CITY OF ATASCADERO

Community-Wide and Government Operations 2005 Baseline Greenhouse Gas Emissions Inventory

Prepared for:

SAN LUIS OBISPO AIR POLLUTION CONTROL DISTRICT
ON BEHALF OF THE CITY OF ATASCADERO

Prepared by:

860 WALNUT STREET, SUITE B
SAN LUIS OBISPO, CA 93401-2725

April 2010

Credits and Acknowledgements

Report prepared by PMC for the San Luis Obispo Air Pollution Control District on behalf of the City of Atascadero.

PMC PROJECT TEAM

Tammy Seale, Project Manager
Jaime Hill, Associate Planner
Jillian Rich, Associate Planner
Scott Kaiser, Assistant Planner

WITH ASSISTANCE FROM:

Air Pollution Control District
Larry Allen, Air Pollution Control Officer
Aeron Arlin Genet, Planning and Outreach Manager
Melissa Guise, Air Quality Specialist
Dean Carlson, Air Quality Engineer

City of Atascadero
Warren Frace, Director, Community Development
Callie Taylor, Associate Planner, Community Development
Geoff English, Deputy Director, Public Works Department
Rachelle Rickard, Director, Administrative Services
Justin Black, Public Works, Chief Plant Operator
Lori Brickley, Finance Tech
Amanda Muether, Dispatch

County of San Luis Obispo
Janice Campbell, Agriculture Department

IWMA
Peter Cron, Analyst

Atascadero Waste Alternatives
Mike LaBarbara, Municipal Marketing

***Pacific* Waste Services, Inc.**
Jim Wyse, President

PG&E
John Bohman, Green Communities and Innovator Pilots

***Southern* California Gas Company**
Colby Morrow, Environmental Affairs Program Manager, Customer Programs

ICLEI – Local Governments for Sustainability
Jonathan Strunin, Program Officer
Allison Culpen, Program Associate

California Air Resources Board
Tom Scheffelin, Analyst, Transportation Analysis Section
Jon Taylor P.E., Manager, Transportation Analysis Section

Table of Contents

List of Figures

List of Tables

Appendices

Executive Summary

Climate change is quickly becoming a high priority among policymakers and residents alike. In March 2009, the City Council made a commitment to evaluating Atascadero's contribution to global climate change through the development of a Community-Wide and City Government Operations Baseline Greenhouse Gas (GHG) Emissions Inventory (Inventory). This Inventory identifies the major sources of greenhouse gas emissions within the city[1] and provides a baseline against which future progress can be measured. This Inventory includes two components: (1) a community-wide analysis and (2) a City government operations analysis. It is important to note that the City government operations inventory is a subset of the community inventory, meaning that all City government operations emissions are included in the commercial/industrial, transportation, waste, or "other" categories of the community-wide inventory. The City government operations inventory should not be added to the community analysis; rather it should be looked at as a slice of the complete picture. Specifically, this Inventory does the following:

- Calculates GHGs from community-wide[2] activities, including City government operations, within the City's jurisdictional boundary in calendar year 2005;
- Identifies the major sources of greenhouse gas emissions from community-wide sources and City government operations;
- Provides City decision-makers and the community with adequate information to inform policy decisions; and
- Forecasts how emissions will grow in the community if no behavioral changes are made.

What are Greenhouse Gas Emissions (GHGs)?

Gases that trap heat in the Earth's atmosphere are called greenhouse gases, or GHGs. Greenhouse gases include carbon dioxide, methane, nitrous oxide, and fluorinated gases. While many of these gases occur naturally in the atmosphere, modern human activity has led to a steep increase in the amount of GHGs released into the atmosphere over the last 100 years. Collectively, these gases intensify the natural greenhouse effect, thus causing global average surface temperatures to rise, which in turn affects global climate patterns. GHGs are often quantified in terms of CO_2 equivalent, or CO_2e, a unit of measurement that equalizes the potency of GHGs.

Source: Intergovernmental Panel on Climate Change (IPCC), 2007

[1] In this report, the term "city" refers to the area inside the jurisdictional boundary of the City of Atascadero, whereas "City government" refers to those activities which are under the operational control of City agencies.

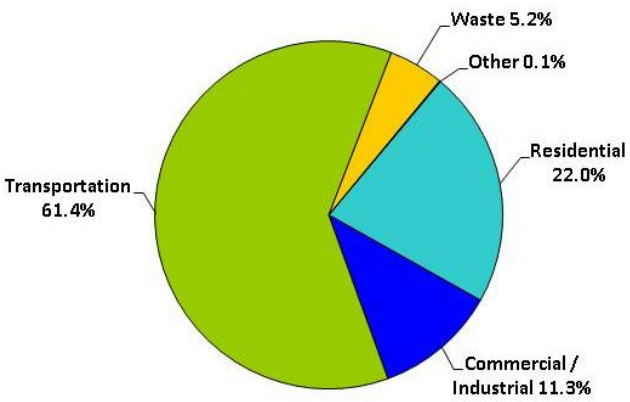
[2] "Community-wide" or "community" refers to all activities within the city (as defined above), including those from businesses, industrial processes, residents, vehicles, and City government operations.

The 2005 community-wide and City government operations baseline GHG Inventory represents a key step in the City of Atascadero's efforts to improve air quality, enhance sustainability, and ensure the safety and comfort of its residents for generations to come. In addition, this Inventory allows the City to quantitatively track and take credit for its numerous efforts related to energy efficiency and the mitigation of global climate change.

COMMUNITY-WIDE GHG INVENTORY RESULTS

The community of Atascadero emitted approximately 176,234 metric tons of carbon dioxide equivalent (CO_2e) in the baseline year 2005. As shown in **Figure ES-1**, the transportation sector was by far the largest contributor to emissions (61.4%), producing approximately 108,223 metric tons of CO_2e in 2005. Emissions from the residential sector were the next largest contributor (22%), producing approximately 38,803 metric tons of CO_2e. The commercial and industrial sectors accounted for a combined 11.3% of the total. Emissions from solid waste comprised 5.2% of the total, and emissions from other sources such as agricultural equipment comprised 0.1%.

FIGURE ES-1: COMMUNITY GHG EMISSIONS BY SECTOR



The majority of emissions from the transportation sector were the result of gasoline consumption in private vehicles traveling on local roads, US 101, and state highways. GHG figures from the waste sector are the estimated future emissions that will result from the decomposition of waste generated by city residents and businesses in the base year 2005, with a weighted average methane capture factor of 60.0%.[3]

[3] In 2005, the San Luis Obispo Air Pollution Control District reported methane capture rates for the Chicago Grade and Cold Canyon landfills. The methane recovery factors of the landfills are based on the system operations at that time.

CITY GOVERNMENT OPERATIONS GHG INVENTORY RESULTS

City government operations and facilities produced approximately 4,128 metric tons of greenhouse gas emissions in 2005. As displayed in **Figure ES-2**, this represents approximately 2.3% of total community-wide emissions in the city. City government emissions result from waste, energy consumption from water and wastewater facilities, buildings, streetlights and other facilities, fuel consumption by the vehicle and transit fleet and employee commutes, and miscellaneous equipment. The largest contributor to the City's emissions (70.7%), was from the wastewater facilities producing 2,920 metric tons of carbon dioxide equivalent. The vehicle fleet was the second largest contributor to the City's emissions (9.7%), producing 402 metric tons of carbon dioxide equivalent (refer to **Figure ES-3**).

FIGURE ES-2: CITY GOVERNMENT OPERATIONS GHG EMISSIONS BY SECTOR

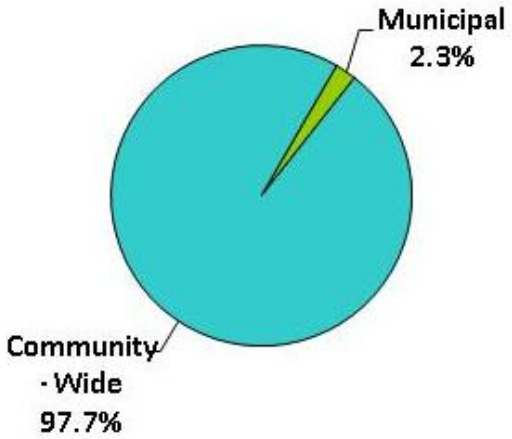
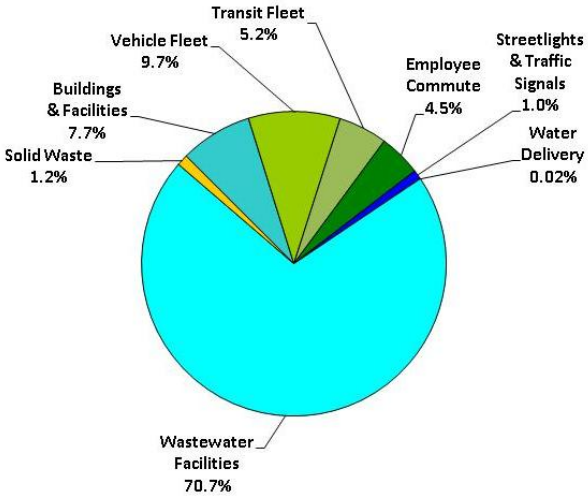


FIGURE ES-3: CITY GOVERNMENT PORTION OF COMMUNITY-WIDE GHG EMISSIONS



City government operations emissions are a subset of the total community-wide emissions as outlined above. However, similar to the way in which businesses and factories perform their own facility-scale GHG Inventories this Inventory analyzes City emissions separately to identify cost-saving and emissions-reducing strategies in the future. The methodology for estimating emissions from local government operations is guided specifically by the Local Government Greenhouse Gas Inventory Protocol developed by the California Air Resources Board, ICLEI – Local Governments for Sustainability, and the California Climate Registry.

DATA LIMITATIONS

This Community-Wide and City Government Operations Baseline GHG Emissions Inventory captures the major sources of greenhouse gases caused by activities within the city per standard practice. However, it is important to note that some likely emission sources were not included in the Inventory, either because of privacy laws, lack of data, or a lack of reasonable methodology for calculating emissions. It is estimated that the sources not included in the inventory comprise less than 5.0% of total emissions in the city. It is likely that as greenhouse gas inventories become more common, methodology and accessibility to data will improve.

The sources that could not be included due to privacy laws, lack of data availability, and/or a reasonable methodology include the following:

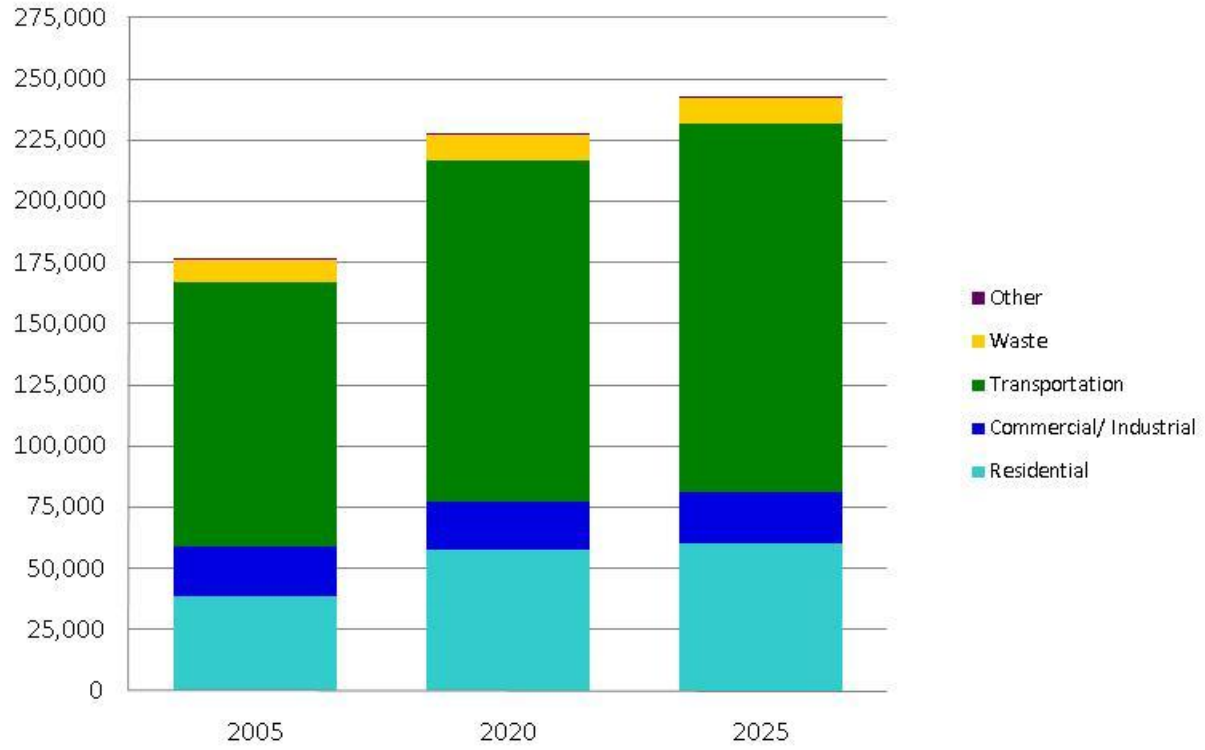
- Refrigerants from City government operations facilities and vehicles;
- Freight and passenger trains;
- Propane, wind or solar energy consumed by the community-at-large;
- Recreational off-road equipment and vehicles; and
- Residential septic tanks systems.

These limitations are explained further in this document.

FORECAST AND NEXT STEPS

If consumption trends continue the pattern observed in 2005 emissions will reach 227,647 metric tons of CO_2e by 2020, or a 29.2% increase over 2005 baseline levels. By 2025 emissions will reach 242,428 metric tons of CO_2e, or a 37.6% increase over 2005 baseline levels.

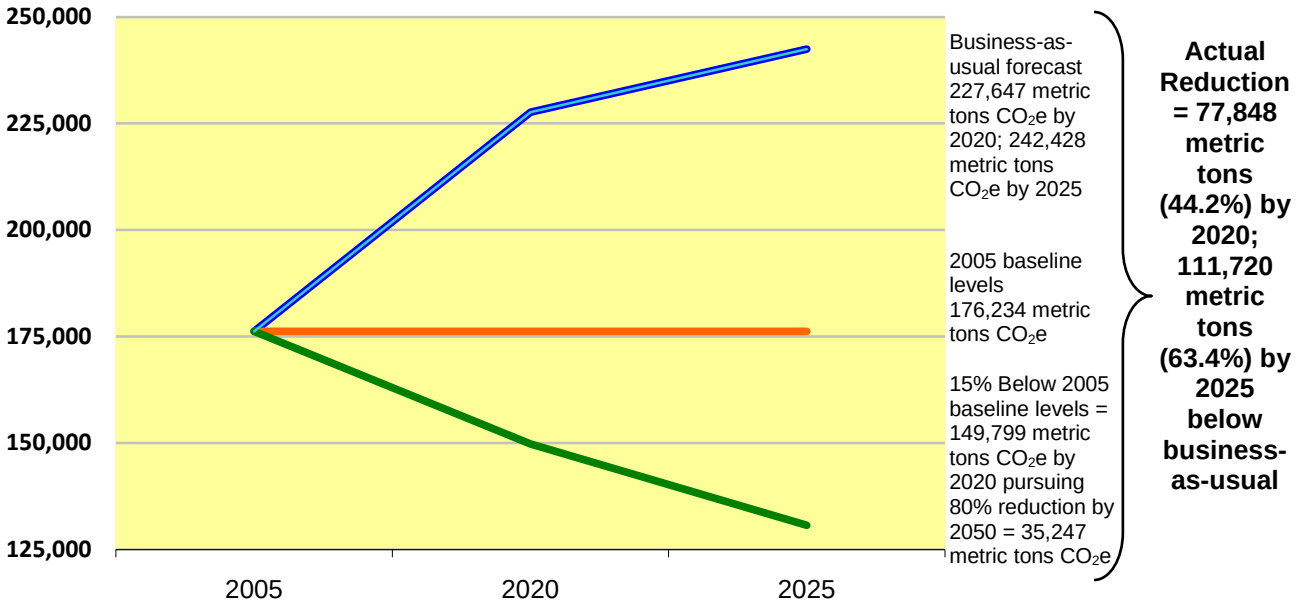
FIGURE ES-4: 2020 AND 2025 CITY OF ATASCADERO BUSINESS-AS-USUAL GHG EMISSIONS FORECAST



With this information, the City can make an informed determination of a reduction target. Conformance with the State of California's recommended reduction of 15% below present levels by 2020 would result in a 44.2% reduction below the city's business-as-usual emissions. By 2025 the reduction would increase to 63.4% below business-as-usual (**Figure ES-5**).[4]

[4] AB 32 Scoping Plan, page 27 states that CARB encourages local governments to "move toward establishing similar goals for community emissions that parallel the State commitment to reduce greenhouse gas emissions by approximately 15 percent from current levels by 2020." http://www.arb.ca.gov/cc/scopingplan/scopingplan.htm

FIGURE ES-5: BUSINESS-AS-USUAL FORECAST IN RELATION TO STATE-RECOMMENDED REDUCTION TARGETS



It is likely that the city's emissions are already below the business-as-usual forecast due to sustainability efforts initiated by the City since 2005.

1. Introduction

In March 2009, the City Council adopted a resolution to join ICLEI – Local Governments for Sustainability (ICLEI) and to authorize the preparation of a greenhouse gas emissions (GHG) baseline inventory. In committing to the project, the City of Atascadero embarked on an ongoing, coordinated effort to reduce the GHG emissions that cause global warming, to improve air quality, and to reduce costs.

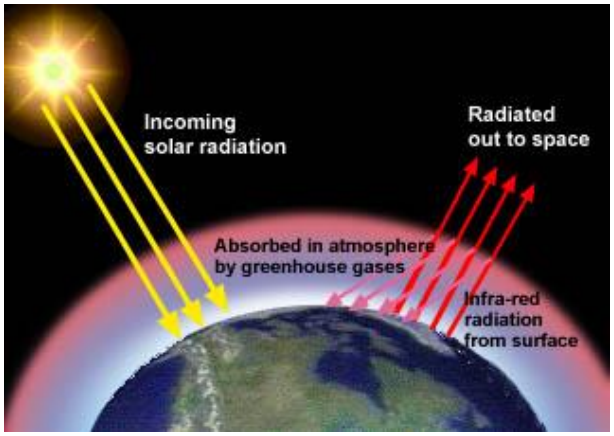
This section introduces the Inventory, defines key terms used throughout the Inventory, and provides an overview of climate change science and regulation in California.

ICLEI, formerly the Intergovernmental Council of Local Environmental Initiatives, is now named ICLEI – Local Governments for Sustainability. The nonprofit organization provides technical assistance to more than 1,000 local governments worldwide on quantifying and reducing greenhouse gas emissions.

1.1 PURPOSE OF A GHG INVENTORY

This Inventory represents completion of the first step in the City's climate protection process. As advised by ICLEI, quantifying recent-year emissions is essential to establish: (1) a baseline against which to measure future emission levels, and (2) an understanding of where the highest percentages of emissions are coming from, and, therefore, the greatest opportunities for emissions reductions. This Inventory presents estimates of greenhouse gas emissions in 2005 resulting from the community as a whole.

FIGURE 1-1:
THE GREENHOUSE GAS EFFECT



Source: Tufts University

Climate Change – Legislative Background

Scientific consensus holds that the world's population is releasing greenhouse gases faster than the earth's natural systems can absorb them. These gases are released as byproducts of fossil fuel combustion, waste disposal, energy use, land-use changes, and other human activities. This release of gases, such as carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), creates a blanket around the earth that allows light to pass through but traps heat at the surface preventing its escape into space (**Figure 1-1**). Known as the greenhouse effect, models show that this phenomenon could lead to a 2°F to 10°F temperature

increase over the next 100 years. The Intergovernmental Panel on Climate Change (IPCC) warns that most of the warming observed over the last 50 years is attributable to human activities.[5]

Although used interchangeably, there is a difference between the terms "climate change" and "global warming." According to the State, climate change refers to "any long-term change in average climate conditions in a place or region, whether due to natural causes or as a result of human activities.[6] The use of the term "climate change" is becoming more prevalent because it encompasses all changes to the climate, not just temperature. Additionally, the term "climate change" conveys temporality, implying that climate change can be slowed with the efforts of local, regional, state, national, and world entities.

Changes in the earth's temperature will have impacts for residents and businesses in the City of Atascadero. Some of the major impacts to the Central Coast expected to occur include the following, separated by sector.[78]

- Coastline: The San Luis Obispo County coastline could face inundation as a result of sea level rise and global warming. As temperatures rise, the ocean waters rise as well due to thermal expansion and the melting of glaciers and snowpack. The state's 2009 Climate Change Impacts Assessment (the 2009 Scenarios Project) estimates that sea levels will rise by 12 to 18 inches by 2050 and 21 to 55 inches by 2100. This level of sea rise has the potential to negatively affect groundwater salination as well as the size and attractiveness of local beaches, which could affect property values and the tourism industry in the county;

- Reduced Water Supply: The 2009 Scenarios Project estimates a decrease in precipitation of 12 -35% by 2050. Higher temperatures are also expected to increase evaporation and make for a generally drier climate. In addition, more precipitation will fall as rain rather than snow, which will cause snow to melt earlier in the year and not in the warmer, drier months when water is in higher demand;

---

[5] Intergovernmental Panel on Climate Change. Fourth Assessment Report, Working Group I. 2007. Climate Change 2007: The Physical Science Basis, Summary for Policy Makers.

[6] California Natural Resources Agency. 2009 California Climate Adaptation Strategy Discussion Draft. August 2009.

[7] California Climate Change Center. Our Changing Climate: Assessing the Risks to California (2006), www.climatechange.ca.gov

[8] Governor's Office of Planning and Research (OPR). Proposed CEQA Guideline Amendments for Greenhouse Gas Emissions. April 2009.

- Agriculture: Climate change could cause a shift in the type and location of agriculture in the area. As saltwater intrudes into coastal aquifers and groundwater resources decrease, it is possible that some crops will be forced out of the area, which affects the local economy and food supply. Water supplies to agriculture may be 20 -23% below demand targets between 2020 and 2050;

- Public Health: Climate change could potentially threaten the health of residents of Atascadero. Heat waves are expected to have a major impact on public health, as will decreasing air quality and an increase in mosquito breeding and mosquito-borne diseases. There is also expected to be an increase in allergenic plant pollen and an increase in the frequency of wildfires. The elderly, young, and other vulnerable populations will need assistance as they will not have the resources to deal with the costs and adapt to the expected changes.

