



# City of Pasadena Greenhouse Gas Emissions Inventory

November 2013

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# City of Pasadena Greenhouse Gas Emissions Inventory

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## **APPENDICES**

Appendix A: Municipal GHG Emissions CACP Report

Appendix B: Community-wide GHG Emissions CACP Report

Appendix C: Tournament of Roses and Rose Bowl VMT Inventory

Appendix D: GHG Accomplishments (2007-2011)





## EXECUTIVE SUMMARY

A greenhouse gas (GHG) emissions inventory identifies the major sources and quantities of GHG emissions produced by City government (municipal) operations and community-wide activities within a jurisdiction's boundaries for a given year. Estimating GHG emissions enables local governments to establish an emissions baseline, track emissions trends, identify the greatest sources of GHG emissions within their jurisdiction, and set targets for future reductions.

This document includes a 2009 baseline inventory of GHG emissions from municipal operations and community-wide activities within the City, and a 2020 and 2035 "business-as-usual" forecast of how emissions in Pasadena would change if consumption trends and behavior continue as they did in 2009, absent any new federal, state, regional or local policies or action that would reduce those emissions. It is important to note that the municipal operations inventory is a subset of the community inventory, meaning that the municipal emissions are included within the community-wide inventory.

The community-wide inventory is divided into five sectors, or sources of emissions: residential energy use, commercial and industrial energy use, transportation, solid waste, and water consumption. The municipal inventory provides a more detailed analysis of emissions resulting from City-owned or -operated buildings, lighting, and fleet/ transit vehicles; electric power generation; water delivery facilities; City-generated solid waste; employee commute travel; and the Tournament of Roses and Rose Bowl Stadium.

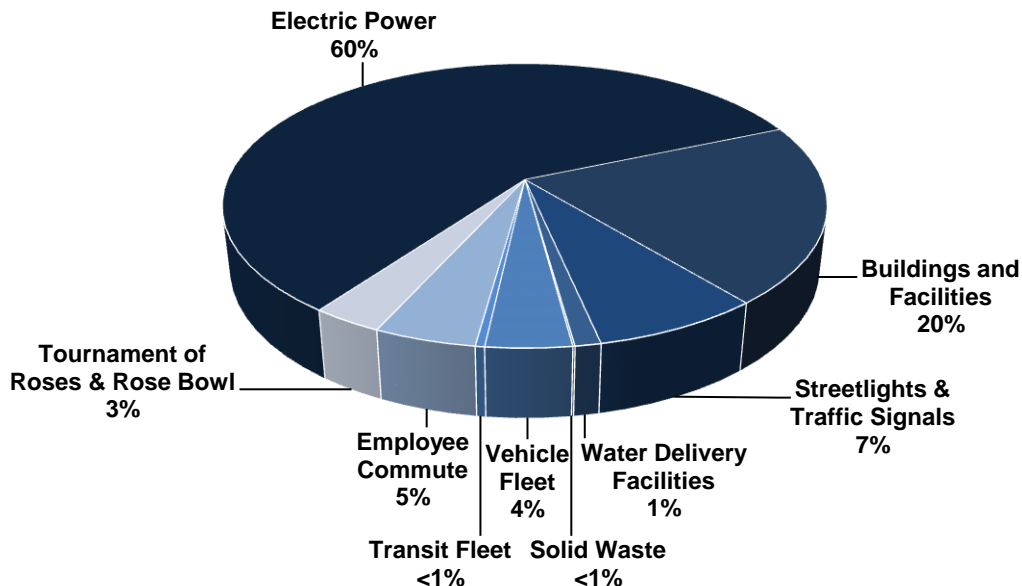
Like all GHG emissions inventories, this document must rely on the best available data and calculation methodologies. Emissions estimates are subject to change as better data and calculation methodologies become available in the future. Nevertheless, the findings of this analysis provide a solid basis upon which Pasadena can begin planning and taking action to reduce its GHG emissions.

### Municipal Inventory Results

In 2009, the City of Pasadena's municipal GHG emissions totaled 121,811 metric tons of carbon dioxide equivalents (MT CO<sub>2</sub>e). As shown in **Figure ES.1** and **Table ES.1** below, emissions from the City's electric power generation facilities were the largest (72,749 MT CO<sub>2</sub>e, or 60%). The second largest source of emissions (24,027 MT CO<sub>2</sub>e, or 20%) were from electricity and

natural gas consumed in the City's buildings and facilities. Cumulatively, the City spent approximately \$13,543,767 on energy for municipal operations in 2009.

**Figure ES.1 2009 Municipal Emissions by Sector**



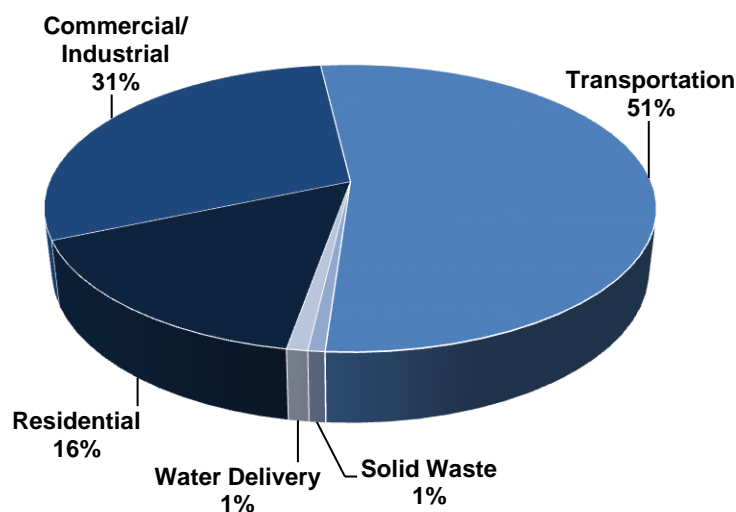
**Table ES.1 2009 Municipal Emissions Summary by Sector**

Sector	GHG Emissions (MT CO <sub>2</sub> e)	Cost	Percentage of Total Emissions
Electric Power	72,749	\$7,147,615	60%
Buildings and Facilities	24,027	\$2,868,862	20%
Streetlights & Traffic Signals	8,623	\$2,297,714	7%
Water Delivery Facilities	1,318	\$262,725	1%
Solid Waste	118	--	<1%
Vehicle Fleet	4,784	\$414,847	4%
Transit Fleet	519	\$552,004	<1%
Employee Commute	5,717	--	5%
Tournament of Roses and Rose Bowl	3,956	--	3%
<b>Total</b>	<b>121,811</b>	<b>\$13,543,767</b>	<b>100%</b>

## Community-wide Inventory Results

In 2009, the Pasadena community emitted approximately 2,052,701 MT CO<sub>2</sub>e. As shown in **Figure ES.2** and **Table ES.2** below, the transportation sector was the largest source of emissions, generating approximately 1,062,681 MT CO<sub>2</sub>e, or 51% of total 2009 emissions. Electricity and natural gas consumption within the commercial/industrial sector was the second largest source of 2009 emissions, generating 632,213 MT CO<sub>2</sub>e, or 31% of the total. Similarly, electricity and natural gas use in Pasadena’s residential sector produced 324,026 MT CO<sub>2</sub>e, or 16% of total community emissions. The remaining 2% of emissions are the result of electricity from water consumption and the methane that will result from the decomposition of waste that was generated by the Pasadena community during 2009.

**Figure ES.2 2009 Community-wide Emissions by Sector**



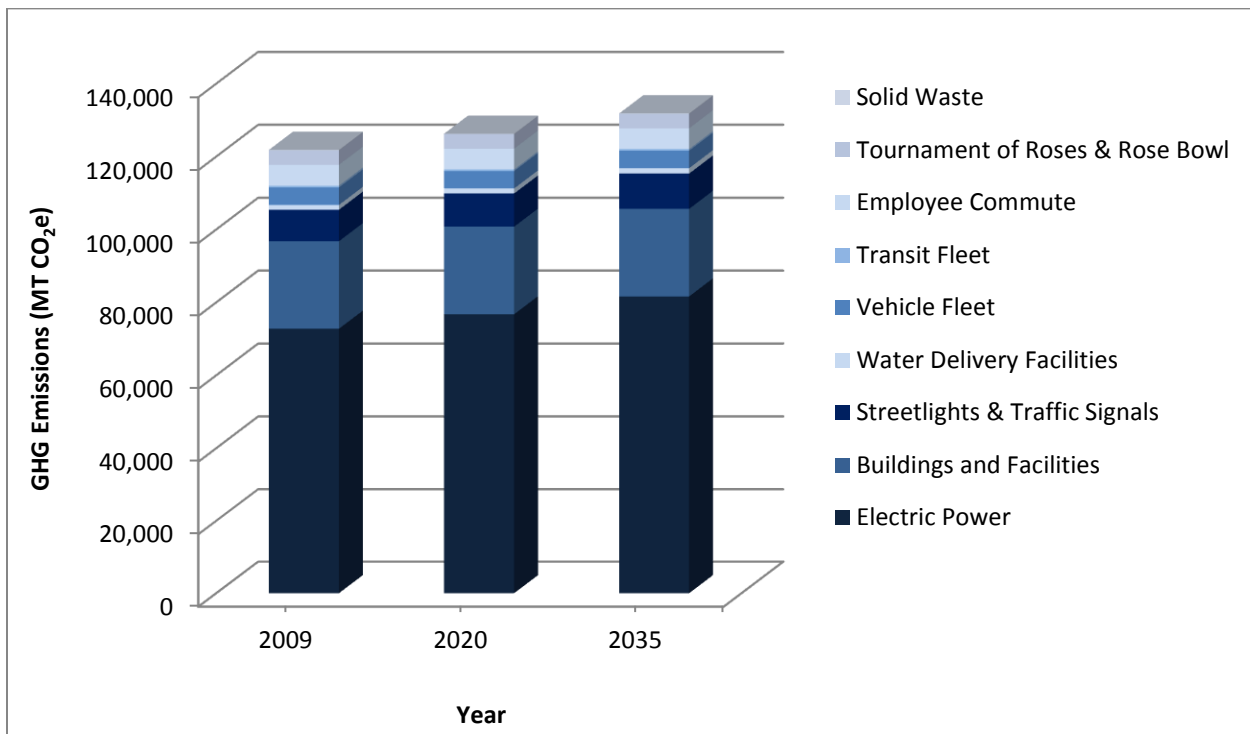
**Table ES.2 2009 Community-wide Emissions Summary by Sector**

Sector	GHG Emissions (MT CO <sub>2</sub> e)	Percentage of Total Emissions
Residential	324,026	16%
Commercial/Industrial	632,213	31%
Transportation	1,062,681	51%
Solid Waste	15,019	1%
Water Consumption	18,762	1%
<b>Total</b>	<b>2,052,701</b>	<b>100%</b>

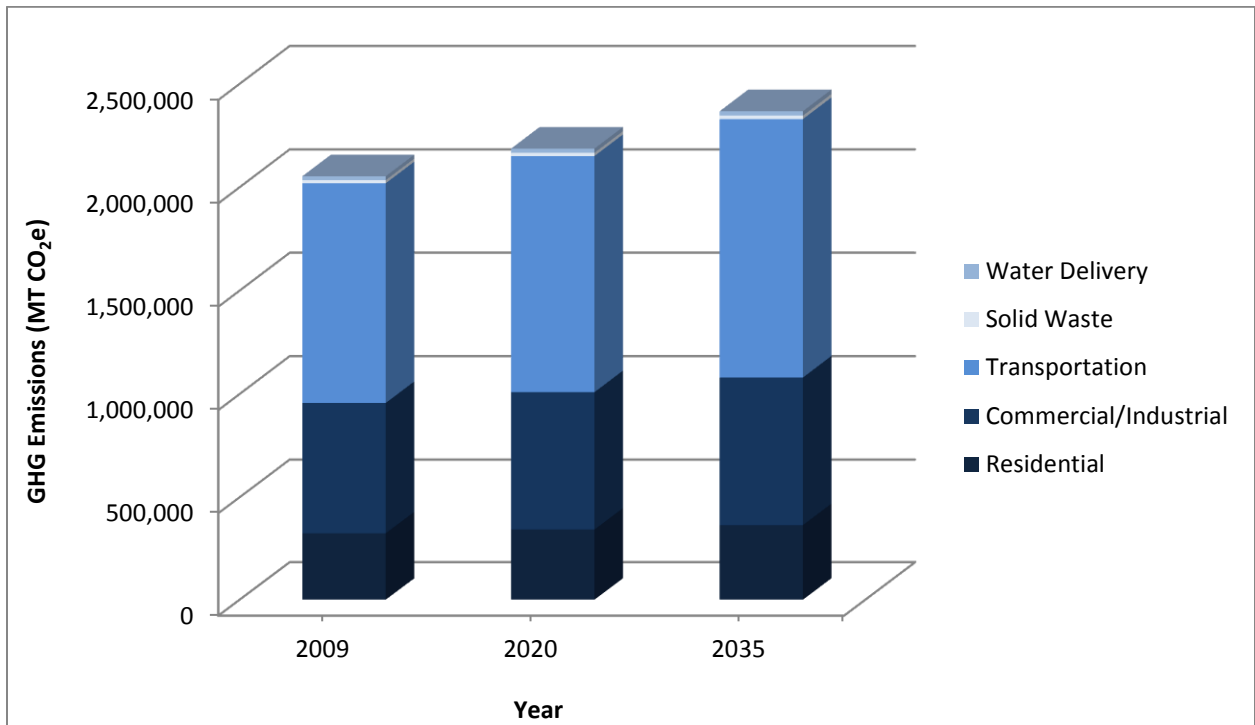
## 2020 and 2035 Emissions Forecast

The GHG emissions forecast provides a “business-as-usual” estimate of how emissions would change in the years 2020 and 2035 if consumption trends continue as they did in the 2009 baseline year, absent any new federal, state, regional, or local policies or actions that would reduce GHG emissions. As shown in **Figure ES.3**, if consumption trends continue the pattern observed in 2009 and accounting for projected growth in population, employment, and vehicle miles traveled (VMT), municipal emissions will reach 126,251 MT CO<sub>2</sub>e by 2020 and 131,838 MT CO<sub>2</sub>e by 2035. Forecast municipal emissions represent a 4% increase in 2020 and 8% increase in 2035 over 2009 baseline levels. Community-wide emissions are forecast to reach 2,186,122 MT CO<sub>2</sub>e by 2020 and 2,367,191 MT CO<sub>2</sub>e by 2035 (**Figure ES.4**). Forecast community-wide emissions represent a 6% increase in 2020 and a 15% increase in 2035 over 2009 baseline levels.

**Figure ES.3 Municipal Emissions Forecast for 2020 and 2035**



**Figure ES.4 Community-wide Emissions Forecast for 2020 and 2035**



# 1. INTRODUCTION

Local governments play a fundamental role in reducing greenhouse gas (GHG) emissions. Local government policies can effectively reduce GHG emissions and can prepare their communities for the potential impacts of climate change. Through such efforts, Pasadena can reduce GHG emissions at both the municipal (local government) and community level.

