencies in building a region that is continually progressing toward environmentally and economically sound resource management. StopWaste.Org is a public agency formed in 1976 by a Joint Exercise of Powers Agreement among the County of Alameda, each of the fourteen cities within the county, and two sanitary districts. The agency serves as the Alameda County Waste Management Authority and the Alameda County Source Reduction and Recycling Board. In this dual role StopWaste.Org is responsible for the preparation and implementation of the County Integrated Waste Management Plan and Hazardous Waste Management Plan as well as the delivery of voter approved programs in the areas of waste reduction, recycled product procurement, market development and grants to non-profit organizations, to help the County achieve its 75% waste diversion goal.

Key program areas in which StopWaste.Org provides technical and financial assistance to its member agencies include:

- Business recycling and waste prevention services through the StopWaste Partnership
- Organics programs, including residential and commercial food waste collection and the promotion of Bay-Friendly Landscaping and gardening
- Green building and construction and demolition debris recycling
- Market development
- Education and outreach, including schools recycling.

As is demonstrated in this document, many of StopWaste.Org's program areas dovetail nicely with municipal efforts to reduce greenhouse gas emissions. While the agency's charge to reduce the waste stream in Alameda County may seem external to traditional emissions reduction strategies, it is working closely with ICLEI in an ongoing way to illustrate the emissions benefits of waste reduction and recycling. Indeed, StopWaste.Org and ICLEI have compiled results in this report that show practices such as residential and commercial recycling and composting, buying recycled products, green building and Bay-Friendly Landscaping play an important role in a local government's emission mitigation strategy. In fact, climate change mitigation can be seen as an umbrella under which the agency's programs play a substantial role.

About ICLEI and the Cities for Climate Protection Campaign

ICLEI's mission is to improve the global environment through local action. The Cities for Climate Protection® (CCP) campaign is ICLEI's flagship campaign designed to educate and empower local governments worldwide to take action on climate change. ICLEI provides resources, tools, and technical assistance to help local governments measure and reduce greenhouse gas emissions in their communities and their internal municipal operations.

ICLEI's CCP campaign was launched in 1993 when municipal leaders, invited by ICLEI, met at the United Nations in New York and adopted a declaration that called for the establishment of a worldwide movement of local governments to reduce greenhouse gas emissions, improve air quality, and enhance urban sustainability. The CCP campaign achieves these results by linking climate change mitigation with actions that improve local air quality, reduce local government operating costs, and improve quality of life by addressing other local concerns. The CCP campaign seeks to achieve significant reductions in U.S. greenhouse gas emissions by assisting local governments in taking action to reduce emissions and realize multiple benefits for their communities.

ICLEI uses the performance-oriented framework and methodology of the CCP campaign's 5-Milestones to assist U.S. local governments in developing and implementing harmonized local approaches for reducing global warming and air pollution emissions, with the additional benefit of improving community livability. The milestone process consists of:

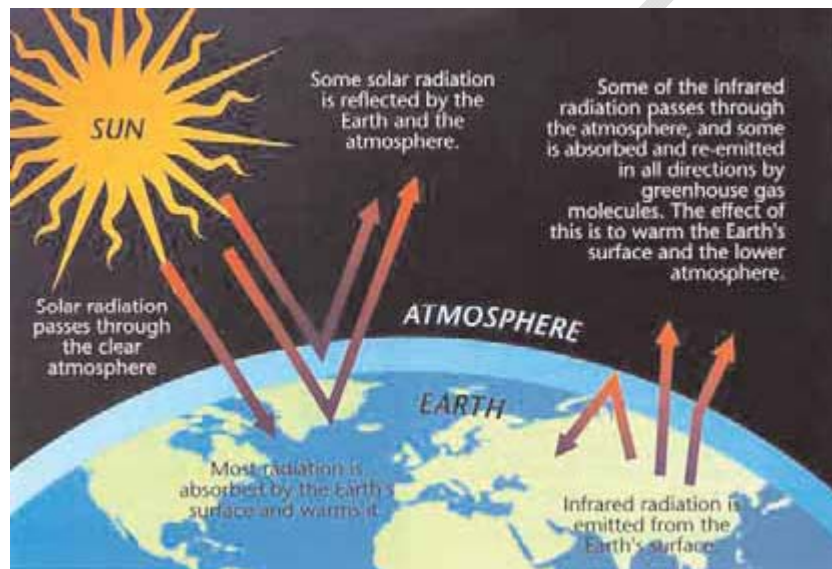
- Milestone 1: Conduct a baseline emissions inventory and forecast
- Milestone 2: Adopt an emissions reduction target
- Milestone 3: Develop a Climate Action Plan for reducing emissions
- Milestone 4: Implement policies and measures
- Milestone 5: Monitor and verify results

1. Introduction

1.1 Introduction to Climate Change Science

The Earth's atmosphere is naturally composed of a number of gases that act like the glass panes of a greenhouse, retaining heat to keep the temperature of the Earth stable and hospitable for life at an average temperature of 60°F. Carbon dioxide (CO₂) is the most prolific of these gases. Other contributing gases include methane (CH₄), nitrous oxide (NO₂), ozone (O₃) and halocarbons. Without the natural warming effect of these gases the average surface temperature of the Earth would be around 14°F.

Figure (1) The Greenhouse Gas Phenomenon



Source: US Environmental Protection Agency

However, recently elevated concentrations of these gases in the atmosphere have had a destabilizing effect on the global climate, fueling the phenomenon commonly referred to as global warming. The global average surface temperature increased during the 20th century by about 1°F. According to NASA scientists, the 1990s were the warmest decade of the century, and the first decade of the 21st century is well on track to be another record-breaker. The years 2002, 2003, 2004 and 2005, along with 1998, were the warmest five years since the 1890s, with 2005 being the warmest year in over a century.

Scientific Facts and Projections:

- The atmospheric concentration of carbon dioxide (CO₂) during the last two decades has increased at the rate of 0.4% every year.
- Current CO₂ concentrations are higher than they have been in the last 420,000 years, and according to some research, the last 20 million years.
- About three-quarters of the CO₂ emissions produced by human activity during the past 20 years are due to the burning of fossil fuels.

Source: The Intergovernmental Panel on Climate Change

The climate and the atmosphere do not react in a linear fashion to increased greenhouse gases. That is to say that you cannot simply predict the specific degree of warming that each ton of carbon dioxide emitted from a power plant or a vehicle's tailpipe will cause. The Earth's climate has a number of feedback loops and tipping points that scientists fear will accelerate global warming beyond the rate at which it is currently occurring. For example, as CO₂ emissions have increased in recent human history, the oceans have been absorbing a significant portion of these gases, but as the oceans become more permeated with CO₂, scientists anticipate they will reach a saturation point, after which each ton of anthropogenically emitted CO₂ will have a more substantial impact.⁵ Another example of this compounding can be found in the polar ice caps. Ice is highly reflective and acts effectively like a giant mirror, reflecting the sun's rays back into space. As the planet warms and some of this ice melts away, a darker land or ocean surface is revealed. This darker surface tends to absorb more heat, accelerating the speed at which the planet warms with each ton of greenhouse gas emitted. As these examples illustrate, the stakes are high, and there is no time to lose in the fight against global warming.

1.2 Effects & Impacts of Climate Change

Global Impacts

In addition to causing an increase in average global surface temperature, rising levels of greenhouse gases have a destabilizing effect on a number of different micro-climates, conditions and systems. According to the Intergovernmental Panel on Climate Change, surface temperatures are on course to increase by between 2.5 and 10.5°F by the year 2100, with regions in the northern parts of North America and Asia heating by 40% above the mean increase.⁶ The increase in the temperature of the oceans is projected to accelerate the water cycle, thereby increasing the severity and rate of both storms and drought, which, along with decreased snow pack, could disrupt ecosystems, agricultural systems and water supplies.

Snow cover has decreased by 10% in the last forty years. Average sea levels have raised between 1/3 and 2/3 of a foot over the course of the 20th century and are projected to rise by at least another 1/3 of a foot and up to almost three feet by the year 2100. These coastal infringements on such a large scale could lead to not only significant environmental and ecosystem disturbances, but also major population displacement and economic upheaval.⁷

Local Impacts

While climate change is a global problem influenced by an array of interrelated factors, climate change is also a local problem with serious impacts foreseen for California, the Bay Area and Emeryville.

Sea level rise: According to the Union of Concerned Scientists, the sea level in the State of California is expected to rise up to 12 inches of the next hundred years. The Pew Center on Climate Change has reported that this would result in the erosion of beaches, bay shores and river deltas, marshes and wetlands and increased salinity of estuaries, marshes, rivers and aquifers.⁸

⁵ Intergovernmental Panel on Climate Change (IPCC) Third Assessment Report: "Climate Change 2001: The Scientific Basis."

⁶ Intergovernmental Panel on Climate Change (IPCC) Third Assessment Report: "Climate Change 2001: The Scientific Basis."

⁷ Intergovernmental Panel on Climate Change (IPCC) Third Assessment Report: "Climate Change 2001: The Scientific Basis."

⁸ Neumann, James E. for the Pew Center on Global Climate Change. "Sea Level Rise & Global Climate Change: A Review of Impacts to the US Coasts." February 2000.

This increased salinity has the potential to damage or destroy crops in low-lying farmlands. Infrastructure at or near sea level, such as harbors, bridges, roads and even the San Francisco International and Oakland International Airports are at risk of damage and destruction.

The San Francisco Bay Area Conservation Commission has modeled the impact of a sea level rise of 3 feet (approx 1 meter) on the San Francisco Bay Area. As shown in Figure (2), areas such as the Oakland Airport would be under water as well parts of Alameda, San Leandro, Hayward, Union City, Fremont and Newark, including sections of Interstate 880.

Figure (2) San Francisco Bay Area Land areas Affected by a 1-meter Sea Level Rise



Source: San Francisco Bay Area Conservation Commission

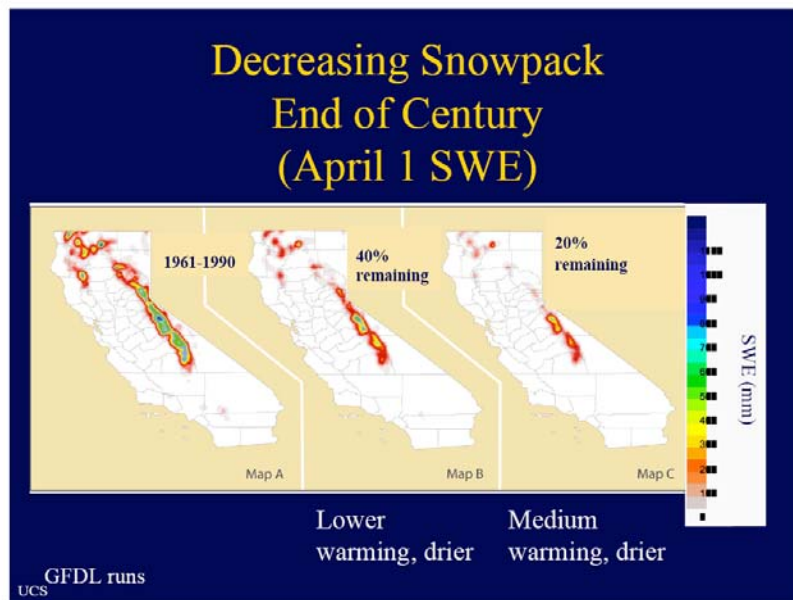
Natural disasters: Climate models predict a 4°F temperature increase in the next 20 to 40 years, with an increase in the number of long dry spells, as well as a 20-30% increase in precipitation in the spring and fall. More frequent and heavier precipitation cause flooding and mudslides, which would incur considerable costs in damages to property, infrastructure and even human life. Heavy rains during the winter of 2005 offer a glimpse of the potential costly and disruptive effects of such precipitation.

In addition, the increase of wildfires due to continued dry periods and high temperatures is another expected impact of continued climate change. In these conditions, fires burn hotter and spread faster. During 2003, there were 14 reported fires in California which were enhanced due to Santa Ana winds and very low levels of humidity. The estimated damage costs were over \$2 Million.

Impacts on water: Water quality and quantity are also at risk as a result of changing temperatures. With warmer average temperatures, more winter precipitation will fall in the form of rain instead of snow, shortening the winter snowfall season and accelerating the rate at which the snowpack melts in the spring. Not only does such snow melt increase the threat for spring flooding, it will decrease the Sierras' capacity as a natural water tower, resulting in decreased water availability for agricultural irrigation, hydro-electric generation and the general needs of a growing population.

The decrease in snow-pack is particularly relevant in the State of California and the Bay Area, as the Sierra snow-pack provides approximately 80% of California's annual water supply, and it is the origin of the Tuolumne River, the primary source of water for the San Francisco regional water system. Figure (3) was provided by the Union of Concern Scientists for the California Climate Action Team Report (2006).

Figure (3) Decreasing Snowpack in California



Source: Union of Concern Scientists

Impacts on plants and vegetation: Native plants and animals are also at risk as temperatures rise. Scientists are reporting more species moving to higher elevations or more northerly latitudes in response. Increased temperatures also provide a foothold for invasive species of weeds, insects and other threats to native species. The increased flow and salinity of water resources could also seriously affect the food web and mating conditions for fish that are of both of economic and recreational interest to residents. In addition, the natural cycle of plant's flowering and pollination, as well as the temperature conditions necessary for a thriving locally adapted agriculture could be affected, with perennial crops such as grapes taking years to recover.

In California, the impacts of climate change on agriculture are estimated to be \$30 billion by the Farm Bureau, mostly due to changes in chill hours required per year for cash crops.