Although one city cannot resolve the issue of climate change, local governments can make a positive impact through cumulative local action. 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. The City can achieve multiple benefits including lower energy bills, improved air quality, economic development, reduced emissions, and better quality of life through:

- Energy efficiency in City facilities and vehicle fleet;

- Sustainable purchasing and waste reduction efforts;

- Land use and transportation planning; and

- Efficient management of water resources.

This Inventory serves as a baseline measurement for implementing and tracking the effectiveness of these efforts.

1.2 CLIMATE CHANGE – LEGISLATIVE BACKGROUND

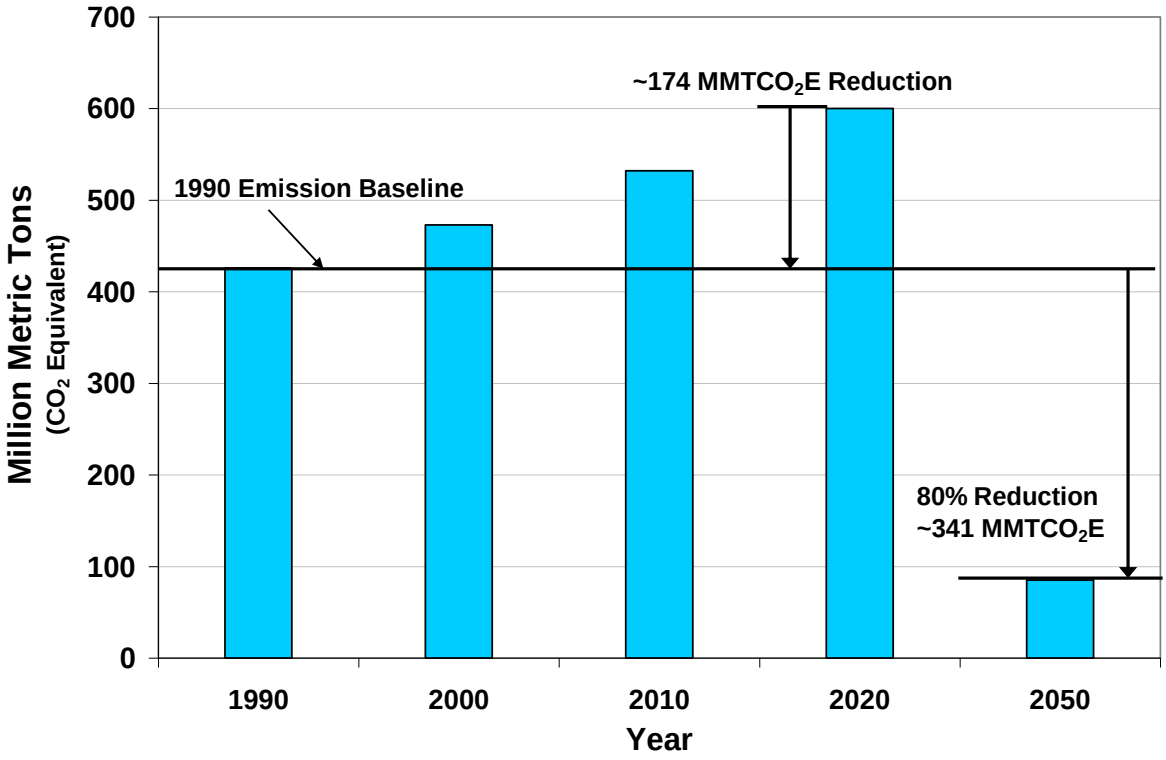
California continues to be a leader in addressing climate change in the United States and in the world. In June of 2005, Governor Schwarzenegger issued a landmark Executive Order establishing progressive greenhouse gas emissions targets for the entire state. Executive Order (EO) S-3-05 makes the following goals:

- By 2010, reduce greenhouse gas emissions to 2000 levels;

- By 2020, reduce greenhouse gas emissions to 1990 levels;
- By 2050, reduce greenhouse gas emissions to 80% below 1990 levels.

To support these reduction targets, the California legislature adopted the California Global Warming Solutions Act of 2006, also known as Assembly Bill (AB) 32. The law requires the California Air Resources Board (CARB) to develop regulatory and market mechanisms that will reduce greenhouse gas emissions to 1990 levels by 2020 as shown in **Figure 1-2** below. To achieve this goal, CARB developed a set of early action measures in 2007 for priority implementation in 2010. These early action measures became part of the AB 32 implementation plan, or Scoping Plan, approved in December 2008. The Scoping Plan identifies a variety of GHG reduction activities including direct regulations, monetary and non-monetary incentives, voluntary actions, market-based mechanisms such as a cap-and-trade, and an implementation fee regulation to fund the program. The Scoping Plan also identifies local governments as "essential partners" and calls for cities and counties to adopt GHG reduction targets consistent with AB 32.

FIGURE 1-2: CALIFORNIA CLIMATE CHANGE EMISSIONS AND TARGETS



In support of the AB 32 reduction targets, California adopted Senate Bill (SB) 97 in August 2007, which formally acknowledges that climate change is an important environmental issue that requires analysis under the California Environmental Quality Act (CEQA). In response to SB 97, the Governor's Office of Planning and Research (OPR) submitted their proposed amendments to the CEQA Guidelines for greenhouse gas emissions in April 2009. The amendments provide guidance to public agencies regarding the analysis of mitigation and the effects of GHG emissions in CEQA documents. The Natural Resources Agency certified and adopted the amendments in December 2009.[9]

Although EO S-3-05 and SB 97 have made California a national leader in climate change policy, there is much more to come. The California legislature passed numerous bills in recent years concerning energy use, land use, transportation, and other climate change topics. These bills will result in the guidance and funding necessary for local governments to move forward with climate action efforts.

At the same time, the State is working to form regional approaches to reducing greenhouse gas emissions in response to the passage of Senate Bill 375. SB 375 aims to reduce greenhouse gas emissions by linking transportation funding to land use planning. It also requires Metropolitan Planning Organizations, including the San Luis Obispo Council of Governments, to include a Sustainable Communities Strategy (SCS) in their Regional Transportation Plans (RTPs) for reducing suburban sprawl. The bill also creates incentives for implementation of sustainable communities strategies and sustainable transportation plans.

Additional efforts are under way to affect the overall transportation sector by mandating fewer emissions from vehicles, including Assembly Bill 1493, signed into law in 2002, which will require carmakers to reduce emissions from new passenger cars and light trucks beginning in 2009. US Environmental Protection Agency (EPA) approved the new emissions standards in June 2009.

The State is also preparing for climate change resiliency in order to adapt to the inevitable effects of climate change. In November 2008, Governor Schwarzenegger signed Executive Order S-13-08 which asked the Natural Resources Agency to identify how state agencies can respond to rising temperature, changing precipitation patterns, sea level rise, and extreme natural events. The order requires the Natural Resources Agency to develop a Climate Adaptation Strategy (CAS) to analyze climate change impacts to the state and recommend

[9] Governor's Office of Planning and Research (OPR). Proposed CEQA Guideline Amendments for Greenhouse Gas Emissions. April 2009.

strategies to manage those threats. The Natural Resources Agency released a discussion draft of the CAS in August 2009.

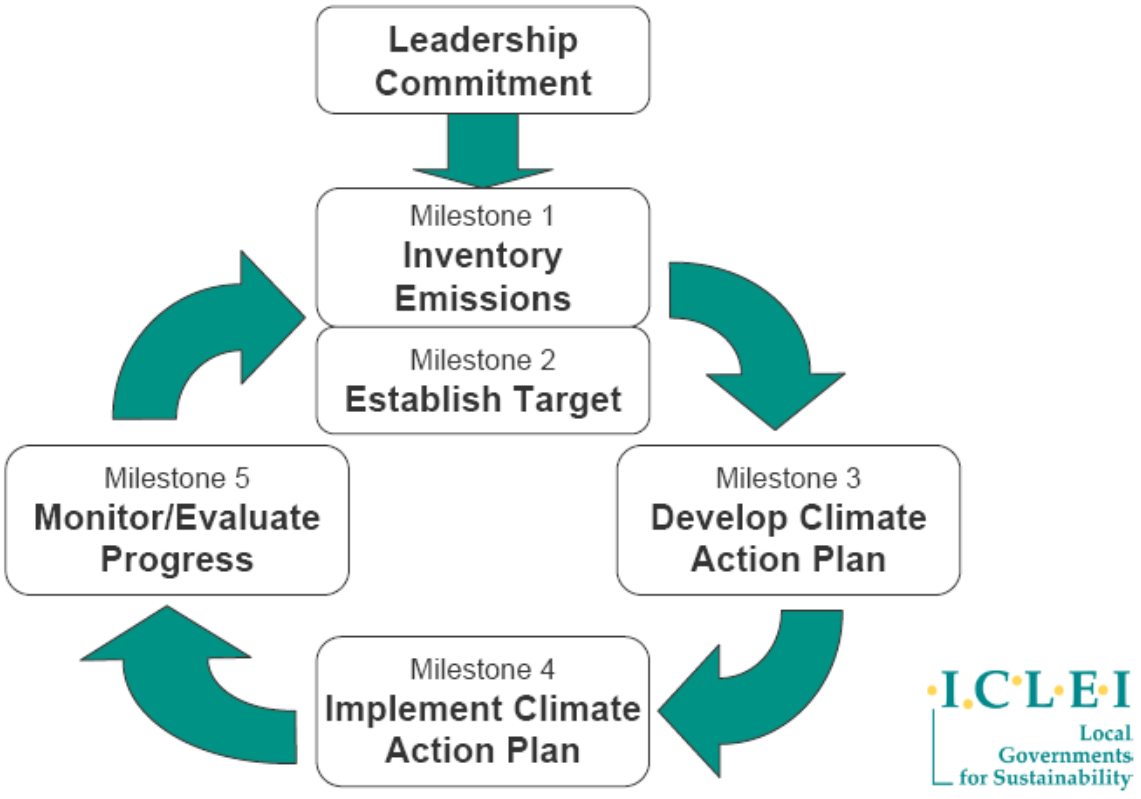
The scale and pace at which the State of California is addressing this issue necessitates that local governments accelerate efforts to combat climate change.

1.3 THE CITIES FOR CLIMATE PROTECTION CAMPAIGN

By adopting a resolution to join ICLEI – Local Governments for Sustainability, the City of Atascadero is now part of an international movement of local governments. More than 1,000 local governments, including over 500 in the United States, have joined ICLEI's Cities for Climate Protection (CCP) campaign.

The CCP campaign provides a framework for local communities to identify and reduce greenhouse gas emissions, organized along five milestones as represented in **Figure 1-3** below:

FIGURE 1-3: THE ICLEI FIVE-MILESTONE PROCESS



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

1.4 LOCAL SUSTAINABILITY AND CLIMATE CHANGE MITIGATION ACTIVITIES

Many of the air pollution programs already in place throughout San Luis Obispo County reduce ozone forming pollutants and toxic emissions, but they also have ancillary benefits and reduce greenhouse gas emissions. The County, cities, and the Air Pollution Control District (APCD) implement rules and regulations, clean fuels programs, CEQA mitigation measures, grants, the Transportation Choices Program, pollution prevention activities, energy efficiency and conservation measures, water conservation programs, partnerships, and general public outreach that directly or indirectly address climate change and reduce greenhouse gas emissions.

The APCD Board, approved the first report or plan to address climate change in the county. The plan, (Options for Addressing Climate Change in San Luis Obispo County (2005)) identifies the following seven actions that could be implemented to specifically address greenhouse gases (GHG) at the local level:

1) Prepare a countywide inventory of greenhouse gas emissions;

2) Target a percentage of mitigation grant funds for greenhouse gas emission reductions;

3) Evaluate and quantify the GHG reduction benefits from existing district programs;

4) Develop public education and outreach campaigns on climate change;

5) Encourage and provide support for local governments to join the Cities for Climate Protection program;

6) Develop partnership with Cal Poly for addressing climate change; and

7) Join the California Climate Registry and encourage local industry participation.

As of November 2008, the APCD has initiated, promoted, or supported all of the implementation actions to address climate change and reduction of greenhouse gas emissions in the county. The APCD joined the California Climate Registry and conducted its greenhouse gas emissions inventory in the fall of 2008. The APCD facilitates regular meetings of Climate Change Stakeholders, a local group of city and county representatives that shares resources to address climate change. To encourage and support local greenhouse gas emissions inventories, the

APCD is providing technical assistance to all of the incorporated cities to assist or perform GHG government operations and community-wide emissions inventories, similar to this Inventory, for all of the incorporated cities in San Luis Obispo County.

The APCD also coordinates the Central Coast Clean Cities Coalition (C5). C5 is a partnership of public/private entities whose goal is to promote the use of alternative fuels vehicles (AFV) on the Central Coast. By working with area fleet operators, C5 sponsors training seminars, public events, and grant funding workshops related to use of alternative fuels.

The City of Atascadero has been pursuing energy efficiencies through such measures as:

- Construction of new and improvement of existing bike lanes and sidewalks through the Safe Routes to School Program to encourage walking and biking to schools (ongoing);
- The construction of bicycle lanes, sidewalks, and multi-use trails throughout the City
- Adoption of Native Tree Ordinance (1998);
- Native tree reforestation projects at various sites throughout the City;
- Partnership with SLO Green Build to promote energy efficiency in new development;
- Joined PG&E's Climate Smart Program to purchase carbon credits to offset emissions from City Hall;
- Replacement of high pressure sodium light bulbs with energy efficient light emitting diodes (LED) bulbs in street and traffic lights;
- Development of a solar financing district through AB 811 to encourage the installation of solar panels and reduce dependence on traditional energy sources (ongoing); and
- Development of a Water Conservation Landscape Ordinance (2009).

2. Community and Government Operations Inventory Methodology

The first step toward reducing greenhouse gas emissions is to identify baseline levels and sources of emissions in the city. This information can later inform the selection of a reduction target and possible reduction measures to be included in a climate action plan.

This section outlines the methodology used to calculate the community and City government operations[10] inventories, including the difference between the two inventories, and the data collection process, data sources, GHG emission scopes, data limitations, and means of calculation.

2.1 BASELINE AND FORECAST YEARS

The year 2005 was selected as the baseline year for the Inventory due to the availability of reliable data and consistency with other cities in San Luis Obispo County. The State of California uses 1990 as a reference year to remain consistent with the Kyoto Protocol, and also because it has well-kept records of transportation trends and energy consumption in that year. However, cities and counties throughout California typically elect to use 2005 or 2006 as a baseline year because of the more reliable recordkeeping from those years and because of the large amount of growth that has occurred since 1990.

This Inventory uses a forecast year of 2020 to be consistent with the State of California GHG Inventory[11] forecast year and AB 32 target, both of which reference 2020. In addition, it is likely that any forecast beyond 2020 would have a significant margin of error because of unknown population growth rates and new technology. The business-as-usual forecast has also been extended to 2025 in consideration of the City's General Plan Horizon.

2.2 THE TWO INVENTORIES: COMMUNITY-WIDE AND CITY GOVERNMENT OPERATIONS

This Inventory is separated into two sections, community-wide and City government operations. Per ICLEI protocol, the City has completed an assessment of activities throughout the community and a more detailed analysis of City government operations including streetlights,

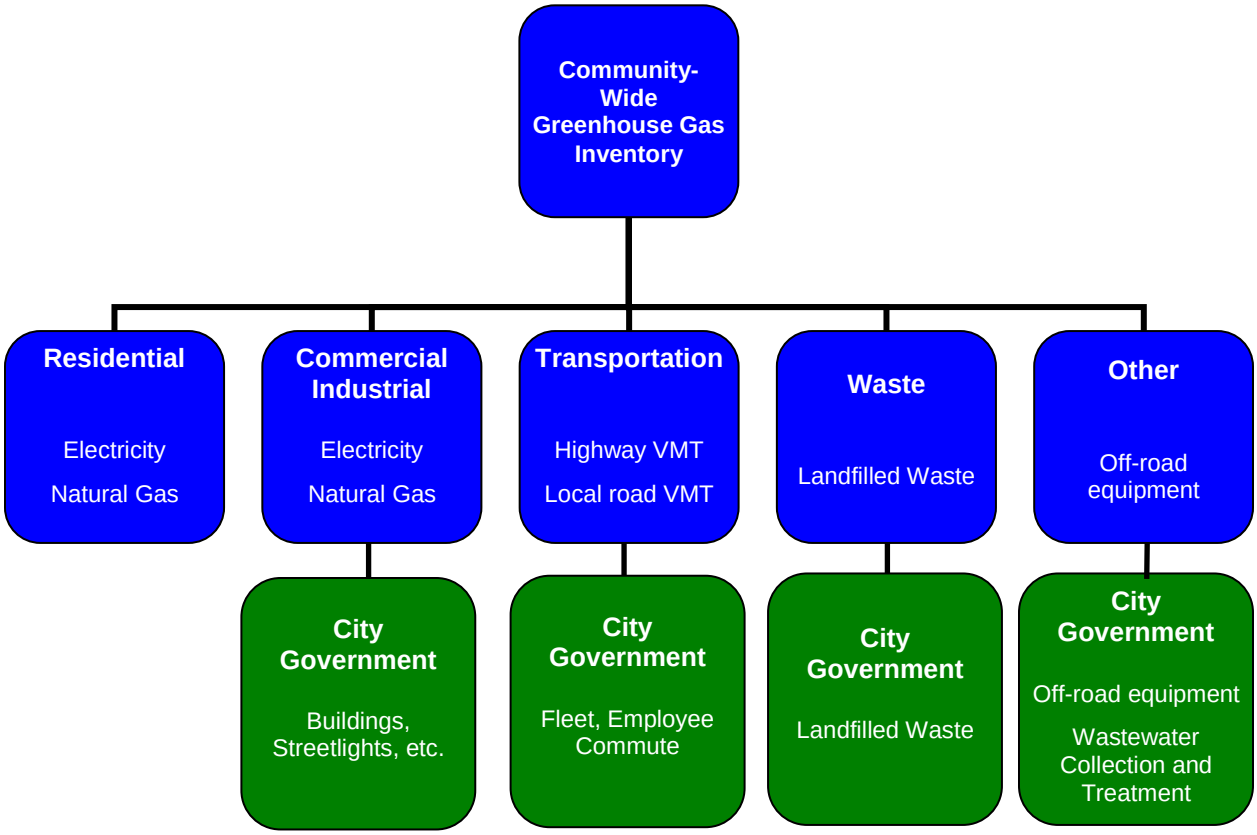
[10] In this report, the term "city" refers to the incorporated area (the jurisdictional boundary of the City of Atascadero), whereas "City" refers to those activities that are under the operational control of City agencies. "Community-wide" or "community" refers to all activities within the city (as defined above), including those from businesses, industrial processes, residents, vehicles, and City government operations.

[11] California Greenhouse Gas Inventory, http://www.arb.ca.gov/cc/inventory/inventory.htm

building energy use, fleet vehicles, and more. The City government operations inventory was conducted consistent with the Local Government Operations Protocol developed by the California Air Resources Board (CARB), ICLEI, The Climate Registry, and the California Climate Action Registry (CCAR).

It is important to note that the City government operations inventory is a subset of the community inventory, meaning that all City government operations are included in the commercial/industrial, transportation, waste, or "other" categories of the community-wide inventory. The City's government operations inventory should not be added to the community analysis; rather it should be looked at as a slice of the complete picture as illustrated in **Figure 2-1**. Although City operations are a small contributor to the community's overall emissions levels, an inventory allows the City to track its individual facilities and vehicles and to evaluate the effectiveness of its emissions reduction efforts at a more detailed level.

FIGURE 2-1: THE RELATIONSHIP BETWEEN COMMUNITY-WIDE AND CITY GOVERNMENT INVENTORIES



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.

2.3 DATA COLLECTION AND METHODOLOGY

Creating the community and City government operations emissions inventories required the collection of information from a variety of sources. Sources for community data included the Pacific Gas and Electric Company (PG&E), the Southern California Gas Company, Caltrans, the California Air Resources Board the California Integrated Waste Management Board, and the County of San Luis Obispo. City government operations data sources included PG&E, the Southern California Gas Company, Atascadero Waste Alternatives, and documentation from multiple City departments including Planning, Public Works, Finance, Police, Fire, and more. Data from the year 2005 were used in both inventories, with the following exceptions:

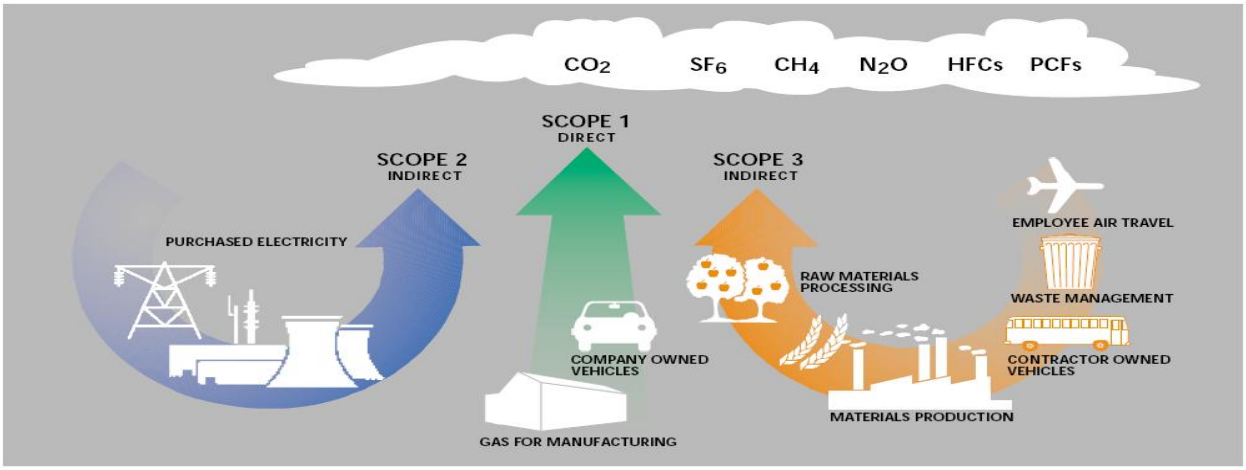
- A subset of waste data by type was not available for 2005, therefore this study utilizes a California statewide waste characterization study conducted in 2003-2004;
- City employee commuting trips were calculated using an employee survey conducted in 2009; and
- Propane, wind and solar power used in both the community-wide and City government inventories.

For community activities and City operations, emissions sources are categorized by scope. Scopes help us identify where emissions originate from and what entity retains regulatory control and the ability to implement efficiency measures. The scopes are illustrated in **Figure 2-2** and defined as follows:

- **Scope 1.** Direct emissions sources located within the community, mostly from the combustion of fuels. Examples of Scope 1 sources include use of fuels such as gasoline and natural gas.
- **Scope 2.** Indirect emissions that result because of activities within the community, limited to electricity, district heating, steam and cooling consumption. An example of a Scope 2 source is purchased electricity used within the community. These emissions should be included in the community-wide analysis, as they are the result of the community's electricity consumption.