The City of Pasadena exercises direct control over its GHG emissions-generating activities. For example, it can reduce energy consumption in municipal buildings, reduce fuel consumption by municipal fleet vehicles, and increase the amount of energy that is obtained from renewable energy sources. The City can also influence community-wide activities that generate GHG emissions, for example, by improving building codes, incentivizing alternative transportation options, and educating community members about their choices as consumers. That influence may be exercised directly through the City's authority over local land use planning and building standards, and indirectly through programs that encourage GHG reducing activities.

By quantifying the GHG emissions from municipal facilities and operations and the community as whole, this report provides an understanding of where the highest percentages of emissions in Pasadena originate and where the greatest opportunities for emissions reductions exist. It also provides City decision-makers and the community with adequate information to inform policy decisions and provides a baseline against which future progress can be measured.

## 1.1 Purpose of GHG Inventory

The purpose of the City of Pasadena GHG Emissions Inventory (Inventory) is to identify the sources and quantities of GHG emissions within the City's jurisdictional boundaries. This Inventory is the first step in addressing GHG emissions. The Inventory was developed to serve the following purposes:

- Provide an understanding of Pasadena's major sources of GHG emissions and where the greatest opportunities for GHG emissions reductions exist;
- Create a GHG emissions baseline from which Pasadena can set GHG emissions reductions targets and measure future progress;
- Enable the City to understand the scale of emissions from various sources and develop GHG emissions accounting and reporting principles; and
- Provide best practices to aid in the development of a citywide Climate Action Plan.

## 2. METHODOLOGY

This Inventory was completed using methodologies recommended and supported by the California Air Resources Board (ARB). The local government operations (municipal) component of the GHG emissions inventory follows the Local Government Operations Protocol (LGOP), version 1.1, which was adopted in 2010 by the ARB and serves as the national standard for quantifying and reporting GHG emissions from local government operations. The community-wide inventory was developed using the Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions (Community Protocol) (2012). Emissions were calculated using the Clean Air Climate Protection (CACP) software, which is based on the principles and methods of these protocols.

### 2.1 Baseline and Forecast Years

The State of California uses 1990 as a reference year to remain consistent with Assembly Bill 32 (AB 32), which codified the State's 2020 GHG emissions target by directing the California ARB to reduce statewide emissions to 1990 levels by 2020. However, cities and counties throughout California typically elect to use years later than 1990 as baseline years because of the increased reliability of recordkeeping from those years and the large amount of growth that has occurred since 1990. The year 2009 was selected as the baseline year for Pasadena's Inventory due to the availability of reliable land use and transportation data, which was prepared for the City's General Plan. This Inventory uses a forecast year of 2020 to be consistent with the State of California GHG Inventory<sup>1</sup> forecast year and AB 32 target, both of which reference 2020. The Inventory also includes a forecast year of 2035 for consistency with the horizon year of the City's General Plan.

### 2.2 Municipal and Community-wide Inventories

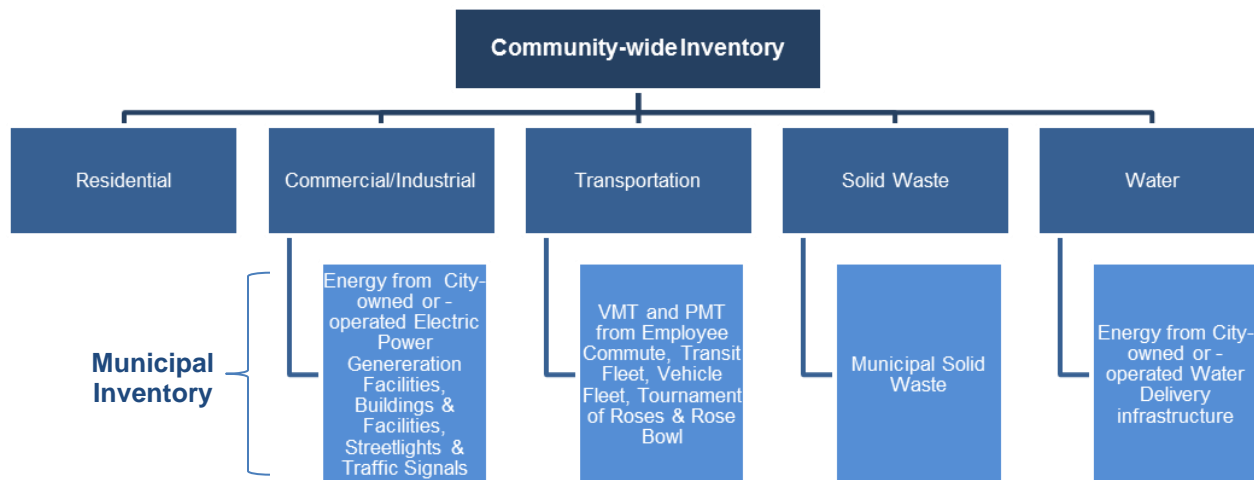
This Inventory is separated into two sections: municipal and community-wide. The municipal inventory includes emissions resulting from facilities that the City owns and/or operates. The community-wide inventory includes all emissions occurring within Pasadena's geo-political control (i.e., sources of emissions within the City limits over which the City has significant influence or jurisdictional authority). The municipal inventory is a subset of the community inventory, meaning that all municipal operations are included in the commercial/industrial,

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<sup>1</sup> California GHG Inventory, <http://www.arb.ca.gov/cc/inventory/inventory.htm>

transportation, solid waste, or water categories of the community-wide inventory. The municipal inventory should not be added to the community analysis; rather, it should be looked at as a portion of the total community emissions. Although municipal operations represent a small portion of the community’s overall emissions, a municipal 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** depicts the relationship between the community-wide and municipal inventories.

**Figure 2.1 Relationship between Community-wide and Municipal Inventories**



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



## 2.3 Calculating Emissions

### 2.3.1 Greenhouse Gases

According to both the LGOP and the Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions, local governments should assess emissions of all six internationally recognized GHGs. These gases are outlined in **Table 2.1**, which includes their sources and global warming potential (GWP), which refers to their ability to trap heat in the atmosphere.<sup>2</sup> For example, one pound of methane has 21 times more heat capturing potential than one pound of carbon dioxide. This report focuses on the three GHGs most relevant to local government policymaking: CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O. These gases comprise a large majority of GHG emissions at the community level. The omitted gases, hydrofluorocarbons, perfluorocarbons, and SF<sub>6</sub> are emitted primarily in private sector manufacturing and electricity transmission,<sup>3</sup> and are the subject of regulation at the state level.

To simplify reporting and analysis of GHGs, GHG emissions are reported in metric tons of carbon dioxide equivalent (MT CO<sub>2</sub>e) units, per standard practice. When dealing with an array of emissions, the gases are converted to their carbon dioxide equivalents for comparison purposes.

**Table 2.1 Greenhouse Gases**

Gas	Chemical Formula	Combustion	Global Warming Potential (CO <sub>2</sub> e)
Carbon Dioxide	CO <sub>2</sub>	Combustion	1
Methane	CH <sub>4</sub>	Combustion, Anaerobic Decomposition of Organic Waste (Landfills, Wastewater), Fuel Handling	21
Nitrous Oxide	N <sub>2</sub> O	Combustion, Wastewater Treatment	310
Hydrofluorocarbons	Various	Leaking Refrigerants, Fire Suppressants	12-11,700
Perfluorocarbons	Various	Aluminum Production, Semiconductor Manufacturing, HVAC Equipment Manufacturing	6,500-9,200
Sulfur Hexafluoride	SF <sub>6</sub>	Transmission and Distribution of Power	23,900

<sup>2</sup> Global warming potential (GWP) is a measure of the amount of warming a GHG may cause, measured against the amount of warming caused by carbon dioxide.

<sup>3</sup> Data provided by Pasadena Water and Power (PWP) from the California ARB's 2009 GHG Report indicate that no emissions of SF<sub>6</sub> associated with storage, purchases, sales and/or change in total nameplate capacity of equipment occurred at City power generation facilities in 2009.

### 2.3.2 Activity Data and Emission Factors

GHG emissions are estimated using calculation-based methodologies to derive emissions using activity data and emissions factors. To estimate emissions, the basic equation below is used:

$$\text{Activity Data} \times \text{Emission Factor} = \text{Emissions}$$

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

Emission factors are used to convert energy usage or other activity data into associated emissions quantities. They are usually expressed in terms of emissions per unit of activity data (e.g., lbs. CO<sub>2</sub>/kWh).

## 2.4 Reporting Emissions

### 2.4.1 Emissions by Scope

For municipal and community-wide inventories, emissions sources can be categorized by “scope” according to the entity’s degree of control over the emissions source and the location of the source. Emissions sources are categorized as direct (Scope 1) or indirect (Scope 2 or Scope 3), in accordance with the World Resources Institute and the World Business Council for Sustainable Development’s *Greenhouse Gas Protocol Corporate Standard*. **Figure 2.2** illustrates the three emissions scopes.

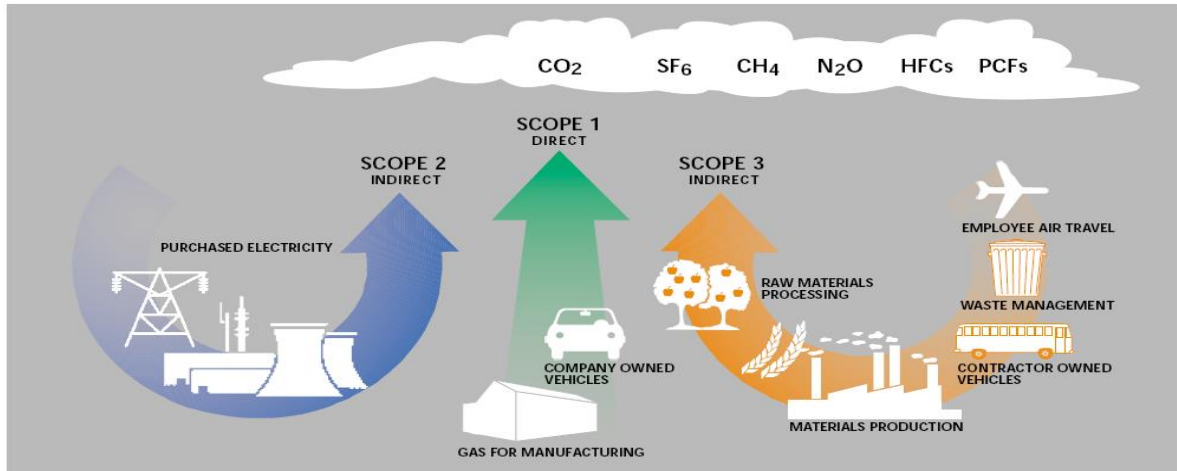
#### Municipal Scope Definitions

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

**Scope 2:** Indirect GHG emissions associated with the consumption of electricity, steam, heating, or cooling that are purchased from a utility provider that also provides energy to other jurisdictions and/or is located outside City boundaries.

**Scope 3:** All other indirect GHG emissions not covered in Scope 2, such as emissions resulting from the extraction and production of purchased materials and fuels, transport-related activities in vehicles not owned or controlled by the City (e.g., employee commuting and business travel, Tournament of Roses vehicles and travel, outsourced activities, waste disposal, etc.).

**Figure 2.2 GHG Emissions Scopes**



Sources of Scope 1, 2, and 3 GHG emissions  
 Source: [Greenhouse Gas Protocol Corporate Standard](#)

Community-wide Scope Definitions

**Scope 1:** Direct GHG emissions from sources located within the jurisdictional boundaries of the community, including emissions from fuel combustion vehicles<sup>4</sup> in the community and direct emissions from natural gas combustion in homes and businesses within the community.

**Scope 2:** Indirect GHG emissions associated with the consumption of electricity within the community.

**Scope 3:** All other indirect or embodied GHG emissions not covered in Scope 2, which occur as a result of activity within the jurisdictional boundaries (e.g., methane emitted at landfills outside the community resulting from solid waste generated within the community).

<sup>4</sup> Accounts for GHG emissions from running exhaust, idle exhaust, starting exhaust, diurnal, resting loss, running loss, and hot soak.

## 2.4.2 Emissions by Sector

In addition to categorizing emissions by scope, ICLEI recommends that local governments examine their emissions in the context of the sector that is responsible for those emissions. Many local governments will find a sector-based analysis more directly relevant to policy making and project management, as it assists in formulating sector-specific reduction measures and climate action plan components.

The municipal inventory reports emissions by the following sectors:

- Electric Power<sup>5</sup>
- Buildings and Facilities
- Streetlights and Traffic Signals
- Water Delivery Facilities
- Solid Waste
- Transit Fleet
- Vehicle Fleet
- Employee Commute
- Tournament of Roses and Rose Bowl Stadium

The community-wide inventory reports emissions by the following sectors:

- Residential
- Commercial/Industrial
- Transportation
- Solid Waste
- Water Consumption

**Table 2.2** summarizes the scopes of each sector in the municipal and community-wide inventories.

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<sup>5</sup> Electric power accounts for GHG emissions associated with City-owned power generation facilities.

**Table 2.2 Emissions by Sector and Scope**

Sector	Scope 1	Scope 2	Scope 3
<b>Municipal Inventory</b>			
Electric Power	Natural Gas	---	---
Buildings and Facilities	Natural Gas	Electricity	---
Streetlights and Traffic Signals	---	Electricity	---
Water Delivery Facilities	---	Electricity	---
Solid Waste	---	---	Methane from Decomposition
Vehicle Fleet <sup>1</sup>	Gasoline & Diesel	---	---
Transit Fleet	Gasoline, Diesel & Compressed Natural Gas	---	---
Employee Commute <sup>1</sup>	---	---	Transportation fuels from car, rail & air travel
Tournament of the Roses and Rose Bowl <sup>2</sup>	---	---	Transportation fuels from car, rail & air travel
<b>Community-wide Inventory</b>			
Residential	Natural Gas	Electricity	---
Commercial/Industrial	Natural Gas	Electricity	---
Transportation <sup>1</sup>	Gasoline & Diesel	---	---
Solid Waste	---	---	Methane from Decomposition
Water Consumption	---	Electricity (associated with water obtained from local sources)	Electricity (associated with water obtained from MWD)

<sup>1</sup> The Vehicle and Transit Fleet Sectors in the municipal inventory and Transportation Sector in the community-wide inventory estimate tailpipe emissions (including running exhaust, idle exhaust, starting exhaust, diurnal, resting loss, running loss, and hot soak) from vehicles, per the LGOP and Community Protocol. Battery electric, hydrogen, and some other alternative fuel vehicles do not produce tailpipe emissions. Emissions from electricity or natural gas (to produce hydrogen) used for these vehicles are aggregated in the Buildings and Facilities Sector for the municipal inventory and the Transportation Sector for the community-wide inventory. According to the Community Protocol, an inventory should “never compare a vehicle’s direct tailpipe emissions with indirect electricity emissions” (Appendix D, page 19).