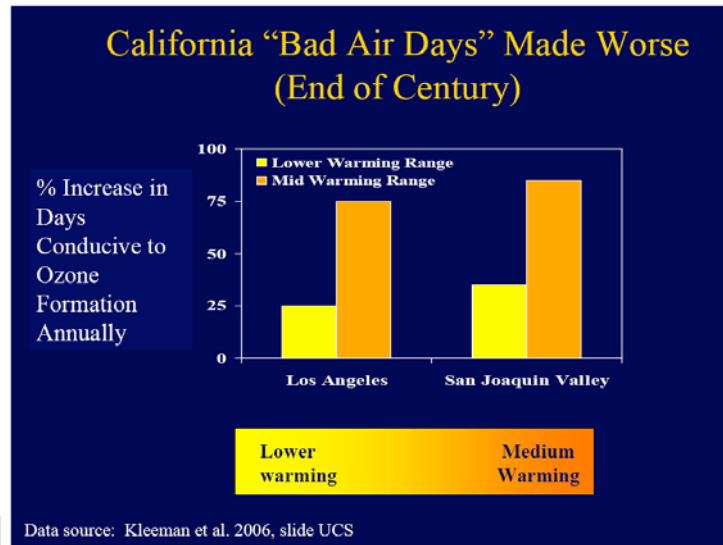
Public health impact: Warming temperatures and increased precipitation can also encourage mosquito-breeding, thus engendering diseases that come with mosquitoes, such as the West Nile

Virus, a disease of growing concern in our region. Heat waves are also expected to have a major impact on public health and be a determinant factor of mortality. According to the IPCC (2004), the summer mortality rates will double by half by 2050 due to hot weather episodes.

Increased temperatures also pose a risk to human health when coupled with high concentrations of ground-level ozone and other air pollutants, which may lead to increased rates of asthma and other pulmonary diseases. Furthermore, anticipated increases in the number and severity of hot days place significant portions of the population, particularly the elderly, young, those already sick, and people who work outdoors, at risk for heat-stroke.

The incidence of bad air days in California’s urban areas has increased, mostly in hot summer days. On long, hot, stagnant days, ground level ozone can build up to levels that violate federal and state health-based standards. In the summer of 2006, the Bay Area Air Quality Management District (BAAQMD) registered 11 Spare the Air days and exceeded the California 1-hour standard for ozone (set at 90 ppb) 18 times.

Figure (4) California Bad Air days



Source: Union of Concern Scientists

Given that climate change has local repercussions and effects on weather, water resources, ecosystems, public health, infrastructural stability and economic vitality, local governments have a vested interest in mitigating the amount of greenhouse gases being produced by their communities.

1.3 Action Being Taken on Climate Change

International Action

As evidence of climate change has mounted, groups at the international, federal, state and local level have responded with ways to confront the impending threat. The United Nations Framework Convention on Climate Change (UNFCCC) leads international efforts to investigate and combat climate change. Recognizing the problem of potential global climate change, the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) established the Intergovernmental Panel on Climate Change (IPCC) in 1988 to assess on a comprehensive, objective, open and transparent basis the scientific, technical and socio-economic information relevant to understanding the scientific basis of risk associated with human-induced

climate change, its potential impacts and options for adaptation and mitigation, releasing its most recent assessment in 2007.⁹

In 1997, 10,000 international delegates, observers and journalists gathered in Kyoto, Japan to participate in the drafting and adoption of the Kyoto Protocol, requiring industrialized nations to reduce their collective greenhouse gas emissions 5.2% below 1990 levels. As of January 2007, 162 countries have ratified the Protocol, with the United States and Australia most notably absent from the list. Additionally, since 1995 the annual Conference of the Parties (COP) has met to discuss action and implementation to combat climate change, with the most recent COP, COP-12, being held in Nairobi in 2006.

State and Federal Action

Though adequate attention and action related to combating climate change has been lacking at the federal level, California has taken significant steps at the state level. California has been leading the charge on combating climate change through legislation:

Senate Bill 1078 Sher, 2002 – Established a Renewable Portfolio Standard requiring electricity providers to increase purchases of renewable energy resources by 1% per year until they have attained a portfolio of 20% renewable resources.

Assembly Bill 1493 Pavley, 2002 – Requires the State Air Resources Board to develop and adopt regulations that achieve the maximum feasible reduction of greenhouse gases from vehicles primarily used for non-commercial transportation by January 2005.

Senate Bill 1771 Sher, 2000 – Requires the California Energy Commission (CEC) to prepare an inventory of the state's greenhouse gas emissions, to study data on global climate change, and to provide government agencies and businesses with information on the costs and methods for reducing greenhouse gases. It also established the California Climate Action Registry to serve as a certifying agency for companies and local governments to quantify and register their greenhouse gas emissions for possible future trading systems.

AB 32 Núñez & Pavley, 2006 – Institutes a mandatory limit on greenhouse gas emissions -- reducing emissions in California to 1990 levels by the year 2020, or 25% below forecasted levels. The bill also directs the California Air Resources Board (CARB) to establish a mandatory reporting system to track and monitor emission levels and requires CARB to develop various compliance options and enforcement mechanisms.

On June 1, 2005, Governor Schwarzenegger signed Executive Order #S-3-05 establishing a greenhouse gas reduction target of reducing emissions to 2000 levels by 2010, to 1990 levels by 2020 and 80 percent below 1990 levels by 2050. In April 2006, the California Climate Action Team released its Report to Governor Schwarzenegger and the State Legislature, outlining recommendations and strategies to achieve those reductions.

Local Action

A great deal of work is being done at the local level on climate change as well. ICLEI—Local Governments for Sustainability has been a leader both internationally and domestically for more than ten years, representing over 770 local governments around the world. ICLEI was launched in the United States in 1995 and has grown to more than 230 cities and counties providing national leadership on climate protection and sustainable development. In June 2006, ICLEI launched the California Local Government Climate Task Force as a formal mechanism to provide ongoing input and collaboration into the State of California's climate action process. ICLEI also works in conjunction with the U.S. Conference of Mayors to track progress and implementation of the U.S. Mayors Climate Protection Agreement, launched in 2005, which more than 376 mayors have

⁹ Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report: "Climate Change 2007"

signed to date pledging to meet or beat the Kyoto Protocol emissions reduction target in their own communities. By the end of 2006, Alameda County mayors from Emeryville, San Leandro, Oakland, Pleasanton, Newark, Hayward, Fremont, Dublin, Berkeley, and Albany signed the U.S. Mayors Climate Protection Agreement.

Climate Protection Efforts by the City of Emeryville

The City of Emeryville has taken several actions on Climate Change in recent years:

On September 7 1999, Council Member Harper asked and received the blessing of the Emeryville City Council to sign onto the “Mayor and Local Official Statement on Global Warming” through the organization “Cities for Climate Protection.”

On June 5, 2005, in San Francisco at the United Nations World Environment Day proceedings, the City of Emeryville signed on as a charter member of the United Nations World Environmental Accords - the smallest city in the world to do so. The Accords ask the participating jurisdictions to take one of the 21 action steps each year; the Cities will be evaluated on their voluntary actions in 2012 by the United Nations at a follow-up conference. One of the key action steps of the Accords is to set a goal of reducing green house gas emissions by 25% by 2030 and developing a system to track Greenhouse Gas (GHG) emissions.

Emeryville has already taken many steps toward increasing energy efficiency, reducing air pollution, and reducing solid waste. Examples include:

- Brownfield Redevelopment - Extensive programs since 1996 resulting in urban in-fill projects and reducing the need for urban sprawl. As of 2008 this redevelopment created: 2,290 new residential units for 3,500 residents of which 719 were affordable; and 3.6 million square feet of new commercial space and 800,000 square feet of new retail space creating 8,400 new jobs
- Establishment of the EPA-award-winning Emery-Go-Round: in 2007 shuttled 1.2 million riders between the MacArthur BART station and the City and growing 8% per year.
- Requiring new City Buildings and Landscapes to be LEED Silver Certified and Bay-Friendly Verified
- Reducing building permit fees for single family home solar installations.
- Installing Solar PV panels on the Civic Center roof.
- Requiring vegetated stormwater treatment in all new developments, cleaning the bay, reducing the heat island effect in the City, reducing energy use for cooling and increasing CO2 uptake by plants.
- Increasing Street tree planting standards for new developments ensuring the long-term health of more trees in the City.
- Implementing environmental purchasing decisions such as switching to recycled content copy paper in many City buildings. This practice benefits the community by incentivizing business practices that conserve resources, reduce emissions, and reduce waste.
- Working with the Emeryville Chamber of Commerce to get 21 businesses in Emeryville to “Go Green” and become certified green businesses over since 2003.
- Working with “SmartLights” of the East Bay Energy Watch program to reduce energy use in the lighting of commercial properties in the City.
- Adopting StopWaste.Org’s Multi-Family Green Building Guidelines which serve to reduce greenhouse gas emissions by keeping construction and demolition debris out of landfills and increasing energy efficiency in buildings.
- Converting traffic signal lights to more energy efficient LED lamps.
- Requiring new developments to rate their projects using the green building scoring

- systems from StopWaste.Org and the United States Green Building Council (USGBC)
- Implementing residential food scrap recycling. Currently approximately 20% percent of households in the single family neighborhoods participate, thereby diverting 9 of tons of food scraps in 2006 from the landfill to a composting facility.
 - Requiring landscapes in new developments and city projects to use locally produced compost and mulch partially made of feedstocks from municipal sources.
 - Equipping the City Corporation Yard with motion occupancy sensors and energy efficient lighting. These steps save the City money, and reduce the emissions that cause global warming. The Senior Center also received rebate funds for the replacement of the old boiler. Other City facilities are also being considered for lighting retrofits.
 - Installing Emeryville's first bike boulevard, adding more bike lanes and building the first phases of the Emeryville Greenway, an urban Rail-to-Trail project, encouraging more people to travel by bike and on foot reducing vehicle emissions.
 - Educating the residents of Emeryville at each years Earth Day event in Temescal Creek Park about environmental issues that face the City and the planet.
 - Adopting the "Eco Food-ware" ordinance requiring disposable food packaging to be recyclable or compostable for all food prepared in the City and reduce plastic litter washing out to the Bay and ocean.
 - Working with the East Bay Green Corridor Partnership to increase the availability of green-collar jobs and green job training
 - Starting in 2007, the City has contracted with California Youth Energy Services each summer to give local high school students energy conservation job skills and retrofit existing Emeryville homes with energy conserving devices.
 - Joint Bio-Energy Institute - Partnering with UC Berkeley, the Lawrence Berkeley Laboratory and the City of Berkeley, Amyris and others creating 360 green jobs in Emeryville.

2. Emissions Inventory

2.1 Reasoning, Methodology & Model

The City of Emeryville's inventory was conducted by ICLEI in partnership with staff from the municipality. The purpose of the baseline emissions inventory is to determine the levels of greenhouse gas emissions that Emeryville emitted in its base year, 2004.

ICLEI's Cities for Climate Protection inventory methodology allows local governments to systematically estimate and track greenhouse gas emissions from energy and waste related activities at the community-wide scale and those resulting directly from municipal operations. The municipal operations inventory is a subset of the community-scale inventory.

Once completed, these inventories provide the basis for creating an emissions forecast and reduction target, and enable the quantification of emissions reductions associated with implemented and proposed measures.

2.1.1 ICLEI's Emissions Analysis Software

To facilitate local government efforts to identify and reduce greenhouse gas emissions, ICLEI developed the Clean Air and Climate Protection (CACP) software package with Torrie Smith Associates. This software estimates emissions derived from energy consumption and waste generation within a community. The CACP software determines emissions using specific factors (or coefficients) according to the type of fuel used. Emissions are aggregated and reported in terms of carbon dioxide equivalent units, or CO₂e. Converting all emissions to carbon dioxide equivalent units allows for the consideration of different greenhouse gases in comparable terms. For example, methane is twenty-one times more powerful than carbon dioxide in its capacity to trap heat, so the model converts one ton of methane emissions to 21 tons of CO₂e.

The emissions coefficients and methodology employed by the software are consistent with national and international inventory standards established by the Intergovernmental Panel on Climate Change (1996 Revised IPCC Guidelines for the Preparation of National GHG Emissions Inventories), the U.S. Voluntary Greenhouse Gas Reporting Guidelines (EIA form 1605), and, for emissions generated from solid waste, the U.S. EPA's Waste Reduction Model (WARM).

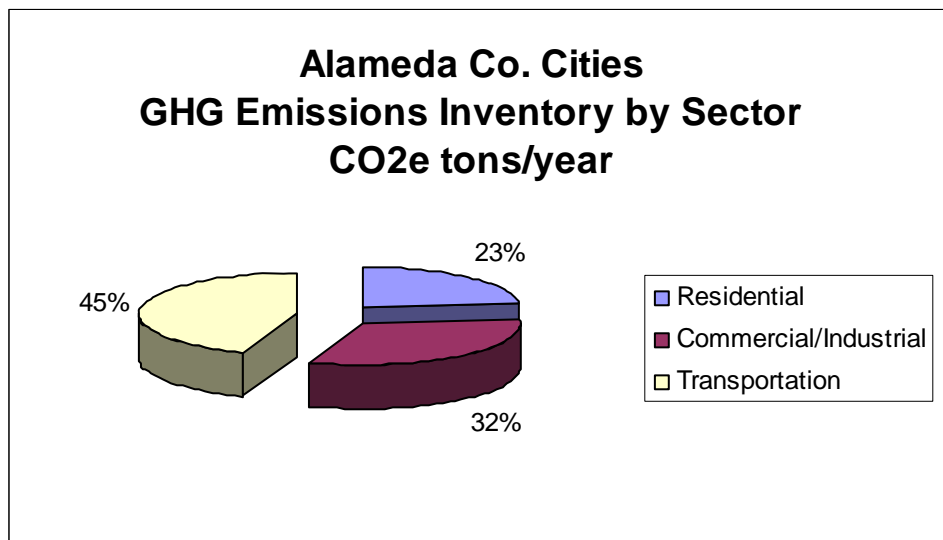
The CACP software has been and continues to be used by over 250 U.S. local governments to reduce their greenhouse gas emissions. However, it is worth noting that, although the software provides City of Emeryville with a sophisticated and useful tool, calculating emissions from energy use with precision is difficult. The model depends upon numerous assumptions, and it is limited by the quantity and quality of available data. With this in mind, it is useful to think of any specific number generated by the model as an approximation rather than an exact value.