- **Scope 3.** All other indirect emissions that occur as a result of activity within the community. Examples of Scope 3 emissions include methane emissions from solid waste generated within the community which decomposes at landfills either inside or outside of the community.

FIGURE 2-2: GHG EMISSIONS SCOPES



Source: NZBCSD (2002), The Challenge of GHG Emissions: the "why" and "how" of accounting and reporting for GHG emissions: An Industry Guide, New Zealand Business Council for Sustainable Development, Auckland.

Appendices A and **B** of this report separate the community and City government operations emissions by scope. Each sector is labeled with a 1, 2, or 3 that corresponds to the scopes above.

2.4 DATA SOURCES

The data used to complete this Inventory came from multiple sources, as summarized in **Tables 2-1** and **2-2**. Utility providers supplied electricity and natural gas consumption data associated with commercial, industrial, residential, and City government buildings in 2005. Vehicle miles traveled (VMT) information was obtained from the 2005 Highway Performance Maintenance System (HPMS) developed by Caltrans and refined with County Geographic Information System (GIS) data. These data sources are further explained in the sector-specific discussions of this document.

TABLE 2-1: DATA SOURCES FOR COMMUNITY ANALYSIS, 2005

Sector	Information	Unit of Measurement	Data Source
Residential	Electricity consumption	kWh	PG&E
	Natural gas consumption	Therms	Southern California Gas
Commercial/Industrial	Electricity consumption	kWh	PG&E
	Natural gas consumption	Therms	Southern California Gas
Transportation	Local road VMT for unincorporated areas	Annual average VMT	Cal Trans HPMS data
	Highway and interstate VMT for SLO County	Annual average VMT	Cal Trans HPMS data
	Portion of highways and interstates within City of Atascadero	Highway miles	County GIS shape files
Solid Waste	Solid waste tonnage sent to landfill from activities in City of Atascadero	Short tons	San Luis Obispo Integrated Waste Management Board
Other - Off-Road Agricultural Equipment	Emissions from off-road agricultural equipment	Tons/year of N_2O, CO_2, and CH_4	California Air Resources Board OFFROAD2007 model
	Portion of agricultural land within the City of Atascadero	Square feet	County GIS shape files

TABLE 2-2: DATA SOURCES FOR CITY GOVERNMENT OPERATIONS ANALYSIS, 2005

Sector	Information	Unit of Measurement	Data Source
Buildings & Facilities	Electricity consumption	kWh	PG&E Data Records
	Natural gas consumption	Therms	Southern California Gas Company Data Records
Vehicle Fleet	Diesel consumption and corresponding vehicle type	Gallons	Billing Records
	Gasoline consumption and corresponding vehicle type	Gallons	Billing Records
Employee Commute	Sample of employee commuting patterns	Annual VMT	Commuter Survey (June 2009)
Streetlights	Electricity consumption	kWh	PG&E Data Records
Water/Sewage	Electricity consumption	kWh	PG&E Data Records
	Methane and nitrous oxide released in the wastewater treatment process	Tonnes	Public Works Department Data Records
Waste	Annual waste tonnage sent to landfill	Short Tons	Atascadero Waste Alternatives

2.5 DATA LIMITATIONS

It is important to note that calculating community-wide greenhouse gas emissions with precision is a complicated task. The ICLEI Clean Air and Climate Protection (CACP2009) software relies on numerous assumptions and is limited by the quantity and quality of available data. Because of these limitations it is useful to think of any specific number generated by the model as an approximation of reality, rather than an exact value. The city's actual 2005 greenhouse gas emissions are likely to be *slightly* greater than what are reported in this document due to three main factors: (1) data limitations, (2) privacy laws, and (3) a lack of a reasonable methodology to collect or model emissions data. The following paragraphs highlight emissions that cannot be included in a GHG Inventory under current science and policy direction, or due to lack of reliable data.

Data Limitations

Lack of available data prevented the calculation of emissions from community-wide freight and passenger trains, off-road vehicles and equipment, propane use, and City government operations refrigerants. For rail, port, and other off-road vehicles, as well as equipment emissions, the California Air Resources Board OFFROAD 2007 software provides emissions from rail activities; however, these numbers are aggregated for the entire San Luis Obispo County area, including incorporated, unincorporated, and state or federally owned land.

Lack of data availability also prevents the calculation of emissions from propane (liquefied petroleum gas, or LPG) created within the city's boundaries. Propane is basically an unregulated fuel in California (except for storage and safety issues which are regulated). Because it is an unregulated commodity, no data is collected by the state on propane sales or usage. Another sector that was excluded from the inventory is City government operations refrigerants.

The City of Atascadero made a best effort to gather data on the amount of refrigerants consumed by fleet vehicles, HVAC systems, and City government operations facilities; however City records were not suited to this purpose. It is recommended that the City look into amending its record keeping so that the amount of refrigerants purchased and consumed within a year is recorded.

Privacy Laws

This Inventory does not separately analyze site-level emissions from specific sources such as refineries or large industrial emitters. The emissions from industrial energy consumption and related transportation are included under the commercial/industrial category, but will not be analyzed independently as part of this Inventory for two reasons:

1) State privacy laws prevent us from obtaining site-level energy consumption data from utility providers. Notably the California Public Utilities Commission 15/15 rule,[12] prevents us from analyzing industrial emissions separately from commercial emissions.

2) It is the responsibility of the emitter, whether it is a large refinery or household, to perform their own energy audit and subsequent reduction process. Efforts to require site-level energy audits and greenhouse gas emissions reporting are being continually

[12] Commercial and Industrial Electricity and Natural Gas were combined into one section due to the California 15/15 rule. The 15/15 rule was adopted by the California Public Utilities Commission in the Direct Access Proceeding (CPUC Decision 97-10-031) to protect customer confidentiality.

expanded and required by the California Climate Action Registry, U.S. Environmental Protection Agency, and California Air Resources Board.

Lack of a Reasonable Methodology

There is a lack of reasonable methodology for estimating life cycle emissions for the community and, therefore, emissions associated with the production and disposal of items consumed by a community are not included in the Inventory. For instance, a life cycle assessment would estimate the emissions associated with the planning, production, delivery, and disposal of each car currently in the city. In contrast, this analysis only captures how much that car drives within the city.

Despite these limitations, the Clean Air and Climate Protection (CACP) software 2009[13] and ICLEI methodology provide the best-available snapshot of the city's greenhouse gas emissions. Additionally, the CACP2009 tool is utilized to promote consistency among municipalities throughout the country and the world. Sector-specific data limitations or methodological issues are explained thoroughly in **Appendices C** and **D.**

However, it is important to note that the emissions identified in this report are primarily greenhouse gases that the community has directly caused and has the ability to reduce through implementation of conservation actions, a Climate Action Plan, or corresponding efforts.

What are Scopes?

The key principles to remember are that Scope 1 emissions are caused by activities within the city and emitted within the city (fuel combustion), while Scope 2 emissions are caused by activities within the city, but most likely are emitted outside of the city (electricity). Scope 3 emissions are indirect emissions, such as waste decomposition.

2.6 CLEAN AIR AND CLIMATE PROTECTION SOFTWARE 2009

The City government operations and community-wide inventories use the Clean Air and Climate Protection 2009 (CACP2009) software package developed by ICLEI in partnership with the National Association of Clean Air Agencies (NACAA) and Torrie Smith Associates. This software calculates emissions resulting from energy consumption, vehicle miles traveled, and waste generation. The CACP2009 software calculates emissions using specific factors (or coefficients) according to the type of fuel used.

[13] The Clean Air and Climate Protection (CACP2009) software 2009 was developed by the State and Territorial Air Pollution Program Administrators and the Association of Local Air Pollution Control Officials (SAPPA/ALAPCO), the International Council for Local Environmental Issues (ICLEI), and Torrie Smith Associates.

CACP2009 aggregates and reports the three main greenhouse gas emissions (CO_2, CH_4, and N_2O) and converts them to equivalent carbon dioxide units, or CO_2e. Equalizing the three main greenhouse gas emissions as CO_2e allows for the consideration of different greenhouse gases in comparable terms. For example, methane (CH_4) is 21 times more powerful than carbon dioxide on a per weight basis in its capacity to trap heat, so the CACP2009 software converts one metric ton of methane emissions to 21 metric tons of carbon dioxide equivalents.[14]

The emissions coefficients and quantification method employed by the CACP2009 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).

[14] 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.

3. Community GHG Inventory Results

The City of Atascadero contains primarily residential and commercial land uses. In the 2005 baseline year, there were approximately 27,596 people, 8,550 jobs, and 10,009 households in the city.[15] The following section provides an overview of the emissions caused by activities within the jurisdictional boundary of the city and analyzes the emissions in terms of scope, sector, source, and population.

3.1 COMMUNITY-WIDE EMISSIONS BY SCOPE

Although there are countless items that can be included in a community-wide emissions inventory, as discussed in Chapter 2, this Inventory includes Scope 1, Scope 2, and Scope 3 sources from the following sectors, consistent with the ICLEI protocol:

- Residential
- Commercial / Industrial
- Transportation
- Waste
- Other – Off-Road Agricultural Equipment Emissions.

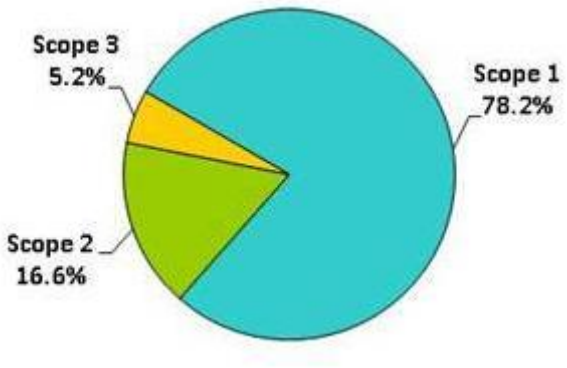
Table 3-1 summarizes the scopes of each sector in this analysis.

TABLE 3-1: GHG EMISSIONS SOURCES INCLUDED IN 2005 COMMUNITY INVENTORY BY SCOPE AND SECTOR

Sector	Scope 1	Scope 2	Scope 3
Residential	Natural Gas	Electricity	---
Commercial/Industrial	Natural Gas	Electricity	---
Transportation	Gasoline & Diesel	---	---
Waste	---	---	Methane from Decomposition
Other	Off-Road Agricultural Equipment	---	---

[15] Population and job data calculated from the ERA Report prepared for the San Luis Obispo Council of Governments, July 2006 revision. Household data calculated through US census data.

FIGURE 3-1: 2005 COMMUNITY GHG EMISSIONS BY SCOPE



Including all sectors and scopes, the community emitted approximately 176,234 metric tons of CO_2e in 2005. As shown in **Figure 3-1** and **Table 3-2,** the majority of community GHG emissions were Scope 1 (78.2%), with Scope 2 (16.6%) and Scope 3 (5.2%) constituting the remainder.

The largest portion of Scope 1 emissions came from the transportation sector (refer to **Table 3-2** and **Figure 3-1**). These emissions qualify as Scope 1 because they involve the direct combustion of fuel within the jurisdictional boundary of the city. The second largest source of Scope 1 emissions was residential natural gas use. Residential uses also generated the largest percentage of Scope 2 emissions. Emissions from waste operations account for the majority of Scope 3 emissions, with inventoried off-road emissions contributing a minor portion.

TABLE 3-2: COMMUNITY GHG EMISSIONS PER SECTOR PER SCOPE (METRIC TONS OF CO_2E)

Sector	Scope 1	Scope 2	Scope 3	Total
Residential	22,911	15,892	---	38,803
Commercial/Industrial	6,603	13,374	---	19,977
Transportation	108,223	---	---	108,223
Waste	---	---	9,083	9,083
Other[16]	---	---	148	148
TOTAL	137,737	29,266	9,231	176,234
Percentage of Total CO_2e	78.2%	16.6%	5.2%	100.0%

[16] The "other" category includes emissions from off-road agricultural equipment. These sources are categorized as 'other' to correspond with the ICLEI CACP2009 software.

3.2 ALL SCOPE EMISSIONS BY SECTOR

As noted above, the community emitted approximately 176,234 metric tons of CO_2e in calendar year 2005. In addition to analyzing the data by scope, it can also be aggregated by sector. As depicted in **Figure 3-2** and **Table 3-3** below, the transportation sector was the largest emitter (61.4%) in 2005. Emissions from the residential sector were the next largest contributor (22%), while the commercial and industrial sectors accounted for a combined 11.3% of the total. Emissions from solid waste comprised 5.2% of the total, and emissions from other sources such as agricultural equipment comprised 0.1% of the total. The majority of emissions from the transportation sector were the result of gasoline consumption in private vehicles traveling on local roads, US 101, and state highways. GHG emissions from the waste sector are the estimated future emissions that will result from the decomposition of waste generated by city residents and businesses in the base year 2005, with a weighted average methane capture factor of 60%.

What is 134,584 Metric Tons of CO2e equivalent to?

176,234 Metric Tons of CO2e is equivalent to the air volume of about 36,110 hot air balloons under standard conditions of pressure and temperature. The same amount of emissions is also equivalent to one year of electricity use in 34,013 California residences!

Source: California Air Resources Board, "Conversion of 1 MMT CO2 to Familiar Equivalents," Oct.2007.

FIGURE 3-2: 2005 COMMUNITY GHG EMISSIONS BY SECTOR

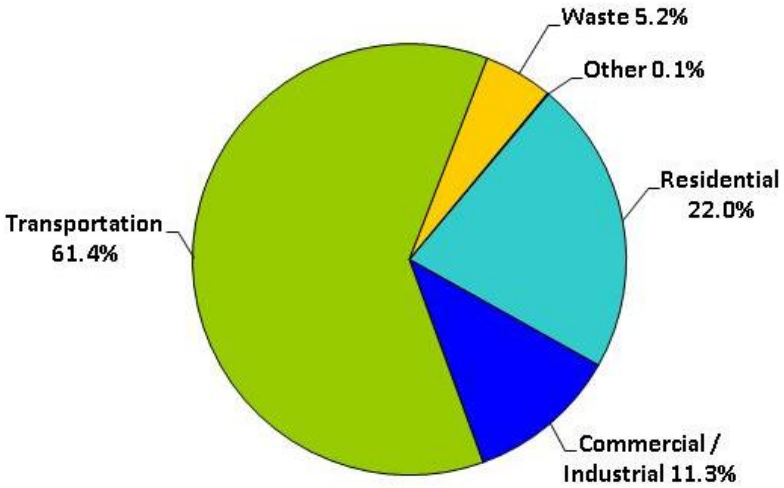


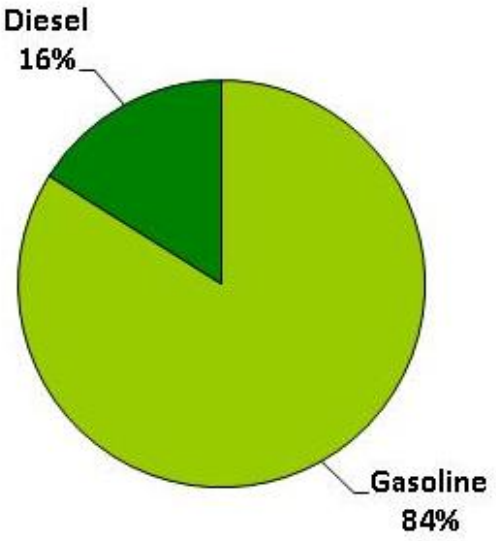
TABLE 3-3: COMMUNITY GHG EMISSIONS BY SECTOR (METRIC TONS OF CO_2E)

2005 Community Emissions by Sector	Residential	Commercial/ Industrial	Trans-portation	Waste	Other[17]	TOTAL
CO_2e (metric tons)	38,803	19,977	108,223	9,083	148	176,234
Percentage of Total CO_2e	22.0%	11.3%	61.4%	5.2%	0.1%	100.0%
Energy Use (MMBtu)	670,824	327,542	1,540,285	n/a	n/a	2,538,651

3.3 TRANSPORTATION

As with the majority of California municipalities,[18] travel by on-road motorized vehicle constitutes the greatest percentage of greenhouse gas emissions in the city (61.4%). The Inventory does not include trains or off-road recreational vehicles as there is no feasible methodology for calculating emissions from these sources. The majority of the emissions in the transportation sector came from travel on local roads (56.4%) in the city (**Table 3-4**). Approximately 43.6% of the greenhouse gas emissions in the transportation sector resulted from highway travel. Of the total emissions in the transportation sector, an estimated 83.9% was due to gasoline consumption, with the remaining 16.1% coming from diesel use (see **Figure 3-3** and **Table 3-5**).

FIGURE 3-3: COMMUNITY GHG EMISSIONS BY FUEL SOURCE



[17] The "other" category includes emissions from off-road agricultural equipment. This source is categorized as 'other' to correspond with the ICLEI CACP2009 software.

[18] For a list of California cities and counties that have developed GHG Inventories, refer to the California Office of Planning and Research's website (http://www.opr.ca.gov).

TABLE 3-4: TRANSPORTATION GHG EMISSIONS BY ROAD TYPE

Transportation Road Type Emissions Sources 2005	Local Roads	State Highways	TOTAL
CO_2e (metric tons)	61,079	47,144	108,223
Percentage of Total CO_2e	56.4%	43.6%	100%
Energy Use (MMBtu)	869,026	671,259	1,540,285

TABLE 3-5: TRANSPORTATION GHG EMISSIONS BY FUEL SOURCE

Transportation Fuel Emissions Sources 2005	Gasoline	Diesel	TOTAL
CO_2e (metric tons)	90,809	17,414	108,223
Percentage of Total CO_2e	83.9%	16.1%	100%
Energy Use (MMBtu)	1,302,375	237,910	1,540,285

These emissions result from the gasoline and diesel consumption of vehicles traveling within the city, including those that are just passing through. As a result, it is likely that the City does not have jurisdictional control to reduce the transportation emissions from the majority of this sector. However ICLEI and State protocol require that these emissions be included in a local inventory in order to capture all emissions within the area and calculate their effect on the local community. The Inventories for all San Luis Obispo cities and the county use this methodology for consistency and to avoid double-counting of transportation emissions.

This analysis of highway transportation emissions assumes constant levels of travel along all highways in the county. The Caltrans data includes aggregated vehicle miles traveled (VMT) along highways for the whole county, including incorporated and unincorporated areas. This data was allocated to municipal jurisdictions using the proportion of highway miles in the city and other incorporated and unincorporated areas; traffic counts were not used to measure actual traffic levels at specific locations. This could mean that the community-wide transportation emissions are slightly inflated or understated; however, there is currently no feasible methodology to calculate emissions for individual jurisdictions with traffic data levels. Further discussion of the transportation sector methodology is included in **Appendix C**.

Emissions that resulted from the air and rail travel of city residents were not included in the transportation sector analysis. As science and data collection methodology develop it is likely

that the greenhouse gas emissions from air, rail and boat travel could be estimated as a Scope 3 items. Please see **Appendix C** for more detail on methods and emissions factors used in calculating emissions from the transportation sector.

3.4 THE BUILT ENVIRONMENT (RESIDENTIAL, COMMERCIAL, INDUSTRIAL)

With all scopes aggregated, 33.3% of total community-wide emissions in the year 2005 came from the "built environment." The built environment is comprised of the residential, commercial, and industrial natural gas and electricity consumption. This analysis does not include emissions from other types of energy such as propane, solar, and wind due to lack of reliable sales, construction, or consumption data. The commercial and industrial sectors are combined in this Inventory due to the mandatory aggregating of commercial and industrial data by PG&E previously referenced.

In 2005, emissions from the built environment were split roughly 66-34% between the residential sector and the commercial/industrial sector (see **Figure 3-4**). All of the emissions calculated from the built environment were the result of local natural gas consumption (Scope 1) and local consumption of electricity generated outside of the city (Scope 2). Overall, electricity consumption and natural gas consumption were split evenly (50-50%) as the cause of emissions from the built environment in 2005 as shown in **Figure 3-5**.

FIGURE 3-4: BUILT ENVIRONMENT GHG EMISSIONS BY SECTOR

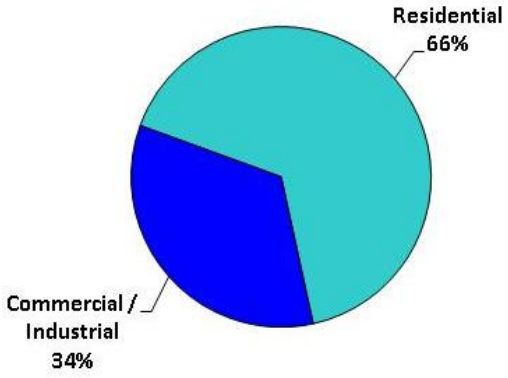
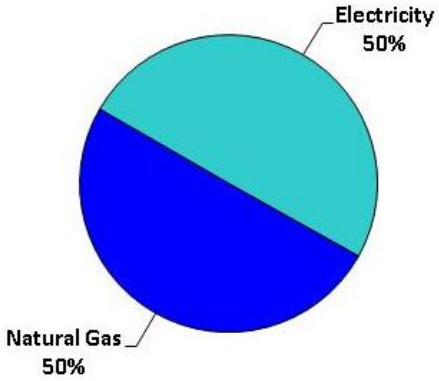


FIGURE 3-5: BUILT ENVIRONMENT GHG EMISSIONS BY SOURCE



Approximately 59% of emissions in the residential sector resulted from combustion of natural gas for heating and cooking (see **Figure 3-6** and **Table 3-6**), while over 33% of emissions in the commercial/industrial sector came from natural gas usage (see **Figure 3-7** and **Table 3-7**).