<sup>2</sup> GHG emissions resulting from electricity usage associated with the Tournament of the Roses and Rose Bowl are aggregated in Building and Facilities and Streetlight and Traffic Signal Sectors of the municipal inventory, consistent with the scoping of sectors outlined in the LGOP.

## 2.5 Data Sources

The data used to complete this Inventory came from multiple sources, as summarized in **Table 2.3**. These data sources are further explained in the sector-specific discussions of this document.

**Table 2.3 Municipal and Community-wide Data Sources**

Sector	Activity Data	Unit of Measurement	Data Source
<b>Municipal Inventory</b>			
Electric Power	Natural Gas Combusted	Cubic Feet	PWP
Buildings and Facilities	Electricity Consumption	kWh	PWP
	Natural Gas Consumption	Therms	SoCalGas
Streetlights and Traffic Signals	Electricity Consumption	kWh	City of Pasadena Public Works
Water Delivery Facilities	Electricity Consumption	kWh	PWP
Solid Waste	Solid Waste Tonnage	Tons	City of Pasadena Public Works
Vehicle Fleet	Gasoline and Diesel Consumption	Gallons	City of Pasadena Public Works
Transit Fleet	Gasoline, Diesel and Compressed Natural Gas Consumption	Gallons	City of Pasadena Transportation Department
Employee Commute	Sample of Employee Commuting Patterns	Annual VMT	City of Pasadena Transportation Department
Tournament of Roses and Rose Bowl	VMT	VMT	Fehr & Peers
<b>Community-wide Inventory</b>			
Residential	Electricity Consumption	kWh	PWP
	Natural Gas Consumption	Therms	SoCalGas
Commercial/Industrial	Electricity Consumption	kWh	PWP
	Natural Gas Consumption	Therms	SoCalGas
Transportation	VMT	VMT	Fehr & Peers
Solid Waste	Solid Waste Tonnage	Tons	City of Pasadena Public Works
Water Consumption	Water Consumption	Acre Feet	PWP, MWD

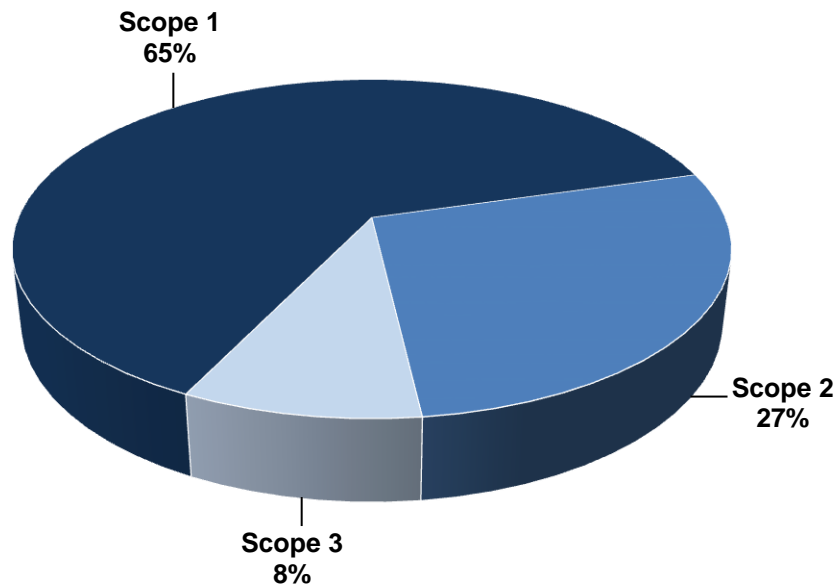
### 3. MUNICIPAL INVENTORY RESULTS

This chapter provides a detailed description of Pasadena’s GHG emissions from municipal operations in 2009. It also provides details on emissions by scope and by operational sector. In 2009, Pasadena’s municipal GHG emissions totaled 121,811 metric tons (MT) of CO<sub>2</sub>e.

#### 3.1 Municipal Emissions by Scope

As shown in **Figure 3.1** and **Table 3.1**, Scope 1 sources produced the largest percentage (65%) of municipal GHG emissions in 2009, totaling 78,642 MT CO<sub>2</sub>e. Scope 2 emissions produced the second largest amount (27%, or 33,378 MT CO<sub>2</sub>e), and Scope 3 emissions accounted for the remaining 8%, or 9,791 MT CO<sub>2</sub>e.

**Figure 3.1 2009 Municipal Emissions by Scope**



**Table 3.1 2009 Municipal Emissions (MT CO<sub>2</sub>e) Summary by Scope**

Sector	Scope 1	Scope 2	Scope 3	Total
Electric Power	72,749	--	--	72,749
Buildings and Facilities <sup>1</sup>	590	23,437	--	24,027
Streetlights & Traffic Signals <sup>1</sup>	--	8,623	--	8,623
Water Delivery Facilities <sup>1</sup>	--	1,318	--	1,318
Solid Waste	--	--	118	118
Vehicle Fleet	4,784	--	--	4,784
Transit Fleet	519	--	--	519
Employee Commute	--	--	5,717	5,717
Tournament of Roses and Rose Bowl	--	--	3,956	3,956
<b>Total</b>	<b>78,642</b>	<b>33,378</b>	<b>9,791</b>	<b>121,811</b>
<b>Percentage of Total</b>	<b>65%</b>	<b>27%</b>	<b>8%</b>	<b>100%</b>

<sup>1</sup>9% of the GHGs from PWP-supplied electricity come from City-owned generators and are therefore considered Scope 1 emissions. The remaining 91% of GHGs from PWP-supplied electricity come from imports generated outside the city and are considered Scope 2. To avoid double-counting, Scope 2 emissions from purchased electricity for municipal buildings and facilities, streetlights & traffic signals, and water delivery facilities were reduced by 9% as they are already accounted for in the Scope 1 category of the Electric Power sector.

The largest portion of Scope 1 emissions resulted from the electric power sector. These emissions qualify as Scope 1 because they involve the stationary combustion of fuels within the jurisdictional boundary of the City. The second largest source of Scope 1 emissions was the City's vehicle fleet. Electricity from City buildings and facilities generated the largest percentage of Scope 2 emissions. Emissions from employee commute and the Tournament of Roses and Rose Bowl Stadium account for the majority of Scope 3 emissions.

### 3.2 Municipal Emissions by Sector

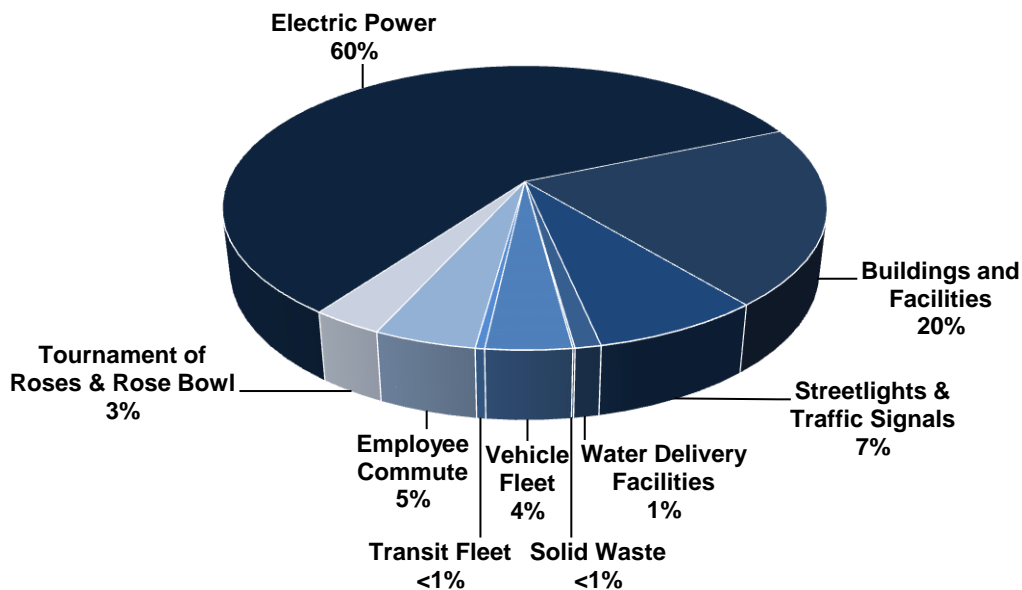
Reporting emissions by sector provides a useful way to understand the sources of the City's emissions. By better understanding the relative scale of emissions from each sector, the City can more effectively focus strategies to achieve the greatest emissions reductions.

As shown in **Figure 3.2** and **Table 3.2**, the City's electric power generation facilities were the largest emitters (60%, or 72,749 MT CO<sub>2</sub>e) in 2009. Emissions from buildings and facilities produced the second highest quantity of emissions, resulting in 24,027 MT CO<sub>2</sub>e (20% of total municipal emissions). The City's streetlights and traffic signals produced 8,623 MT CO<sub>2</sub>e (7% of total municipal emissions), with the remainder coming from employee commuting, the



Tournament of Roses and Rose Bowl, the vehicle fleet, water delivery facilities, the transit fleet, and solid waste.

**Figure 3.2 2009 Municipal Emissions by Sector**



**Table 3.2 2009 Municipal Inventory Summary by Sector**

Sector	GHG Emissions (MT CO <sub>2</sub> e)	Cost	Percentage of Total Emissions
Electric Power	72,749	\$7,147,615	60%
Buildings and Facilities	24,027	\$2,868,862	20%
Streetlights & Traffic Signals	8,623	\$2,297,714	7%
Water Delivery Facilities	1,318	\$262,725	1%
Solid Waste <sup>1</sup>	118	--	<1%
Vehicle Fleet	4,784	\$414,847	4%
Transit Fleet	519	\$552,004	<1%
Employee Commute <sup>1</sup>	5,717	--	5%
Tournament of Roses and Rose Bowl <sup>1</sup>	3,956	--	3%
<b>Total</b>	<b>121,811</b>	<b>\$13,543,767</b>	<b>100%</b>

<sup>1</sup>No municipal costs are associated with these Scope 3 emissions. As with the GHG emissions, costs resulting from electricity usage associated with the Tournament of the Roses and Rose Bowl are aggregated in building and facilities and streetlight and traffic signal sectors of the municipal inventory, consistent with the scoping of sectors outlined in the LGOP (see footnote 2 in Table 2.2).

### 3.2.1 Electric Power

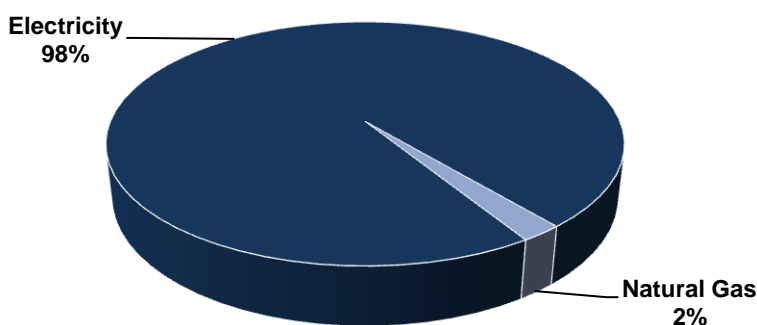
The City owns and operates two power generation facilities under the direction of PWP. Power generation facilities use a number of stationary combustion technologies to generate, transmit, and distribute electricity and produce heat and/or steam. PWP calculated a utility-specific coefficient set for its own operations for the baseline year, which was applied to the associated activity data in the CACP software. In 2009, PWP's electric power generation facilities generated 72,749 MT CO<sub>2</sub>e (60% of total municipal emissions).

### 3.2.2 Buildings and Facilities

The City owns and/or operates several facilities, including City Hall, fire stations, libraries, and parks. Facility operations result in the consumption of electricity and fuels, such as natural gas and diesel, which result in GHG emissions. City-owned and -leased facilities were identified by cross-checking two lists, one from PWP and another from the City's Buildings Systems and Fleet Management Division (BSFMD). Energy use data for these facilities was provided by PWP and entered into the CACP Software.<sup>6</sup>

In 2009, the operation of City buildings and facilities generated approximately 24,027 MT CO<sub>2</sub>e. As shown in **Figure 3.3**, the majority of emissions resulted from electricity use (98%). The City spent approximately \$2,868,862 in 2009 on the electricity and natural gas that resulted in these emissions.

**Figure 3.3 Emissions from City Buildings and Facilities by Source**



<sup>6</sup> The City owns and operates two power generation facilities under the direction of PWP. Only 9% of the total PWP-supplied was generated by these PWP power generation facilities and is considered Scope 1. The remaining 91% was supplied through PWP but generated outside the City and is considered Scope 2. To avoid double-counting, Scope 2 emissions from purchased electricity for municipal buildings and facilities, streetlights and traffic signals, and water delivery facilities were decreased by 9%, as they are already accounted for in the Scope 1 category of the Electric Power sector.

### 3.2.3 Streetlights and Traffic Signals

Like most local governments, Pasadena operates a range of public lighting, from traffic signals and sidewalk lighting to outdoor and park lights. In 2009, public lighting in Pasadena consumed a total of 14,833,100 kilowatt hours (kWh) of electricity, producing approximately 8,623 MT CO<sub>2</sub>e.<sup>5</sup> **Table 3.3** reports 2009 emissions by lighting type and annual electricity consumption associated with the activities that generated these emissions. The City spent approximately \$2,297,714 in 2009 on the electricity that caused these emissions.

**Table 3.3 Energy Use and Emissions from Public Lighting**

Source	GHG Emissions (MT CO <sub>2</sub> e)	Percentage of Total
Streetlights	7,520	87%
Traffic Signals	982	11%
Other Outdoor Lighting	121	2%
<b>Total</b>	<b>8,623</b>	<b>100%</b>

### 3.2.4 Water Delivery Facilities

This section addresses all City-owned or -operated stationary sources used for the distribution of water. Pasadena operates water transport equipment, including groundwater wells, booster pumps, interconnections, reservoirs, and water treatment plants, which use electricity resulting in GHG emissions. The majority of water delivery to the city is handled by PWP and the Metropolitan Water District (MWD).

In 2009, operation of the City's water delivery equipment produced approximately 1,318 MT CO<sub>2</sub>e, representing 1% of total municipal emissions.<sup>5</sup> Pasadena spent approximately \$262,725 in 2009 on the electricity that caused these emissions.

### 3.2.5 Solid Waste

Many local government facilities and operations generate solid waste, much of which is eventually sent to a landfill. Typical sources of solid waste from local government operations include paper and food waste from offices and facilities, construction waste from public works, and plant debris from parks departments. Organic materials in government-generated solid waste (including paper, food scraps, plant debris, textiles, wood waste, etc.) generate methane as they decay in the anaerobic environment of a landfill. An estimated 75% of this methane is

routinely captured via landfill gas collection systems;<sup>7</sup> however, a portion escapes and is emitted into the atmosphere. As such, estimating emissions from waste generated by government operations is an important component of a comprehensive emissions inventory.