2.1.2 Inventory Data Sources and Creation Process

An inventory of greenhouse gas emissions requires the collection of information from a variety of sectors and sources. For community electricity and natural gas data, ICLEI consulted Pacific Gas & Electric Company (PG&E) and Alameda Power & Telecom¹⁰. The Metropolitan Transportation Commission (MTC), Bay Area Air Quality Management District (BAAQMD), and Bay Area Rapid Transit (BART) served as sources of transportation data. Solid waste data was gathered from StopWaste.Org, Waste Management, Inc., Alameda County Industries, Republic Services, Inc. and the U.S. Environmental Protection Agency (U.S. EPA). City of Emeryville staff person, Peter Schultze-Allen, was instrumental in providing data on municipal operations.

¹⁰ Exclusively for the City of Alameda

Figure (5) GHG Emissions Inventory Results in Alameda County



Source: CACP output

Table (2) and Figure (5) above shows the County’s total greenhouse gas emissions from all major sources for the year 2005. The year 2005 was the baseline for all cities except for Albany and Emeryville who used 2004. The County of Alameda is emitting approximately 5,710,393 tons of CO₂e from the residential, commercial/industrial, and transportation sectors. Burning fossil fuels in vehicles and for energy use in buildings and facilities is a major contributor to the County’s greenhouse gas emissions. Fuel consumption in the transportation sector is the single largest source of emissions, contributing 45% of total emissions. The residential and commercial/industrial sectors represent emissions that result from electricity and natural gas used in both private and public sector buildings and facilities.

2.3 Emeryville Inventory Results

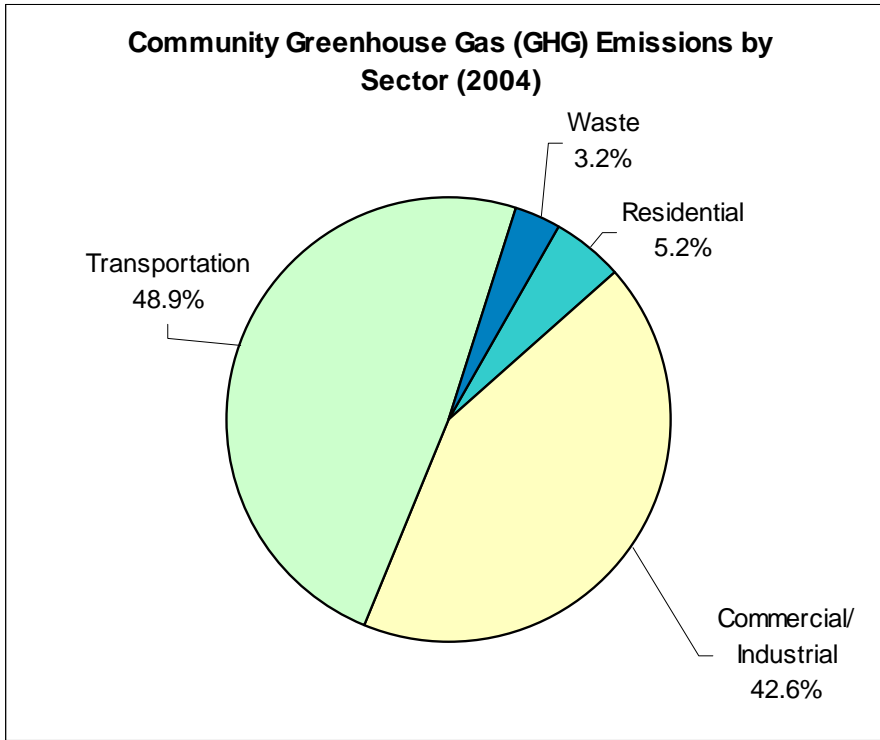
The results below represent the City of Emeryville’s completion of the first milestone of ICLEI’s CCP campaign. The inventory was first done in 2006 and then updated with Highway emissions in August of 2008. The inventory described below includes those highway emissions.

2.3.1 Community Emissions Inventory Summary – 2004

Table (3) Community Emissions Summary

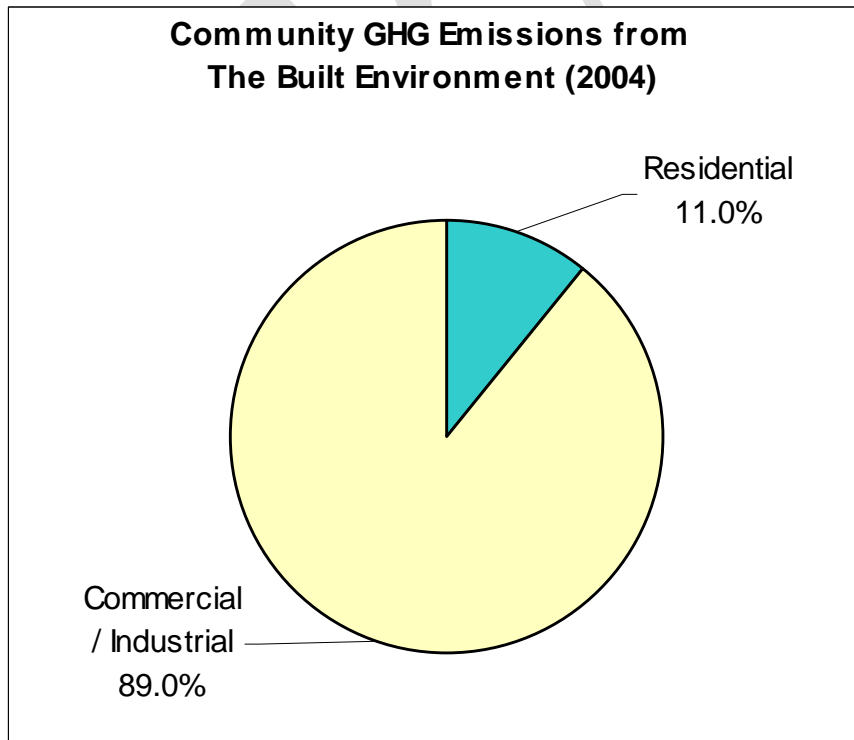
2004 Community Emissions by Sector	Residential	Commercial/Industrial	Transportation	Waste	TOTAL
CO ₂ e (metric tons)	9,380	76,204	87,447	5,801	178,832
Percentage of Total CO ₂ e	5.2%	42.6%	48.9%	3.2%	100.0%
Energy Use (MMBtu)	160,562	1,267,105	262,451	0	1,690,118

Figure (6) Community Emissions by Sector



2.3.2 Community Emissions Inventory Detail – 2004

Figure (7) Community Emissions – Built Environment

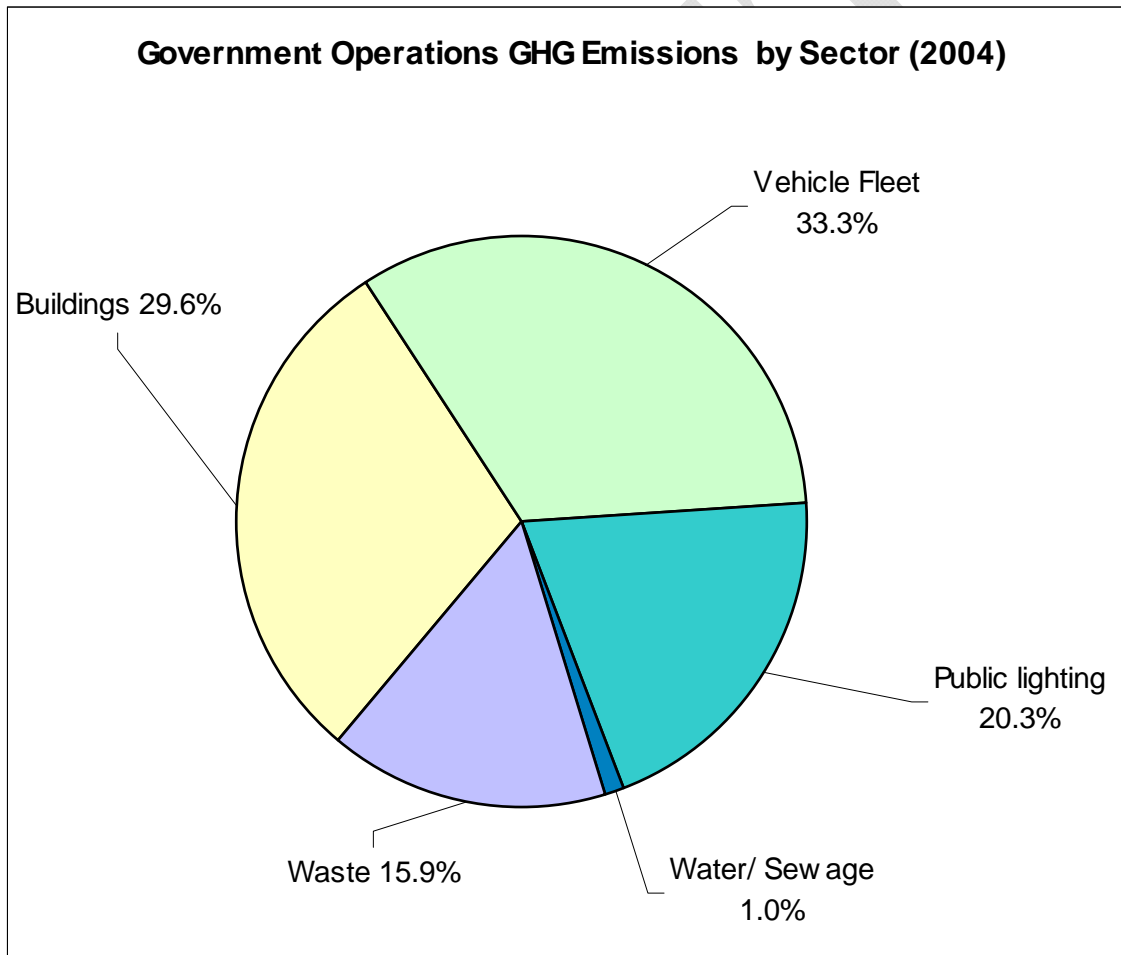


2.3.3 Government Emissions Inventory Summary 2004

Table (4) Government Emissions

Government Emissions 2004	Buildings	Vehicle Fleet	Public Lighting	Water/ Sewage	Waste	TOTAL
CO2e (metric tons)	395	444	271	13	212	1,335
% of Total CO2e	29.6%	33.3%	20.3%	1.0%	15.9%	100.0%
MMBtu	6,633	5,713	4,137	195	-	16,678
Cost (\$)	\$169,608.00	\$118,974.00	\$136,974.00	\$7,801.00	-	433,357

Figure (8) Government Emissions by Sector



3. Forecast for Greenhouse Gas Emissions – 2020

Table 5 shows the projected new development in the City of Emeryville (taken from the City’s draft General Plan - Land Use section.) The row headings are described below:

A. Approved Projects. This includes the various projects that have been approved or are under construction as of November 2007. This development includes 907 housing units and 1.3 million square feet of non-residential space.

B. Gross New Development. This value results from application of average assumed intensities to change areas. Approximately 2,930 housing units and 3.0 million square feet of non-residential space will be added.

C. Existing Development Lost Due to Redevelopment. This value reflects existing underutilized properties that will be replaced by new uses.

D. Net New Development. This reflects the total of the three above categories, and represents the expected development during the life of the General Plan.

E. Existing Development. This reflects existing development, as of November 2007.

F. City at 2030. Totaling net new development and existing development results in the General Plan development potential at 2030. This will result in an increase of approximately 3,800 housing units, a 70 percent increase in the existing population of 9,727 to 16,500, and 2.5 million square feet of total non-residential space, an increase of 21% over 2007 levels.

Table (5) General Plan Development Potential at 2030, by Land Use (draft)

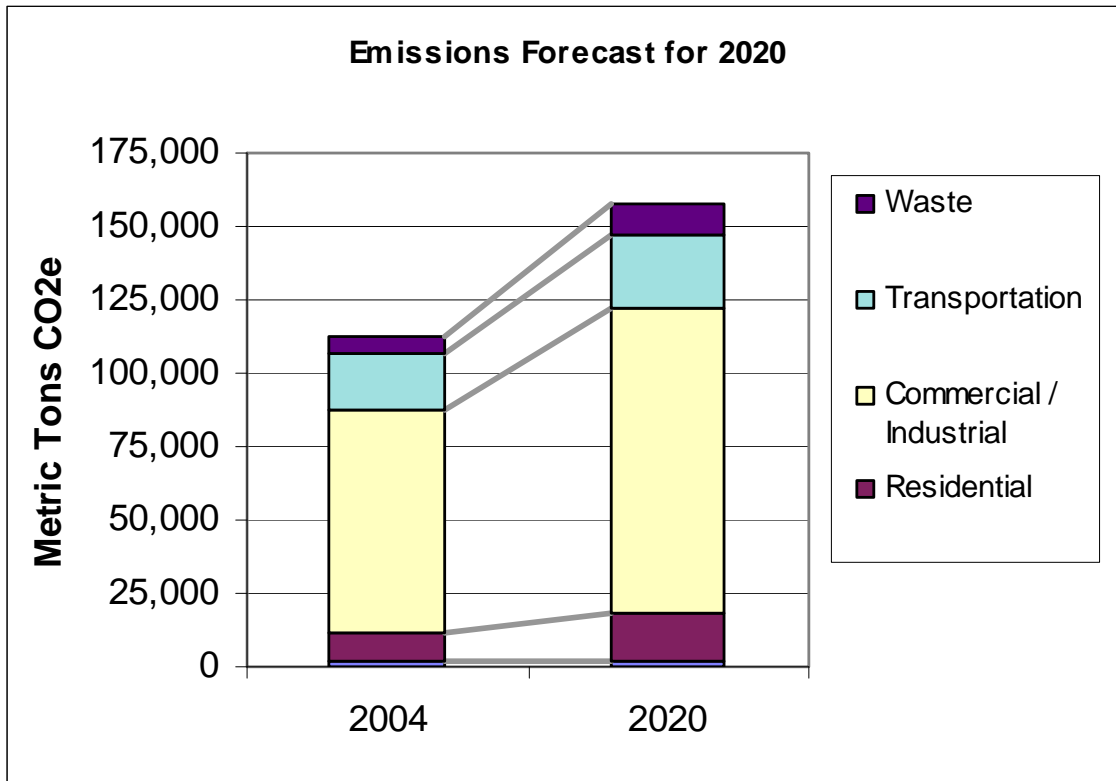
	Residential (units)	Retail (SF)	Hotel (SF)	Office ¹ (SF)	Industrial (SF)
A. Approved Development	907	34,461	0	1,313,000	0
B. Gross New Development	2,930	1,075,400	324,600	1,569,700	76,200
C. Existing Lost Due to Redevelopment	70	468,598	14,375	509,740	855,377
D. Net New Development (A+B-C)	3,767	641,263	310,225	2,372,960	-779,177
E. Existing Development	5,988	2,441,660	464,500	4,852,118	4,132,675
F. City at 2030 (D+E)	9,755	3,082,923	774,725	7,225,078	3,353,499

¹Office includes R&D development.