FIGURE 3-6: RESIDENTIAL GHG EMISSIONS BY SOURCE

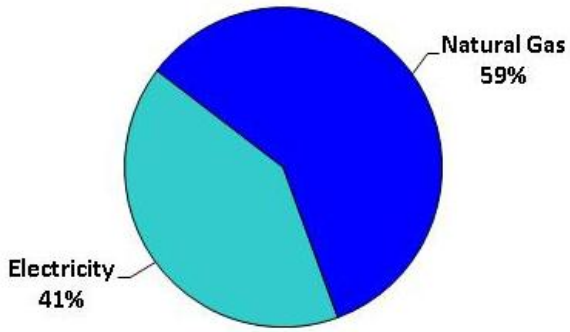
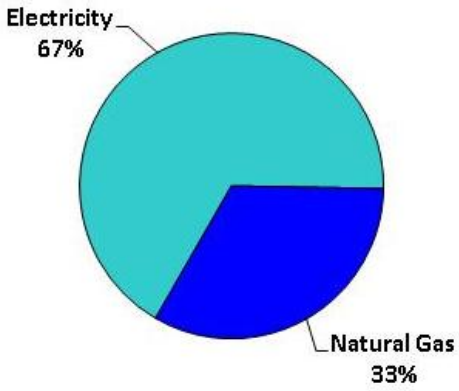


FIGURE 3-7: COMMERCIAL/ INDUSTRIAL GHG EMISSIONS BY SOURCE



It is useful to consider the causes behind significant variations in data when developing policies and programs to reduce emissions from each sector. For example, the policies that would aim to reduce emissions from the commercial/industrial sector may differ from those aiming to reduce emissions from the residential sector based upon the information above (and in the figures and tables below).

TABLE 3-6: RESIDENTIAL GHG EMISSIONS BY SOURCE

Residential Emission Sources 2005	Electricity	Natural Gas	TOTAL
CO2e (metric tons)	15,892	22,911	38,803
Percentage of Total CO2e	41.0%	59.0%	100%
Energy Use (MMBtu)	231,309	435,123	666,432

TABLE 3-7: COMMERCIAL/INDUSTRIAL GHG EMISSIONS SOURCES

Commercial / Industrial Emission Sources 2005	Electricity	Natural Gas	TOTAL
CO2e (metric tons)	13,374	6,603	19,977
Percentage of Total CO2e	66.9%	33.1%	100%
Energy Use (MMBtu)	295,700	240,473	536,173

3.5 WASTE

Solid waste disposed of at managed landfills was responsible for 5.2% of total emissions for the community. The CACP2009 software calculates methane generation from waste sent to landfill in 2005, and accounts for the reported methane recovery factors among the two utilized landfills (Cold Canyon and Chicago Grade), which have a 60% weighted average. The Chicago Grade Landfill accepted approximately 99% of the community's solid waste, while less than 1% went to Cold Canyon. The methane recovery factors of the landfills are well documented by the San Luis Obispo Air Pollution Control District based on the system operations at that time. For more information, please see detailed methodology in **Appendix C**.

Waste emissions are considered Scope 3 emissions because they are not generated in the base year, but will result from the decomposition of waste generated in 2005 over the full 100-year+ cycle of its decomposition. In 2005, the community sent approximately 31,122.52 tons of waste to landfill. The 2004 California Statewide Waste Characterization Study provides standard waste composition for the State of California. Identifying the different types of waste in the general mix is necessary because during decomposition various materials generate methane within the anaerobic environment of landfills at differing rates. Carbonaceous materials such as paper and wood would actually sequester the methane released in managed landfills, thereby offsetting some or all of the emissions from food and plant waste. However, GHG sequestration at the landfills has been set to zero, based on guidance in the Local Government Operations Protocol, which recommends eliminating the effect of landfill sequestration for both government operations inventories and community inventories, to be consistent with the principle that local government operations and community inventories should not account for emissions sinks. **Figure 3-8** and **Table 3-8** show the estimated percentage of emissions coming from the various types of organic, methanogenic waste.

FIGURE 3-8: WASTE GHG EMISSIONS BY TYPE

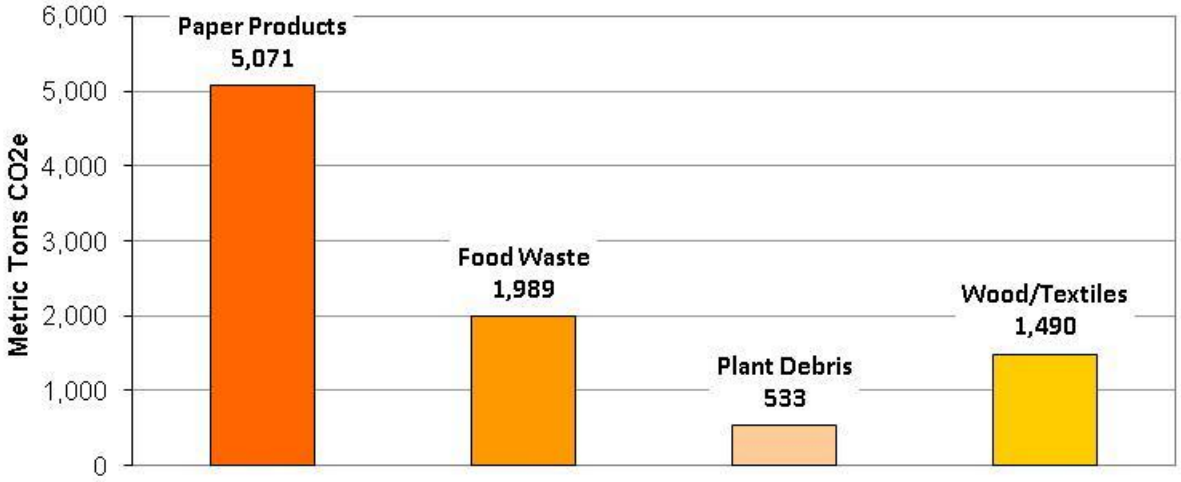


TABLE 3-8: WASTE GHG EMISSIONS BY WASTE TYPE

Waste Emissions Sources 2005	Paper Products	Food Waste	Plant Debris	Wood / Textiles	TOTAL
CO_2e (metric tons)	5,071	1,989	533	1,490	9,083
Percentage of Total CO_2e	55.8%	21.9%	5.9%	16.4%	100%
Energy Use (MMBtu)	n/a	n/a	n/a	n/a	n/a

3.6 OTHER – OFF-ROAD AGRICULTURAL EQUIPMENT

Off-road agricultural equipment including tractors, mowers, balers, combines, tillers, and other equipment produced approximately 0.1% of emissions in 2005, or 148 metric tons CO_2e. This calculation was performed using the California Air Resources Board OFFROAD2007 model and inputted into the 'other' category in CACP2009. The OFFROAD model generates emission inventories by equipment type, accounting for age within a given year (2005).

The OFFROAD software has the ability to calculate emissions from other types of off-road vehicles such as recreational vehicles, motor boats, and more. However, since data is aggregated by county, this information is only usable if it can be divided by jurisdiction within the county in a reasonable manner. As a reminder, this emissions inventory is a snapshot of emissions caused by activities within the city in the year 2005. Therefore, absent a methodology

for estimating the portion of off-road vehicles driven or used within various jurisdictions, OFFROAD data cannot be allocated to different jurisdictions. As current practice and methodology stands, population data is not an acceptable measure of emissions per jurisdiction.

To complete the analysis of impacts associated with agriculture activities, the Inventory allocated total agricultural emissions by the percentage of agricultural and open space land contained in each jurisdiction. For consistency, county agriculture and crop GIS data from 2007 was utilized to determine acreage within each jurisdiction. The city held a very minor part of agricultural land (0.23%) and therefore only a small portion associated off-road agricultural equipment emissions.

Off-Road Emissions in San Luis Obispo County

According to a report by the Center for Biological Diversity (2008), off-road vehicle use in California releases as much GHG as burning 500,000 barrels of oil each year, which is equivalent to more than 1.5 million car trips from San Francisco to Los Angeles. Despite this fact, there is no current methodology to calculate GHGs from off-road vehicles at the local level. The California Air Resources Board OFFROAD2007 model produces countywide figures for San Luis Obispo County which cannot be separated by jurisdiction. This is for two main reasons: 1) Many off-road vehicles, such as motor boats and recreational vehicles, are operated outside of County jurisdiction in State-owned parks or waters, and 2) There are wide degrees of variability in off-road vehicle use and fuel consumption. For instance, if we allocated the emissions from off-road agricultural equipment by population and not by portion of agricultural land, cities that have minimal agricultural lands, would receive an equal portion of agricultural emissions per person as the county, which has 98% of agricultural land in the county. This approach would misrepresent emissions.

3.7 COMMUNITY EMISSIONS BY SOURCE

In addition to viewing emissions by sector and by scope, policy and programs development can benefit from an analysis of emissions according to their raw fuel or waste source. **Figure 3-9** and **Table 3-9** below demonstrates that more than half (51.5%) of all community emissions come from the consumption of gasoline on local roads and highways. Natural gas (16.7%) and electricity (16.6%) consumption from the built environment are the next most significant figures, with the remainder coming from diesel, off-road equipment and various waste products. Methane released from the City's wastewater treatment plant is not included in this figure because the wastewater treatment plant is considered a point source emitter. Point source emitters are not captured at the community-wide scale in greenhouse gas emissions inventories.

FIGURE 3-9: COMMUNITY GHG EMISSIONS BY SOURCE

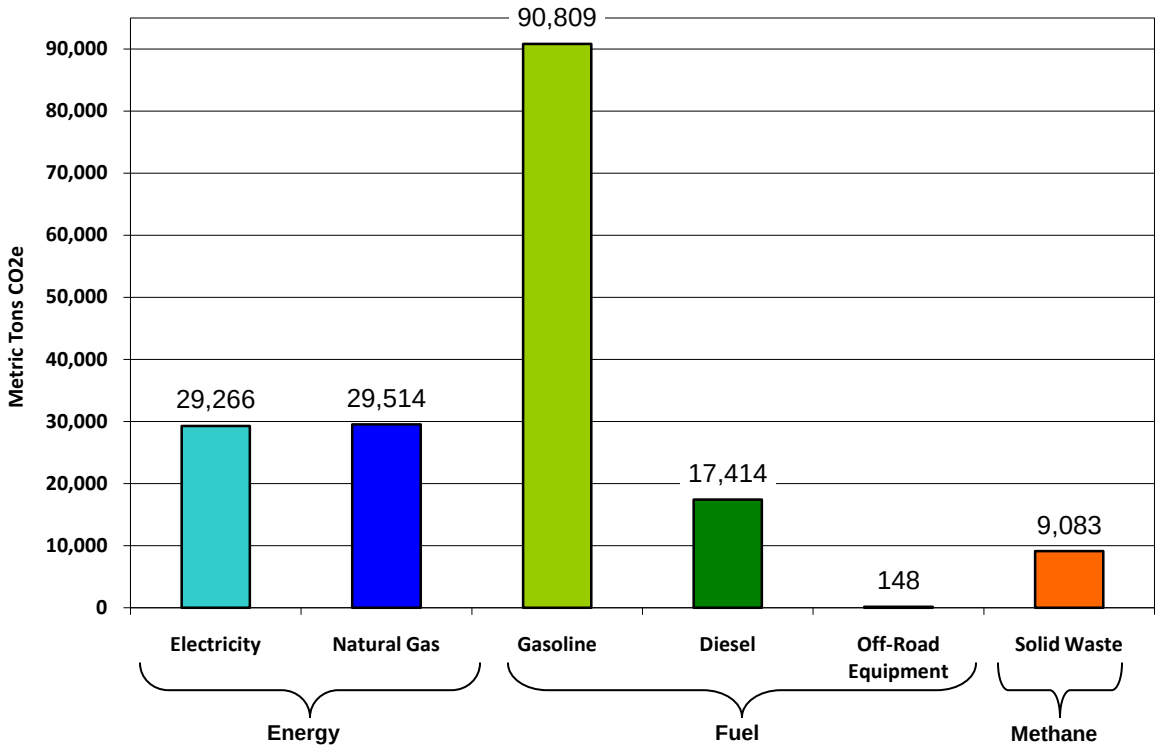


TABLE 3-9: COMMUNITY GHG EMISSIONS BY SOURCE

Community GHG Emissions 2005 by Source	CO_2e (metric tons)	CO_2e (percent of total)
Electricity	29,266	16.6%
Natural Gas	29,514	16.7%
Gasoline	90,809	51.5%
Diesel	17,414	9.9%
Off-Road Equipment	148	0.1%
Solid Waste	9,083	5.2%
TOTAL	176,234	100%

3.8 PER CAPITA EMISSIONS

Per capita emissions can be a useful metric for measuring progress in reducing greenhouse gases and for comparing one community's emissions with neighboring cities and against regional and national averages. Currently it is difficult to make meaningful comparisons between local inventories because of variations in the scope of inventories conducted. For instance, this Inventory takes in to account emissions from agricultural off-road vehicles, which many inventories like the Sonoma County GHG Inventory do not. Only when ICLEI, the California Air Resources Board, and other organizations adopt universal reporting standards will local inventories be prepared in a consistent manner and therefore be comparable.

Simply dividing total community greenhouse gas emissions (176,234 metric tons of CO_2e) by city population in 2005 (27,596) yields a result of 6.38 metric tons CO_2e per capita.[19] It is important to understand that this number is not the same as the carbon footprint of the average individual living in the City of Atascadero. It is also important to note that the per capita emissions number for the city is not directly comparable to every per capita number produced by other emissions studies because of differences in emission inventory methods.

What's the difference between an emissions inventory and a carbon footprint?

An emissions inventory incorporates emissions directly caused by actions taken within the city that we know how to calculate. A carbon footprint, on the other hand, encompasses greenhouse gas emissions from the entire life cycle of a product or service. This could include the emissions from raising beef for sale at the supermarket or the fuel consumption associated with residents' flights out of SBP for vacation. At this time, it is difficult to accurately estimate the community's carbon footprint. However, individuals may reduce their carbon footprint by buying locally produced foods and goods, reducing packaging, and other behavioral changes.

[19] Population in 2005 derived from the San Luis Obispo Council of Governments Long Range Socio-Economic Projections (Year 2025); July 2006 Revision.

4. City Government Operations GHG Emissions Inventory Results

The City of Atascadero government is comprised of seven departments: City Manager, Administrative Services, Police and Fire Services, Community Development, Community Services, and Public Works. This Inventory accounts for the 128 people employed by the City and City-owned and/or –operated buildings and facilities in 2005. This chapter reviews the results of the City government operations inventory by sector, including employee commuting emissions.

4.1 CITY GOVERNMENT OPERATIONS INVENTORY RESULTS

City government operations and facilities produced approximately 4,128 metric tons of greenhouse gas emissions in 2005. As displayed in **Figure 4-1**, government operations emissions would equate to approximately 2.3% of total community-wide emissions. City government emissions result from waste, energy consumption from wastewater facilities, buildings, streetlights and other facilities, fuel consumption by the vehicle and transit fleet and employee commutes, wastewater treatment processes, and miscellaneous equipment. The wastewater facilities and processes were the largest contributor to the City's emissions (70.7%) with 2,920 metric tons of carbon dioxide equivalent. The vehicle fleet (9.7%) was the second largest contributor to the City's emissions with 402 metric tons of carbon dioxide equivalent. (Refer to **Figure 4-2** and **Table 4-1** below)

FIGURE 4-1: CITY GOVERNMENT OPERATIONS CONTRIBUTION TO COMMUNITY-WIDE GHG EMISSIONS

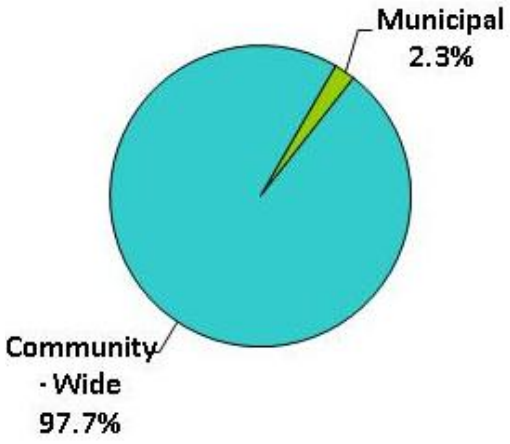
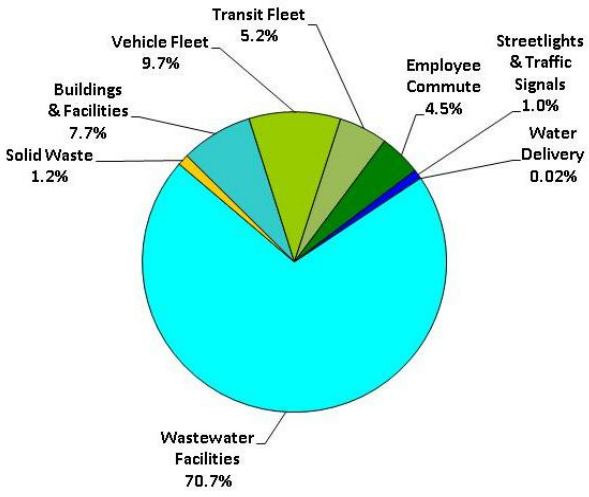


FIGURE 4-2: CITY GOVERNMENT OPERATIONS GHG EMISSIONS BY SECTOR



As mentioned in the Introduction, these emissions are a subset of the community emissions inventory discussed in **Chapter 3**. The City's government operations emissions are separately analyzed in this section in a manner that is similar to how an industry or business would produce a facility-scale greenhouse gas audit. The Local Government Greenhouse Gas Inventory Protocol developed by the California Air Resources Board, The Climate Registry, the California Climate Action Registry, and ICLEI guides the methodology for estimating emissions from local government operations. Local government emissions reporting is deemed significant in order to establish local governments as climate leaders in the community so that they can lead by example and pave the way for energy efficiency improvements.

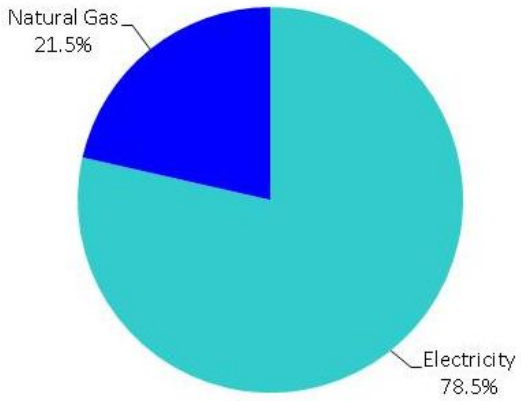
TABLE 4-1: 2005 CITY GOVERNMENT OPERATIONS GHG EMISSIONS BY SECTOR

2005 Emissions by Sector	Buildings & Facilities	Vehicle Fleet	Transit Fleet	Employee Commute	Street Lights & Traffic Signals	Water Delivery	Waste-water Facilities	Solid Waste	TOTAL
CO_2e (metric tons)	317	402	214	185	40	1	2,920	49	4,128
Percentage of CO_2e	7.7%	9.7%	5.2%	4.5%	1.0%	0.02%	70.7%	1.2%	100%
Energy Use (MMBtu)	5,054	5,672	3,073	2,621	615	10	4,032	n/a	21,077

4.2 BUILDING SECTOR

The building sector includes greenhouse gas emissions from energy consumption in facilities owned and operated by a municipality but does not included facilities located at the wastewater treatment plant. Electricity consumption in facilities located at the wastewater treatment plant are included in the Wastewater Facilities Sector. The facilities included in this analysis include City Hall, fire and police Stations, recreation facilities, Charles Paddock Zoo, parks, and numerous other facilities. As depicted in **Figure 4-3** and **Table 4-2**, the majority of emissions resulted from electricity consumption (78.5%).

FIGURE 4-3: BUILDING GHG EMISSIONS BY SOURCE



It should be noted that the historic Administration Building has been unoccupied since 2004. In 2004, an earthquake damaged the historic building and forced the City to move its government offices to another building in downtown. Subsequently, this Inventory does not include energy consumption in the historic Administration Building. Estimated emissions for City Hall are from a more energy efficient building where government offices were located in 2005.

The City has been working with the Federal Emergency Management Administration (FEMA) to obtain the necessary funding to restore the building to pre-earthquake condition. Once the building has been repaired to pre-earthquake condition, the City plans to upgrade the building. These upgrades will likely increase the efficiency of the Administration Building; however, baseline emissions were not calculated for this building as part of this inventory and; therefore, the amount of increase in efficiency is unknown. The City plans to move its government offices back to the Administration building within the next couple of years. The relocation is likely to affect the business-as-usual forecast.

TABLE 4-2: BUILDING SECTOR GHG EMISSIONS BY SOURCE, 2005

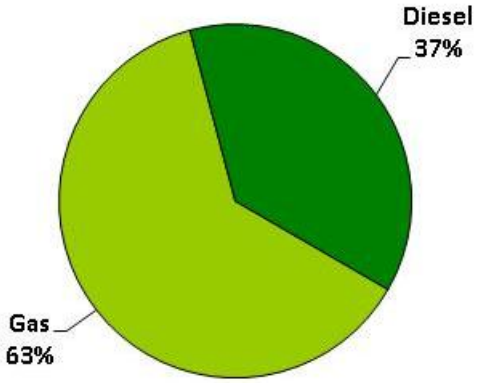
2005 City Government Operations Emissions by Sector	Electricity	Natural Gas	Total
CO_2e (metric tons)	249	68	317
Percentage of Total CO_2e	78.5%	21.5%	100%
Energy Use (MMBtu)	3,781	1,273	5,054

These emissions and associated consumption data provided in **Appendix B** will be useful in determining significant sources of energy consumption from City facilities. This will allow for the City to designate priority facilities for energy efficiency retrofits and conservation outreach.

4.3 VEHICLE AND TRANSIT FLEET

City-owned and -operated vehicles emitted approximately 616 metric tons of CO_2e, or 14.9% of total City government emissions. This sector includes gasoline and diesel consumption from all departments in the City operating vehicles, including the Fire and Police Departments, Community Services, Public Works, and Community Development. This sector also includes the transit fleet operated by the City. This estimate is based on 2005 fuel billing record data provided by the Finance Department for most departments. The Police Department provided their own fuel consumption data as their records are were more complete than the fuel billing records.

FIGURE 4-4: VEHICLE FLEET FUEL CONSUMPTION PER YEAR BY TYPE



The majority of fuel used by the City – vehicle and transit fleets combined – is gasoline (54%), with the remainder diesel (46%) (see **Figure 4-4**). When compared to the total emissions per fuel type, diesel emissions actually produce less CO_2e for the vehicle types used by the City. However, there are other, non-CO_2e emissions from diesel-like particulate matter that make such a comparison misleading to the reader. The trend for diesel to emit less CO_2e in this case does not necessarily mean that the City should aim to convert more vehicles to conventional diesel. There are multiple clean and alternative fuel options available, including biodiesel conversion, electric vehicles, hybrid vehicles, smaller vehicles, and shared vehicles.

4.4 EMPLOYEE COMMUTE

This sector estimates greenhouse gas emissions from City employees traveling to and from work in 2005. The estimate is based on a June 2009 online survey conducted by the City, a blank version of which is included as **Appendix F**. Approximately 69 employees responded to the survey with usable information, meaning that all essential questions were answered. This results in approximately a 58% response rate, the results of which were applied to the City employment total for 2005.