In 2009, municipal facilities and operations generated 735 tons of solid waste. Identifying the different types of waste is necessary for a GHG inventory because certain types of waste generate methane at differing rates during decomposition within the anaerobic environment of landfills. The 2008 California Statewide Waste Characterization Study characterizes waste composition for the State of California and was used for this inventory.<sup>8</sup> Default emissions factors provided by CACP were used to calculate emissions by waste type. Municipal solid waste generated 118 MT CO<sub>2</sub>e.

### 3.2.6 Vehicle and Transit Fleet

The majority of local governments use vehicles and other mobile equipment as an integral part of their daily operations – from maintenance trucks used for parks and recreation to police cruisers and fire trucks. These vehicles and equipment use gasoline, diesel, and compressed natural gas, which result in GHG emissions.

In 2009, City-owned and -operated vehicles emitted approximately 5,303 MT CO<sub>2</sub>e. This sector includes gasoline, diesel, and compressed natural gas consumption from all departments in the City's operating vehicles (including off-road vehicles/equipment), as well as the transit fleet operated by the City. **Table 3.4** shows 2009 emissions from the combined vehicle fleet and transit fleet. The City's vehicle fleet accounts for 90% of total mobile emissions and the City's transit fleet accounts for the remaining 10% of total mobile emissions. Off-road vehicles and equipment resulted in 242 MT CO<sub>2</sub>e, or 5% of the City's vehicle fleet emissions.

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<sup>7</sup> Per the LGOP, landfill gas collection systems are not 100% efficient in collecting gas; therefore, a value of 75% collection efficiency should be used as a conservative default.

<sup>8</sup> CalRecycle's 2008 California Statewide Waste Characterization Study is available at <http://www.calrecycle.ca.gov/publications/Detail.aspx?PublicationID=1346>

**Table 3.4 Mobile Emissions Summary by Source**

Source	GHG Emissions (MT CO <sub>2</sub> e)	Cost	Percentage of Total Mobile Emissions
<b>Vehicle Fleet</b>			<b>90%</b>
Gasoline	3,421	\$1,182,794	65%
Diesel	1,363	\$374,550	26%
<b>Transit Fleet</b>			<b>10%</b>
Gasoline	406	\$154,572	8%
Diesel	113	\$375,880	2%
Compressed Natural Gas	>1	\$21,552	>1%
<b>Total</b>	<b>5,303</b>	<b>\$2,109,348</b>	<b>100%</b>

Of all mobile emissions calculated, 72% resulted from the combustion of gasoline, 28% resulted from the combustion of diesel, and less than 1% resulted from the combustion of compressed natural gas. The City of Pasadena spent approximately \$2,109,348 on the fuels that caused these emissions in 2009.

### 3.2.7 Employee Commute

Fuel combustion from employees commuting to work is another important emissions source from City operations. Similar to the City's vehicle fleet, the vehicles of personal employees use gasoline and other fuels, which when burned, generate GHG emissions. Emissions from employee commutes are considered optional to inventory by LGOP because the vehicles are owned and operated privately by the employees. However, LGOP encourages reporting these emissions because local governments can influence how their employees commute to work through incentives and commuting programs.

In 2009, emissions from employee commutes resulted in approximately 5,717 MT CO<sub>2</sub>e (5% of total municipal emissions). Emissions were calculated from the results of the Pasadena Department of Transportation (DOT) Employee Commute Survey. These results included employee zip code, one-way trip mileage, and commute mode. Daily commute information was entered into CACP Software to determine annual VMT based on Pasadena's 4.5-day workweek. Since the travel mode was unknown, total drive-alone commute and carpool commute mileage were entered into CACP Software using a 65% passenger vehicle – 35% light truck ratio, per ICLEI's guidance. **Table 3.5** shows modes of employee commute based on 1,882 responses to the survey.

**Table 3.5 Employee Travel by Commute Mode**

Most Common Mode of Travel	Number of Employees	Percentage of Total
Drive Alone	976	51.9%
Carpool/Vanpool	693	36.8%
Transit	134	7.1%
Biking	34	1.8%
Walking	38	2.0%
Other/Telecommute	7	0.4%
<b>Total</b>	<b>1,882</b>	<b>100%</b>

Employee business travel was also included as a component of emissions from employee commute. Mileage reimbursement forms from the City’s Finance Department were accessed to determine total annual mileage by travel mode. Total automobile VMT was entered into the CACP Software using the 65% - 35% breakdown described above. Passenger Miles Travelled (PMT) for train and airplane travel cannot be quantified by CACP Software and were calculated based on methodologies and formulas described by the U.S. Environmental Protection Agency (EPA).<sup>9</sup> **Table 3.6** depicts employee business travel by mode. Emissions from business travel account for 2% of total employee commute emissions.

**Table 3.6 Business Travel by Mode**

Mode of Travel	GHG Emissions (MT CO <sub>2</sub> e)	Percentage of Total Business Commute
Car	26	21%
Train	<1	<1%
Airplane	98	79%
<b>Total</b>	<b>124</b>	<b>100%</b>

### 3.2.8 Tournament of Roses and Rose Bowl Stadium

The City owns the Rose Bowl Stadium and has jurisdictional control over Tournament of Roses, which is an annual festival comprised of several distinct events. GHG emissions resulting from energy usage associated with the Tournament of the Roses and Rose Bowl are aggregated in Building and Facilities, Streetlight and Traffic Signal, and Water Delivery Facilities sectors of the municipal inventory, consistent with the scoping of sectors outlined in the LGOP. This section

<sup>9</sup> U.S. EPA “Optional Emissions from Commuting, Business Travel and Product Transport” May 2008.

identifies Scope 3 emissions that resulted from vehicle travel associated with Rose Bowl Stadium and Tournament of the Roses events held in 2009. These events are listed in **Table 3.7**.

Emissions were derived from VMT estimates (calculated in part using the Pasadena Citywide Travel Model and 2009 event attendance records; see **Appendix C** for detailed VMT calculations and methodology<sup>10</sup>) and regional emissions factors from the ARB's EMFAC 2007 model. EMFAC provides regionally-specific information on the mix of vehicle classes and model years, as well as ambient conditions and travel speeds that determine fuel efficiency.<sup>11</sup> As shown in **Table 3.7**, GHG emissions in 2009 from the Tournament of Roses and Rose Bowl Stadium events totaled 3,956 MT CO<sub>2</sub>e. These emissions represent 3% of Pasadena's total municipal emissions.

**Table 3.7 Tournament of Roses and Rose Bowl Stadium GHG Emissions**

Event	VMT	GHG Emissions (MT CO <sub>2</sub> e)	Percentage of Total
<b>Tournament of Roses</b>			<b>58%</b>
Rose Parade	1,542,423	813	21%
Rose Bowl Game	333,576	176	4%
Post Parade	233,770	123	3%
Float Decorating	2,266,134	1,194	30%
<b>Rose Bowl</b>			<b>42%</b>
Rose Bowl Flea Market	898,343	473	12%
UCLA Football Games	1,118,087	589	15%
International Soccer	615,701	324	8%
July 4 <sup>th</sup> Americafest	65,181	34	1%
High School Football	27,606	15	<1%
US Marine Corps Silent Drill	15,923	8	<1%
U2 Concert	393,403	207	5%
<b>Total</b>	<b>7,510,147</b>	<b>3,956</b>	<b>100%</b>

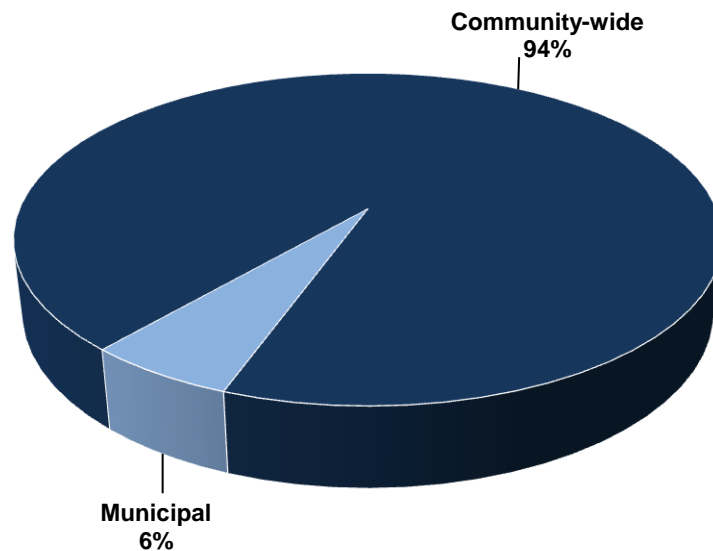
<sup>10</sup> Appendix C includes details regarding event attendance, travel mode, average vehicle occupancy, average trip length, and trip origin, which were used to calculate VMT.

<sup>11</sup> EMFAC accounts for the following types of emissions: running exhaust, idle exhaust, starting exhaust, diurnal, resting loss, running loss, and hot soak.

## 4. COMMUNITY-WIDE INVENTORY RESULTS

In 2009, activities and operations taking place within Pasadena’s jurisdictional boundaries resulted in approximately 2,052,701 MT CO<sub>2</sub>e. This number includes all Scope 1 emissions from on-site combustion of fuels in the residential and commercial/industrial sectors, and from the combustion of gasoline and diesel in vehicles traveling on local roads and state highways within Pasadena. This total also includes all Scope 2 emissions associated with electricity consumed within Pasadena, and all Scope 3 emissions from electricity consumption from water delivery to Pasadena from sources outside the city and waste generated by the Pasadena community. As shown in **Figure 4.1**, municipal operations represented 6% of total community-wide emissions in 2009.

**Figure 4.1 Municipal Operations Portion of Community-wide Emissions**

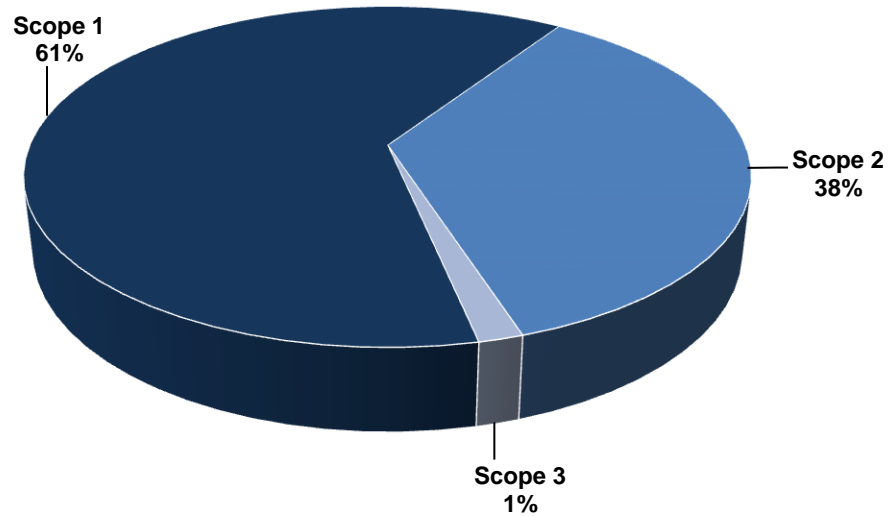


### 4.1 Community-wide Emissions by Scope

As shown in **Figure 4.2** and **Table 4.1**, Scope 1 sources produced the largest percentage (61%) of community GHG emissions in 2009, totaling 1,256,695 MT CO<sub>2</sub>e. Scope 2 emissions produced the second-largest amount (38%, or 769,610 MT CO<sub>2</sub>e), and Scope 3 emissions accounted for the remaining 1%, or 26,396 MT CO<sub>2</sub>e.



**Figure 4.2 2009 Community-wide Emissions by Scope**



**Table 4.1 2009 Community-wide Emissions (MT CO<sub>2</sub>e) Summary by Scope**

Sector	Scope 1	Scope 2	Scope 3	Total
Residential	116,939	207,087	--	324,026
Commercial/Industrial	77,075	555,138	--	632,213
Transportation	1,062,681	--	--	1,062,681
Solid Waste	--	--	15,019	15,019
Water Consumption	--	7,385	11,377	18,762
<b>Total</b>	<b>1,256,695</b>	<b>769,610</b>	<b>26,396</b>	<b>2,052,701</b>
<b>Percentage of Total</b>	<b>61%</b>	<b>38%</b>	<b>1%</b>	<b>100%</b>

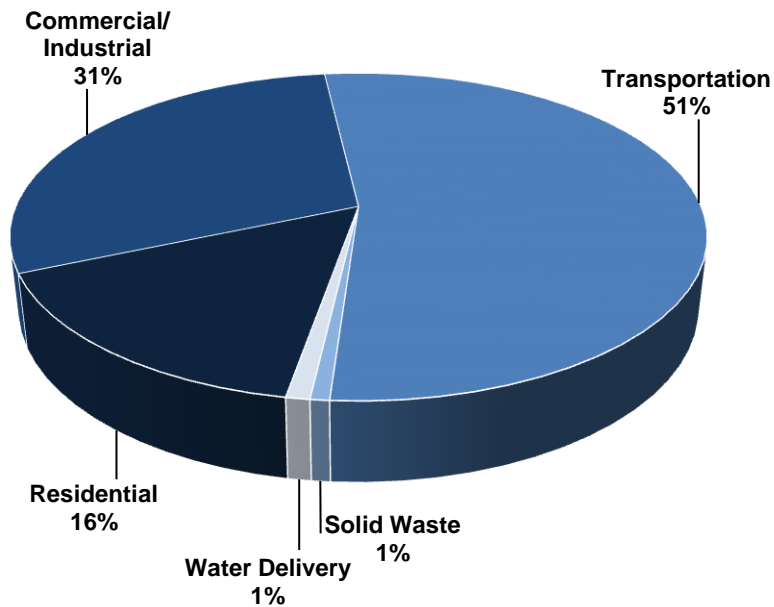
The largest portion of Scope 1 emissions in 2009 came from the transportation sector. These emissions qualify as Scope 1 because they involve the direct combustion of fuel within the jurisdictional boundary of the City. The second-largest source of Scope 1 emissions was residential natural gas use. Commercial/Industrial electricity use resulted in the largest percentage of Scope 2 emissions. Emissions from solid waste account for the majority of Scope 3 emissions.

## 4.2 Community-wide Emissions by Sector

By understanding the relative scale of emissions from each primary sector, the City can more effectively focus emission reductions strategies to achieve the greatest emission reductions. As

noted above, the community emitted 2,052,701 MT CO<sub>2</sub>e in 2009. **Figure 4.3** and **Table 4.2** show the total community emissions summarized by sector.