From 2004 to 2020, under a business-as-usual scenario, the City of Emeryville’s emissions will grow by approximately 32.6% from 178,832 to 237,101 metric tons CO₂e¹¹. To illustrate the potential emissions growth based on projected trends in energy use, driving habits, job growth, and population growth from the baseline year going forward, ICLEI conducted an emissions forecast for the year 2020. Figure 9 and Table 6 show the results of the forecast. A variety of different reports and projections were used to create the emissions forecast.

¹¹ Transportation growth rates calculated for this forecast assume a base year of 2005, and would be slightly different from 2004.

Figure (9) Community Emissions Forecast



Residential Forecast Methodology

For the residential sector, ICLEI calculated the compounded annual population growth rate¹² between 2005 and 2020, using population projections from Emeryville’s draft General Plan. This growth rate (3.444%) was used to estimate average annual compound growth in energy demand. From the Emeryville General Plan, ICLEI estimated that the City’s population will be 13,300 in 2020¹³.

Commercial / Industrial Forecast Methodology

Analysis contained within “California Energy Demand 2008-2018: Staff Revised Forecast¹⁴,” a report by the California Energy Commission (CEC), shows that commercial floor space and the number of jobs have closely tracked the growth in energy use in the commercial sector. Using job growth projections from the draft Emeryville General Plan, ICLEI calculated that the compounded annual growth in energy use in the commercial sector between 2005 and 2020 will be 1.99%.¹⁵

¹² Compounded annual growth rate= ((2020 population/2005 population)^(1/15))-1

¹³ The General Plan provides population predictions for 2030. To estimate 2020 population, ICLEI used 2000 Census data and assumed an equal growth rate every five years between 2000 and 2030.

¹⁴ <http://www.energy.ca.gov/2007publications/CEC-200-2007-015/CEC-200-2007-015-SF2.PDF>

¹⁵ The Emeryville General Plan states that 10,000 new jobs will be added by 2030. ICLEI estimated the 2007 number of jobs by assuming a constant growth between 2005 and 2010 from ABAG jobs forecast data and added 10,000 to estimate 2030 jobs (30,668). This was then prorated in the same manner as population projections to estimate 2020 jobs (27,065).

Transportation Forecast Methodology

For the transportation sector, projected growth in energy demand was obtained from the CEC 2008 energy demand forecast referenced above. The recently passed federal Corporate Average Fuel Economy standards and the state of California’s pending tailpipe emission standards could significantly reduce the demand for transportation fuel in Emeryville. An analysis of potential fuel savings from these measures at a scale that would be useful for the purpose of this report has not been conducted, nor would such an analysis produce a true business-as-usual estimation. Regardless of future changes in the composition of vehicles on the road as a result of state or federal rulemaking, emissions from the transportation sector will continue to be largely determined by growth in vehicle-miles-traveled (VMT). In their report, “Transportation Energy Forecasts for the 2007 Integrated Energy Policy Report,” the CEC projects that on-road VMT will increase at an annual rate of 1.51% per year through 2020¹⁶. This is the number that was used to estimate emission growth in the transportation sector for the Emeryville forecast.

Waste Forecast Methodology

As with the residential sector, the primary determinate for growth in emissions in the waste sector is population. Therefore, the compounded annual population growth rate for 2005 to 2020, which is 3.444%¹⁷ (as calculated from the draft Emeryville General Plan), was used to estimate future emissions in the waste sector.

Table 6 – Community Emissions Growth Projections by Sector

Community Emissions Growth Forecast by Sector	2004	2020	Annual Growth Rate	Percent Change from 2004 to 2020
Residential	9,380	15,587	3.444%	66.2%
Commercial / Industrial	76,204	102,407	1.990%	34.4%
Transportation (incl. 2005 State Hwy data)	87,447	109,467	1.509%	25.2%
Waste	5,801	9,640	3.444%	66.2%
TOTAL	178,832	237,101	--	32.6%

As Table 6 shows, emissions from the residential and waste sectors will experience a 66.2% increase. Emeryville can dramatically reduce these emissions by ensuring energy and water efficiency standards are met in new residential developments and promoting recycling and composting across the City.

The Municipal operations of the City are not expected to grow in any significant manner, so the business as usual emissions are projected to remain roughly the same. This is reflected in Table 7.

¹⁶ Report available at: <http://www.energy.ca.gov/2007publications/CEC-600-2007-009/CEC-600-2007-009-SF.PDF>. Compounded Annual growth rate for 2005-2020 is calculated from Table 4 on page 12. In light of recent fuel cost increases, the calculation assumes high fuel cost scenario.

¹⁷ Ibid

4. Greenhouse Gas Emissions Reduction Target

A reduction target provides a tangible goal for Emeryville’s emissions reduction efforts. Our emissions reduction target represents a percentage by which the community aims to decrease emissions, below the 2004 baseline, by 2020.

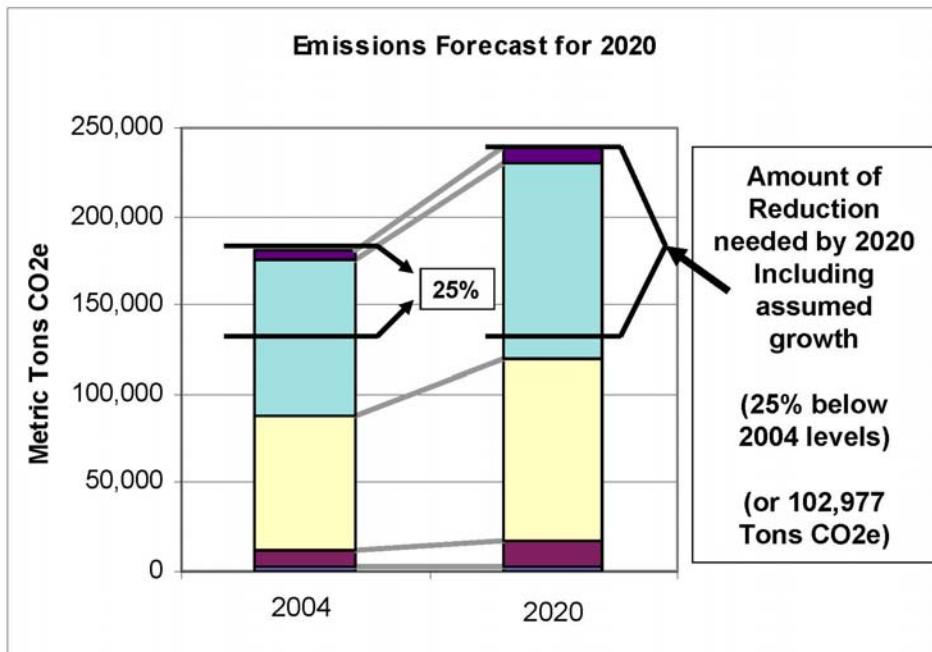
Many factors were considered when selecting Emeryville’s reduction target. We strove to choose a target that is both aggressive and achievable given local circumstances. Emeryville’s residential and commercial redevelopment is occurring at a rapid level, which provides the City with both challenges and opportunities for climate change actions.

Table (7) Emeryville Emissions Summary

Emeryville’s Emissions Summary		
	Community-wide	Government Operations
Base year	2004	2004
Quantity of CO ₂ e emissions in base year (tons)	178,832	1,335
Target year	2020	2020
Business-as-usual projection of CO ₂ e emissions in 2020 (tons)	237,101	1,335
Percent CO ₂ e reduction targeted by target year relative to base year (%)	25%	25%
Quantity of CO ₂ e reduction targeted relative to base year (tons)	102,977	284

Source: CACP Model Output

Figure (10) Emission Reduction Target Summary



5. Existing Emissions Reduction Measures & Policies

5.1 Summary of Existing Emissions Reduction Measures

Table (8) Emeryville’s Emissions Summary

Emeryville Emissions Summary		
	Community Analysis	Government Operations Analysis
Base year	2004	2004
Quantity of CO ₂ e emissions in base year (tons)	178,832	1,335
Target year	2020	2020
Business-as-usual projection of CO ₂ e emissions in 2020 (tons)	237,101	1,335
Percent CO ₂ e reduction targeted by target year relative to base year (%)	25%	25%
Quantity of CO ₂ e reduction targeted relative to base year (tons)	102,977	333
Quantity of CO ₂ e reduction achieved to date (tons)	0 ¹	50 ²
Percent of CO ₂ e reduction target achieved to date (%)	0% ¹	7% ²
Quantity of CO ₂ e reduction pending to reach target (tons)	102,977	284

Source: CACP Model Output

¹ Until the next emissions inventory is performed, it is not possible to accurately estimate the community emission reductions to date.

² The Municipal emission reductions to date were estimated from the new programs that have occurred since the end of 2004: solar pv system on City Hall, the police bike patrol program, the lighting retrofit at the Corp Yard, the boiler replacement at the Senior Center, compost and recycling improvements at City facilities and new fleet vehicles with better emissions.

6. Proposed Emissions Reduction Measures & Policies

Based on careful consideration of the emissions reductions needed to achieve our stated targets, the distribution of emissions revealed in our emissions inventory, existing priorities and resources, and the potential costs and benefits of various potential emissions reduction projects, Emeryville has identified a set of emissions reduction measures that should be set into motion as soon as possible. An implementation table prioritizing the measures with costs and scheduling for each measure is attached as Exhibit A. The actions are divided into the following sectors/measure types: transportation, energy efficiency, renewable energy, and solid waste management¹⁸. Within each of these categories, the measures are further divided into the measures that affect community-wide emissions and measures that affect the emissions that result from municipal operations.

Summary of Proposed Actions:

Community-Wide

	<u>Affected Sector</u>
Increase Transit Oriented Development	New Development Projects
Adopt a Green Building and Bay-Friendly Ordinance	New Development Projects
Enhance Transportation Demand Management Conditions	New Development Projects
New Pedestrian, Cycling and Transit Programs & Incentives	All Sectors
Increase Transit Service and Ridership	All Sectors
Commercial and Residential Energy Conservation Ordinances	Existing Buildings and Homes
Develop and Incentivize Local Renewable Energy Production	All Sectors
Conserve Potable Water and Develop Rainwater Usage	All Sectors
Reduce 2004 Landfilled Waste Tonnage by 50% by 2020	All Sectors

Government Operations

GB/BFL for buildings and landscapes
Fleet changes – fuel and vehicle types
Reduce 2004 Landfilled Waste Tonnage by 50% by 2020
Environmentally Preferable Purchasing
Alternative Transportation Incentives/Initiatives

The emissions that result from municipal facilities and operations account for less than 1% percent of Emeryville community-wide emissions. That being said, measures taken to reduce municipal emissions show that the city's elected officials and staff are committed to action on climate change and to inspiring action in both our community and neighboring communities. Emeryville is proud of the emissions reduction efforts implemented to date and is committed to building on those efforts by increasing fleet fuel efficiency, reducing solid waste, and increasing energy efficiency and conservation in municipal buildings.

¹⁸ Waste Management is used in the broader sense to include, waste reduction, recycling, composting and final disposal activities.