The online survey found that most City employees travel to and from work by car. Employees were asked how many days of the week they travel by each commute mode, including driving alone (which includes motorcycles), carpooling, vanpooling, public transit, bicycling, walking, telecommuting, and other. The results show that employees get to and from 77.4% of their workdays by personal vehicle. The second most popular mode of transportation was bicycling (10.7%), followed by walking and other means such as skateboarding with a combined 7.2% of the total.

TABLE 4-3: DAYS OF CITY EMPLOYEE TRAVEL BY COMMUTE MODE

Mode of Travel	Days traveled by Commute mode	% of Total
Drive Alone	12,792	77.4%
Carpool	468	2.8%
Vanpool	52	0.3%
Public transit	260	1.6%
Bicycle	1,768	10.7%
Walk	520	3.1%
Other	676	4.1%
Total	16,536	100%

These figures for commute mode were combined with each respondent's travel distance to work, car model (if any), and fuel type (if any). The results show vehicle miles traveled (VMT) annually per vehicle type and fuel type (see **Table 4-4**). These VMT numbers were then adjusted for the total employee population in 2005 and entered into the CACP2009 software to obtain CO_2e.

Driving patterns were assumed to be constant for the purposes of this study; therefore, the 2009 sample was applied directly to the 2005 employee population. Only one modification to the sample data was made in order to account for the large increase in hybrid car sales between 2005 and 2009. The proportion of hybrid to traditional vehicles was roughly two-thirds less in 2005 than in 2009, according to State sales data.[20]

The 2009 survey results, adjusted for 2005 employee totals, resulted in an estimate of 185 metric tons CO_2e in 2005 from commuter travel to and from work. This figure comprises 4.5% of total greenhouse gas emissions released from City government operations. The calculation does not include employee business travel or travel during lunchtime hours.

[20] www.hybridcars.com

TABLE 4-4: EMPLOYEE COMMUTE VMT BY VEHICLE AND FUEL TYPE

Vehicle Group	2009 Survey results		Adjusted for 2005	
	Annual VMT	Fuel Type	Annual VMT	Fuel Type
Light Truck/SUV/Pickup	56,197.86	Gasoline	120,997.07	Gasoline
	313.08	Diesel	544.76	Diesel
Large Truck	22,620.03	Gasoline	39,358.85	Gasoline
	16,843.70	Diesel	29,308.04	Diesel
Passenger Vehicle	138,885.77	Gasoline	183,403.96	Gasoline
Motorcycle	208.72	Gasoline	363.17	Gasoline
Total	235,069.16		373,975.86	

Employee business travel is usually included in a City government GHG Inventory per protocol; however, we could not include it in this baseline analysis due to data limitations. The City maintains financial records of when employees travel by air or vehicle to conferences and other events; however, it does not keep records of business travel destinations. As such, this Inventory could not accurately account for GHG emissions from employee business travel. A minor adjustment to City recordkeeping would allow the data to be included in the next City government operations GHG inventory.

4.5 STREETLIGHTS AND TRAFFIC SIGNALS

The electricity consumed by City streetlights and traffic signals in calendar year 2005 resulted in approximately 40 metric tons of CO_2e, or approximately 1.0% of total City government emissions. This Inventory accounts for approximately 289 streetlights and 9 traffic signals.

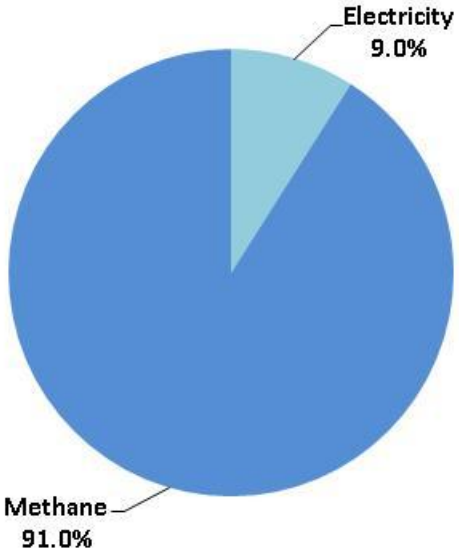
4.6 WATER AND SEWAGE

The City of Atascadero does not provide potable water to its residents. The Atascadero Mutual Water Company provides residents with drinking water and; therefore, the City does not have regulatory control over the distribution of potable water within the City. Emissions associated with the pumping and distribution of potable water are included in the commercial/industrial portion of the energy sector of the community-wide section of the Inventory.

The City is responsible for the collection, treatment, and disposal of wastewater. Approximately half (50%) of the community is served by sewer and the other 50 percent on septic. Due to a lack of methodology for calculating emissions resulting from septic systems, these emissions are not included in the Inventory. In 2005, electricity consumption from wastewater facilities in

the City emitted approximately 263 metric tons of CO_2e, or 9.0% of total emissions related to wastewater (see **Figure 4-5**). This category includes energy use at the Wastewater Treatment Plant and the numerous lift stations and pumps necessary to convey effluent to the treatment plant. Point-source emissions that arise from the wastewater treatment system due to fermentation of discarded biomass in the lagoons resulted in an additional 2,657 metric tons of CO_2e, increasing the percentage of total emissions attributed to wastewater facilities to 70.7% of government operations emissions.

FIGURE 4-5: GHG EMISSIONS FROM WASTEWATER TREATMENT PLANT



The wastewater treatment plant consists of four aerated lagoons and provides a cost effective way to treat wastewater. However, aside from the aeration of these lagoons, the City does not use additional processes to treat the influent. As organic matter is broken down through the process of lagoons, methane is released into the atmosphere. While this Inventory identifies methane from the wastewater treatment plant as the major contributor to the government operations emissions, emissions from other sectors and sources within government operations should not be overlooked entirely. This Inventory is meant to identify the sources of emissions from the City's operations. It does not recommend or mandate improvements or upgrades to the wastewater treatment plant. Upgrading the wastewater treatment plant to reduce greenhouse gas emissions would likely require a complete redesign of the wastewater treatment plant and

be very costly. Emissions associated with government operations are broken down further in **Section 4.9**.

4.7 WASTE

Similar to the Community-Wide analysis, waste produced by City facilities was calculated using the methane commitment method. The CACP2009 calculates the methane expected to be released from this landfilled waste over the course of its lifetime. Unlike other sectors analyzed, the emissions from waste disposed of in 2005 will occur over multiple years as the waste breaks down over time. Atascadero Waste Alternatives estimates that in 2005, City facilities sent a total of 168.65 tons of waste to landfill, producing 49 metric tons of CO_2e, or 1.2% of total emissions. This category includes only those emissions generated by waste produced at City facilities and does not include the total emissions released from the landfill.

4.8 OTHER – MISCELLANEOUS EQUIPMENT

Emissions from miscellaneous equipment such as general service equipment and equipment used at park facilities would be included in the 'other' category of the Inventory. Due to data limitations, emissions from these 'other' sources could not be quantified. The Finance Department keeps record of miscellaneous equipment; however, fuel billing records do not identify fuel purchased for miscellaneous equipment versus fleet vehicles. A minor adjustment in City recordkeeping will allow for future inventories to quantify these emissions.

4.9 CITY EMISSIONS BY SOURCE

It can also be helpful to view overall City government emissions by source. As shown in **Table 4.5** and **Figure 4.6**, the majority of emissions are from methane produced at the wastewater treatment plant during the treatment of wastewater (64.4%). Electricity (13.4%) consumption in City-owned buildings, streetlights, and water and wastewater facilities is the second largest source of emissions. Gasoline consumption by the vehicle and transit fleets account for 13.7% of government operations emissions and natural gas, miscellaneous equipment, diesel and solid waste contributed in decreasing amounts to the remaining 8.5% of the overall City greenhouse gas emissions.

Since the majority of greenhouse gas emissions are associated with the wastewater treatment plant and water treatment processes and strategies to reduce emissions at the treatment plant would require an expensive redesign of the plant, **Table 4.5** also breaks down emissions by source with emissions from the wastewater treatment plant and water treatment processes excluded. Viewing emissions without the wastewater treatment plant (see **Figure 4.7**) will aide the City in identifying other sources of emissions within their operations that are equally as important in reducing the City's overall greenhouse gas emissions.

TABLE 4-5: CITY GOVERNMENT OPERATIONS GHG EMISSIONS BY SOURCE

City Emissions 2005 by Source	All Sectors		Emissions from the Wastewater Treatment Plant Removed	
	CO_2e (metric tons)	CO_2e (percent of total)	CO_2e (metric tons)	CO_2e (percent of total)
Electricity	552	13.4%	289	23.9%
Natural Gas	68	1.6%	68	5.6%
Gasoline	567	13.7%	567	46.9%
Diesel	234	5.7%	234	19.4%
Solid Waste Decomposition (Methane)	49	1.2%	49	4.1%
Wastewater Treatment Processes (Methane)	2,657	64.4%	n/a	n/a
TOTAL	4,128	100%	1,207	100%

FIGURE 4-6: CITY GOVERNMENT OPERATIONS GHG EMISSIONS BY SOURCE

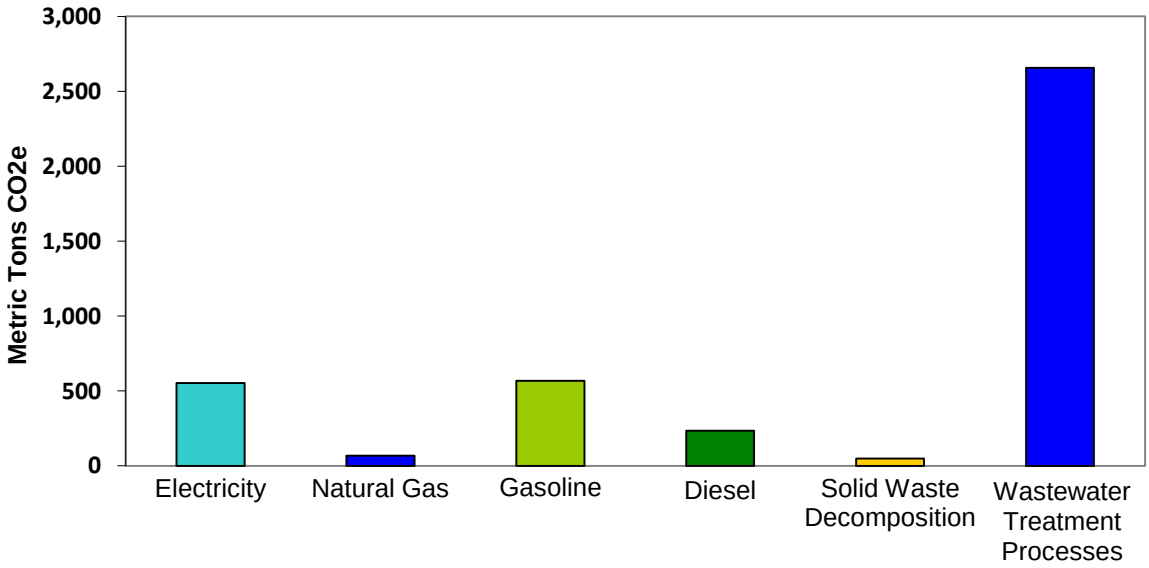
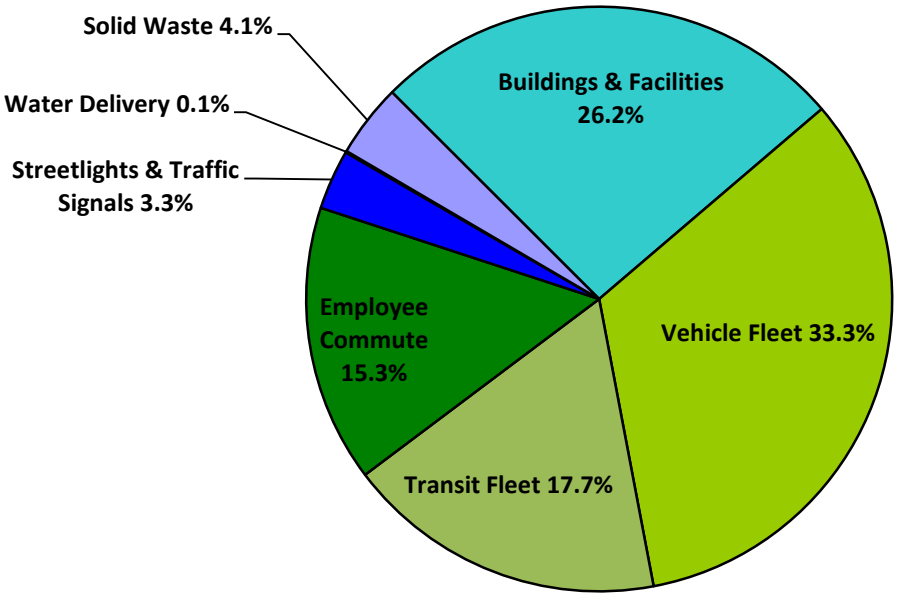


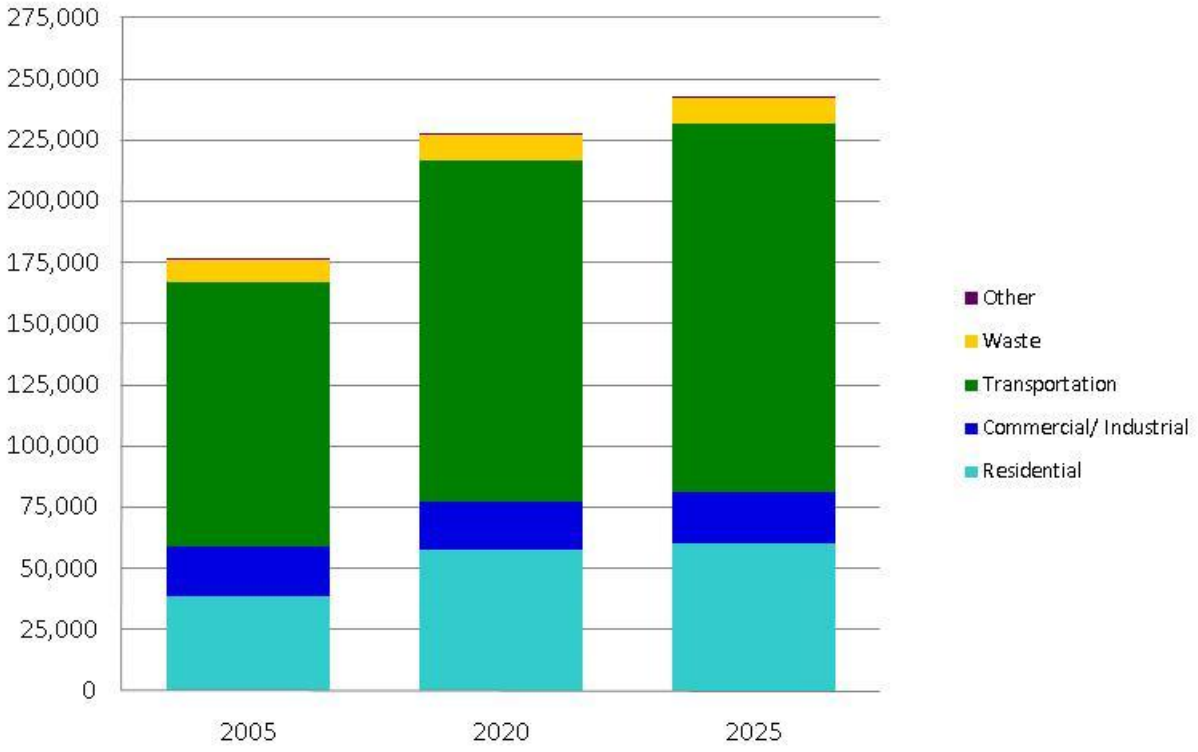
FIGURE 4-7: CITY GOVERNMENT OPERATIONS GHG EMISSIONS BY SECTOR WITH WASTEWATER TREATMENT PLANT REMOVED



5. Forecast

The emissions forecast for the City of Atascadero represents a business-as-usual prediction of how community-wide GHG levels will change over time if consumption trends and behavior continue as they did in 2005. These predictions are based on the community inventory results included in this report and statistics on job, household, and population growth from the City. The analysis shows that if behavior and consumption trends continue as business-as-usual, emissions will reach 227,674 metric tons of CO_2e by 2020, or a 29.2% increase over 2005 baseline levels (see **Figure 5-1**). By 2025 emissions will reach 242,428 metric tons of CO_2e, or a 37.5% increase over 2005 baseline levels.

FIGURE 5-1: 2020 AND 2025 BUSINESS-AS-USUAL PROJECTED GROWTH IN COMMUNITY-WIDE GHG EMISSIONS



The forecast does not quantify emissions reductions from State or federal activities including AB 32, the renewable portfolio standard, and SB 375. Additionally, it does not take into account reduction activities already underway or completed since 2005, the results of which likely put the community's emissions on a track well below the business-as-usual linear projection.

Forecasts were performed by applying household, job, and population growth rates to 2005 community-wide greenhouse gas emissions levels. Baseline data and estimated growth were obtained from a long-range projections report developed by the San Luis Obispo Council of Governments in 2006, as revised in May 2009. The “mid-range” cases for population, job, and household growth were used in this forecast estimation.

City government operations emissions are not separately analyzed as part of this forecast due to a lack of reasonable growth indicators for the City government sector. However, an increase in emissions is not expected for existing facilities and operations in the City government operations sector. If anything, the City expects that emissions within the scope of the 2005 City government operations inventory will decrease because of energy efficiency improvements, fleet upgrades, and the consolidation of Fire and Police Services with adjacent jurisdictions. At the same time, it is likely the City will have to expand services and infrastructure to accommodate the expected growth in the region, which could add new sources of emissions to the City government operations inventory that did not exist in 2005.

6. Conclusion and Next Steps

The City of Atascadero has 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 community was responsible for emitting 176,234 metric tons of CO_2e in the base year 2005, with the transportation sector contributing the most (61.4%) to this total. As a component of the community-wide analysis, City government operations produced 4,128 metric tons of CO_2e, or 2.3% of the total. In addition to establishing the baseline for tracking progress over time, this report serves to identify the major sources of city emissions, and therefore the greatest opportunities for emission reductions. In this regard, the emissions inventory ought to inform the focus of the City's Climate Action Plan. If no action is taken, this report found that business-as-usual (worst case scenario) emissions will likely rise by 29.2% by 2020 and 37.5% by 2025.

If the community reduced GHG emissions by 77,848 metric tons of CO_2e, what would that be equivalent to?

- 16,815 passenger cars not driven for one year
- 179,050 barrels of oil saved
- 2,024,038 tree seedlings grown over 10 years
- 1,012,019 compact fluorescent bulbs used instead of standard light bulbs for one year.

Source: California Air Resources Board, "Conversion of 1 MMT CO2 to Familiar Equivalents," Oct. 2007.

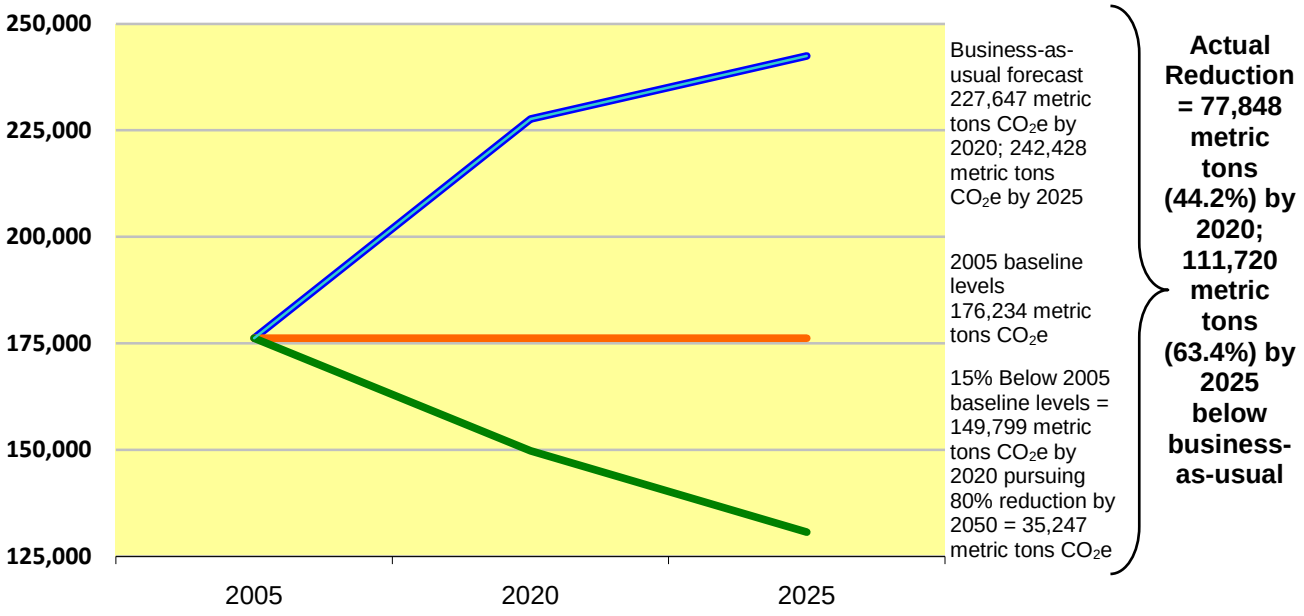
It is important to note that in order to remain consistent with greenhouse gas reduction methodology, all future quantifications of reduction activities must be subtracted from this 'business-as-usual' line. Not doing so would be assuming that emissions remain at constant 2005 levels while reduction activities are underway. In reality, the City's climate action efforts will be working against a rising emissions level due to job, population, and household growth. **Figure 6-1** below shows the business-as-usual emissions forecast in relation to 2005 baseline levels and the 15% reduction below 2005 levels recommended by the State Attorney General and Air Resources Board. [21]

The difference between the business-as-usual forecast and the reduction targets is actually 44.2% in 2020 and 63.4% in 2025, which makes the State's recommended reduction goal challenging, but still feasible. As noted in the Forecast section, it is likely that the City's

[21] The AB 32 Climate Change Scoping Plan Document prepared by the Air Resources Board calls for reducing greenhouse gas emissions to 1990 levels by cutting approximately 30 percent from business-as-usual emission levels projected for 2020, or about 15 percent from today's levels.

sustainability efforts have already caused emissions to fall below the business-as-usual linear projection line, thus making the 77,848 metric tons CO_2e reduction by 2020 achievable.

FIGURE 6-1: GHG FORECAST IN RELATION TO REDUCTION TARGETS



As the City moves forward to the next milestones in the process, including designation of emission reduction targets and development of a Climate Action Plan, the City should identify and quantify the emission reduction benefits of projects that have already been implemented since 2005, as well as the emissions reduction benefits of existing General Plan policies. The benefits of both existing 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.