**Figure 4.3 2009 Community-wide Emissions by Sector**



**Table 4.2 2009 Community-wide Emissions Summary by Sector**

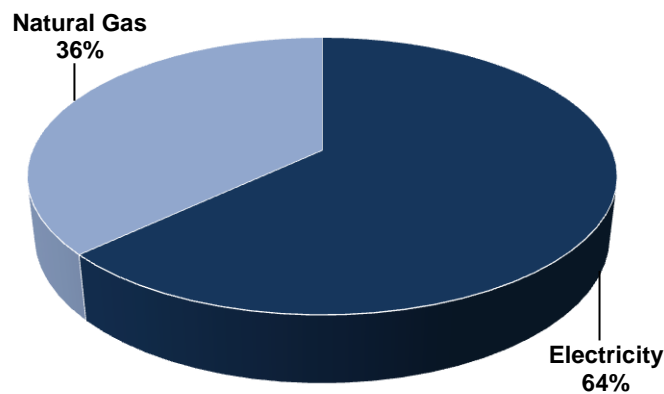
Sector	GHG Emissions (MT CO <sub>2</sub> e)	Percentage of Total Emissions
Residential	324,026	16%
Commercial/Industrial	632,213	31%
Transportation	1,062,681	51%
Solid Waste	15,019	1%
Water Consumption	18,762	1%
<b>Total</b>	<b>2,052,701</b>	<b>100%</b>

### 4.2.1 Residential

The residential sector includes GHG emissions resulting from electricity and natural gas used in residences in Pasadena. In 2009, the residential sector produced 324,026 MT CO<sub>2</sub>e. This represented 16% of total community-wide emissions.

In 2009, Pasadena’s entire residential sector consumed 331,682,808 kWh of electricity and 21,999,120 therms of natural gas. As shown in **Figure 4.4**, 64% of total residential emissions (207,087 MT CO<sub>2</sub>e) were the result of electricity consumption, and 36% (116,939 MT CO<sub>2</sub>e) were the result of natural gas use.

**Figure 4.4 Residential Emissions by Source**



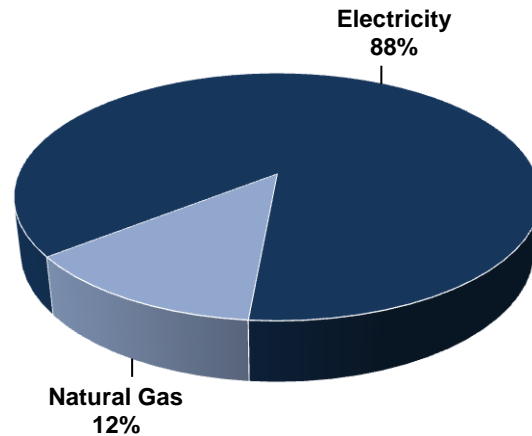
### 4.2.2 Commercial/Industrial

The commercial/industrial sector includes emissions resulting from electricity and natural gas used in non-residential buildings and facilities within Pasadena. In 2009, buildings and facilities within the commercial/industrial sector produced 632,213 MT CO<sub>2</sub>e (31% of total community-wide emissions).<sup>12</sup>

<sup>12</sup> Please note the commercial/industrial sector does not include direct emissions from private stationary sources (fixed emitters of air pollutants, such as industrial plants, private cogeneration facilities, etc.) that are regulated by the South Coast Air Quality Management District or through Federal or State programs due to insufficient data. Also, this inventory is intended to guide future local policy decisions that relate to emissions within the City’s jurisdictional control; therefore, these sources are excluded for the purpose of setting accurate emissions reduction targets. However, for disclosure purposes, according to the California Air Resources Board “Mandatory GHG Reporting Data - Emissions Reported for Calendar Year 2009” (March 12, 2012), the California Institute of Technology’s (Caltech) cogeneration facility emitted 56,195 MT CO<sub>2</sub>e in 2009.

In 2009, the City's commercial/industrial sector consumed 873,047,487 kWh electricity and 14,499,806 therms of natural gas. As shown in **Figure 4.5**, 88% of total commercial/industrial emissions (555,138 MT CO<sub>2</sub>e) were the result of electricity consumption and 12% (77,075 MT CO<sub>2</sub>e) were the result of natural gas use. Emissions resulting from electricity and natural gas use could not be disaggregated between commercial and industrial uses.

**Figure 4.5 Commercial/Industrial Emissions by Source**



### 4.2.3 Transportation

As with many other local governments, transportation on roads within Pasadena's geographic boundary constitutes the greatest percentage (51%) of community-wide emissions. Community-wide VMT for 2009 was calculated by Fehr & Peers, who performed a traffic study to quantify VMT for both vehicle trips internal to Pasadena and those that either originated or ended in Pasadena, but involved travel outside of the City's limits. Since travel mode was unknown, VMT data was input into CACP Software using the 65% passenger vehicle – 35% light trucks ratio described in Section 3.2.7 above. The transportation sector totaled 1,062,681 MT CO<sub>2</sub>e in 2009.

### 4.2.4 Solid Waste

The solid waste sector comprised less than 1% of total community-wide emissions in 2009. Emissions from the waste sector are an estimate of the methane generation from the decomposition of solid waste sent to landfill in the base year (2009). In 2009, the community generated 93,632 tons of solid waste that was sent to landfills. These emissions are considered Scope 3 because they are not generated in the base year, but will result from the decomposition of 2009 waste over the full 100+ year cycle of its decomposition. The 2008 California Statewide Waste Characterization Study describes the standard waste composition for the State of

California.<sup>13</sup> 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. About 75% of landfill methane emissions are captured through landfill gas collection systems, but the remaining 25% escape into the atmosphere.<sup>14</sup> Default emissions factors provided by CACP were used to calculate emissions by waste type. Please see **Table 4.3** below for a summary of emissions per waste type.

**Table 4.3 Solid Waste Emissions Sources**

Source	GHG Emissions (MT CO <sub>2</sub> e)	Percentage of Total
Paper Products	3,984	27%
Food Waste	7,855	52%
Plant Debris	1,034	7%
Wood/Textiles	2,146	14%
<b>Total</b>	<b>15,019</b>	<b>100%</b>

#### 4.2.5 Water Consumption

The majority of water delivery to the City is handled by PWP and the MWD.<sup>15</sup> According to PWP, water usage totaled 32,800 AF in 2009. Based on percentages outlined in the Pasadena Water Integrated Resources Plan,<sup>16</sup> 65% of water usage resulted from the residential sector and 35% resulted from the commercial/industrial sector. As shown in **Table 4.4**, emissions from water delivery totaled approximately 18,762 MT CO<sub>2</sub>e, representing less than 1% of total community-wide emissions.

**Table 4.4 Water Consumption by Sector**

Sector	Acre Feet	GHG Emissions (MT CO <sub>2</sub> e)	Percentage of Total
Residential	21,320	12,195	65%
Commercial/Industrial	11,480	6,567	35%
<b>Total</b>	<b>32,800</b>	<b>18,762</b>	<b>100%</b>

<sup>13</sup> <http://www.calrecycle.ca.gov/publications/Detail.aspx?PublicationID=1346>

<sup>14</sup> US EPA AP 42.

<sup>15</sup> MWD provided the GHG emissions coefficient of 0.572 MT CO<sub>2</sub>e per acre foot (AF) of water delivered to the City.

<sup>16</sup> <http://ww2.cityofpasadena.net/waterandpower/WaterPlan/default.asp>

## 5. 2020 AND 2035 EMISSIONS FORECAST

The emissions forecast for the City represents a “business-as-usual” projection, which is a representation of how municipal and community-wide GHG levels would change over time if consumption trends and behavior continue as they did in 2009, while taking into account projected growth in population, employment, and vehicle miles traveled. 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 under way or completed since 2009, the results of which likely put the City’s emissions on a track below the business-as-usual linear projection.

### 5.1 Growth Rates

Several indicator growth rates were developed and applied to the various sectors in order to project emissions. The growth rates were applied to the 2009 baseline data to obtain projected activity data (i.e., energy use, gasoline consumption, VMT, etc.). This data was then entered into CACP Software for the future years in order to calculate the projected emissions. **Table 5.1** displays the growth rates (and their data sources) that were applied to each sector.

#### 5.1.1 Population

Due to lack of accurate data, Pasadena population data from the 2010 Census was used as a proxy for 2009 population. Southern California Association of Governments (SCAG) population projections were used for 2020 and 2035. To account for the distortion caused by calculated growth rates between the Census and SCAG data, the numerical increment between SCAG’s 2003 and 2020 and 2003 and 2035 figures were divided by the number of years in that increment (17 and 32, respectively). The resulting number was then multiplied by the number of years between 2010 and 2020 and 2010 and 2035 (10 and 25, respectively). The growth rate was calculated using the resultant figures and the 2010 Census figure.

#### 5.1.2 Community Employment

SCAG community employment projections were used to calculate the employment growth rate. Due to lack of available data, 2010 community employment projections were used as a proxy for 2009.

### 5.1.3 VMT

VMT projections for 2035 were provided by Fehr & Peers. An interpolation calculation using the 2009 baseline and projected 2035 data points was performed in order to determine VMT data for 2020.

### 5.1.4 Municipal Employment

Data on the number of Pasadena’s municipal employees were both historically limited (2002-2011) and covered a period of atypical growth (both positive and negative). Given these constraints, it was determined that municipal employment would be held constant at 2009 baseline levels for 2020 and 2035.

**Table 5.1 Growth Rates by Sector**

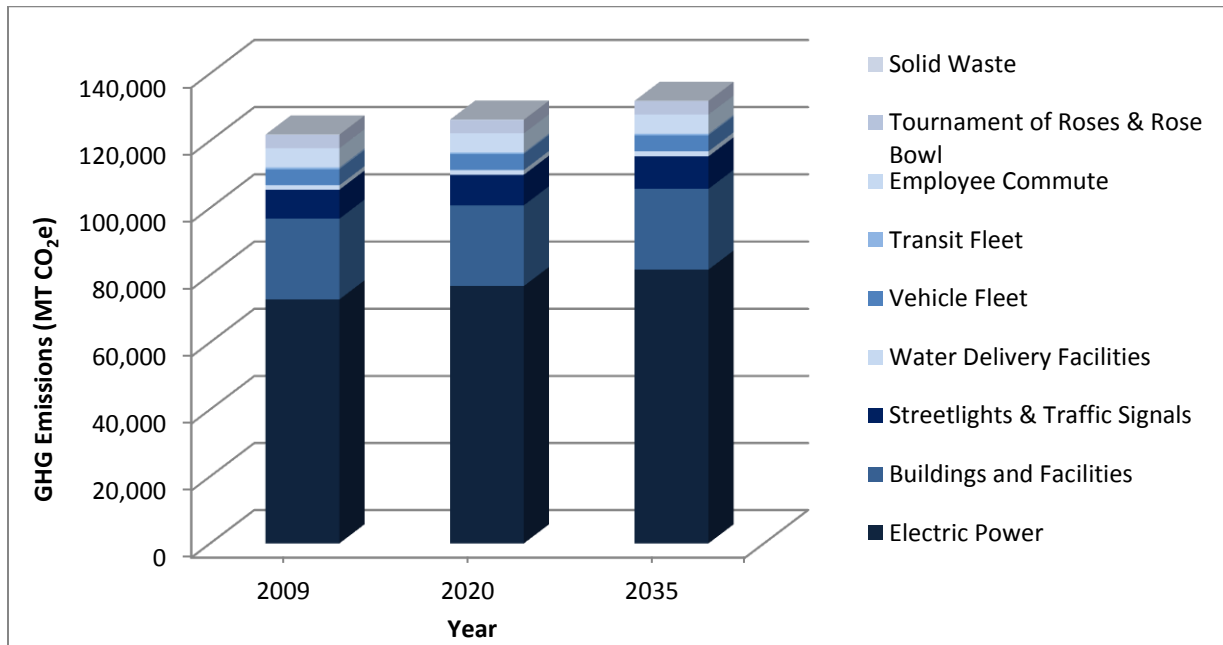
Sector	Applied Growth Rate	Source
<b>Municipal Forecast</b>		
Electric Power	Population	U.S. Census, SCAG
Buildings and Facilities	Municipal Employment	Pasadena Planning and Finance Departments
Streetlights and Traffic Signals	Population	U.S. Census, SCAG
Water Delivery Facilities	Population	U.S. Census, SCAG
Solid Waste	Municipal Employment	Pasadena Planning and Finance Departments
Transit Fleet	Population (adjusted to phase out diesel fleet)	U.S. Census, SCAG, and Phasing Out Diesel Powered Fleet
Vehicle Fleet	Municipal Employment	Pasadena Planning and Finance Departments
Employee Commute	Municipal Employment	Pasadena Planning and Finance Departments
Tournament of Roses and Rose Bowl <sup>1</sup>	---	Fehr & Peers, Pasadena Tournament of Roses Association
<b>Community-wide Forecast</b>		
Residential	Population	U.S. Census, SCAG
Commercial/Industrial	Community Employment	SCAG
Transportation	VMT	Fehr & Peers
Solid Waste	Population	U.S. Census, SCAG
Water Consumption	Population	U.S. Census, SCAG

<sup>1</sup> No growth rates were applied to emissions from the Tournament of Roses or Rose Bowl Stadium. Baseline emissions for these sectors were calculated based on annual attendance and there are no plans for an expansion in facility capacity.

## 5.2 Municipal Emissions Forecast

Under a business-as-usual scenario, it is anticipated that Pasadena’s municipal emissions will grow by approximately 4% by 2020 and 8% by 2035. **Figure 5.1** and **Table 5.2** show the results of the forecast.