6.1 Community-wide Energy and Transportation/Land-Use Measures

Table (9) Proposed Community-wide Energy & Transportation/Land-use Measures

(Source – CAPP software from ICLEI and WARM model from EPA)

Measure ID#	Measure	CO2e (metric tons)	% towards goal
C58	Transit Oriented Development	17,640	18.00%
C16	Require Green Building for New Construction	10,511	10.73%
C29	Energy Efficiency Education Targeted at Residents	7,514	7.67%
C32	Water Conservation Ordinance	5,341	5.45%
C30	Promote Green Building Through Loans & Incentives	5,256	5.36%
C44	Education on Low-carbon Transportation Options	3,985	4.07%
C23	Require Energy Efficiency Retrofit at Time of Sale	3,757	3.83%
C17	Strict Commercial Energy Code	3,504	3.58%
C22	Energy Efficiency Retrofits of Existing Facilities	3,504	3.58%
C47	Bus Rapid Transit for Emery-Go-Round and AC Transit	3,466	3.54%
C28	Energy Efficiency Education Targeted at Business	3,325	3.39%
C38	Reflective Roofing	2,346	2.39%
C52	Expand Carshare	2,317	2.36%
C18	Strict Residential Energy Code	2,254	2.30%
C19	Offer Loans for Residential Energy Efficiency Improvements	2,254	2.30%
C10	High Efficiency Water Heaters	2,185	2.23%
C21	Energy Efficient Affordable Housing	1,503	1.53%
C36	Low-Maintenance Landscaping	1,480	1.51%
C57	Provide Free High School Bus Passes	1,002	1.07%
C36	Lighting Occupancy Sensors	958	0.98%
C20	Low-income Home Weatherization	881	0.90%
C27	Efficient Lighting Retrofits - T12 lamps to T-8 lamps	821	0.84%
C11	Increase Chiller Efficiency	817	0.83%
C31	Green Business Programs	665	0.68%
C39	Install Solar Photovoltaic (PV) Energy	656	0.67%
C51	Increase BART & AMTRAK Ridership	639	0.65%
C5	Energy Efficient Refrigerators	556	0.57%
C46	Increase Emery-Go-Round Ridership	556	0.57%
C48	Parking Cashout	450	0.46%
C40	Install Solar Hot Water through incentives	390	0.40%
C34	Water Saving Shower Heads	377	0.39%
C1	Energy Efficient Computers	365	0.37%
C2	Energy Efficient Computer Monitors	340	0.35%
C13	HVAC Fan Upgrades	331	0.34%
C14	HVAC Maintenance Tune-ups	317	0.32%
C50	Increase AC Transit Ridership	278	0.28%
C56	Provide Bicycles for Daily Trips	262	0.27%
C8	Energy-Efficient Dish Washers	252	0.26%
C45	Bicycling Paths and Facilities	243	0.25%

C12	Increase Boiler Efficiency	222	0.23%
C6	Energy Efficient Vending Machines	199	0.20%
C37	Green Roofs	196	0.20%
C53	Promote Carpooling and Vanpooling	187	0.19%
C15	Switch Electric Heat to Natural Gas	185	0.19%
C9	Efficient Clothes Washers	172	0.18%
C54	Promote Telecommuting	172	0.18%
C60	Parking and Lane Incentives for Hybrid Vehicles	164	0.17%
C59	Use Hybrid Vehicles - (all sectors)	164	0.17%
C4	Energy Efficient Copiers	150	0.15%
C63	Increase Urban Forest	126	0.13%
C49	Walking Friendly Environments	122	0.12%
C42	Electric Vehicle Charging Stations on Parking Structures	119	0.12%
C61	Use Smaller Fleet Vehicles	92	0.09%
C43	Integrate Bicycles and Transit	81	0.08%
C3	Energy Efficient Printers	74	0.08%
C25	Energy Efficient Exit Signs	54	0.06%
C62	Plant Trees to Shade Buildings	41	0.04%
C33	Water Saving Faucets	38	0.04%
C24	Compact Fluorescent Light Bulb (CFL) Distribution	35	0.04%
C35	High Efficiency Toilets	25	0.03%
C7	Energy Efficient Water Coolers	24	0.02%
C41	Use Wind Energy	20	0.02%
	Sub Total from CAPP Software	95,961	97.99%
	Waste Measures – See Section 6.3 below (WARM model)	16,766	
	TOTAL TONS REDUCED	112,727	

6.2 Government Energy and Transportation Measures

Table (10): Proposed Government Energy and Transportation Measures
(Source – CAPP software from ICLEI and WARM model from EPA)

Measure ID #	Measure	CO2e (metric tons)	% of goal
G21	Use Solar Photovoltaic (PV) Energy	65.61	23.12%
G12	Require Green Building for New Construction	26.28	9.26%
G13	Energy Efficiency Retrofits of Existing Facilities	21.90	7.72%
G28	Increase BART & AMTRAK Transit Ridership by employees	16.80	5.92%
G32	Hybrid Vehicles - City Fleet	16.45	5.80%
G22	Use Solar Heat for Public Swimming Pool	15.74	5.55%
G36	Establish/Expand Recycling Programs	13.15	4.63%
G17	Lighting Occupancy Sensors	11.49	4.05%
G35	Fuel Efficient Vehicles for Parking Enforcement	10.55	3.72%
G18	Low-Maintenance Landscaping	9.87	3.48%

G27	Increase Emery-Go-Round Ridership by employees	7.31	2.58%
G25	Police on Bicycles	7.08	2.50%
G16	LED Traffic Signals	4.73	1.67%
G20	Reflective Roofing	4.69	1.65%
G26	Parking Cashout	4.50	1.58%
G8	Increase Chiller Efficiency	4.09	1.44%
G38	Plant Trees to Shade Buildings	4.07	1.44%
G19	Green Roofs	3.92	1.38%
G33	Use Smaller Fleet Vehicles	3.69	1.30%
G7	High Efficiency Water Heaters	3.64	1.28%
G29	Carsharing program for fleet vehicles	3.45	1.22%
G11	HVAC Maintenance Tune-ups	3.17	1.12%
G4	Energy Efficient Copiers	3.00	1.06%
G37	Reuse or Recycling of Construction Materials	2.98	1.05%
G23	Install Solar Hot Water	1.92	0.68%
G1	Energy Efficient Computers	1.83	0.64%
G2	Energy Efficient Computer Monitors	1.70	0.60%
G10	HVAC Fan Upgrades	1.65	0.58%
G3	Energy Efficient Printers	1.48	0.52%
G9	Increase Boiler Efficiency	1.11	0.39%
G14	Energy Efficient Exit Signs	1.09	0.38%
G15	LED Street Lights	1.05	0.37%
G5	Energy Efficient Refrigerators	0.93	0.33%
G30	Promote Telecommuting	0.86	0.30%
G34	Retire Old or Underused Fleet Vehicles	0.75	0.26%
G24	Bicycling Paths and Facilities	0.46	0.16%
G31	Provide Bicycles for Daily Trips	0.45	0.16%
G6	Energy Efficient Water Coolers	0.41	0.14%
	Sub Total from CAPP Software	285	
	Waste Measures – see Section 6.4 below (WARM model)	50	
	TOTAL TONS REDUCED	335	

6.3 Community-wide Solid Waste Reduction Measures

Table (11): Proposed Community-wide Solid Waste Reduction Measures

Reduce Landfilled Waste in half by 2020 over 2004 levels by:
Increasing participation in commercial recycling/reuse programs for paper, cardboard, metal, glass and plastics – rigid and film.
Participating in StopWaste.Org’s audit and technical assistance program
Encouraging businesses to participate in the County Green Business program
Increasing participation in residential recycling programs
Educating residents and businesses about the benefits of Bay-Friendly Landscaping and Gardening
Increasing participation in commercial and residential food waste collection program (for composting).
Revising franchise language as franchises are renegotiated to include language that maximizes diversion (see StopWaste.Org for best practices)
Considering incentives for waste reduction such as new rate structures for refuse and discards collection that credit diversion and allow for reduced rate composting/recycling services for businesses and residents.

6.4 Government Solid Waste Reduction Measures

Table (12): Proposed Government Solid Waste Reduction Measures

Reduce Landfilled Waste in half by 2020 over 2004 levels by:
Implementing a duplex copying/printing policy in municipal office buildings
Reducing Landscape Waste in City landscapes by implementing StopWaste.Org’s <i>Bay-Friendly Landscaping</i> Program. Include practices such as: Increase on-site composting and mulching of municipal plant debris, using compost as a soil amendment, mulch for weed suppression, including the use of drip irrigation systems, a diverse plant pallet to resist pests, and reducing turf and sheared hedges.
Increasing recycling and composting in municipal facilities
Adopting policies that support reduced waste (and which support other environmental priorities) including the following: Environmental purchasing policy 75% Diversion Goal Construction & Demolition materials recycling ordinance Civic Bay-Friendly/Green Building Ordinance Residential green building resolution Consider mandatory residential & commercial recycling/composting ordinance
Revising franchise language as franchises are renegotiated to include language that maximizes diversion (see StopWaste.Org for best practices)

City of Emeryville

Greenhouse Gas Emissions Analysis

**2004 Community Emissions Inventory
&
2004 Municipal Operations Emissions Inventory**



**December 2006
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Table of Contents

- 1. Introduction 3
 - 1.1. Introduction and History 3
 - 1.2. Climate Change Background 3
 - 1.3. ICLEI Membership and the Five Milestones..... 4
 - 1.4. Sustainability and Climate Change Mitigation Activities in Emeryville..... 4
- 2. City of Emeryville 2004 Greenhouse Gas Emissions Inventory 6
 - 2.1. Methods..... 6
 - 2.1.1. CACP Software..... 6
 - 2.1.2. Creating the Inventory 6
 - 2.2. Inventory Results 7
 - 2.2.1. Community Emissions Inventory 7
 - 2.2.2. Community Emissions Forecast.....10
 - 2.2.3. Government Operations Emissions Inventory.....12
 - 2.2.4. Government Operations Emissions Forecast.....15
- 3. Conclusion16
- 4. Appendices17
 - 4.1. Appendix A: Forecast Data from ABAG’s *Projections 2005*17
 - 4.2. Appendix B: Emissions Factors Used in the Alameda County Climate Protection Partnership.....18
 - 4.3. Appendix C: Waste Calculation Methodology19
 - 4.4. Appendix D: Detailed CACP Report: Government Operations Greenhouse Gas Emissions in 2004..... (attached)
 - 4.5. Appendix E: Detailed CACP Report: Community Greenhouse Gas Emissions in 2004 (attached)

1. Introduction

1.1. Introduction and History

In 1999, the Emeryville City Council adopted a resolution authorizing the Mayor to sign the U.S. Mayors Climate Protection Agreement, thereby committing the City to taking action for climate protection. In doing so, the City joined all of the other local governments in Alameda County in committing to becoming a member of ICLEI and participating in the Alameda County Climate Protection Project. The project was launched by ICLEI in partnership with StopWaste.Org and the Alameda County Conference of Mayors.

Through these actions, the City recognized that “climate disruption is a reality and that human activities are largely responsible for increasing concentrations of global warming pollution.” Through energy efficiency in its facilities and vehicle fleet, clean alternative energy sources, sustainable purchasing and waste reduction efforts, land use and transportation planning, preparing for sea level rise, and other activities, the City of Emeryville can achieve multiple benefits, including lower energy bills, improved air quality, economic development, reduced emissions, and a better quality of life throughout the community.

This greenhouse gas emissions inventory represents completion of the first step in Emeryville’s climate protection process. As advised by ICLEI, it is essential to first quantify recent-year emissions to establish: 1) a baseline, against which to measure future progress, and 2) an understanding of where the highest percentages of emissions are coming from, and, therefore, where the greatest opportunities for emissions reductions are. Presented here are estimates of greenhouse gas emissions in 2004 resulting from the community as a whole, and from the City’s government operations.

1.2. Climate Change Background

A balance of naturally occurring gases dispersed in the atmosphere determines the Earth’s climate by trapping solar radiation. This phenomenon is known as the greenhouse effect. Modern human activity, most notably the burning of fossil fuels for transportation and electricity generation, introduces large amounts of carbon dioxide and other gases into the atmosphere. Collectively, these gases intensify the natural greenhouse effect, causing global average surface temperature to rise, which is in turn expected to affect global climate patterns.

Overwhelming evidence suggests that human activities are increasing the concentration of greenhouse gases in the atmosphere, causing a rise in global average surface temperature and consequent climate change. In response to the threat of climate change, communities worldwide are voluntarily reducing greenhouse gas emissions. The Kyoto Protocol, an international effort to coordinate mandated reductions, went into effect in February 2005 with 161 countries participating. The United States is one of three industrialized countries that chose not to sign the Protocol.

In the face of federal inaction, many communities in the United States are taking responsibility for addressing climate change at the local level. The community of Emeryville might be impacted by rising sea levels and resultant changes in the height, salinity and behavior of the San Francisco Bay, as well as other changes to local and regional weather patterns and species migration. Beyond our community, scientists also expect changing temperatures to result in more frequent and damaging storms accompanied by flooding and land slides, summer water shortages as a result of reduced snow pack, and disruption of ecosystems, habitats and agricultural activities.

Although one jurisdiction cannot independently resolve the issue of climate change, local governments can make a positive impact through cumulative local action. This is the impetus of the Alameda County Climate Protection Project. Cities and counties have the ability to reduce greenhouse gas emissions through effective land use and transportation planning, wise waste management, and the efficient use of energy.

1.3. ICLEI Membership and the Five Milestones

By adopting a resolution committing the City to locally advancing climate protection, Emeryville has joined an international movement of local governments. More than 800 local governments, including over 450 in the United States, have joined ICLEI. In addition to Emeryville, all 14 Alameda municipalities and the County are ICLEI members, part of the 120 member California network (approximately 80 members are located in the Bay Area).

The Five Milestone Process provides a framework for local communities to identify and reduce greenhouse gas emissions, organized along five milestones:

- (1) Conduct an **inventory** of local greenhouse gas emissions;
- (2) Establish a greenhouse gas emissions **reduction target**;
- (3) Develop a **climate action plan** for achieving the emissions reduction target;
- (4) **Implement** the climate action plan; and,
- (5) **Re-inventory** emissions to monitor and report on progress.

This report represents the completion of the first CCP milestone, and provides a foundation for future work to reduce greenhouse gas emissions in Emeryville.

1.4. Sustainability and Climate Change Mitigation Activities in Emeryville

Emeryville has already taken many steps toward increasing energy efficiency, reducing air pollution, and reducing solid waste. Examples include:

- Extensive programs over the last 15 years for brownfield re-development resulting in urban in-fill projects and reducing the need for urban sprawl.
- Establishment of the EPA-award-winning Emery-Go-Round which now shuttles over one million riders per year from the MacArthur BART station to the City.
- Reducing building permit fees for single family home solar installations
- Installing Solar PV panels on the Civic Center roof
- Requiring stormwater treatment using vegetation in all new developments reducing the heat island effect in the city and reducing energy use for cooling and increasing CO2 uptake by plants
- Increasing Street tree planting standards for new developments ensuring the long-term health of more trees in the City
- Implementing environmental purchasing decisions such as switching to recycled content copy paper in many City buildings. This practice benefits the community by incentivizing business practices that conserve resources, reduce emissions, and reduce waste.
- Working with the Emeryville Chamber of Commerce to get 17 businesses in Emeryville to “Go Green” and become certified green businesses over the last three years.
- Working with “SmartLights” of the East Bay Energy Watch program to reduce energy use in the lighting of commercial properties in the City.
- Adopting StopWaste.Org’s Multi-Family Green Building Guidelines, which serve to reduce greenhouse gas emissions by keeping construction and demolition debris out of landfills and

increasing energy efficiency in buildings.