APPENDIX A:
CACP DETAILED REPORT FOR COMMUNITY-WIDE EMISSIONS, 2005

Community Greenhouse Gas Emissions in 2005
Detailed Report

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	(%)	Energy (MMBtu)
Residential						
San Luis Obsipo APCD, CA						
1 SoCal Gas Company Residential Natural Gas						
Natural Gas	22,725	428	2,527	22,911	13.0	428,287
Subtotal 1 SoCal Gas Compan	22,725	428	2,527	22,911	13.0	428,287

Source(s):

Southern California Gas Co. data provided by Colby Morrow, Air Quality Manager, Customer Programs Environmental Affairs; office:559.324.0109 or email CLMorrow@semprautilities.com.

Notes:

1. Conversion of 1MCF=10 therms was used.
2. Default Fuel CO2 Set.
3. CEC Emission Factor for Natural Gas - RCI Average Set

2 PG&E Residential Electricity

Electricity	15,762	355	935	15,892	9.0	242,538
Subtotal 2 PG&E Residential E	15,762	355	935	15,892	9.0	242,538

Source(s):

All PG&E data was provided by John Bohman, Pacific Gas and Electric Company Green Communities and Innovator Pilots; 415-973-0040 or jzbx@PGE.com.

Notes:

The "PG&E California" electricity coefficient set is based on the 2005 PG&E eCO2 emission factor of 0.489 lbs/kWh of delivered electricity. This emissions factor is certified by the California Climate Action Regisry. Criteria air pollutant emission factors for electricity are derived from the NERC Region 13-Western Systems Coordinating Council/CNV Average Grid.

Subtotal Residential	38,487	783	3,462	38,803	22.0	670,824
Commercial						
San Luis Obsipo APCD, CA						
1 SoCal Gas Company Commercial Natural Gas						
Natural Gas	6,438	121	716	6,491	3.7	121,340
Subtotal 1 SoCal Gas Compan	6,438	121	716	6,491	3.7	121,340

Source(s):

Southern California Gas Co. data provided by Colby Morrow, Air Quality Manager, Customer Programs Environmental Affairs; office:559.324.0109 or email CLMorrow@semprautilities.com.

Notes:

Community Greenhouse Gas Emissions in 2005
Detailed Report

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	(%)	Energy (MMBtu)

1. Conversion of 1MCF=10 therms was used.
2. Default Fuel CO2 Set.
3. CEC Emission Factor for Natural Gas - RCI Average Set

2 PG&E Commercial + Industrial Electricity

Electricity	13,264	298	787	13,374	7.6	204,102
Subtotal 2 PG&E Commercial	13,264	298	787	13,374	7.6	204,102

Source(s):

All PG&E data was provided by John Bohman, Pacific Gas and Electric Company Green Communities and Innovator Pilots; 415-973-0040 or jzbx@PGE.com.

Notes: 1. The "PG&E California" electricity coefficient set is based on the 2005 PG&E eCO2 emission factor of 0.489 lbs/kWh of delivered electricity. This emissions factor is certified by the California Climate Action Regisry. Criteria air pollutant emission factors for electricity are derived from the NERC Region 13-Western Systems Coordinating Council/CNV Average Grid. 2. Commercial and Industrial electricity are combined due to the 15/15 Rule, which was adopted by the CPUC in the Direct Access Proceeding (CPUC Decision 97-10-031) to protect customer confidentiality. The 15/15 rule requires that any aggregated information provided by the Utilities must be made up of at least 15 customers and a single customer'

Subtotal Commercial	19,703	420	1,503	19,864	11.3	325,442

Industrial

San Luis Obsipo APCD, CA

1 SoCal Gas Company Industrial Natural Gas

Natural Gas	111	2	12	112	0.1	2,100
Subtotal 1 SoCal Gas Compar	111	2	12	112	0.1	2,100

Source(s):

Southern California Gas Co. data provided by Colby Morrow, Air Quality Manager, Customer Programs Environmental Affairs; office:559.324.0109 or email CLMorrow@semprautilities.com.

Notes:

1. Conversion of 1MCF=10 therms was used.
2. Default Fuel CO2 Set.
3. CEC Emission Factor for Natural Gas - RCI Average Set

Subtotal Industrial	111	2	12	112	0.1	2,100

Community Greenhouse Gas Emissions in 2005
Detailed Report

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	(%)	Energy (MMBtu)
Transportation						
San Luis Obsipo APCD, CA						
1 Highway Community VMT						
Diesel	7,361	21	1,047	7,389	4.2	100,960
Gasoline	38,745	2,895	5,359	39,755	22.6	570,299
Subtotal 1 Highway Communit	46,106	2,916	6,406	47,145	26.8	671,259

Source(s):

1. Emissions factors for gas and diesel per vehicle class provided by EMFAC 2007 v2.3 run by Tom Scheffelin, California Air Resources Board Planning and Technical Support Division, Tscheffe@arb.ca.gov. Manipulated by Jaime Hill, PMC, jhill@PMCworld.com to convert EMFAC vehicle classes to those used in CACP.
2. Highway road segments derived from San Luis Obispo County GIS shapefiles for roads and political boundaries, provided by Bobby Jo Close, Mapping Systems Specialist at the County of San Luis Obispo. Manipulated by John DeMartino, PMC, jdemartino@PMCworld.com.

Notes:

1. Diesel Heavy Duty Vehicles includes Transit Buses, based on a weighted average of Trucks representing 98.7% of the category and Transit Buses representing 3.3%.
2. Gasoline Passenger Vehicles includes Motorcycles, based on a weighted average of Passenger Vehicles representing 98.7% of the category and Motorcycles representing 1.3%.
3. Highway maintained miles differ slightly from HPMS data. It is likely that the County's GIS I23shapefile is more detailed than Caltrans figures.B26 2. The City's highway VMT was calculated by using GIS to find the portion of highway road segments in unincorporated County land and multiplying it by total County highway VMT.

1 On-Road Community VMT						
Diesel	9,985	30	1,459	10,025	5.7	136,950
Gasoline	49,736	3,847	5,972	51,054	29.0	732,076
Subtotal 1 On-Road Communit	59,721	3,876	7,431	61,079	34.7	869,026

Source(s):

1. Emissions factors for gas and diesel per vehicle class provided by EMFAC 2007 v2.3 run by Tom Scheffelin, California Air Resources Board Planning and Technical Support Division, Tscheffe@arb.ca.gov. Manipulated by Jaime Hill, PMC, jhill@PMCworld.com to convert EMFAC vehicle classes to those used in CACP.

Notes:

1. Diesel Heavy Duty Vehicles includes Transit Buses, based on a weighted average of Trucks representing 98.7% of the category and Transit Buses representing 3.3%.
2. Gasoline Passenger Vehicles includes Motorcycles, based on a weighted average of Passenger Vehicles representing

Community Greenhouse Gas Emissions in 2005
Detailed Report

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	(%)	Energy (MMBtu)

98.7% of the category and Motorcycles representing 1.3%.

Subtotal Transportation	105,827	6,792	13,837	108,223	61.4	1,540,285

Waste

San Luis Obsipo APCD, CA

3 Community Solid Waste - Chicago Grade — *Disposal Method - Managed Landfill*

Paper Products	0	0	241,287	5,067	2.9
Food Waste	0	0	94,629	1,987	1.1
Plant Debris	0	0	25,393	533	0.3
Wood or Textiles	0	0	70,890	1,489	0.8
Subtotal 3 Community Solid W	0	0	432,198	9,076	5.2

1. Total waste tonnage for the City in 2005 provided by the 2005 Disposal Quarterly Reports prepared by San Luis Obispo County Integrated Waste Management Authority on 6/17/05, 9/27/05, 12/27/05 and 3/6/06, provided by Peter Cron, pcron@iwma.com.
2. Percentages of waste share by type for landfill tonnage provided by CIWMB 2004 Statewide Waste Characterization Study. http://www.ciwmb.ca.gov/Publications/default.asp?pubid=1097

3. Chicago Grade landfill reports a methane recovery factor of 60%. Chicago Grade total gas generated = 157.47 mmcf/yr. Total gas transferred = 94.48 mmcf/yr.

4. Cold Canyon landfill reports a methane recovery factor of 60%. Cold Canyon total gas generated = 700 mmcf/yr. Total gas transferred = 400 mmcf/yr.

Notes:

1. Waste Type data not collected by landfill. State average waste characterization data is used for residential, commercial, and self haul waste.

3 Community Solid Waste - Cold Canyon — *Disposal Method - Managed Landfill*

Paper Products	0	0	199	4	0.0
Food Waste	0	0	78	2	0.0
Plant Debris	0	0	21	0	0.0
Wood or Textiles	0	0	59	1	0.0
Subtotal 3 Community Solid W	0	0	357	7	0.0

Source(s):

1. Total aste tonnage for the City in 2005 provided by the 2005 Disposal Quarterly Reports prepared by San Luis Obispo County Integrated Waste Management Authority on 6/17/05, 9/27/05, 12/27/05 and 3/6/06, provided by Peter Cron, pcron@iwma.com.
2. Percentages of waste share by type for landfill tonnage provided by CIWMB 2004 Statewide Waste Characterization Study. http://www.ciwmb.ca.gov/Publications/default.asp?pubid=1097

3. Chicago Grade landfill reports a methane recovery factor of 60%. Chicago Grade total gas generated = 157.47 mmcf/yr. Total gas transferred = 94.48 mmcf/yr.

Community Greenhouse Gas Emissions in 2005
Detailed Report

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	(%)	Energy (MMBtu)

4. Cold Canyon landfill reports a methane recovery factor of 60%. Cold Canyon total gas generated = 700 mmcf/yr. Total gas transferred = 400 mmcf/yr.

Notes:

1. Waste Type data not collected by landfill. State average waste characterization data is used for residential, commercial, and self haul waste.

Subtotal Waste	0	0	432,555	9,084	5.2	

Other

San Luis Obsipo APCD, CA

1 Agricultural Equipment

Carbon Dioxide	147	0	0	147	0.1	
Methane	0	0	30	1	0.0	
Nitrous Oxide	0	2	0	1	0.0	
Subtotal 1 Agricultural Equipm	147	2	30	148	0.1	

Source(s):
1. CO2, CH4 and N2O emissions calculated using the California Air Resources Board OFFROAD2007 modeling tool.
2. The portion of agricultural land per jurisdiction in SLO County calculated by John DeMartino, PMC, jdemartino@PMCworld.com <mailto:jdemartino@PMCworld.com> using County GIS shape files.

Notes:
1. OFFROAD aggregates off-road agricultural equipment emissions for the entire county. Emissions were separated by jurisdiction based on the proportion of agricultural land per jurisdiction. This analysis was completed sing GIS shapefiles of land use patterns in the county.
2. OFFROAD includes the following agricultural equipment: 2-wheel tractors, agricultural mowers, agricultural tractors, balers, combines, hydro power units, other agricultural equipment, sprayers, swathers and tillers.

Subtotal Other	147	2	30	148	0.1	
Total	164,276	7,999	451,399	176,235	100.0	2,538,652

APPENDIX B:
CACP DETAILED REPORT FOR CITY GOVERNMENT OPERATIONS EMISSIONS, 2005

Government Greenhouse Gas Emissions in 2005
Detailed Report

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	Equiv CO_2 (%)	Energy (MMBtu)	Cost ($)
Buildings and Facilities							
San Luis Obsipo APCD, CA							
1 & 2 6109 ECR Ste. B							
Electricity	1	0	0	1	0.0	11	506
Natural Gas	0	0	0	0	0.0	1	39
Subtotal 1 & 2 6109 ECR Ste.	1	0	0	1	0.0	12	545
Electricity data recieved from PG&E (ghgdatarequests@pge.com). Natural gas data retrieved from The Gas Company billing statements. Billing statements were provided by the Finance Department Richelle Rickard (805-470-3428).							
1 & 2 C/W Dance Hall							
Electricity	35	1	2	36	0.9	543	24,435
Natural Gas	4	0	0	4	0.1	74	1,029
Subtotal 1 & 2 C/W Dance Hal	39	1	3	40	1.0	618	25,464
Electricity data recieved from PG&E (ghgdatarequests@pge.com). Natural gas data retrieved from The Gas Company billing statements. Billing statements were provided by the Finance Department Richelle Rickard (805-470-3428).							
1 & 2 City Hall (6901 ECR Ste. A)							
Electricity	11	0	1	12	0.3	176	6,865
Natural Gas	4	0	0	4	0.1	75	896
Subtotal 1 & 2 City Hall (6901	15	0	1	16	0.4	251	7,761
Electricity data recieved from PG&E (ghgdatarequests@pge.com). Natural gas data retrieved from The Gas Company billing statements. Billing statements were provided by the Finance Department Richelle Rickard (805-470-3428).							
1 & 2 City Hall (on Palma)							
Electricity	3	0	0	3	0.1	41	2,343
Natural Gas	0	0	0	0	0.0	0	120
Subtotal 1 & 2 City Hall (on Pa	3	0	0	3	0.1	41	2,463
Electricity data recieved from PG&E (ghgdatarequests@pge.com). Natural gas data retrieved from The Gas Company billing statements. Billing statements were provided by the Finance Department Richelle Rickard (805-470-3428).							
1 & 2 Fire Dept #1							
Electricity	9	0	1	9	0.2	136	5,149
Natural Gas	6	0	1	6	0.1	115	1,497
Subtotal 1 & 2 Fire Dept #1	15	0	1	15	0.4	251	6,646
Electricity data recieved from PG&E (ghgdatarequests@pge.com). Natural gas data retrieved from The Gas Company billing statements. Billing statements were provided by the Finance Department Richelle Rickard (805-470-3428).							

Government Greenhouse Gas Emissions in 2005
Detailed Report

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	Equiv CO_2 (%)	Energy (MMBtu)	Cost ($)
1 & 2 Fire Station #2							
Electricity	5	0	0	5	0.1	70	2,721
Natural Gas	7	0	1	7	0.2	131	1,709
Subtotal 1 & 2 Fire Station #2	11	0	1	12	0.3	201	4,430

Electricity data recieved from PG&E (ghgdatarequests@pge.com). Natural gas data retrieved from The Gas Company billing statements. Billing statements were provided by the Finance Department Richelle Rickard (805-470-3428).

1 & 2 Multi-Purpose Building @ Zoo							
Electricity	11	0	1	11	0.3	169	7,425
Natural Gas	17	0	2	17	0.4	325	3,693
Subtotal 1 & 2 Multi-Purpose E	28	1	3	28	0.7	494	11,118

Electricity data recieved from PG&E (ghgdatarequests@pge.com). Natural gas data retrieved from The Gas Company billing statements. Billing statements were provided by the Finance Department Richelle Rickard (805-470-3428).

1 & 2 Police Station							
Electricity	52	1	3	52	1.3	798	32,225
Natural Gas	18	0	2	18	0.4	333	3,791
Subtotal 1 & 2 Police Station	70	2	5	70	1.7	1,131	36,016

Electricity data recieved from PG&E (ghgdatarequests@pge.com). Natural gas data retrieved from The Gas Company billing statements. Billing statements were provided by the Finance Department Richelle Rickard (805-470-3428).

1 & 2 Rec Center							
Electricity	2	0	0	2	0.0	26	1,768
Natural Gas	1	0	0	1	0.0	20	356
Subtotal 1 & 2 Rec Center	3	0	0	3	0.1	47	2,124

Electricity data recieved from PG&E (ghgdatarequests@pge.com). Natural gas data retrieved from The Gas Company billing statements. Billing statements were provided by the Finance Department Richelle Rickard (805-470-3428).

1 & 2 Recreation Hall							
Electricity	18	0	1	18	0.4	277	10,365
Natural Gas	9	0	1	9	0.2	161	2,023
Subtotal 1 & 2 Recreation Hall	27	1	2	27	0.6	438	12,388

Electricity data recieved from PG&E (ghgdatarequests@pge.com). Natural gas data retrieved from The Gas Company billing statements. Billing statements were provided by the Finance Department Richelle Rickard (805-470-3428).

Government Greenhouse Gas Emissions in 2005
Detailed Report

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	Equiv CO_2 (%)	Energy (MMBtu)	Cost ($)
1 & 2 Yard-Dar Garage							
Electricity	2	0	0	2	0.0	29	1,344
Natural Gas	0	0	0	0	0.0	4	170
Subtotal 1 & 2 Yard-Dar Garag	2	0	0	2	0.1	33	1,515

Electricity data recieved from PG&E (ghgdatarequests@pge.com). Natural gas data retrieved from The Gas Company billing statements. Billing statements were provided by the Finance Department Richelle Rickard (805-470-3428).

1 9401 Marchant							
Natural Gas	2	0	0	2	0.0	30	470
Subtotal 1 9401 Marchant	2	0	0	2	0.0	30	470

Natural gas data retrieved from The Gas Company billing statements. Billing statements were provided by the Finance Department Richelle Rickard (805-470-3428).

2 Zoo & Parking Lot							
Electricity	18	0	1	18	0.4	270	9,117
Subtotal 2 Zoo & Parking Lot	18	0	1	18	0.4	270	9,117

Electricity data recieved from PG&E (ghgdatarequests@pge.com).

2 BBQ Area							
Electricity	0	0	0	0	0.0	0	100
Subtotal 2 BBQ Area	0	0	0	0	0.0	0	100

Electricity data recieved from PG&E (ghgdatarequests@pge.com).

2 Chalk Mountain Repeater							
Electricity	0	0	0	0	0.0	6	352
Subtotal 2 Chalk Mountain Rep	0	0	0	0	0.0	6	352

Electricity data recieved from PG&E (ghgdatarequests@pge.com).

2 City Park							
Electricity	10	0	1	10	0.2	147	5,407
Subtotal 2 City Park	10	0	1	10	0.2	147	5,407

Electricity data recieved from PG&E (ghgdatarequests@pge.com).

2 City Rec Office							
Electricity	2	0	0	2	0.1	36	1,686
Subtotal 2 City Rec Office	2	0	0	2	0.1	36	1,686

Government Greenhouse Gas Emissions in 2005
Detailed Report

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	Equiv CO_2 (%)	Energy (MMBtu)	Cost ($)
Electricity data recieved from PG&E (ghgdatarequests@pge.com).							
2 El Camino Real & Traffic Way							
Electricity	1	0	0	1	0.0	12	620
Subtotal 2 El Camino Real & T	1	0	0	1	0.0	12	620
Electricity data recieved from PG&E (ghgdatarequests@pge.com).							
2 Horse Arena @ Paloma Park							
Electricity	0	0	0	0	0.0	1	128
Subtotal 2 Horse Arena @ Pal	0	0	0	0	0.0	1	128
Electricity data recieved from PG&E (ghgdatarequests@pge.com).							
2 Marchant Avenue							
Electricity	4	0	0	4	0.1	65	2,944
Subtotal 2 Marchant Avenue	4	0	0	4	0.1	65	2,944
Electricity data recieved from PG&E (ghgdatarequests@pge.com).							
2 Reptile Cage							
Electricity	6	0	0	6	0.1	86	3,336
Subtotal 2 Reptile Cage	6	0	0	6	0.1	86	3,336
Electricity data recieved from PG&E (ghgdatarequests@pge.com).							
2 Restrooms @ Lake Park							
Electricity	1	0	0	1	0.0	10	526
Subtotal 2 Restrooms @ Lake	1	0	0	1	0.0	10	526
Electricity data recieved from PG&E (ghgdatarequests@pge.com).							
2 Restrooms @ Traffic Way Park							
Electricity	2	0	0	2	0.1	37	1,728
Subtotal 2 Restrooms @ Traffi	2	0	0	2	0.1	37	1,728
Electricity data recieved from PG&E (ghgdatarequests@pge.com).							
2 San Marcos Road Repeater							
Electricity	0	0	0	0	0.0	1	115
Subtotal 2 San Marcos Road F	0	0	0	0	0.0	1	115
Electricity data recieved from PG&E (ghgdatarequests@pge.com).							

Government Greenhouse Gas Emissions in 2005
Detailed Report

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	Equiv CO_2 (%)	Energy (MMBtu)	Cost ($)
2 Santa Rosa Road 500F							
Electricity	2	0	0	2	0.0	24	1,370
Subtotal 2 Santa Rosa Road 5	2	0	0	2	0.0	24	1,370
Electricity data recieved from PG&E (ghgdatarequests@pge.com).							
2 Serena Court							
Electricity	1	0	0	1	0.0	20	876
Subtotal 2 Serena Court	1	0	0	1	0.0	20	876
Electricity data recieved from PG&E (ghgdatarequests@pge.com).							
2 Shop Storage Bldg							
Electricity	0	0	0	0	0.0	5	242
Subtotal 2 Shop Storage Bldg	0	0	0	0	0.0	5	242
Electricity data recieved from PG&E (ghgdatarequests@pge.com).							
2 Sports Fields @ Portola							
Electricity	2	0	0	2	0.1	37	1,508
Subtotal 2 Sports Fields @ Po	2	0	0	2	0.1	37	1,508
Electricity data recieved from PG&E (ghgdatarequests@pge.com).							
2 Sports Fields @ Traffic Way							
Electricity	48	1	3	48	1.2	735	31,687
Natural Gas	0	0	0	0	0.0	4	169
Subtotal 2 Sports Fields @ Tra	48	1	3	48	1.2	739	31,856
Electricity data recieved from PG&E (ghgdatarequests@pge.com).							
2 Sunken Gardens							
Electricity	1	0	0	1	0.0	13	512
Subtotal 2 Sunken Gardens	1	0	0	1	0.0	13	512
Electricity data recieved from PG&E (ghgdatarequests@pge.com).							
Subtotal Buildings and Facilities	313	7	22	316	7.7	5,055	173,364

Government Greenhouse Gas Emissions in 2005
Detailed Report

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	Equiv CO_2 (%)	Energy (MMBtu)	Cost ($)
Streetlights & Traffic Signals							
San Luis Obsipo APCD, CA							
2 Streetlights - 9315 Pismo Ave (4 Lights)							
Electricity	0	0	0	0	0.0	7	435
Subtotal 2 Streetlights - 9315 F	0	0	0	0	0.0	7	435
Data recieved from PG&E (ghgdatarequests@pge.com).							
2 Streetlights - East Mall (150 Lights)							
Electricity	15	0	1	15	0.4	234	17,930
Subtotal 2 Streetlights - East M	15	0	1	15	0.4	234	17,930
Data recieved from PG&E (ghgdatarequests@pge.com).							
2 Streetlights - ECR & East Mall (46 Lights)							
Electricity	4	0	0	4	0.1	64	6,451
Subtotal 2 Streetlights - ECR &	4	0	0	4	0.1	64	6,451
Data recieved from PG&E (ghgdatarequests@pge.com).							
2 Streetlights - Service ID # 4949700002 (6 Lights)							
Electricity	1	0	0	1	0.0	14	919
Subtotal 2 Streetlights - Servic	1	0	0	1	0.0	14	919
Data recieved from PG&E (ghgdatarequests@pge.com).							
2 Streetlights - Service ID # 4949700022 (30 Lights)							
Electricity	6	0	0	6	0.1	93	6,401
Subtotal 2 Streetlights - Servic	6	0	0	6	0.1	93	6,401
Data recieved from PG&E (ghgdatarequests@pge.com).							
2 Streetlights - Service ID # 4949700026 (6 Lights)							
Electricity	1	0	0	1	0.0	19	1,666
Subtotal 2 Streetlights - Servic	1	0	0	1	0.0	19	1,666
Data recieved from PG&E (ghgdatarequests@pge.com).							
2 Streetlights - Service ID # 4949700028 (43 Lights)							
Electricity	4	0	0	4	0.1	63	8,514
Subtotal 2 Streetlights - Servic	4	0	0	4	0.1	63	8,514
Data recieved from PG&E (ghgdatarequests@pge.com).							