**Figure 5.1 Municipal Emissions Forecast for 2020 and 2035**



**Table 5.2 Municipal Emissions Growth Forecast by Sector**

Sector	2009 MT CO <sub>2</sub> e	2020 MT CO <sub>2</sub> e	2035 MT CO <sub>2</sub> e	Percent Change from 2009 to 2020	Percent Change from 2009 to 2035
Electric Power	72,749	76,734	81,626	5%	12%
Buildings & Facilities	24,027	24,027	24,027	0%	0%
Streetlights & Traffic Signals	8,623	9,095	9,675	5%	12%
Water Delivery Facilities	1,318	1,390	1,479	5%	12%
Solid Waste	118	118	118	0%	0%
Vehicle Fleet	4,784	4,784	4,784	0%	0%
Transit Fleet <sup>1</sup>	519	429	456	-17%	-12%
Employee Commute	5,717	5,717	5,717	0%	0%
Rose Bowl	3,956	3,956	3,956	0%	0%
<b>Total</b>	<b>121,811</b>	<b>126,251</b>	<b>131,838</b>	<b>4%</b>	<b>8%</b>

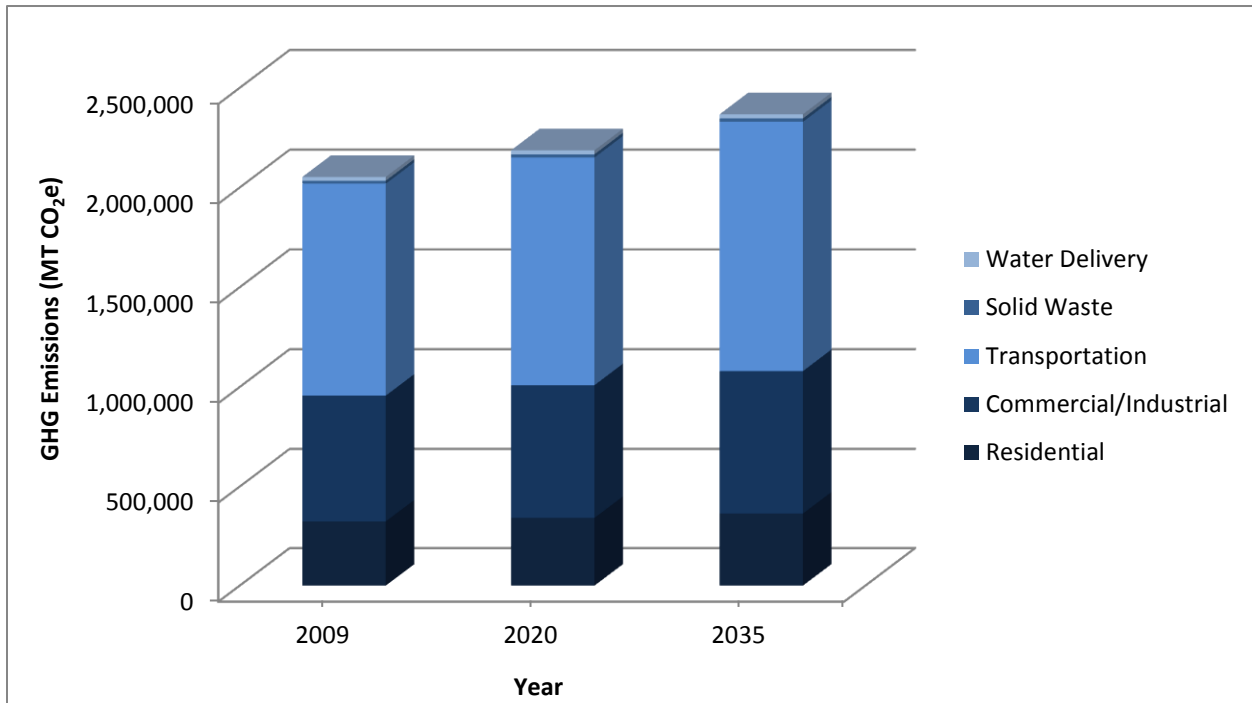
<sup>1</sup> Projected diesel usage for the City’s fleet in 2020 and 2035 was converted into terms of compressed natural gas (CNG) and added to the existing CNG projections to reflect the phasing out of diesel vehicles by 2020.



### 5.3 Community-wide Emissions Forecast

Under a business-as-usual scenario, Pasadena’s community-wide emissions will grow by approximately 6% by 2020 and 15% by 2035. **Figure 5.2** and **Table 5.3** show the results of the forecast.

**Figure 5.2 Community-wide Emissions Forecast for 2020 and 2035**



**Table 5.3 Community-wide Emissions Growth Forecast by Sector**

Sector	2009 MT CO <sub>2</sub> e	2020 MT CO <sub>2</sub> e	2035 MT CO <sub>2</sub> e	Percent Change from 2009 to 2020	Percent Change from 2009 to 2035
Residential	324,026	341,775	363,563	5%	12%
Commercial/Industrial	632,213	666,788	715,735	5%	13%
Transportation	1,062,681	1,141,927	1,249,990	7%	18%
Solid Waste	15,019	15,842	16,852	5%	12%
Water Consumption	18,762	19,790	21,051	5%	12%
<b>Total</b>	<b>2,052,701</b>	<b>2,186,122</b>	<b>2,367,191</b>	<b>6%</b>	<b>15%</b>

## 6. CONCLUSION

This Inventory will assist decision makers and stakeholders in identifying opportunities to reduce GHG emissions throughout the City of Pasadena. It also provides an emissions baseline that the City can use to set future emissions reduction targets. As previously detailed, the City emitted approximately 2,052,701 MT CO<sub>2</sub>e in 2009. Municipal GHG emissions totaled 121,811 MT CO<sub>2</sub>e, or about 6% of that total.

Programs and policies are already underway to help Pasadena reduce its GHG emissions consistent with AB 32. Such programs include the City's energy efficiency programs, solar rebates, conservation programs, green business support and green building program, incentives and ordinances and Cool Trees programs. Refer to **Appendix D** for a complete list of GHG reduction programs that the City accomplished between 2007 and 2011. Accomplishments since the 2009 inventory baseline (i.e. the 2010-2011 accomplishments) could be quantified and included in a climate action plan.

### 6.1 Best Practices

This Inventory identifies Pasadena's major sources of emissions and, therefore, provides direction to decision makers as to where to target emissions reduction activities. Given the results of the inventory, it is recommended that the City focus on the following cost-effective "best practices" in order to significantly reduce emissions from its municipal operations:

#### Buildings

- Continued audits and retrofit of existing municipal buildings, parks, stadiums, swimming pools and other recreation facilities, e.g. lighting, insulation, HVAC systems
- Continued building-specific renewable energy applications, e.g. installing solar hot water heating for locker rooms of recreational facilities
- Continued lighting efficiency improvements
- Expanded use of light colors on existing rooftops and street paving to reduce "heat island" effect
- Expanded procurement policies that specify energy efficiency standards in all purchasing and bid specifications for office equipment, motors, lighting, appliances, etc.

#### Lighting

- Continued replacement of existing indoor and outdoor lighting with energy efficient and low-wattage lamps and ballast

- Reduction in energy use through reducing hours of operation and/or number of lights
- Solar photovoltaic powered street and emergency lighting

### Vehicle Fleet

- Continued replacement of existing vehicles with zero and/or low emissions vehicles
- Reduction in fleet size, i.e. total number of vehicles
- Continued improvements in scheduling and route efficiency
- Improved maintenance regime for increased efficiency, e.g. check tire pressure

### Water Conservation

- Continued energy efficient retrofit of facilities, especially pumping processes
- Continued energy efficient specs for new construction of sewage and waste water system
- Process changes to improve energy efficiency of treatment of drinking water, wastewater and sewage

### Waste

- Increased office recycling, e.g. paper, cardboard, cans, toner cartridges
- Recovery of food waste in cafeterias and kitchens of local government buildings for composting or other use
- Expanded waste prevention in day-to-day operations—two-side copying, reduced paper requirements, etc.
- Continued purchasing preferences for recycled materials
- Continued composting of park, street, and other landscaping debris for re-use by Parks and Recreation
- Establishment of municipal composting program

### Other

- Implementation of urban forestry projects
- Establishment of energy efficiency or climate protection information clearinghouse

In addition to the types of actions described above, which reduce emissions from government operations, ICLEI recommends developing policies and actions that will help to reduce emissions throughout the community. Examples include:

## Residential and Commercial/Industrial Energy

- Building codes
  - Raising energy efficiency standards for new construction, significant renovations, remodeling, and additions
  - Requiring light colored, high albedo rooftops and pavement
- Ordinances for energy efficient retrofits of existing building stock at time of sale
- Continued solar hot water/pool heating and solar photovoltaic applications, ordinance, or incentives
- Continued financial incentives (e.g., existing tax incentives, rebates, loans) for:
  - Installation of solar photovoltaic systems, and other renewable energy applications
  - More efficient appliances, e.g. refrigerators, lighting, water heaters
  - Improving efficiency in existing and new buildings
- Home insulation or weatherization programs
- Expanded distribution of water saving devices, such as low-flow shower heads and faucet aerators
- Cooperative or aggregate purchase or buyer program for lighting, efficient equipment
- Reduced business fees or waiver of permits for energy efficiency improvements and use of solar energy
- Building energy tax credits
- Ordinances establishing energy efficiency requirements for new industrial permits
- Ordinances requiring industries to develop and implement energy conservation programs
- Ordinances lowering business fees or waiving permits for energy efficiency improvements and fuel switching (including use of solar energy), heat recovery/co-generation systems
- Provision of energy services to businesses, e.g. audits, assessments to recommend process changes, other energy efficiency improvements
- Establishment of financing program for efficiency improvements in the community (e.g., revolving loan funds through bonds, energy taxes, etc.)

## Transportation and Land Use

- Policy shifting funding away from roads to alternative transit
- Increased use of alternative transit—public transit, van-, carpooling, cycling, walking through:
  - Funding for facility, system and/or infrastructure improvements
  - Adopt a complete streets plan
  - Implement the facility and network improvements included in the Bicycle Transportation Plan

- Implement a bike share program serving the Central District
- Enhance Pasadena ARTS service connecting neighborhoods to Gold Line Stations
- Establishment of service center selling transit passes, coordinating car/van pooling, ridesharing, etc.
- Establishment of solar photovoltaic or other electric vehicle charging stations
- Parking policies:
  - Zoning ordinance that reduces minimum parking space requirements for new construction
  - Parking fees to fund transit use, bicycle or pedestrian improvements
- Zoning change to reduce parking requirements and allowances
- Density bonuses and incentives for high-density, infill, mixed use, and transit-oriented development
- Implement a Parking Guidance and Wayfinding program

### Waste Reduction

- Home composting education programs, distribute compost bins
- Improved or expanded residential curbside recycling collection (e.g., food waste recycling)
- Improved or expanded commercial recycling collection
- Financial incentives to reduce waste such as:
  - Special taxes and tipping fees
  - Advance disposal fees
- Establishment of a center for reusing salvageable goods
- Continued efforts to support the City's Zero Waste Strategic Plan

By identifying and implementing a set of these types of strategies, Pasadena would likely be able to reduce its GHG emissions consistent with AB 32. In the process, it may also be able to improve the quality of its services, reduce costs, and stimulate local economic development.

## 7. REFERENCES AND PREPARERS

### 7.1 References

California Air Resource Board, California Greenhouse Gas Inventory, April 2012. Available at: <http://www.arb.ca.gov/cc/inventory/inventory.htm>

California Department of Energy, Energy Information Administration's 2003 Commercial Building Energy Consumption Survey (CBECS)

CalRecycle, California 2008 Statewide Waste Characterization Study, November 2009. Available at: <http://www.calrecycle.ca.gov/publications/Detail.aspx?PublicationID=1346>

City of Pasadena, Water Integrated Resources Plant (WIRP), January 2012. Available at: <http://ww2.cityofpasadena.net/waterandpower/WaterPlan/default.asp>

New Zealand Business Council for Sustainable Development (NZBCSD), 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, 2002

USC Marshall Sports Business Institute, 2008 Economic Output Impact and Demographics Study, November 2008

U.S. Environmental Protection Agency, AP-42, Compilations of Air Pollutant Emission Factors, Fourth Edition, September 1985.

U.S. Environmental Protection Agency, Optional Emissions from Commuting, Business Travel and Product Transport, May 2008.

### 7.2 List of Preparers

This GHG Inventory was prepared by Rincon Consultants, Inc. and Fehr & Peers under contract to the City of Pasadena. Persons involved in research, analysis, report preparation, project management, and quality control include:

Joe Power, Principal, Rincon Consultants, Inc.  
Shauna Callery, Senior Project Manager, Rincon Consultants, Inc.  
Christina McAdams, Associate Planner, Rincon Consultants, Inc.

Chris Gray, Senior Associate, Fehr & Peers  
Peter Carter, Transportation Planner, Fehr & Peers

# APPENDIX A

CACP DETAILED REPORT FOR  
MUNICIPAL EMISSIONS, 2009





# Government Greenhouse Gas Emissions in 2009

## Detailed Report

### Scope 1 + Scope 2 + Scope 3

CO <sub>2</sub> (tonnes)	N <sub>2</sub> O (kg)	CH <sub>4</sub> (kg)	Equiv CO <sub>2</sub> (tonnes)	Bio CO <sub>2</sub> (tonnes)	Energy (MMBtu)	Cost (\$)
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#### Buildings and Facilities

##### Pasadena, CA

###### City Buildings & Facilities - Natural Gas

Natural Gas	588	1	55	590	0	11,095	98,515
<b>Subtotal City Buildings &amp; Facilities</b>	<b>588</b>	<b>1</b>	<b>55</b>	<b>590</b>	<b>0</b>	<b>11,095</b>	<b>98,515</b>

Natural Gas data may not be comprehensive, information was gathered from invoices for 28 facilities.

Data contact for Municipal Buildings Natural Gas Data: Sharon Killoran, Public Works, Management Analyst IV, 626-744-3920  
skilloran@cityofpasadena.net

###### City Leased Facilities - Purchased Electricity

Electricity	3,444	27	71	3,454	0	18,451	7,554
<b>Subtotal City Leased Facilities - P</b>	<b>3,444</b>	<b>27</b>	<b>71</b>	<b>3,454</b>	<b>0</b>	<b>18,451</b>	<b>7,554</b>

Total electricity used in City-leased facilities/buildings was 5,940,936 kWh in 2009.

PWP was unable to provide energy usage data for three leased facilities. Therefore, energy usage data for these facilities were calculated based on an average electricity usage statistic (27.26 kWh/sq ft) from The Department of Energy's, 2003 Commercial Building Energy Consumption Survey.

9% of GHGs from purchased electricity are from City-owned generators and are considered Scope 1 emissions (and are accounted for under Electric Power sector). Therefore, these GHGs (which are Scope 2) were reduced by 9% to avoid double counting with the emissions accounted for in the Electric Power sector.

Total emissions from electricity used in City-owned + City-leased buildings/facilities = 23,437 MT CO<sub>2</sub>e

Total does not include any electricity used for water transportation/delivery. Water-related energy use is captured in the water delivery facilities tab.

Data Sources: Cielo Martinez, Customer Service Supervisor, 626-744-4403, cmartinez@cityofpasadena.net; Badia Harrell, Management Analyst, PWP, bharrell@cityofpasadena.net.

###### City Owned Facilities - Purchased Electricity

Electricity	19,926	156	411	19,983	0	106,761	2,762,793
<b>Subtotal City Owned Facilities - P</b>	<b>19,926</b>	<b>156</b>	<b>411</b>	<b>19,983</b>	<b>0</b>	<b>106,761</b>	<b>2,762,793</b>

Total electricity used in City-owned facilities/buildings was 34,374,559 kWh in 2009.

9% of GHGs from purchased electricity are from City-owned generators and are considered Scope 1 emissions (and are accounted for under Electric Power sector). Therefore, these GHGs (which are Scope 2) were reduced by 9% to avoid double counting with the emissions accounted for in the Electric Power sector.

Total emissions from electricity used in City-owned + City-leased buildings/facilities = 23,437 MT CO<sub>2</sub>e

Total does not include any electricity used for water transportation/delivery. Water-related energy use is captured in the water delivery facilities tab.