- Converting traffic signal lights to more energy efficient LED lamps.
- Requiring new developments to rate their projects using the green building scoring systems from StopWaste.Org and the United States Green Building Council (USGBC)
- Implementing residential food scrap recycling. Currently approximately 20% percent of households in the single family neighborhoods participate, thereby diverting 9 of tons of food scraps in 2006 from the landfill to a composting facility.
- Requiring landscapes in new developments and city projects to use locally produced compost and mulch partially made of feedstocks from municipal sources.
- Equipping the City Corporation Yard with motion occupancy sensors and energy efficient lighting. These steps save the City money, and reduce the emissions that cause global warming. The Senior Center also received rebate funds for the replacement of the old boiler. Other City facilities are also being considered for lighting retrofits.
- Installing Emeryville's first bike boulevard, adding more bike lanes and building the first phases of the Emeryville Greenway encouraging more people to travel by bike and on foot reducing vehicle emissions.
- Educating the residents of Emeryville at each years Earth Day event in Temescal Creek Park about environmental issues that face the City and the planet.¹

¹ From Draft Emeryville Climate Action Plan. Provided to ICLEI by Peter Schultze-Allen in August 2008.
2004 Greenhouse Gas Emissions Inventory, City of Emeryville

2. City of Emeryville 2004 Greenhouse Gas Emissions Inventory

2.1. Methods

ICLEI assists local governments in systematically tracking energy and waste related activities within their jurisdiction, and in calculating the relative quantities of greenhouse gases produced by each activity and sector. The greenhouse gas inventory protocol involves performing two assessments: 1) a community-wide assessment, and 2) a separate inventory of municipal facilities and activities. The municipal inventory is a subset of the community inventory.

Once completed, these inventories provide the basis for policy development, the quantification of emissions reductions associated with proposed measures, the creation of an emissions forecast, and the establishment of an informed emissions reduction target.

2.1.1. CACP Software

To facilitate community efforts to reduce greenhouse gas emissions, ICLEI developed the Clean Air and Climate Protection (CACP) software package in partnership with the State and Territorial Air Pollution Program Administrators (STAPPA), the Association of Local Air Pollution Control Officials (ALAPCO)², and Torrie Smith Associates. This software calculates emissions resulting from energy consumption and waste generation. The CACP software determines emissions using specific factors (or coefficients) according to the type of fuel used. CACP aggregates and reports the three main greenhouse gas emissions (CO₂, CH₄, and N₂O) in terms of equivalent carbon dioxide units, or CO₂e. Converting all emissions to equivalent carbon dioxide units allows for the consideration of different greenhouse gases in comparable terms. For example, methane (CH₄) is twenty-one times more powerful than carbon dioxide on a per weight basis in its capacity to trap heat; so the CACP software converts one metric ton of methane emissions to 21 metric tons of carbon dioxide equivalents.³ The CACP software is also capable of reporting input and output data in several formats, including detailed, aggregate, source-based and time-series reports.

The emissions coefficients and quantification method employed by the CACP software are consistent with national and international inventory standards established by the Intergovernmental Panel on Climate Change (1996 Revised IPCC Guidelines for the Preparation of National Inventories) and the U.S. Voluntary Greenhouse Gas Reporting Guidelines (EIA form1605).

The CACP software has been and continues to be used by over 400 U.S. cities, towns and counties to reduce their greenhouse gas emissions. However, it is worth noting that, although the software provides Emeryville with a sophisticated and useful tool, calculating emissions from energy use with precision is difficult. The model depends upon numerous assumptions, and it is limited by the quantity and quality of available data. With this in mind, it is useful to think of any specific number generated by the model as an approximation of reality, rather than an exact value. It should also be understood by policy makers, staff, and the public that the final total may change as new data, emissions coefficient sets, and better estimation methods become available.

2.1.2. Creating the Inventory

The greenhouse gas emissions inventory consists of two distinct components: one for the Emeryville community as a whole defined by its geographic borders, and the second for emissions resulting from the City of Emeryville's municipal operations. The municipal inventory is effectively a subset of the

² Now the National Association of Clean Air Agencies (NACAA)

³ The potency of a given gas in heating the atmosphere is defined as its Global Warming Potential, or GWP. For more information on GWP see: IPCC Fourth Assessment Report, Working Group I, Chapter 2, Section 2.10.

community-scale inventory (the two are not mutually exclusive). This allows the municipal government, which has formally committed to reducing emissions, to track its individual facilities and vehicles and to evaluate the effectiveness of its emissions reduction efforts at a more detailed level. At the same time, the community-scale analysis provides a performance baseline against which we can build policies and demonstrate progress for Emeryville.

Creating this emissions inventory required the collection of information from a variety of sources, including the Pacific Gas and Electric Company (PG&E), Stopwaste.org, the Bay Area Air Quality Management District, the Metropolitan Transportation Commission, CalTrans, the California Integrated Waste Management Board, the California Energy Commission, Association of Bay Area Governments.

2.2. Inventory Results

2.2.1. Community Emissions Inventory

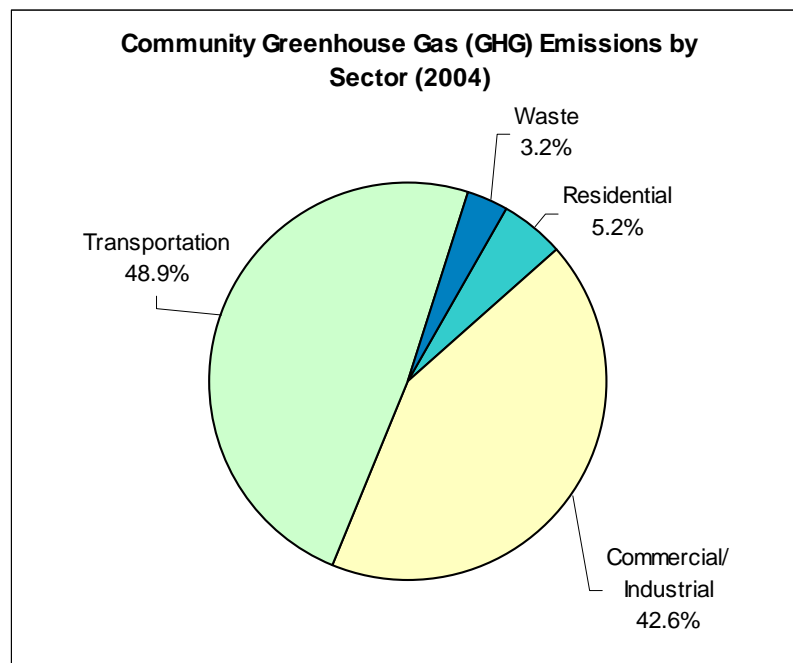
There are numerous items that can be included in a community scale emissions inventory, as demonstrated above. This inventory includes sources from the following sectors:

- Residential
- Commercial / Industrial
- Transportation
- Waste

Emissions by Sector

The community of Emeryville emitted approximately *178,832 metric tons of CO₂e in the year 2004⁴*. As visible in Figure 1 and Table 1 below, the transportation sector was the largest emitter, totaling 48.9% of the community's emissions. The commercial and industrial sectors were significant sources of community greenhouse gases (42.6%) while Emeryville's small residential sector accounted for 5.2% of community emissions. Methane generated by waste sent to landfill comprised 3.2% of total emissions.

Figure 1 – Community GHG Emissions by Sector



⁴ There are slight variations in emitted CO₂e totals throughout the report due to different rounding techniques between the CACP software and Microsoft Excel.

Table 1 – Community GHG Emissions by Sector (metric tons CO₂e)

2004 Community Emissions by Sector	Residential	Commercial/Industrial	Transportation	Waste	TOTAL
CO ₂ e (metric tons)	9,380	76,204	87,447	5,801	178,832
Percent of Total CO ₂ e	5.2%	42.6%	48.9%	3.2%	100.0%
Energy Equivalent (MMBtu)	160,562	1,267,105	1,180,261	0	2,607,928

Transportation

As with other San Francisco Bay area cities, travel by motorized vehicle (when including State highways) constitutes the greatest percentage of greenhouse gas emissions in Emeryville. In 2004, MTC estimated that 35.1 million vehicle miles traveled (VMT) occurred on Emeryville city roads. As Table 1 and Figure 1 show, this resulted in approximately one-half of the overall community emissions (87,447 metric tons CO₂e).

Since Emeryville's inventory was for 2004, state highway VMT data was not available. The City chose to include state highway VMT from 2005 as a proxy for 2004 data. Using this data, Table 2 breaks down emissions from the transportation sector by type.

Table 2 – Transportation GHG Emissions by Road Type

Transportation Road Type Emissions Sources 2004 ⁵	Local Roads	State Highways	TOTAL
CO ₂ e (metric tons)	19,445	68,002	87,447
Percent of Total CO ₂ e	22.2%	77.8%	100%
Total Vehicle Miles Traveled	35,109,350	122,780,890	157,890,240

Please see the appendices for more detail on methods and emissions factors used in calculating emissions from the transportation sector. It is important to note that ICLEI used 2005 Alameda County emissions coefficients to calculate emissions from the transportation sector, as 2004 emissions coefficients are currently unavailable. When the data becomes available, ICLEI will assist the City in updating its emissions inventory.

As a side note, ICLEI (in partnership with staff from the Bay Area Rapid Transit (BART) district) also developed a methodology for allocating the greenhouse gases that BART emits as a major regional transit provider. *The results of this quantification are meant to be illustrative and are not included in Emeryville's CO₂ baseline.* ICLEI generated the emissions estimates for BART travel by collecting 2004 electricity consumption data from BART and then allocating that consumption to Alameda County jurisdictions based on ridership (exit counts from the relevant BART stations). Emeryville's share of ridership at the Macarthur station is based on Emery-Go-Round ridership data. As BART's source of electricity through the year 2004 is hydropower, 2004 BART-related emissions are zero. That being said, BART's future fuel mix will not rely solely on hydropower. As such, based on ICLEI's methodology for allocating BART emissions to the jurisdictions that have access to a BART station, Emeryville is projected to be allocated 1,513 tons of eCO₂ in 2020 (based on PG&E emissions factors).

The Built Environment (Residential, Commercial, Industrial)

In 2004, 47.8 % of total community-wide emissions came from the built environment, which is comprised of the residential, commercial and industrial sectors. These sectors consumed about 224.9 million kWh of electricity and 6.6 million therms of natural gas. Within this report the commercial and industrial sectors have been combined due to a mandatory aggregating of commercial and industrial data by PG&E.

⁵ 2004 State Highway VMT is proxied from 2005 data.

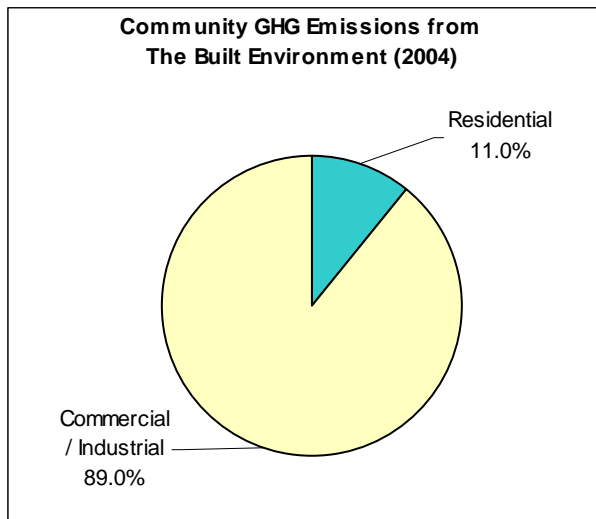


Figure 2 – Built Environment Emissions

The City of Emeryville receives its electricity from Pacific Gas & Electric Company (PG&E). The 2005 emissions coefficients for electricity provided by PG&E are included in the notes in Appendix B. Similar to the transportation sector, CCAR-verified 2004 PG&E emissions coefficients for CH₄ and N₂O were unavailable, and ICLEI used 2005 PG&E coefficients as a proxy for 2004.

The types of power sources that make up a utility’s electricity generation mix have a significant impact on a city’s greenhouse gas emissions. A coal fired power plant, for example, releases 1.3 tons of CO₂e per megawatt-hour of electricity generated versus 0.7 tons for gas turbines and 0 tons for renewable sources such as solar, wind, or hydroelectric power.

Because Emeryville has very strong commercial and industrial sectors, emissions from the built environment are overwhelmingly composed of emissions from these sectors (89.0 %, see Figure 2). Emeryville’s growing residential sector contributed 11.0% of all emissions from the built environment. All of the emissions that are being calculated from the built environment are the result of local natural gas consumption and local consumption of electricity that is being generated outside of Emeryville.

Residential

In 2004, Emeryville’s approximately 7,770⁶ residents consumed 19.3 million kWh of electricity, or about 4,300 kWh per household, and 945,917 therms of natural gas, or about 212 therms per household⁷. This consumption resulted in a release of 9,380 tons of CO₂e, 4,321 tons from electricity and 5,059 from natural gas. Major residential energy uses include refrigeration, lighting and water heating.

Commercial/Industrial

In 2004, Emeryville’s commercial/industrial sector buildings consumed 205.6 million kWh of electricity and 5.65 million therms of natural gas. This consumption resulted in a release of 76,204 tons of CO₂e into the atmosphere, 45,967 tons from electricity and 30,236 from natural gas.

Waste

In 2004, Emeryville sent approximately 16,710 tons of solid waste, and 150 tons of alternative daily cover (ADC)⁸ to landfill, resulting in a total of 5,801 metric tons of CO₂e. Table 3 breaks down emissions for municipal solid waste by type.