Government Greenhouse Gas Emissions in 2005
Detailed Report

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	Equiv CO_2 (%)	Energy (MMBtu)	Cost ($)
2 Streetlights - Service ID # 4949700032 (2 Lights)							
Electricity	0	0	0	0	0.0	5	153
Subtotal 2 Streetlights - Servic	0	0	0	0	0.0	5	153
Data recieved from PG&E (ghgdatarequests@pge.com).							
2 Streetlights - Service ID # 494970008 (2 Lights)							
Electricity	0	0	0	0	0.0	2	282
Subtotal 2 Streetlights - Servic	0	0	0	0	0.0	2	282
Data recieved from PG&E (ghgdatarequests@pge.com).							
2 Traffic Signal - Curbaril & ECR							
Electricity	1	0	0	1	0.0	15	650
Subtotal 2 Traffic Signal - Curt	1	0	0	1	0.0	15	650
Data recieved from PG&E (ghgdatarequests@pge.com).							
2 Traffic Signal - Del Rio Rd. & ECR							
Electricity	2	0	0	2	0.0	28	1,152
Subtotal 2 Traffic Signal - Del I	2	0	0	2	0.0	28	1,152
Data recieved from PG&E (ghgdatarequests@pge.com).							
2 Traffic Signal - HWY 41 & NWC West Mall							
Electricity	0	0	0	0	0.0	7	383
Subtotal 2 Traffic Signal - HWY	0	0	0	0	0.0	7	383
Data recieved from PG&E (ghgdatarequests@pge.com).							
2 Traffic Signal - Junipero & ECR							
Electricity	1	0	0	1	0.0	10	110
Subtotal 2 Traffic Signal - Juni	1	0	0	1	0.0	10	110
Data recieved from PG&E (ghgdatarequests@pge.com).							
2 Traffic Signal - Palomar & ECR							
Electricity	1	0	0	1	0.0	9	424
Subtotal 2 Traffic Signal - Palo	1	0	0	1	0.0	9	424
Data recieved from PG&E (ghgdatarequests@pge.com).							

Government Greenhouse Gas Emissions in 2005
Detailed Report

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	Equiv CO_2 (%)	Energy (MMBtu)	Cost ($)
2 Traffic Signal - San Anselmo & ECR							
Electricity	1	0	0	1	0.0	10	463
Subtotal 2 Traffic Signal - San	1	0	0	1	0.0	10	463
Data recieved from PG&E (ghgdatarequests@pge.com).							
2 Traffic Signal - Santa Rosa & ECR							
Electricity	1	0	0	1	0.0	12	567
Subtotal 2 Traffic Signal - Sant	1	0	0	1	0.0	12	567
Data recieved from PG&E (ghgdatarequests@pge.com).							
2 Traffic Signal - State Hospital & ECR							
Electricity	1	0	0	1	0.0	10	481
Subtotal 2 Traffic Signal - State	1	0	0	1	0.0	10	481
Data recieved from PG&E (ghgdatarequests@pge.com).							
2 Traffic Signal - Traffic & ECR							
Electricity	1	0	0	1	0.0	13	598
Subtotal 2 Traffic Signal - Traffi	1	0	0	1	0.0	13	598
Data recieved from PG&E (ghgdatarequests@pge.com).							
Subtotal Streetlights & Traffic Si	40	1	2	40	1.0	613	47,579
Water Delivery Facilities							
San Luis Obsipo APCD, CA							
2 Aeration System @ Lake Park							
Electricity	0	0	0	0	0.0	3	292
Subtotal 2 Aeration System @	0	0	0	0	0.0	3	292
Data recieved from PG&E (ghgdatarequests@pge.com).							
2 Irrigation Control #1							
Electricity	0	0	0	0	0.0	1	152
Subtotal 2 Irrigation Control #1	0	0	0	0	0.0	1	152
Data recieved from PG&E (ghgdatarequests@pge.com). Service ID# 4949700200							

Government Greenhouse Gas Emissions in 2005
Detailed Report

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	Equiv CO_2 (%)	Energy (MMBtu)	Cost ($)
2 Irrigation Control #2							
Electricity	0	0	0	0	0.0	4	241
Subtotal 2 Irrigation Control #2	0	0	0	0	0.0	4	241
Data recieved from PG&E (ghgdatarequests@pge.com). Service ID# 4949700085							
2 Irrigation Control #3							
Electricity	0	0	0	0	0.0	0	89
Subtotal 2 Irrigation Control #3	0	0	0	0	0.0	0	89
Data recieved from PG&E (ghgdatarequests@pge.com). Service ID# 4949700080							
2 Lake Aeration System							
Electricity	0	0	0	0	0.0	0	87
Subtotal 2 Lake Aeration Syste	0	0	0	0	0.0	0	87
Data recieved from PG&E (ghgdatarequests@pge.com).							
2 Water Fountain Pump							
Electricity	0	0	0	0	0.0	2	117
Subtotal 2 Water Fountain Pur	0	0	0	0	0.0	2	117
Data recieved from PG&E (ghgdatarequests@pge.com).							
Subtotal Water Delivery Facilitie	1	0	0	1	0.0	10	978
Wastewater Facilities							
San Luis Obsipo APCD, CA							
2 Lift Station #1							
Electricity	2	0	0	2	0.1	32	1,378
Subtotal 2 Lift Station #1	2	0	0	2	0.1	32	1,378
Data recieved from PG&E (ghgdatarequests@pge.com). Service ID# 4949700205							
2 Sewer Lift							
Electricity	22	0	1	22	0.5	340	15,039
Subtotal 2 Sewer Lift	22	0	1	22	0.5	340	15,039
Data recieved from PG&E (ghgdatarequests@pge.com). Service ID# 4949700095							

Government Greenhouse Gas Emissions in 2005
Detailed Report

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	Equiv CO_2 (%)	Energy (MMBtu)	Cost ($)
2 Sewer Lift #12							
Electricity	5	0	0	5	0.1	74	3,326
Subtotal 2 Sewer Lift #12	5	0	0	5	0.1	74	3,326
Data recieved from PG&E (ghgdatarequests@pge.com).							
2 Sewer Lift Pump							
Electricity	0	0	0	0	0.0	5	351
Subtotal 2 Sewer Lift Pump	0	0	0	0	0.0	5	351
Data recieved from PG&E (ghgdatarequests@pge.com). Service ID# 4949700145							
2 Sewer Lift Pump #2							
Electricity	0	0	0	0	0.0	3	266
Subtotal 2 Sewer Lift Pump #2	0	0	0	0	0.0	3	266
Data recieved from PG&E (ghgdatarequests@pge.com). Service ID# 4949700215							
2 Sewer Lift Pump #3							
Electricity	0	0	0	0	0.0	6	400
Subtotal 2 Sewer Lift Pump #3	0	0	0	0	0.0	6	400
Data recieved from PG&E (ghgdatarequests@pge.com). Service ID# 4949700100							
2 Sewer Lift Pump #4							
Electricity	6	0	0	6	0.1	94	4,192
Subtotal 2 Sewer Lift Pump #4	6	0	0	6	0.1	94	4,192
Data recieved from PG&E (ghgdatarequests@pge.com). Service ID# 4949700180							
2 Sewer Lift Station							
Electricity	0	0	0	0	0.0	0	130
Subtotal 2 Sewer Lift Station	0	0	0	0	0.0	0	130
Data recieved from PG&E (ghgdatarequests@pge.com). Service ID# 4949700190							
2 Wastewater Treatment Plant							
Electricity	226	5	13	228	5.5	3,478	116,941
Methane	0	0	126,500	2,657	64.4	0	0
Subtotal 2 Wastewater Treatm	226	5	126,513	2,884	69.9	3,478	116,941
Electricity consumption data recieved from PG&E (ghgdatarequests@pge.com). Methane data was calculated using amount of BOD5 removed from the wastewater treatment process in kg per day and the percent of BOD5 removed at the end of the treatment process. This data was provided by							

Government Greenhouse Gas Emissions in 2005
Detailed Report

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	(%)	Energy (MMBtu)	Cost ($)

Justin Black, Public Works Department (805)470-3132, and entered into ICLEI's Wastewater Calculator to calculate tonnes of CH4 released per year. Tonnes of CH4 was entered into CACP for total CO2e.

Subtotal Wastewater Facilities	262	6	126,516	2,921	70.8	4,033	142,024

Solid Waste Facilities

San Luis Obsipo APCD, CA

3 - All Facilities

Carbon Dioxide	49	0	0	49	1.2	0	0
Subtotal 3 - All Facilities	49	0	0	49	1.2	0	0

Data provided by Mike LaBarbera (805.466.3636) at Atascadero Waste Alternatives.

Subtotal Solid Waste Facilities	49	0	0	49	1.2	0	0

Vehicle Fleet

San Luis Obsipo APCD, CA

1 ComDev

Gasoline	14	1	1	14	0.3	207	4,250
Subtotal 1 ComDev	14	1	1	14	0.3	207	4,250

All vehicle fuel consumption records provided by the Finance Department. Records consisted of gas card billing statements. Gas cards are maintained by individual Departments. Community Development assigned gas cards to specific vehicles. This information was provided by Annette Manier, Community Development Department, (805-470-3470). Light Trucks MY 1999 includes 2 - Ford Rangers. Light Trucks MY 2004 includes 1 - Ford Explorer.

1 Fire Dept.

Diesel	60	0	0	60	1.5	829	14,537
Gasoline	12	1	1	12	0.3	172	2,298
Subtotal 1 Fire Dept.	72	1	1	72	1.8	1,001	16,835

All vehicle fuel consumption records provided by the Finance Department. Records consisted of gas card billing statements. Gas cards are maintained by individual Departments. Fire Department assigned gas cards to specific vehicles; however, the fleet has changed since 2005 and it was difficult to match present card information with specific vehicles in 2005. It was assumed all diesel consumption was by firetrucks and unleaded gasoline by the remaining fleet vehicles. Unleaded gasoline was distributed evenly between the six vehicles. Gas card information was provided by Ellen Perkins, Fire Department, (805-470-3300). Diesel Heavy-Duty Vehicles (All MY) includes - Vehicle Numbers 501, 502, 503, 507, and 574. Light Trucks MY 19987 to 1993 includes 2 - Chevy Blazers. Light Trucks MY 2001 includes 2 - Ford F250. Light Trucks MY 2004 includes 1 - Chevy Tahoe Fire Command Vehicle.

1 Parks

Gasoline	23	3	2	24	0.6	342	0
Subtotal 1 Parks	23	3	2	24	0.6	342	0

All vehicle fuel consumption records provided by the Finance Department. Records consisted of gas card billing statements. Gas cards are

Government Greenhouse Gas Emissions in 2005
Detailed Report

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	Equiv CO_2 (%)	Energy (MMBtu)	Cost ($)

maintained by individual Departments. Light Trucks MY 1987 to 1993 includes 1- 1980 Cushman Scooter, 1- 1986 Ford Ranger, 1- 1980 Chevy Truck, 1- 1990 GMC Truck. Heavy Duty Vihicles MY 2002 includes 1- 2002 Dodge Truck 3/4 Ton dump bed.

1 Police Department

Diesel	1	0	0	1	0.0	11	0
Gasoline	130	7	6	132	3.2	1,910	0
Subtotal 1 Police Department	131	7	6	133	3.2	1,922	0

All vehicle gas consumption data provided by Terry Buckley, Police Department (ext. 3258). The Police Department tracks vehicle fuel consumption. Police Department personnel use government credit cards in addition to assigned gas cards to purchase fuel. These purchases do not show up in the gas card billing statements provided by the Finance Department. Unleaded gasoline was distributed evenly between the 23 vehicles. Passenger Cars MY 2005 includes 3 - Ford Crown Victoria and 1 - BMW Motorcycle. Passenger Cars MY 2004 includes 1 - Ford Crown Victoria. Passenger Cars MY 2003 includes 1 - Ford Crown Victoria and 1 - Dodge Intrepid. Passenger Cars MY 1999 includes 2 - Ford Crown Victoria and 1 - Ford Taurus. Passenger Cars MY 2001 includes 3 - Ford Crown Victoria. Passenger Cars MY 2000 includes 2 - Ford Crown Victoria. Passenger Cars MY 1998 includes 1 - Ford Taurus. Passenger Cars MY 1997 includes 2 - Dodge Intrepid. Passenger Cars MY 1995 includes 2 - Ford Crown Victoria. Passenger Cars MY 1984 to 1993 includes 1 - 1955 Chevy. Light Trucks MY 2004 includes 1 - Ford Expedition. Light Trucks MY 1987-1993 includes 1 - 1989 Jeep. Diesel Heavy-Duty Vehicles includes 1 - 1981 Chevy Bus.

1 PW Building Maintenance

Gasoline	6	1	0	7	0.2	94	1,827
Subtotal 1 PW Building Mainte	6	1	0	7	0.2	94	1,827

All vehicle fuel consumption records provided by the Finance Department. Records consisted of gas card billing statements. Gas cards are maintained by individual Departments. Unleaded gasoline was distributed evenly between the three vehicles. Light Trucks MY 2002 includes 1 - Ford F150. Light Trucks MY 1987 to 1993 includes 1 - Chevrolet (C-11).

1 PW Operations

Gasoline	1	0	0	1	0.0	11	319
Subtotal 1 PW Operations	1	0	0	1	0.0	11	319

All vehicle fuel consumption records provided by the Finance Department. Records consisted of gas card billing statements. Gas cards are maintained by individual Departments. Light Trucks MY 2005 includes 1 - Ford Explorer.

1 PW Streets

Gasoline	6	0	1	6	0.1	88	1,922
Subtotal 1 PW Streets	6	0	1	6	0.1	88	1,922

All vehicle fuel consumption records provided by the Finance Department. Records consisted of gas card billing statements. Gas cards are maintained by individual Departments. Unleaded gasoline is evenly distributed between the nine vehicles within the fleet. Heavy Duty Vehicles MY 1985 to 1986 includes 1 - 1980 3/4 Ton Chevy Utility Truck, 1 - 1981 5 YD Ford Dump Truck, 1 - 1982 5 YD Ford Dump Truck, and 1 - 1984 1 Ton Chevy Service Truck. Heavy Duty Vehicles MY 1990 to 1995 includes 1 - 1990 GMC 1 Ton Service Truck. Light Trucks MY 1987 to 1993 includes 1 - 1973 Chevy 1/2 Ton, 1 - 1989 1/2 Ton Chevy Pick-up, and 1 - 1990 1/2 Ton GMC Pick-up. Light Trucks MY 2002 includes 1 - 1/2 Ton Dodge Pick-up.

Government Greenhouse Gas Emissions in 2005
Detailed Report

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	Equiv CO_2 (%)	Energy (MMBtu)	Cost ($)
1 Wastewater							
Diesel	125	0	0	125	3.0	1,717	0
Gasoline	12	1	1	12	0.3	178	0
Subtotal 1 Wastewater	137	1	1	138	3.3	1,894	0

All vehicle fuel consumption records provided by the Finance Department. Records consisted of gas card billing statements. Gas cards are maintained by individual Departments. Diesel fuel was distrubeted evenly between the Front End Case Loader and Aquatech Sewer Jet Truck. Unleaded gasoline was distributed evenly between the remainder of the fleet. Diesel Heavy Duty Trucks All MY includes 1- Front End Case Loader and 1- Aquatech Sewer Jet Truck. Light Trucks MY 1987 to 1993 includes 1 - 1984 Chevy truck and 1 - 1992 GMC medium duty with crane. Light Trucks MY 1999 includes 1 - Ford F250. Heavy Duty Vehicles MY 2003 includes 1 - Ford F550 Super Duty. Light Trucks MY 2003 includes 1 - Dodge Ram.

1 Zoo							
Gasoline	8	1	1	8	0.2	113	2,302
Subtotal 1 Zoo	8	1	1	8	0.2	113	2,302

All vehicle fuel consumption records provided by the Finance Department. Records consisted of gas card billing statements. Gas cards are maintained by individual Departments. Unleaded gasoline was distributed evenly between the four vehicles.Light Trucks MY 1987 to 1993 includes 1 - 1979 Chevy Luv 4x4, 1 - 1985 Dodge Sedan, 1 - 1990 Chevy S-10, and 1 - Isuzu Trooper.

Subtotal Vehicle Fleet	398	15	13	403	9.8	5,672	27,456
Employee Commute							
San Luis Obsipo APCD, CA							
1 Employee Commute							
Diesel	48	0	1	48	1.2	652	0
Gasoline	134	10	15	137	3.3	1,969	0
Subtotal 1 Employee Commute	181	10	16	185	4.5	2,621	0

Passenger Cars Alt. Method includes motorcycles.

Subtotal Employee Commute	181	10	16	185	4.5	2,621	0
Transit Fleet							
San Luis Obsipo APCD, CA							
1 Dail-A-Ride							
Gasoline	116	8	3	119	2.9	1,712	26,725
Subtotal 1 Dail-A-Ride	116	8	3	119	2.9	1,712	26,725

All vehicle fuel consumption records provided by the Finance Department. Records consisted of gas card billing statements. Gas cards are maintained by individual Departments. Transit Fleet information was provided by Amanda Muether, Dispatch, (805) XXX-XXXX. Heavy Duty Vehicles MY 2002 includes 1 - Chapion Type III Bus. Heavy Duty Vehicles MY 2005 includes 1 - Eldorado Aerotech Bus. Heavy Duty Vehicles MY 2003 includes 2 - Ford Type III Bus. Heavy Duty Vehicles MY 2000 includes 1 - Eldorado Champion Bus

Government Greenhouse Gas Emissions in 2005
Detailed Report

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	Equiv CO_2 (%)	Energy (MMBtu)	Cost ($)
1 North County Shuttle (Fixed Route)							
Gasoline	92	7	3	95	2.3	1,361	26,950
Subtotal 1 North County Shuttl	92	7	3	95	2.3	1,361	26,950

All vehicle fuel consumption records provided by the Finance Department. Records consisted of gas card billing statements. Gas cards are maintained by individual Departments. Transit Fleet information was provided by Amanda Muether, Dispatch, (805) 461-5000. Heavy Duty Vehicles MY 2003 includes 1 - Ford Type III Bus with Graphics.

Subtotal Transit Fleet	209	14	6	213	5.2	3,073	53,675
Total	1,453	54	126,575	4,128	100.0	21,076	445,076

APPENDIX C:
DETAILED METHODOLOGY FOR COMMUNITY-WIDE INVENTORY

APPENDIX C: DETAILED METHODOLOGY FOR COMMUNITY-WIDE INVENTORY

Detailed Methodology for Community-Wide Inventory

The following is a detailed explanation of data sources and methodology for calculating greenhouse gas (GHG) emissions in each sector of the community-wide analysis. The purpose of this appendix is to provide transparency of this Inventory, outline data limitations, and give guidance for future City inventories to maintain methodological consistency.

ELECTRICITY AND NATURAL GAS

Note: We attempted to collect energy production/consumption data besides that from natural gas and electricity such as propane, solar, and wind; however the data was not available in the level of detail necessary to meet the protocol for this Inventory.

Residential

Pacific Gas and Electric (PG&E) and Southern California Gas Company (SoCal Gas Co.) provided residential electricity and natural gas consumption data. Specifically, data was provided by:

- John Bohman, Analyst with PG&E Green Communities and Innovator Pilots (jzbx@pge.com)
- Colby Morrow, Southern California Gas Company & San Diego Gas and Electric Company Air Quality Manager, Customer Programs Environmental Affairs (clmorrow@semprautilities.com)

The raw data received from PG&E and SoCal Gas Co. is summarized in the chart below. This raw data was inputted into the CACP2009 software in kWh and therms. CACP2009 Average Grid Electricity, RCI Average, and Fuel CO_2 coefficient sets were amended per PG&E and State guidance (see 'electricity and natural gas coefficients' section).

TABLE 1: RESIDENTIAL ENERGY USE

2005 Residential Energy Emissions	Scope	Input Data Metric Tons	Metric Tons CO_2e per year
PG&E Electricity	2	71,063,501 kWh	15,892
SoCal Gas Co. Natural Gas	1	4,282,865 Therms	22,911

Commercial / Industrial

Commercial and industrial electricity were combined into one section by PG&E due to the California 15/15 Rule. The 15/15 Rule was adopted by the California Public Utilities Commission (CPUC) in the Direct Access Proceeding (CPUC Decision 97-10-031) to protect customer confidentiality. The 15/15 Rule requires that any aggregated information provided by the utilities must be made up of at least 15 customers. A single customer's load must be less than 15 percent of an assigned category. If the number of customers in the complied data is below 15, or if a single customer's load is more than 15 percent of the total data, categories must be combined before the information is released. The Rule further requires that if the 15/15 Rule is triggered for a second time after the data has been screened already using the 15/15 Rule, the customer must be dropped from the information provided.

As a result, PG&E aggregated commercial and industrial energy consumption in Atascadero into one report. SoCal Gas Co. separated commercial and industrial gas usage (shown in the chart below) into two reports. It would have been misleading to present an 'Industrial' for only natural gas emissions; therefore, the SoCal Gas Co. emissions were aggregated with commercial as well.

Data for this sector was provided by:

- John Bohman, Analyst with PG&E Green Communities and Innovator Pilots (jzbx@pge.com)
- Colby Morrow, Southern California Gas Company & San Diego Gas and Electric Company Air Quality Manager, Customer Programs Environmental Affairs (clmorrow@semprautilities.com)

Raw data received from these sources is reflected in the table below. CACP2009 Average Grid Electricity, RCI Average, and Fuel CO_2 Coefficient Sets were amended to reflect California standards (See 'electricity and natural gas coefficients' section).