Data contact: Clarence Siruno, PW, [csiruno@cityofpasadena.net](mailto:csiruno@cityofpasadena.net) Sharon Killoran, PW-BSFM, [skilloran@cityofpasadena.net](mailto:skilloran@cityofpasadena.net)

# Government Greenhouse Gas Emissions in 2009

## Detailed Report

### Scope 1 + Scope 2 + Scope 3

	CO <sub>2</sub> (tonnes)	N <sub>2</sub> O (kg)	CH <sub>4</sub> (kg)	Equiv CO <sub>2</sub> (tonnes)	Bio CO <sub>2</sub> (tonnes)	Energy (MMBtu)	Cost (\$)
<i>Propane Tanks</i>							
Propane	0	0	0	0	0	7	0
<b>Subtotal Propane Tanks</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>7</b>	<b>0</b>
16 propane tanks hold 20 lbs each.							
Data source: George Aleman, BSFMD, galeman@cityofpasadena.net							
<b>Subtotal Buildings and Facilities</b>	<b>23,958</b>	<b>184</b>	<b>538</b>	<b>24,027</b>	<b>0</b>	<b>136,314</b>	<b>2,868,862</b>

### Streetlights & Traffic Signals

#### Pasadena, CA

##### 2800 Sierra Grande

Electricity	25	0	1	25	0	133	744
<b>Subtotal 2800 Sierra Grande</b>	<b>25</b>	<b>0</b>	<b>1</b>	<b>25</b>	<b>0</b>	<b>133</b>	<b>744</b>

Total electricity usage was 42,904 kWh in 2009.

9% of GHGs from purchased electricity are from City-owned generators and are considered Scope 1 emissions (and are accounted for under Electric Power sector). Therefore, these GHGs (which are Scope 2) were reduced by 9% to avoid double counting with the emissions accounted for in the Electric Power sector.

The meter at this address formerly belonged to AVON, but currently serves as safety lighting for the Sierra Madre Villa Gold Line station. It is metered separately because an individual meter here when the building still belonged to AVON.

Data Contact: Cheri Kuhlins, PW, ckuhlins@cityofpasadena.net

##### Billboards

Electricity	3	0	0	3	0	18	227
<b>Subtotal Billboards</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>18</b>	<b>227</b>

Total electricity usage was 5,652 kWh in 2009.

9% of GHGs from purchased electricity are from City-owned generators and are considered Scope 1 emissions (and are accounted for under Electric Power sector). Therefore, these GHGs (which are Scope 2) were reduced by 9% to avoid double counting with the emissions accounted for in the Electric Power sector.

Data Contact: Cheri Kuhlins, PW, ckuhlins@cityofpasadena.net

##### Flashing Beacon

Electricity	1	0	0	1	0	5	861
<b>Subtotal Flashing Beacon</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>5</b>	<b>861</b>

Total electricity usage was 1,488 kWh in 2009.

# Government Greenhouse Gas Emissions in 2009

## Detailed Report

### Scope 1 + Scope 2 + Scope 3

CO <sub>2</sub> (tonnes)	N <sub>2</sub> O (kg)	CH <sub>4</sub> (kg)	Equiv CO <sub>2</sub> (tonnes)	Bio CO <sub>2</sub> (tonnes)	Energy (MMBtu)	Cost (\$)
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9% of GHGs from purchased electricity are from City-owned generators and are considered Scope 1 emissions (and are accounted for under Electric Power sector). Therefore, these GHGs (which are Scope 2) were reduced by 9% to avoid double counting with the emissions accounted for in the Electric Power sector.

Data Contact: Cheri Kuhlins, PW, ckuhlins@cityofpasadena.net

#### Other Outdoor Lighting

Electricity	91	1	2	92	0	489	157,531
<i>Subtotal Other Outdoor Lighting</i>	91	1	2	92	0	489	157,531

Total electricity usage was 157,507 kWh in 2009.

Other outdoor lighting - e.g., park lighting, parking lot lighting, etc.

9% of GHGs from purchased electricity are from City-owned generators and are considered Scope 1 emissions (and are accounted for under Electric Power sector). Therefore, these GHGs (which are Scope 2) were reduced by 9% to avoid double counting with the emissions accounted for in the Electric Power sector.

Data Contact: Cheri Kuhlins, PW, ckuhlins@cityofpasadena.net

#### Streetlights

Electricity	7,499	59	155	7,520	0	40,178	1,881,120
<i>Subtotal Streetlights</i>	7,499	59	155	7,520	0	40,178	1,881,120

Total electricity usage was 12,936,405 kWh in 2009.

9% of GHGs from purchased electricity are from City-owned generators and are considered Scope 1 emissions (and are accounted for under Electric Power sector). Therefore, these GHGs (which are Scope 2) were reduced by 9% to avoid double counting with the emissions accounted for in the Electric Power sector.

Data Contact: Cheri Kuhlins, PW, ckuhlins@cityofpasadena.net

#### Traffic Signals

Electricity	979	8	20	982	0	5,246	257,231
<i>Subtotal Traffic Signals</i>	979	8	20	982	0	5,246	257,231

Total electricity usage was 1,689,144 kWh in 2009.

9% of GHGs from purchased electricity are from City-owned generators and are considered Scope 1 emissions (and are accounted for under Electric Power sector). Therefore, these GHGs (which are Scope 2) were reduced by 9% to avoid double counting with the emissions accounted for in the Electric Power sector.

Data Contact: Kuhlins, PW, ckuhlins@cityofpasadena.net

# Government Greenhouse Gas Emissions in 2009

## Detailed Report

### Scope 1 + Scope 2 + Scope 3

	CO <sub>2</sub> (tonnes)	N <sub>2</sub> O (kg)	CH <sub>4</sub> (kg)	Equiv CO <sub>2</sub> (tonnes)	Bio CO <sub>2</sub> (tonnes)	Energy (MMBtu)	Cost (\$)
<b>Subtotal Streetlights &amp; Traffic Signs</b>	8,598	67	178	8,623	0	46,069	2,297,714

### Water Delivery Facilities

#### Pasadena, CA

##### Municipal Water Delivery

Electricity	1,315	10	27	1,318	0	7,044	262,725
<b>Subtotal Municipal Water Delivery</b>	1,315	10	27	1,318	0	7,044	262,725

Total electricity use was 2,268,002 kWh in 2009.

9% of GHGs from purchased electricity are from City-owned generators and are considered Scope 1 emissions (and are accounted for under Electric Power sector). Therefore, these GHGs (which are Scope 2) were reduced by 9% to avoid double counting with the emissions accounted for in the Electric Power sector.

Data source: Brad Boman, PWP, [bboman@cityofpasadena.net](mailto:bboman@cityofpasadena.net)

<b>Subtotal Water Delivery Facilities</b>	1,315	10	27	1,318	0	7,044	262,725
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### Vehicle Fleet

#### Pasadena, CA

##### Hybrid Vehicles 2004

Gasoline	13	0	0	13	0	184	4,012
<b>Subtotal Hybrid Vehicles 2004</b>	13	0	0	13	0	184	4,012

Data for MY 2006-2009 vehicles was entered using methodology described in ICLEI CACP 2009 v3.0 Data Entry document

Data source: Killoran, Sharon. Aleman, George, [skilloran@cityofpasadena.net](mailto:skilloran@cityofpasadena.net), [galeman@cityofpasadena.net](mailto:galeman@cityofpasadena.net)

##### Hybrid Vehicles 2006-2008

Gasoline	27	1	3	27	0	384	8,070
<b>Subtotal Hybrid Vehicles 2006-2008</b>	27	1	3	27	0	384	8,070

Data source: Killoran, Sharon. Aleman, George, [skilloran@cityofpasadena.net](mailto:skilloran@cityofpasadena.net), [galeman@cityofpasadena.net](mailto:galeman@cityofpasadena.net)

##### Hybrid Vehicles 2009

Gasoline	7	0	1	7	0	103	2,185
<b>Subtotal Hybrid Vehicles 2009</b>	7	0	1	7	0	103	2,185

Data source: Killoran, Sharon. Aleman, George, [skilloran@cityofpasadena.net](mailto:skilloran@cityofpasadena.net), [galeman@cityofpasadena.net](mailto:galeman@cityofpasadena.net)

# Government Greenhouse Gas Emissions in 2009

## Detailed Report

### Scope 1 + Scope 2 + Scope 3

	CO <sub>2</sub> (tonnes)	N <sub>2</sub> O (kg)	CH <sub>4</sub> (kg)	Equiv CO <sub>2</sub> (tonnes)	Bio CO <sub>2</sub> (tonnes)	Energy (MMBtu)	Cost (\$)
<i>Vehicle Fleet 2006-2008</i>							
Gasoline	1,080	37	106	1,094	0	15,379	0
<b>Subtotal Vehicle Fleet 2006-2008</b>	<b>1,080</b>	<b>37</b>	<b>106</b>	<b>1,094</b>	<b>0</b>	<b>15,379</b>	<b>0</b>
Data source: Killoran, Sharon. Aleman, George. <a href="mailto:skilloran@cityofpasadena.net">skilloran@cityofpasadena.net</a> , <a href="mailto:galeman@cityofpasadena.net">galeman@cityofpasadena.net</a>							
Note: Although fuel usage and cost data for 2009 was available by model year, this data was summed and entered under the alternative method for Heavy Duty, Light Truck and Passenger Vehicle categories. Due to time constraints, data was entered in this way for the years 2020 and 2035. When the reports were run, the emissions totals reflected inconsistencies between 2009 and the other years, so 2009 data was re-entered in the way that was consistent with how 2020 and 2035 data was entered.							
<i>Vehicle Fleet 2009</i>							
Gasoline	56	2	5	56	0	793	17,508
<b>Subtotal Vehicle Fleet 2009</b>	<b>56</b>	<b>2</b>	<b>5</b>	<b>56</b>	<b>0</b>	<b>793</b>	<b>17,508</b>
Data source: Killoran, Sharon. Aleman, George. <a href="mailto:skilloran@cityofpasadena.net">skilloran@cityofpasadena.net</a> , <a href="mailto:galeman@cityofpasadena.net">galeman@cityofpasadena.net</a>							
<i>Vehicle Fleet up to 2005</i>							
Compressed Natural Gas	0	0	0	0	0	1	601
Diesel	1,144	3	3	1,145	0	15,469	321,388
Gasoline	2,151	142	120	2,198	0	30,626	0
OFF ROAD Diesel	216	5	12	218	0	2,916	53,162
OFF ROAD Gasoline	26	1	1	26	0	367	7,921
<b>Subtotal Vehicle Fleet up to 2005</b>	<b>3,537</b>	<b>152</b>	<b>137</b>	<b>3,587</b>	<b>0</b>	<b>49,379</b>	<b>383,072</b>
Data source: Killoran, Sharon. Aleman, George. <a href="mailto:skilloran@cityofpasadena.net">skilloran@cityofpasadena.net</a> , <a href="mailto:galeman@cityofpasadena.net">galeman@cityofpasadena.net</a>							
Note: Although fuel usage and cost data for 2009 was available by model year, this data was summed and entered under the alternative method for Heavy Duty, Light Truck and Passenger Vehicle categories. Due to time constraints, data was entered in this way for the years 2020 and 2035. When the reports were run, the emissions totals reflected inconsistencies between 2009 and the other years, so 2009 data was re-entered in the way that was consistent with how 2020 and 2035 data was entered.							
<b>Subtotal Vehicle Fleet</b>	<b>4,720</b>	<b>192</b>	<b>252</b>	<b>4,785</b>	<b>0</b>	<b>66,221</b>	<b>414,847</b>

# Government Greenhouse Gas Emissions in 2009

## Detailed Report

### Scope 1 + Scope 2 + Scope 3

	CO <sub>2</sub> (tonnes)	N <sub>2</sub> O (kg)	CH <sub>4</sub> (kg)	Equiv CO <sub>2</sub> (tonnes)	Bio CO <sub>2</sub> (tonnes)	Energy (MMBtu)	Cost (\$)
<b>Employee Commute</b>							
<b>Pasadena, CA</b>							
<i>Business Travel - Car - Scope 3</i>							
Gasoline	25	2	1	26	0	360	0
<i>Subtotal Business Travel - Car - S</i>	25	2	1	26	0	360	0
Data source: Ozzie Aranda, Finance, oaranda@cityofpasadena.net							
Using Alt method - VMT. 65% of total VMT attributed to passenger vehicles, 35% to light trucks							
Total emissions from Car Business Travel using EPA Climate Leaders formula: 21,092.055 kg CO <sub>2</sub> e							
EPA ClimateLeaders formula CO <sub>2</sub> e = VMT or PMT * (EFCO <sub>2</sub> + EFCH <sub>4</sub> * 0.021 + EFN <sub>2</sub> O * 0.310)							
Emissions from Business Travel by Car: 26 MT CO <sub>2</sub> e							
<i>Business Travel - Plane - Scope 3</i>							
OFF ROAD Jet Fuel	98	0	0	98	0	1,377	0
<i>Subtotal Business Travel - Plane -</i>	98	0	0	98	0	1,377	0
<i>Employee Commute - Drive Alone (Scope 3)</i>							
Gasoline	2,806	187	158	2,867	0	39,944	0
<i>Subtotal Employee Commute - Dr.</i>	2,806	187	158	2,867	0	39,944	0
Using Alt method - VMT. 65% of total VMT attributed to passenger vehicles, 35% to light trucks							
Data source: Rideshare survey, Jenny Cristales, DOT, jcristales@cityofpasadena.net							
<i>Employee Commute - Public Bus - Scope 3</i>							
Compressed Natural Gas	6	1	13	7	0	120	0
<i>Subtotal Employee Commute - Pu</i>	6	1	13	7	0	120	0
<i>Employee Commute Carpool Scope 3</i>							
Gasoline	2,661	177	150	2,719	0	37,878	0
<i>Subtotal Employee Commute Car,</i>	2,661	177	150	2,719	0	37,878	0
Using Alt method - VMT. 65% of total VMT attributed to passenger vehicles, 35% to light trucks							

# Government Greenhouse Gas Emissions in 2009

## Detailed Report

### Scope 1 + Scope 2 + Scope 3

	CO <sub>2</sub> (tonnes)	N <sub>2</sub> O (kg)	CH <sub>4</sub> (kg)	Equiv CO <sub>2</sub> (tonnes)	Bio CO <sub>2</sub> (tonnes)	Energy (MMBtu)	Cost (\$)
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Data source: Rideshare survey, Jenny Cristales, DOT, jcristales@cityofpasadena.net

<b>Subtotal Employee Commute</b>	5,596	366	323	5,716	0	79,679	0
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#### Transit Fleet

##### Pasadena, CA

###### Transit Fleet CNG

Compressed Natural Gas	0	0	0	0	0	3	21,552
<b>Subtotal Transit Fleet CNG</b>	0	0	0	0	0	3	21,552

Data source: Jenny Cristales, DOT, jcristales@cityofpasadena.net

###### Transit Fleet Diesel

Diesel	113	0	0	113	0	1,530	375,880
<b>Subtotal Transit Fleet Diesel</b>	113	0	0	113	0	1,530	375,880

Data source: Jenny Cristales, DOT, jcristales@cityofpasadena.net

###### Transit Fleet Gasoline

Gasoline	399	23	27	406	0	5,675	154,572
<b>Subtotal Transit Fleet Gasoline</b>	399	23	27	406	0	5,675	154,572

Data source: Jenny Cristales, DOT, jcristales@cityofpasadena.net

<b>Subtotal Transit Fleet</b>	512	23	28	520	0	7,208	552,004
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#### Electric Power