Emissions from the waste sector are an estimate of methane (CH₄) generation that will result from the anaerobic decomposition of the waste sent to landfill from community as a whole in the base year (2004). It is important to note that these emissions are not solely generated in the base year, but occur over the 100+ year timeframe in which the waste generated in 2004 will decompose. This “frontloading” of future emissions allows for simplified accounting and accurate comparison of the emissions impacts of waste

⁶ Populations and household estimates are from ABAG’s *Projections 2005*.

⁷ Ibid.

⁸ The California Integrated Waste Management Board defines ADC as “Alternative cover material other than earthen material placed on the surface of the active face of a municipal solid waste landfill at the end of each operating day to control vectors, fires, odors, blowing litter, and scavenging.”

disposed in each year. Therefore, if the amount of waste sent to a landfill is significantly reduced in a future year, that year’s emissions profile will reflect those reductions⁹.

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. Alameda County is unique among California counties in that it conducted its own waste characterization study in the year 2000. ICLEI utilized this study to determine the average composition of the waste stream for all Alameda municipalities. The specific characterization of ADC tonnage was provided by the CIWMB via the Disposal Reporting System (DRS).

Most landfills in the Bay Area capture methane emissions either for energy generation or for flaring. The US EPA estimates that 60%-80%¹⁰ of total methane emissions are recovered at the landfills to which Emeryville sends its waste. Following the recommendation of the Alameda County Waste Management Authority, and keeping with general IPCC guidelines to err towards conservative estimation, ICLEI has adopted 60% as the methane recovery factor used in these calculations.

The tonnage of waste that is recycled, composted, or otherwise diverted from landfills is not directly inputted into CACP. The impact of such programs, however, is reflected in the CACP software model as a reduction in the total tonnage of waste going to the landfill (therefore reducing the amount of methane produced at that landfill). The CACP model does not capture the emissions reductions in “upstream” energy use from recycling (or any other emissions reduction practice) in the inventory. However, it should be noted that *recycling and composting programs can have significant additional impact on GHG emissions, as manufacturing products with recycled materials avoids emissions from the energy that would have been used during extraction, transporting and processing of virgin materials.*

Table 3 – Community Waste Composition and Emissions by Waste Type¹¹

Waste Type	Paper Products	Food Waste	Plant Debris	Wood/ Textiles	All Other Waste	TOTAL
CO ₂ e (metric tons)	3,916	734	175	939	0	5,764
Percent of Total CO ₂ e	67.9%	12.7%	3.0%	16.3%	0.0%	100%
Percent of Tonnage Disposed	30.2%	10.0%	4.2%	25.6%	30.0%	100%

2.2.2. Community Emissions Forecast

Under a business-as-usual scenario, the City of Emeryville’s emissions will grow over the next decade and a half by approximately 35.1%, from 178,832 to 241,659 metric tons CO₂e¹². To illustrate the potential emissions growth based on projected trends in energy use, driving habits, job growth, and population growth from the baseline year going forward, ICLEI conducted an emissions forecast for the year 2020. Figure 3 and Table 4 show the results of the forecast. A variety of different reports and projections were used to create the emissions forecast.

Residential Forecast Methodology

For the residential sector, ICLEI calculated the compounded annual population growth rate¹³ between 2005 and 2020, using population projections from Emeryville’s General Plan. This growth rate (3.444%)

⁹ As the emissions reductions associated with decreasing the amount of waste being landfilled are real and there are usually few external variables that change those emissions levels later, this front-loading is considered to be an accurate practice for counting and reporting emissions that will be generated over time.

¹⁰ AP 42, section 2.4 Municipal Solid Waste, 2.4-6, <http://www.epa.gov/ttn/chief/ap42/index.html>

¹¹ Waste characterization study conducted by Stopwaste.org for the year 2000. Figures include only municipal solid waste, and not alternative daily cover.

¹² Growth rates calculated for this forecast assume a base year of 2005, and would be slightly different that estimates from 2004.

¹³ Compounded annual growth rate= ((2020 population/2005 population)^(1/15))-1

was used to estimate average annual compound growth in energy demand. From the Emeryville General Plan, ICLEI estimated that the City’s population will be 13,300 in 2020¹⁴.

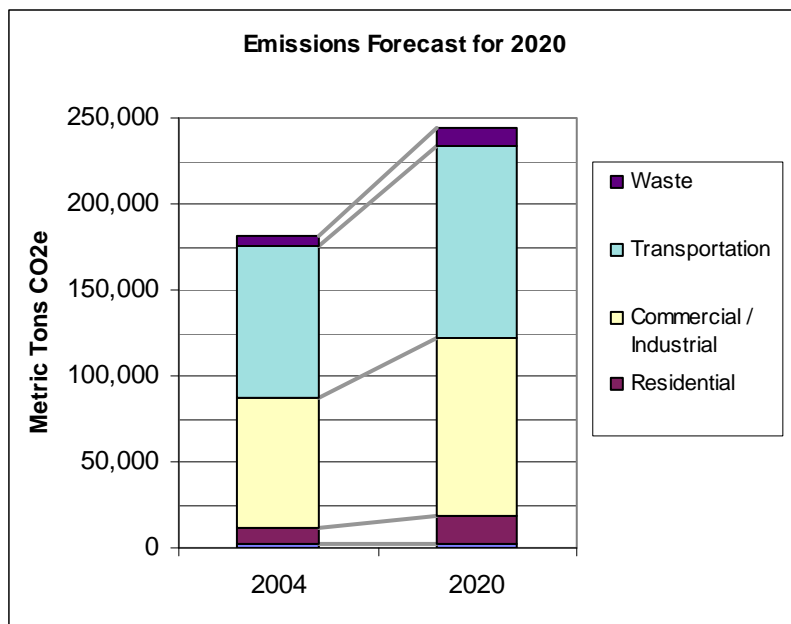
Commercial / Industrial Forecast Methodology

Analysis contained within “California Energy Demand 2008-2018: Staff Revised Forecast¹⁵,” a report by the California Energy Commission (CEC), shows that commercial floor space and the number of jobs have closely tracked the growth in energy use in the commercial sector. Using job growth projections from the Emeryville General Plan, ICLEI calculated that the compounded annual growth in energy use in the commercial sector between 2005 and 2020 will be 1.99%.¹⁶

Transportation Forecast Methodology

The recently passed federal Corporate Average Fuel Economy standards and the state of California’s pending tailpipe emission standards could significantly reduce the demand for transportation fuel in Emeryville. An analysis of potential fuel savings from these measures at a scale that would be useful for the purpose of this report has not been conducted, nor would such an analysis produce a true business-as-usual estimation. Regardless of future changes in the composition of vehicles on the road as a result of state or federal rulemaking, emissions from the transportation sector will continue to be largely determined by growth in vehicle-miles-traveled (VMT). In their report, “Transportation Energy Forecasts for the 2007 Integrated Energy Policy Report,” the CEC projects that on-road VMT will increase at an annual rate of 1.51% per year through 2020¹⁷. This is the number that was used to estimate emission growth in the transportation sector for the Emeryville forecast.

Figure 3 – Community Emissions Forecast



“Transportation Energy Forecasts for the 2007 Integrated Energy Policy Report,” the CEC projects that on-road VMT will increase at an annual rate of 1.51% per year through 2020¹⁷. This is the number that was used to estimate emission growth in the transportation sector for the Emeryville forecast.

Waste Forecast Methodology

As with the residential sector, the primary determinate for growth in emission in the waste sector is population. Therefore, the compounded annual population growth rate for 2005 to 2020 (3.444%¹⁸, as calculated from the Emeryville General Plan), was used to estimate future emissions in the waste sector.

¹⁴ The General Plan provides population predictions for 2030. To estimate 2020 population, ICLEI used 2000 Census data and assumed an equal growth rate every year between 2000 and 2030.

¹⁵ <http://www.energy.ca.gov/2007publications/CEC-200-2007-015/CEC-200-2007-015-SF2.PDF>

¹⁶ The Emeryville General Plan states that 10,000 new jobs will be added by 2030. ICLEI estimated the 2007 number of jobs by assuming a constant growth between 2005 and 2010 from ABAG jobs forecast data and added 10,000 to estimate 2030 jobs (30,668). This was then prorated in the same manner as population projections to estimate 2020 jobs (27,065).

¹⁷ Report available at: <http://www.energy.ca.gov/2007publications/CEC-600-2007-009/CEC-600-2007-009-SF.PDF>.

Compounded Annual growth rate for 2005-2020 is calculated from Table 4 on page 12. In light of recent fuel cost increases, the calculation assumes high fuel cost scenario.

¹⁸ Ibid

Table 4 – Community Emissions Growth Projections by Sector

2004 Community Emissions Growth Forecast by Sector	2004	2020	Annual Growth Rate	Percent Change from 2004 to 2020
Residential	9,380	16,124	3.444%	71.9%
Commercial / Industrial	76,204	104,445	1.990%	37.1%
Transportation	87,447	111,118	1.509%	27.1%
Waste	5,801	9,972	3.444%	71.9%
TOTAL	178,832	241,659	--	35.1%

As Table 4 shows, emissions from the residential and waste sectors will experience the largest relative increase, growing by 71.9%. Emeryville can dramatically reduce these emissions by ensuring energy and water efficiency standards in new residential developments and promoting recycling and composting across the City. The transportation and commercial/industrial sectors will still compose the large majority of the City’s emissions, and Emeryville should focus policy solutions on these sectors.

2.2.3. Government Operations Emissions Inventory

The sources of emissions that are being counted in the Government Inventory are facilities and equipment owned and operated by the City. The Government Operations Inventory includes sources from the following sectors:

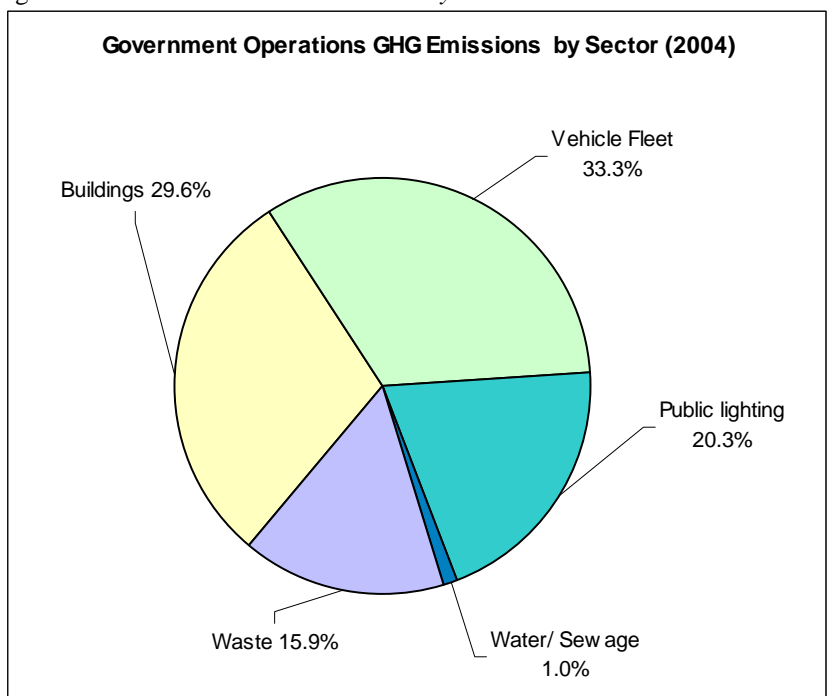
- Facilities
- Vehicle Fleet
- Public lighting
- Water Pumping and Irrigation
- Solid Waste

Emissions by Sector

The government operations in the City of Emeryville emitted approximately 1,335 metric tons of CO₂e in the year 2004.

As visible in Table 5 and Figure 4, the City’s vehicle fleet (including some contracted vehicles) is the largest emitter of greenhouse gases, composing about one-third of the government emissions. Emissions from City facilities compose another significant proportion of the total government emissions (29.6%), with public lighting generating 20.3%, and the remainder coming from waste (15.9%) and electricity for pumping water, sewage and stormwater (1.0%).

Figure 4 – Government GHG Emissions by Sector



Energy Related Costs

In addition to generating estimates on emissions per sector, ICLEI has calculated the basic energy costs of various government operations. During 2004, the Emeryville municipal government spent approximately \$433,000 on energy (electricity, natural gas, gasoline and diesel) for its buildings, public lighting and vehicles. Powering and heating facilities composed the majority of costs (\$169,608), with public lighting energy costing \$136,974 and fuel for the City’s fleet costing \$118,974.

Beyond reducing harmful greenhouse gases, any future reductions in municipal energy use have the potential to reduce these costs, enabling Emeryville to reallocate limited funds toward other municipal services. For example, if Emeryville police replaced some vehicles with bicycles, they could reduce costs associated with fuel and maintenance (maintenance costs not included here) while reducing emissions from the police fleet.

Table 5 – Government GHG Emissions by Sector

Government Emissions 2005	Facilities	Vehicle Fleet	Public lighting	Water/ Sewage	Waste	TOTAL
CO ₂ e (metric tons)	395	444	271	13	212	1,335
Percent of Total CO ₂ e	29.6%	33.3%	20.3%	1.0%	15.9%	100.0%
Energy Equivalent (MMBtu)	6,633	5,713	4,137	195	-	16,678
Cost (\$)	\$169,608	\$118,974	\$136,974	\$7,801	-	\$433,357

Facilities / Municipal Buildings

In 2004, Emeryville municipal buildings and other facilities consumed about 972,928 kWh of electricity and 33,122 therms of natural gas, which resulted in a release of 395 tons of CO₂e emissions into the atmosphere.

As stated above, and as visible in Figure 4, emissions from municipal facilities constitute approximately 29.6% of total City emissions. Table 6 breaks down emissions by facility. About half of the emissions from City buildings came from the Civic Center and the Police Station. The Senior Center was responsible for 12.4% of City operations emissions, and the Development Center, Corporation Yard, and Fire Stations each composed less than 10% of total emissions. Cumulatively, the City spent approximately \$169,608 on electricity and natural gas to power and heat City facilities in 2004.