TABLE 2: COMMERCIAL/INDUSTRIAL ENERGY USE

2005 Commercial / Industrial Energy Emissions	Scope	Input Data	Metric Tons CO_2e per year
PG&E Commercial + Industrial Electricity	2	59,802,016 kWh	13,374
SoCal Gas Co. Commercial Natural Gas	1	1,213,399 Therms	6,491
SoCal Gas Co. Industrial Natural Gas	1	21,004 Therms	112

Electricity and Natural Gas Coefficients

Electricity and natural gas coefficients are defaulted to national averages in the CACP2009 software. To make the Inventory more accurate and representative of the city's real impact on climate change, tailored coefficient sets for California were obtained. Sources and coefficient values are summarized in the table below.

TABLE 3: PG&E COEFFICIENT SETS

Coefficient Set	Unit	Value	Source
Average Grid Electricity Set	Lbs / MWh	489 CO_2	John Bohman, Analyst with PG&E Green Communities and Innovator Pilots (jzbx@pge.com)
Marginal Grid Electricity Set	Lbs / MWh	489.16 CO_2 0.00808 N_2O 0.03024 CH_4	Utility Pacific Gas and Electric Coefficient set provided by CACP2009

TABLE 4: SOCAL GAS CO COEFFICIENT SETS

Coefficient Set	Unit	Value	Source
Fuel CO_2 Set	kg/MMBtu	53.060	Coefficient set provided by CACP2009
RCI Average Set - Residential	kg/MMBtu	0.001 N_2O 0.0059 CH_4	Coefficient set created by the CEC and provided by SoCal Gas Co.
RCI Average Set - Commercial	kg/MMBtu	0.001 N_2O 0.0059 CH_4	Coefficient set created by the CEC and provided by SoCal Gas Co.
RCI Average Set - Industrial	kg/MMBtu	0.001 N_2O 0.0059 CH_4	Coefficient set created by the CEC and provided by SoCal Gas Co.

TRANSPORTATION

Community On-Road VMT

Community on-road vehicle miles traveled (VMT) are miles traveled on locally maintained roads within the City of Paso Robles. State roads, highways, and interstate routes are not included in this calculation. Local VMT data was obtained from the Caltrans Highway Performance Maintenance System (HPMS) 2005 Report. The raw data obtained from this report is reflected in the table below.

TABLE 5: CALTRANS HPMS DATA FOR SAN LUIS OBISPO COUNTY, 2005

San Luis Obispo County	Jurisdiction	Maintained Miles			Daily Vehicle Miles of Travel (DVMT) (1,000)		
		Rural	Urban	Total	Rural	Urban	Total
Cities:	Arroyo Grande	0	58.52	58.52	0	199.7	199.70
	Atascadero	4.36	146.03	150.39	1.86	285.52	287.37
	Grover Beach	0	40.87	40.87	0	98.81	98.81
	Morro Bay	0	49.51	49.51	0	115.77	115.77
	Paso Robles	6.55	112.82	119.37	3.89	253.29	257.19
	Pismo Beach	0	45.47	45.47	0	64.25	64.25
	San Luis Obispo	0	121.08	121.08	0	443.81	443.81

San Luis Obispo County	Jurisdiction	Maintained Miles			Daily Vehicle Miles of Travel (DVMT) (1,000)		
		Rural	Urban	Total	Rural	Urban	Total
Other:	County (unincorporated)	1,073.65	240.16	1,313.81	767.21	399.72	1,166.93
	State Highway	278.41	85.47	363.88	2,432.14	2,849.85	5,281.98
	State Park Service	20.56	1.7	22.26	1.85	5.78	7.63
	US Fish & Wildlife Service	19.19	0	19.19	6.72	0	6.72
	US Forest Service	42.5	0	42.5	1.28	0	1.28
SAN LUIS OBISPO Total		**1,445.22**	**901.63**	**2,342.71**	**3,214.95**	**4716.5**	**7,931.44**

The rural and urban daily vehicle miles of travel (DVMT) were then converted to annual VMT by multiplying by 365 days/year. The HPMS DVMT average includes lessened travel on weekends, which means this methodology is appropriate.

TABLE 6: CALTRANS HPMS DATA ADJUSTED FOR ANNUAL VMT PER JURISDICTION, 2005

City	Community On-Road Annual VMT
Arroyo Grande	72,890,500
Atascadero	104,890,050
Grover Beach	36,065,650
Morro Bay	42,256,050
Paso Robles	93,847,350
Pismo Beach	23,451,250
San Luis Obispo	161,990,650
Unincorporated County	425,929,450
Total	961,347,950

Highway VMT

Highway VMT are miles traveled on highways and interstate routes. Highway VMT data was also given in the Caltrans HPMS report; however, it is aggregated by county rather than by city. As such, we calculated the city's VMT by determining the portion of total highway road segments within the incorporated area. This was done using Geographic Information Systems (GIS) to 'clip' a map of highway roads in the San Luis Obispo County by jurisdictional boundary. The analysis concluded that 4.29% of total state and federal highways and roads are included in the city. Using this as an indicator of VMT, we concluded that approximately 82.76 million VMT occurred in the city in 2005. This methodology of distributing VMT by road segment length is supported by ICLEI; however, it does assume constant levels of traffic along all roads within the county. The levels of traffic along each road segment in each jurisdiction are unavailable, therefore this methodology is the best available at this time.

This analysis includes the following State Routes:

- US 101
- SR 41

TABLE 7: STATE HIGHWAY VMT PER JURISDICTION, 2005

City	Highway maintained miles	Percentage of total maintained highway miles	Highway VMT Annual Totals per jurisdiction
Arroyo Grande	4.3683	1.2147%	23,419,197.36
Atascadero	15.4372	4.2927%	82,760,872.61
Grover Beach	0.9577	0.2663%	5,134,376.99
Morro Bay	5.7539	1.6000%	30,847,605.74
Paso Robles	10.6936	2.9737%	57,329,868.21
Pismo Beach	7.8788	2.1909%	42,239,547.18
San Luis Obispo	10.3831	2.8873%	55,665,080.01
Unincorporated County	304.1360	84.5739%	1,630,518,574.64
Total	359.61	99.9996%	1,927,915,122.74

Transportation Coefficients

By default, the CACP 2009 software uses a national average distribution of vehicles by type (passenger vehicle, light truck, heavy truck, etc), national average fuel economies per vehicle type (miles per gallon), and national average emissions coefficients. In order to provide an accurate assessment of the emissions within the city, we obtained county-specific emissions data from the California Air Resources Board EMissions FACtors (EMFAC) software. The EMFAC2007 model calculates emission rates from all motor vehicles, such as passenger cars to heavy-duty trucks, operating on highways, freeways and local roads in California. In the EMFAC model, the emission rates are multiplied with vehicle activity data provided by the regional transportation agencies to calculate the statewide or regional emission inventories.

The EMFAC analysis was performed by the California Air Resources Board for San Luis Obispo County. Specifically, the data was provided by:

- Tom Scheffelin, California Air Resources Board Planning and Technical Support Division, Tscheffe@arb.ca.gov

This data was then manipulated to fit the format of CACP2009, which uses different vehicle classification categories than EMFAC. For instance, CACP2009 defines “heavy duty truck” as trucks with a gross vehicle weight of over 8,000 pounds, which includes EMFAC classifications for Light Heavy-Duty Trucks (LHDT) 1, LDHT 2, Medium Heavy-Duty Trucks (MHDT), and Heavy Heavy-Duty Trucks (HHDT). Additionally, CACP2009 does not include categories for transit buses or motorcycles. To account for these vehicle types the fuel efficiency for the Diesel Heavy Duty Vehicles was manipulated to include Transit Buses, based on a weighted average of Trucks representing 98.7% of the category and Transit Buses representing 3.3%. Similarly, the emission factors for Gasoline Passenger Cars was manipulated to include Motorcycles, based on a weighted average of Passenger Vehicles representing 98.7% of the category and Motorcycles representing 1.3%. For simplicity in re-running this analysis for future Inventories, tailored coefficients and VMT distributions were only applied to five vehicle types, which included the following EMFAC vehicle classifications:

1) **Heavy truck:** LHDT1, LHDT2, HHDT, OB, MHDT
2) **Light truck/SUV/Pickup:** MDT
3) **Passenger Vehicle:** Passenger Car, LDT1, LDT2
4) **Transit Bus:** Urban Bus (UB), School Bus (SB)
5) **Motorcycle:** Motorcycle (MC)

For each of the five vehicle classes above, a weighted average was calculated using the EMFAC coefficients and their portion of total vehicle miles traveled.

WASTE

The methane commitment method embedded in CACP2009 is based on the EPA's WAste Reduction Model (WARM) for calculating lifecycle emissions from waste generated within the jurisdictional boundary of the city in 2005. The analysis does not use the waste-in-place method, which calculates emissions from all waste generated in 2005 and all waste already existing in the landfill before the baseline year.

The waste sector takes into account the waste sent to landfill from city residents, businesses, and institutions. It does not calculate emissions from the total amount of waste sent to county landfills (Cold Canyon and Chicago Grade) in 2005 since those landfills accept waste from the unincorporated county and incorporated cities.

Solid waste tonnage data per jurisdiction was provided by:

- "2005 Disposal Report" by quarter, prepared by the San Luis Obispo Integrated Waste Management Board on 3/6/06. Document provided by Peter Cron, San Luis Obispo County Integrated Waste Management Authority (pcron@iwma.com).

Since the composition of waste sent to landfill in 2005 is unknown for the city, the following statewide average waste composition study was utilized:

- CIWMB 2004 Statewide Waste Characterization Study, http://www.ciwmb.ca.gov/Publications/default.asp?pubid=1097.

The Waste Characterization Study's distribution of waste by type was then converted into the five categories included in the CACP2009 software, which resulted in the following waste characterization:

- Paper Products: 20.5%
- Food Waste: 12%
- Plant Debris: 9.3%
- Wood/Textiles: 19.2%
- All other waste: 39%

The CACP2009 software does not have the ability to assign an individual methane recovery factor to each landfill; therefore, we took a weighted average (60%) based on the portion of

waste in each landfill. The methane recovery factors of the landfills are well documented by the San Luis Obispo Air Pollution Control District based on the system operations at that time. **Table 8** includes methane recovery factors for the Chicago Grade and Cold Canyon landfills.

TABLE 8: COMMUNITY GENERATED WASTE, 2005

Methane recovery and indicator inputs, 2005	Methane Recovery	Total gas generated (mmcf/yr)	Total gas transferred (mmcf/yr)	Data Source	Waste Tonnage from city, 2005 (tons)
Chicago Grade	60%	157.47	94.48	Data from APCD 2005 Inventory	31,097
Cold Canyon	60%	700.00	400.00	Data from APCD 2005 Inventory	26

Other – Off-road agricultural equipment

Off-road agricultural equipment emissions were calculated using the OFFROAD2007 modeling software developed by the California Air Resources Board. The tool calculates total emissions per off-road category per emission type (CH_4, N_20, CO_2, etc) for the entire county, including incorporated and unincorporated areas.

To separate the aggregate 2005 emissions outputs for off-road agricultural equipment in the city, we used agriculture and crop GIS shape files provided by San Luis Obispo County. These shape files were clipped with the jurisdictional boundaries within the county by PMC to yield the following results:

TABLE 9: OFF-ROAD AG EMISSIONS PER JURISDICTION, 2005

Ag land and off-road ag equipment emissions per jurisdiction, 2005	Ag/OS[1] (acres)	% of total	N_2O (tons/yr)	CH_4 (tons/yr)	CO_2 (tons/yr)
Arroyo Grande	365.10	0.11%	0.0010	0.0164	79.9719
Atascadero	740.20	0.23%	0.0019	0.0333	162.1341
Grover Beach	287.10	0.09%	0.0008	0.0129	62.8867
Morro Bay	1,040.80	0.32%	0.0027	0.0469	227.9778
Paso Robles	2,517.50	0.78%	0.0066	0.1134	551.4356
Pismo Beach	119.90	0.04%	0.0003	0.0054	26.2630
San Luis Obispo	311.20	0.10%	0.0008	0.0140	68.1655
Unincorporated County	317,226.40	98.33%	0.8356	14.2859	69,485.5771
Total	322,608.20	100.00%	0.8498	14.5283	70,664.4118

The OFFROAD software calculates emissions from other sources of off-road equipment as well, including recreational vehicles and watercrafts; however, these emissions were not included because there was no feasible methodology for separating these emissions per jurisdiction within the county. Population is proven to not be an accurate indicator of consumption rates. To remain consistent with protocol and practice, emissions must be separated in a spatial manner, similar to how highway emissions are determined by road segment length within each jurisdiction. It should also be noted that many location-sources of off-road emissions, such as recreational vehicle emissions, occur in State Parks or Beaches outside of the jurisdiction of each city or the county.

2020 AND 2025 FORECAST

The 2020 and 2025 forecasts calculate business-as-usual growth based on population, job, and household growth rates. Employment and population baseline data was obtained from the San Luis Obispo Council of Governments report, "Long Range Socio-Economic Projections (Year 2030)" prepared by Economic Research Associates (ERA) in May 2006, Revised July 2006.

[1] Land identified as agricultural or open space uses provided by San Luis Obispo County.

Employment and population projections were obtained from the May 2009 Revision. Mid-range estimates of growth were used in both instances. It should be noted that these forecasts do not take into consideration any planned or actual efficiency or conservation measures after 2005. For example, the State Renewable Energy portfolio has advanced significantly since 2005, but the forecast calculates 2020 energy emissions by assuming constant emissions factors.

APPENDIX D:
DETAILED METHODOLOGY FOR CITY GOVERNMENT OPERATIONS INVENTORY

APPENDIX D: DETAILED METHODOLOGY FOR GOVERNMENT OPERATIONS INVENTORY

Detailed Methodology for Government Operations GHG Emissions Inventory

The detailed methodology for government operations is much less complex than the community-wide methodology explanation. Since the government operations GHG emissions inventory is a facility-scale study, data records are much more reliable and consistent. In addition, the Local Government Operations Protocol provides us a verified guide for calculating emissions in each sector.

BUILDING

The building sector includes all emissions from natural gas and electricity consumed in City-owned and - operated facilities. The kWh of electricity and therms of natural gas were then entered into the CACP2009 software where they were converted to CO_2e. For a complete list of buildings included in this sector, please see the detailed CACP2009 report in **Appendix B**.

The building sector used the PG&E verified Average Grid Electricity Set and the CEC Emission Factor for Natural Gas RCI Average Set, as defined in **Appendix C**. The analysis did not use the PG&E natural gas coefficient for the fuel CO_2 set because natural gas comes entirely from the Southern California Gas Company.

VEHICLE FLEET

The vehicle fleet sector includes gasoline and diesel vehicles from the following City departments:

- Community Development
- Community Services
- Fire
- Police
- Public Works

Gasoline and diesel consumption for calendar year 2005 was obtained from fuel billing statements provided by the Finance Department. The Police Department provided their own fuel usage data as there record keeping was more complete. Specific sources of data within each organization are outlined in the notes of **Appendix B**.

For the vehicle fleet, we used the County EMFAC coefficients for gasoline and diesel described in **Appendix C**. These are weighted averages per multiple vehicle types in San Luis Obispo County.

EMPLOYEE COMMUTE

Employees were surveyed in June 2009 using an online survey instrument. The questions, attached as **Appendix E**, asked employees about their current commuting patterns. Of those questions, we used the following for our analysis:

- What is your approximate one-way distance to work (in miles)? Please indicate the most direct distance to work, discounting midway destinations that would be taken whether or not you drove to work each day (i.e. dropping off children at school).
- Please indicate the type of transportation you take to work each day in your average work week. Please note that there are two types of carpooling.
  - ◇ Drive alone
  - ◇ Carpool with fellow City employees
  - ◇ Carpool with drivers not employed by the City
  - ◇ Vanpool
  - ◇ Public transit
  - ◇ Motorcycle
  - ◇ Bicycle
  - ◇ Walk
  - ◇ Telecommute
  - ◇ Other
- What type of vehicle do you drive?
- What type of fuel does your vehicle use?
- If you carpool with fellow City employees, how many City employees ride with you? If you carpool with a different number each day, please indicate the average.

Approximately 69 employees responded to the survey with usable information, meaning that all essential questions were answered. Answers with mileage left blank or with highly inconsistent data (ex: saying they walked three days to work, biked two, and drove five) were omitted. In

addition, if a respondent did not describe their 'other' category of transportation, the entry was omitted.

To perform this analysis, we took the following steps:

1) Separate entries by what type of vehicle they own and operate (compact, midsize car, full-size car, small truck, medium-small truck, large truck, motorcycle or "don't drive"). Within each new group, separate the entries by diesel, gasoline or hybrid.

2) For each group of entries with the same vehicle type and technology, multiply the number of miles to work by 2 (to get round-trip estimate) and then by the number of 'drive alone' days for each entry. Multiply the number of miles to work by the number of 'carpool' days (half of the 'drive alone' emissions). Note: If a respondent entered that they motorcycle to work, but own a car as well, the motorcycle miles were moved to the motorcycle category). Adjust for hybrids (see below).

3) Add all miles per vehicle type and technology and multiply by 52.18 work weeks/year.

4) Calculate the multiplier to adjust survey response data to the entire 2005 employee population. In 2005, there were 128 employees. This, divided by the 69 survey entries, gives us our multiplier of 1.74.

5) Multiply the mileage per vehicle per technology type by the multiplier.

6) Divide the number of hybrid miles by three and add the difference to the 'passenger car' category. This is to account for the large increase in hybrid sales between 2005 and 2009 (Source: Hybridcars.com sales statistics).

7) Manipulate the vehicle classes to fit the CACP2009 software categories.

8) Enter final miles into the CACP2009 software per vehicle type and fuel.

APPENDIX D: DETAILED METHODOLOGY FOR GOVERNMENT OPERATIONS INVENTORY

TABLE 1: 2009 EMPLOYEE COMMUTE SURVEY

Vehicle Group	2009 Survey Results		Adjusted for 2005	
	Annual VMT	Fuel Type		
Light Trucks	56,197.86	Gasoline	107,536.92	Gasoline
	313.08	Diesel	6,645.64	Diesel
Large Trucks	22,620.03	Gasoline	19,750.03	Gasoline
	16,843.70	Diesel	34,785.80	Diesel
Passenger Vehicle	138,885.77	Gasoline	34,785.80	Gasoline
Motorcycle	208.72	Gasoline		Gasoline
Total	306,621.16	Gasoline	610,176.11	Gasoline
	20,819.82	Diesel	41,431.44	Diesel

The CACP2009 software does not provide a method of calculating emissions from hybrid cars. As a result, these emissions were divided by 2.20 based on the difference between average fuel economy of a 2005 Toyota Prius and the average fuel economy included in the 2005 SLO EMFAC data and then entered into the CACP2009 software under 'passenger vehicle' (Source: www.fueleconomy.gov).

STREETLIGHTS

The City's Finance Department provided billing information for the electricity used to operate City streetlights and traffic signals. The total kWh were entered into the CACP2009 software using the verified PG&E Average Grid Electricity Set outlined in **Appendix C**.

WATER / SEWAGE

This sector calculates emissions from energy consumption at City-owned and operated wastewater facilities and point-source emissions that arise due to fermentation of degraded biomass in the wastewater lagoons. The Finance Department provided the electricity consumption for each of the water facilities. Operational data provided by the Wastewater Treatment Plant Manager was utilized to determine total methane and nitrous oxide emissions using ICLEI's Wastewater Emissions Data tool. Both of these sources are outlined in **Appendix**

B. These totals were entered into the CACP2009 software with the PG&E Average Grid Electricity Set outlined in **Appendix C**.

WASTE

Atascadero Waste Alternatives reported solid waste tonnage produced by City operations. The City produced 168.65 tons of waste in 2005 that was sent to managed landfill. The waste composition was unknown for the city; therefore, the California averages provided by the 2004 California Integrated Waste Management Board Waste Characterization Report were used. A weighted average methane recovery factor of 60% was used in this analysis, as outlined in **Appendix C**.

APPENDIX E:
CITY EMPLOYEE COMMUTE SURVEY, 2009

City Employee Commute Survey, 2009

---

1) What is your approximate on-way distance to work (in miles)? Please indicate the most direct distance to work, discounting midway destinations that would be taken whether or not you drove to work each day (i.e. dropping off children at school).

_____

2) Please indicate the type of transportation you take to work each day in your average work week. Please note that there are two types of carpooling.

	Day 1	Day 2	Day 3	Day 4	Day 5
Drive Alone	☐	☐	☐	☐	☐
Carpool with fellow City employees	☐	☐	☐	☐	☐
Carpool with other drivers not employed by the City	☐	☐	☐	☐	☐
Vanpool	☐	☐	☐	☐	☐
Public transit	☐	☐	☐	☐	☐
Motorcycle	☐	☐	☐	☐	☐
Bicycle	☐	☐	☐	☐	☐
Walk	☐	☐	☐	☐	☐
Telecommute	☐	☐	☐	☐	☐
Other	☐	☐	☐	☐	☐

3) What type of vehicle do you drive?

- ☐ Compact/Sub-Compact car (Civic, Corolla, Focus, Neon, Cavalier, Jetta or similar)
- ☐ Mid-size car (Accord, Camry, Passat, Monte Carlo, Sable, Sebring or similar)
- ☐ Full-size car (Impala, Intrepid, Taurus, Crown Victoria, Bonneville, Town Car or similar)
- ☐ Small Truck/SUV/Pickup (RAV4, Chev S10, Pickup (4 cylinder), PT Cruiser or similar)
- ☐ Medium-Small Truck/SUV/Pickup (Minivan, Sonoma Pickup Truck or similar)
- ☐ Medium-Large Truck/SUV/Pickup (Durango, Safari Cargo Van, Ford F150 or similar)
- ☐ Large Truck/SUV/Pickup (Suburban, Expedition, Navigator, Ford E250/350/450 or similar)
- ☐ Motorcycle
- ☐ I don't drive alone or drive a carpool

4) What type of fuel does your vehicle from question 3 use?

- ☐ Gasoline
- ☐ Diesel
- ☐ Biodiesel
- ☐ Hybrid
- ☐ Electric
- ☐ I don't drive to work or drive a carpool
- ☐ Other (Specify): _____

5) If you carpool or vanpool with fellow City employees, home may City employees ride with you? If you carpool with a different number each day, please indicate the average. If 'not applicable', please enter "0".

Enter # of people: _____