Table 6– Emissions from Municipal Facilities

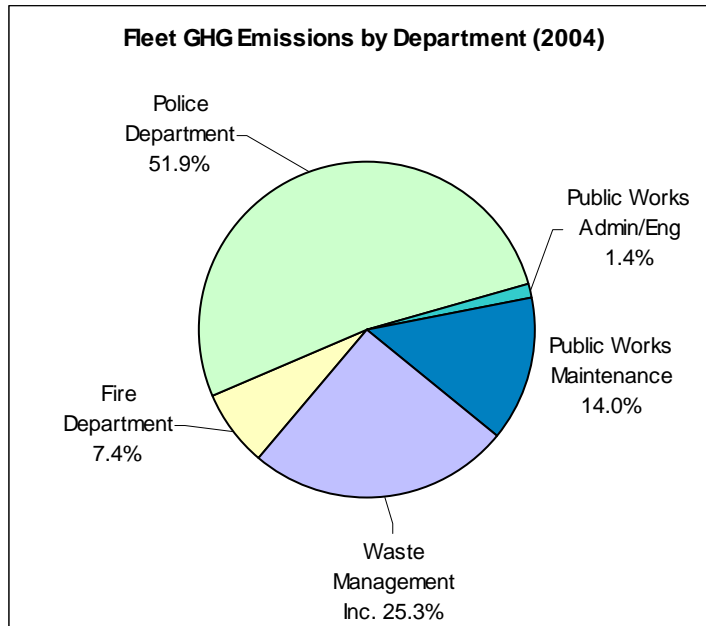
Facility	CO ₂ e (metric tons)	Percent CO ₂ e of All Facilities	Electricity Consumption (kWh)	Natural Gas Consumption (therms)	Energy Equivalent (MMBtu)	Total Cost (\$)
Child Care Development Center	35	8.9%	67,429	3,784	609	\$13,932
Civic Center (Offices)	127	32.2%	352,000	9,052	2,107	\$56,126
Corp Yard	29	7.4%	94,920	1,365	460	\$16,341
Fire Station #1	36	9.1%	100,400	2,600	603	\$17,761
Fire Station #2	33	8.4%	70,859	3,260	568	\$14,037
Police Station	85	21.6%	252,320	5,410	1,402	\$39,128
Senior Center	49	12.4%	35,000	7,651	885	\$12,283
TOTAL	394	100.0%	972,928	33,122	6,634	\$169,608

City and Contractor Vehicle Fleet

As visible in Figure 4, the fleet of City-owned and contractor vehicles were the largest source of municipal emissions in 2004, producing 33.3% of total emissions. Not including the Fire Department and Public Works Maintenance vehicles, the City owned 31 vehicles in 2004, and Waste Management used 4 vehicles to haul the City’s waste.

The vehicle fleet consumed 63,266 gallons of fuel (including gasoline, diesel, ultra low sulfur diesel and natural gas) and emitted about 444 tons of CO₂e. The municipal fleet includes all vehicles owned and operated by the City of Emeryville plus some contractor vehicles performing City functions. As

Figure 5 – Emissions from City Fleet Vehicles



portrayed in Figure 5 and Table 7, the greatest percentage of fleet emissions (51.9%) comes from gasoline and diesel consumption in Police Department vehicles. Waste Management vehicles that use CNG and ultra low sulfur diesel emitted one-quarter of the City’s mobile emissions. The Fire Department and the Public Works Department are collectively responsible for the remaining quarter of the total fleet emissions.

Table 7 – 2004 City Vehicle Fleet Emissions and Fuel Consumption

Department	CO ₂ e (metric tons)	Percent CO ₂ e of Total Fleet	Gasoline Consumption (gal)	Other Fuel consumption (gal)	Total Fuel Cost (\$)
Fire Department	33	7.4%	1,958	1,454 (diesel)	\$6,620
Police Department	230	51.9%	23,684	0	\$50,466
Public Works Admin/Eng	6	1.4%	660	0	\$1,406
Public Works Maintenance	62	14.0%	6,082	325 (diesel)	\$13,641
Waste Management Inc.	112	25.3%	4	17,452 (CNG), 11,648 (ULSD)	\$46,841
TOTAL	443	100.0%	32,388	30,879	\$118,974

Public Lighting

The category of public lighting includes all traffic signals and all sidewalk and outdoor parking lighting. In 2004, public lighting consumed about 1.2 million kWh of electricity, which resulted in a release of 271 metric tons of CO₂e emissions into the atmosphere. Table 8 breaks down energy use and emissions from public lighting by type. Over all categories of energy, across all sectors of municipal operation, public lighting generated about 20.3 % of emissions (Figure 4).

Table 8 – 2004 Public Lighting Emissions and Energy Use

Lighting Type	CO ₂ e (metric tons)	Electricity Consumption (kWh)	Energy Equivalent (MMBtu)	Cost (\$)
Streetlights	255	1,138,978	3887	\$125,282.00
Traffic Signals/Controllers	16	73,817	250	\$11,692.00
TOTAL	271	1,212,795	4,137	\$136,974

Water/Sewage

This water infrastructure in Emeryville is comprised mainly of pumps and irrigation equipment. Emissions associated with the electricity needed to power this infrastructure are included in this report. In 2004, water distribution consumed about 57,000 kWh of electricity, which resulted in a release of 13 metric tons of CO₂e emissions into the atmosphere. Table 9 breaks down energy use and emissions from water/sewage by type. Water pumping facilities accounted for approximately 1.0% of total municipal emissions – the smallest contributor to City emissions.

Table 9 – 2004 Water/Irrigation Emissions and Energy Use

Water/Irrigation Type	CO ₂ e (metric tons)	Electricity Consumption (kWh)	Energy Equivalent (MMBtu)	Cost (\$)
Waterpumps	12	54,505	186	\$6,882.00
Irrigation / Sprinkler Systems	1	2,580	9	\$919.00
TOTAL	13	57,085	195	\$7,801

Solid Waste

Solid waste generated by City-owned facilities and infrastructure produced an estimated 15.9% (Figure 4) of the total emissions from government operations. As in the community analysis, these emissions are an estimate of future methane generation over the full, multi-year decomposition period of the waste generated in the year 2004.

In 2004, Emeryville sent approximately 550 tons of solid waste to landfill, resulting in a total of 212 metric tons of CO₂e.

In the absence of a centralized disposal record like the CIWMB Disposal Reporting System, waste generation figures from government operations, as well as the characterization of government waste, were estimated by Waste Management staff. Additionally, the final emissions number generated by the CACP software used the 60% methane recovery factor discussed above.

2.2.4. Government Operations Emissions Forecast

While the community emissions growth forecast is based upon known per capita energy consumption, workforce expansion, and population growth projections, the forecast of growth within municipal operations is based upon the expansion of City services or infrastructure. It was not within the scope of this project to estimate growth of City infrastructure or services, and, therefore, the government operations emissions forecast is not included. ICLEI advises that the City conduct such a forecast to be included in this report at a later date, and to inform the process of selecting an emission reduction target for City operations.

3. Conclusion

In passing a resolution to endorse the U.S. Conference of Mayors Climate Protection Agreement, the City of Emeryville made a formal commitment to reduce its greenhouse gas emissions. This report lays the groundwork for those efforts by estimating baseline emission levels against which future progress can be demonstrated.

This analysis found that the Emeryville community as a whole was responsible for emitting *178,832 metric tons of CO₂e in the base year 2004*, with the transportation sector contributing the most (48.9%) to this total. The City of Emeryville's own municipal operations were responsible for *1,335 metric tons of CO₂e in the year 2004*, with the greatest percentage of emissions coming from the City vehicle fleet and City facilities.

In addition to establishing the baseline for tracking progress over time, this report serves to identify the major sources of Emeryville emissions, and therefore the greatest opportunities for emission reductions. In this regard, the emissions inventory ought to inform the areas of focus within the Emeryville Climate Action Plan.

Following the ICLEI methodology, we also recommend that the City of Emeryville utilize the inventory to begin to consider potential greenhouse gas reduction targets for the community and for municipal operations.

As Emeryville works to finalize the Climate Action Plan, the City should identify and quantify the emission reduction benefits of projects that have already been implemented since 2004, as well as the emissions reduction benefits of proposed future emissions reduction measures. The benefits of both existing and proposed strategies can be tallied against the baseline established in this report to determine the appropriate set of strategies that will deliver the City to its chosen emissions reduction goal.

4. Appendices

4.1. Appendix A: Forecast Data from ABAG's Projections 2005

Forecast Table 1 – ABAG Projections on Job Growth in Emeryville

TOTAL JOBS					
JURISDICTIONAL BOUNDARY	2000	2005	2010	2015	2020
ALAMEDA	27,380	27,960	34,750	37,990	41,080
ALBANY	5,190	4,940	5,560	5,650	5,670
BERKELEY	78,320	76,890	79,080	80,580	81,690
DUBLIN	16,540	19,950	24,770	29,170	32,030
EMERYVILLE	19,860	20,140	21,460	21,750	21,900
FREMONT	104,830	96,530	105,060	119,360	136,770
HAYWARD	76,320	73,670	80,030	84,330	88,790
LIVERMORE	32,820	33,660	40,420	46,170	55,070
NEWARK	21,420	21,180	23,310	23,810	24,230
OAKLAND	199,470	207,100	223,490	235,030	250,260
PIEDMONT	2,120	2,120	2,140	2,160	2,190
PLEASANTON	58,670	58,670	66,050	72,020	73,410
SAN LEANDRO	44,370	42,790	44,840	50,460	54,380
UNION CITY	19,310	19,920	24,000	29,010	34,900
UNINCORPORATED	43,540	41,980	43,880	47,480	50,940

Forecast Table 2 – ABAG Projections on Population Growth in Emeryville

TOTAL POPULATION					
JURISDICTIONAL BOUNDARY	2000	2005	2010	2015	2020
ALAMEDA	72,259	75,400	77,600	79,900	82,300
ALBANY	16,444	16,800	17,200	17,400	17,800
BERKELEY	102,743	105,300	107,200	109,500	111,900
DUBLIN	29,973	40,700	50,000	57,000	63,800
EMERYVILLE	6,882	8,000	8,800	9,300	9,900
FREMONT	203,413	211,100	217,300	226,900	236,900
HAYWARD	140,030	146,300	151,400	156,600	160,300
LIVERMORE	73,345	78,000	84,300	90,200	96,300
NEWARK	42,471	44,400	46,000	47,400	49,000
OAKLAND	399,484	414,100	430,900	447,200	464,000
PIEDMONT	10,952	11,100	11,200	11,200	11,200
PLEASANTON	63,654	68,200	72,600	76,500	80,400
SAN LEANDRO	79,452	82,400	84,300	87,500	90,800
UNION CITY	66,869	71,400	75,100	78,600	82,600
UNINCORPORATED	135,770	143,900	150,600	153,600	157,300

4.2. Appendix B: Emissions Factors Used in the Alameda County Climate Protection Partnership

PG&E Emission Factors:

Emission Source	GHG	Emission Factor	Emission Factor Source
PG&E Electricity	CO ₂	0.489155 lbs/kwh (for 2004 and 2005)	The certified CO ₂ emission factor for delivered electricity is publicly available at http://www.climateregistry.org/CarrotDocs/19/2005/2005_PUP_Report_V2_Rev1_PGE_rev2_Dec_1.xls
	CO _{2e}	0.492859 lbs/kwh	PG&E-this factor includes release of CH ₄ and N ₂ O. Figure provided is a 2005 number being used as proxy for 2004.
Default Direct Access Electricity	CO ₂	343.3 short tons/GWh	ICLEI/Tellus Institute (2005 Region 13 - Western Systems Coordinating Council/CNV Average Grid Electricity Coefficients)
	CH ₄	0.035 short tons/GWh	
	N ₂ O	0.027 short tons/GWh	
Natural Gas	CO ₂	53.05 kg/MMBtu	PG&E/CCAR. Emission factors are derived from: California Energy Commission, Inventory of California Greenhouse Gas Emissions and Sinks: 1990-1999 (November 2002); and Energy Information Administration, Emissions of Greenhouse Gases in the United States 2000 (2001), Table B1, page 140.
	CH ₄	0.0059 kg/MMBtu	CCAR. Emission factors are derived from: U.S. EPA, "Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2000" (2002), Table C-2, page C-2. EPA obtained original emission factors from the Intergovernmental Panel on Climate Change, Revised IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual (1996), Tables 1-15 through 1-19, pages 1.53-1.57.
	N ₂ O	0.001 kg/MMBtu	

Alameda County Transportation Sector Emission Factors:

CH ₄ Rates (grams/mile)		N ₂ O Rates (grams/mile)		VMT Mix		CO ₂ Rates-(grams/gallon)		Fuel Efficiency (miles/gallon)	
Gas	Diesel	Gas	Diesel	Gas (Passenger Vehicles)	Diesel (Heavy Trucks)	Gas	Diesel	Gas	Diesel
0.062	0.042	0.070	0.050	92.8%	7.2%	8,599	10,092	19.1	6.4

Provided by the Bay Area Air Quality Management District EMFAC Model

Alameda County Waste Sector Emission Factors:

Waste Type	Methane Emissions (tonne/tonne of waste disposed)	Sequestration (tonne/tonne of waste disposed)
Paper Products	2.138262868	0
Food Waste	1.210337473	0
Plant Debris	.685857901	0
Wood/Textiles	.605168736	0
All Other Waste	0	0

Methane recovery factor of 60% derived from the US EPA AP 42 Emissions Factors report (<http://www.epa.gov/ttn/chief/ap42/index.html>).

4.3. Appendix C: Waste Calculation Methodology

Emissions Calculation Methods

CO₂e emissions from waste and ADC disposal were calculated using the *methane commitment method* in the CACP software, which uses a version of 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 CO₂e 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:

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

4.4. Appendix D: Detailed CACP Report: Government Operations Greenhouse Gas Emissions in 2004 (attached)

4.5. Appendix E: Detailed CACP Report: Community Greenhouse Gas Emissions in 2004 (attached)