##### Pasadena, CA

###### PWP Electric Power - Glenarm and Broadway

Carbon Dioxide	72,749	0	0	72,749		0	0
<b>Subtotal PWP Electric Power - Gk</b>	72,749	0	0	72,749	0	0	0

Data source: Badia Harrell, Management Analyst, PWP, bharrell@cityofpasadena.net; Jason Miller, Engineer, PWP, jpmiller@cityofpasadena.net, (Aug 2013)

Note: Total MMBtu = 1,370,762.60. Total cost = \$7,147,615

<b>Subtotal Electric Power</b>	72,749	0	0	72,749	0	0	0
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# Government Greenhouse Gas Emissions in 2009

## Detailed Report

### Scope 1 + Scope 2 + Scope 3

	CO <sub>2</sub> (tonnes)	N <sub>2</sub> O (kg)	CH <sub>4</sub> (kg)	Equiv CO <sub>2</sub> (tonnes)	Bio CO <sub>2</sub> (tonnes)	Energy (MMBtu)	Cost (\$)
<b>Scope 3 Waste</b>							
<b>Pasadena, CA</b>							
<i>Municipal Solid Waste</i>				<i>Disposal Method - Managed Landfill</i>			
Paper Products	0	0	2,936	62	0		0
Food Waste	0	0	1,489	31	0		0
Plant Debris	0	0	387	8	0		0
Wood or Textiles	0	0	802	17	0		0
<b>Subtotal Municipal Solid Waste</b>	<b>0</b>	<b>0</b>	<b>5,614</b>	<b>118</b>	<b>0</b>		<b>0</b>
Data Source: Gabriel Silva, City of Pasadena Public Works							
Waste Share derived from CalRecycle's 2008 Waste Characterization Study							
<b>Subtotal Scope 3 Waste</b>	<b>0</b>	<b>0</b>	<b>5,614</b>	<b>118</b>	<b>0</b>		<b>0</b>
<b>Total</b>	<b>117,448</b>	<b>843</b>	<b>6,960</b>	<b>117,856</b>	<b>0</b>	<b>1,713,296</b>	<b>13,543,767</b>



# APPENDIX B

CACP DETAILED REPORT FOR  
COMMUNITY-WIDE EMISSIONS, 2009



# Community Greenhouse Gas Emissions in 2009

## Detailed Report

### Scope 1 + Scope 2 + Scope 3

	CO <sub>2</sub> (tonnes)	N <sub>2</sub> O (kg)	CH <sub>4</sub> (kg)	Equiv CO <sub>2</sub> (tonnes)	Bio CO <sub>2</sub> (tonnes)	Energy (MMBtu)
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#### Residential

##### Pasadena, CA

###### Residential Electricity

Electricity	206,496	1,617	4,264	207,087	0	1,106,379
<b>Subtotal Residential Electricity</b>	<b>206,496</b>	<b>1,617</b>	<b>4,264</b>	<b>207,087</b>	<b>0</b>	<b>1,106,379</b>

In 2009, 331,682,808 kWh of electricity was used in the residential sector. However, 7,513,804 kWh of this is attributed to water delivery and is therefore captured in the "Other" tab under water delivery. Therefore, 7,513,804 kWh was subtracted from the residential electricity total to avoid double counting.

Data Sources: Charles Chang, PWP, "2009 Calendar Year Retail Revenue and Usage by Customer Class," John Lambeck, MWD, jlambeck@mwdh2o.com; Natalie Ouwersloot, PWP, nouwersloot@cityofpasadena.net

###### Residential Natural Gas

Natural Gas	116,639	220	11,000	116,939	0	2,199,912
<b>Subtotal Residential Natural Gas</b>	<b>116,639</b>	<b>220</b>	<b>11,000</b>	<b>116,939</b>	<b>0</b>	<b>2,199,912</b>

2009 residential natural gas usage was 21,999,120 therms. Of this, 18,653,515 therms were used in single family residences, and 3,345,605 therms were used in multifamily residences.

Data Sources: Tony Tartaglia, Sempra Utilities, ttartaglia@semprautilities.com and Angela Kimmey, PWP, Management Analyst IV; 626-744-7582, akimmey@cityofpasadena.net

In 2009, Pasadena had 54,771 occupied households and 136,502 residents (Data Source: California Department of Finance Report E-8).

<b>Subtotal Residential</b>	<b>323,135</b>	<b>1,837</b>	<b>15,264</b>	<b>324,025</b>	<b>0</b>	<b>3,306,291</b>
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#### Commercial

##### Pasadena, CA

###### Commercial/Industrial Electricity

Electricity	553,554	4,336	11,431	555,138	0	2,965,873
<b>Subtotal Commercial/Industrial El</b>	<b>553,554</b>	<b>4,336</b>	<b>11,431</b>	<b>555,138</b>	<b>0</b>	<b>2,965,873</b>

In 2009, total non-residential electricity usage reported by PWP was 873,047,487 kWh. However, 4,046,503 kWh of this is attributed to water delivery and is therefore captured in the "Other" tab under water delivery. Therefore, 4,046,503 kWh was subtracted from the residential electricity total to avoid double counting.

Data Sources: Charles Chang, PWP, "2009 Calendar Year Retail Revenue and Usage by Customer Class," John Lambeck, MWD, jlambeck@mwdh2o.com; Natalie Ouwersloot, PWP, nouwersloot@cityofpasadena.net

# Community Greenhouse Gas Emissions in 2009

## Detailed Report

### Scope 1 + Scope 2 + Scope 3

	CO <sub>2</sub> (tonnes)	N <sub>2</sub> O (kg)	CH <sub>4</sub> (kg)	Equiv CO <sub>2</sub> (tonnes)	Bio CO <sub>2</sub> (tonnes)	Energy (MMBtu)
<i>Commercial/Industrial Natural Gas</i>						
Natural Gas	76,878	145	7,250	77,075	0	1,449,981
<b>Subtotal Commercial/Industrial Natural Gas</b>	<b>76,878</b>	<b>145</b>	<b>7,250</b>	<b>77,075</b>	<b>0</b>	<b>1,449,981</b>
Data Sources: Tony Tartaglia, Sempra Utilities, ttartaglia@semprautilities.com and Angela Kimmey, PWP, Management Analyst IV; 626-744-7582, akimmey@cityofpasadena.net						
<b>Subtotal Commercial</b>	<b>630,432</b>	<b>4,481</b>	<b>18,681</b>	<b>632,213</b>	<b>0</b>	<b>4,415,854</b>

### Transportation

#### Pasadena, CA

##### Community-wide VMT

Gasoline	1,040,018	69,131	58,666	1,062,681	0	14,805,039
<b>Subtotal Community-wide VMT</b>	<b>1,040,018</b>	<b>69,131</b>	<b>58,666</b>	<b>1,062,681</b>	<b>0</b>	<b>14,805,039</b>

Vehicle miles traveled (VMT) data comes from consultant Fehr & Peers analysis for Pasadena's General Plan Update. Total VMT for 2009 base year was 2,017,319,960 (5,526,904 average daily VMT). Approximately 1,311,257,974 VMT (annual) was attributed to passenger vehicles and 706,061,986 VMT (annual) was attributed to light trucks.

Data Source: Brian Welch, Fehr & Peers (no longer at Fehr & Peers)

<b>Subtotal Transportation</b>	<b>1,040,018</b>	<b>69,131</b>	<b>58,666</b>	<b>1,062,681</b>	<b>0</b>	<b>14,805,039</b>
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### Waste

#### Pasadena, CA

##### Landfilled Solid Waste

##### Disposal Method - Managed Landfill

Paper Products	0	0	374,066	7,855	0	
Food Waste	0	0	189,705	3,984	0	
Plant Debris	0	0	49,242	1,034	0	
Wood or Textiles	0	0	102,196	2,146	0	
<b>Subtotal Landfilled Solid Waste</b>	<b>0</b>	<b>0</b>	<b>715,208</b>	<b>15,019</b>	<b>0</b>	

Data Sources: Solid waste tonnage provided by Gabriel Silva, City of Pasadena Public Works.  
Waste share from CalRecycle's 2008 Waste Characterization Study

In 2009, landfilled solid waste from Pasadena totaled 93,632 tons. Of this approximately 16,198 tons were paper products, 14,513 tons were food waste, 6,648 tons were plant debris, 15637 tons were wood or textiles, and the remainder was other waste.

## Community Greenhouse Gas Emissions in 2009

### Detailed Report

#### Scope 1 + Scope 2 + Scope 3

	CO <sub>2</sub> (tonnes)	N <sub>2</sub> O (kg)	CH <sub>4</sub> (kg)	Equiv CO <sub>2</sub> (tonnes)	Bio CO <sub>2</sub> (tonnes)	Energy (MMBtu)
<b>Subtotal Waste</b>	0	0	715,208	15,019	0	
<b>Other</b>						
<b>Pasadena, CA</b>						
<i>Water Delivery</i>						
Carbon Dioxide	18,762	0	0	18,762	0	
<i>Subtotal Water Delivery</i>	18,762	0	0	18,762	0	
<p>Total water delivery to customers in Pasadena totaled 32,800 AF in 2009. Approximately 65% of the total is attributed to the residential sector (broken out as 48% single family, and 17% multi-family) and the remaining 35% of the total is attributed to the commercial/industrial sector.</p> <p>Based on the total water delivery in 2009 (32,800 AF) in 2009 and an emissions factor (0.572 MT CO<sub>2</sub>e per AF) provided by Metropolitan Water District for 2009, total emissions associated with water delivery were 18,762 MT CO<sub>2</sub>e in 2009.</p> <p>Data source: Natalie Z. Ouwersloot, PWP, nouwersloot@cityofpasadena.net; John Lambeck, MWD, jlambeck@mwdh2o.com</p>						
<b>Subtotal Other</b>	18,762	0	0	18,762	0	
<b>Total</b>	2,012,347	75,449	807,819	2,052,700	0	22,527,184



# APPENDIX C

TOURNAMENT OF ROSES AND  
ROSE BOWL VMT INVENTORY







Date: April 17, 2013

To: Shauna Callery, Rincon Consultants, Inc.

From: Chris Gray, Fehr & Peers

**Subject: City of Pasadena Rose Bowl Event Vehicle Miles Traveled (VMT)-Updated**

SM12-2552

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As part of the City of Pasadena Greenhouse Gas Emissions Inventory, Fehr & Peers has estimated vehicle miles traveled (VMT) associated with the Rose Bowl. This estimate was produced in consultation with the City and was informed by email correspondence from Rose Bowl event planning consultant John Blanchard and the Pasadena Convention and Visitors Bureau. In all, the Tournament of Roses and Rose Bowl stadium events produce an estimated annual VMT of 7,510,147. The methodology and assumptions used to produce this estimate are described below.

### **TOURNAMENT OF ROSES**

The Tournament of Roses is an annual festival comprised of several distinct events. For purposes of this analysis, we followed the breakdown used in the *2008 Economic Output Impact and Demographics Study* produced by the USC Marshall Sports Business Institute and commissioned by the Pasadena Tournament of Roses Association. The study refers to four specific events in the following descending order: the Rose Parade, the Rose Bowl Game, the Post Parade, and Float Decoration.

The Waterfall Method was used to estimate attendance at each of these events to avoid double counting multi-event attendees. According to this method, attendance at "upstream" events is captured first, with tallies at lower levels capturing residual attendance. For example, if someone attends the Rose Parade and the Rose Bowl Game, they are only counted in the Rose Parade "bucket." While this method was used for purposes of estimating spending, it was assumed to be applicable for estimating corresponding vehicle trips.

### ***Estimated Attendees***

Table 1 shows the total number of "waterfall" attendees estimated by the study to have attended each event. In addition, a detailed survey of event participants describes their points of origin before traveling to the Tournament of Roses. For purposes of estimating VMT, attendees were assumed to have come from the City of Pasadena if they said that they lived in Pasadena, reported staying at a hotel in Pasadena or said that they were staying with friends. If they said they were staying with friends, a proportional share of this category was applied. Attendees were assumed to have come from outside Pasadena if they did not come from inside Pasadena. This group included people staying at hotels, people staying with friends, and people who chose "other," presumably referring to lodging in a Southern California city other than Pasadena or Los Angeles. Long distance trips, such as airline flights, were not included in this analysis.



### ***Mode Choice and Average Vehicle Occupancy***

Rose Bowl event planner John Blanchard suggested that there are typically 400 to 500 private transit coaches used to transport people to the Rose Parade in a typical year and up to 800 in a good year. Using a conservative estimate of 400 private transit coaches and Blanchard's estimate of 40 people per private transit vehicle, an estimated 16,000 people travel to the Rose Parade by private transit. Applying this number to the Rose Parade bucket suggests that 4% of people from this group arrive by private transit. Although the exact number of people arriving by public transit was unavailable, this analysis assumes that 1% of people arrive by public bus or rail. Based on these estimates, it was assumed that 95% of people attending the Rose Parade, the Rose Bowl, and the Post Parade arrived by private vehicle. Given the absence of organized private shuttles during Float Decoration, 99% of trips associated with this activity were assumed to be made by private vehicle.

John Blanchard estimated that average vehicle occupancy (AVO) during the Rose Parade was 3.5 and for employees and participants (corresponding to Float Decoration), it was 1.5. This analysis also assumed an AVO of 3.5 for the Rose Bowl Game and the Post Parade.

### ***Average Trip Length***

Average trip length was estimated based on outputs from the Pasadena Citywide Travel Model. According to the model, the average length of a car trip beginning and ending in Pasadena (internal-internal) is 4.15 miles, or 8.30 miles roundtrip. The average length of a car trip coming to or from Pasadena (internal-external or external-internal) is 14.85 miles, or 29.70 miles roundtrip. The weighted average for all Pasadena trips is 8.32 miles or 16.64 miles roundtrip. For automobile trips coming into or out of Pasadena, VMT was discounted by 50%, to avoid excessive attribution of miles traveled outside City limits. This approach follows the Regional Targets Advisory Committee (RTAC) recommendation to the California Transportation Commission on using VMT for purposes of estimating mobile source greenhouse gas emissions. This recommendation appears in the report *Recommendations of the Regional Targets Advisory Committee (RTAC) Pursuant to Senate Bill 375* (RTAC 2009).



### ***Annual Occurrences***

The Rose Parade, Rose Bowl Game and Post Parade each occur once a year. Float Decorating occurs for an average of two weeks in advance of the Rose Parade and was assumed for this analysis to occur on 12 days each year.

### **UCLA FOOTBALL, THE ROSE BOWL FLEA MARKET AND OTHER EVENTS**

In addition to the Tournament of Roses events, other events were analyzed including:

- Rose Bowl Flea Market (12 events in 2009)
- UCLA Football Games (6 events in 2009)
- International Soccer (3 events in 2009)
- July 4<sup>th</sup> Americafest (1 event in 2009)
- High School Football (1 event in 2009)
- USMC Color, Drum, Bugle, Silent Drill Corp (1 event in 2009)
- U2 Concert (1 event in 2009)

The Pasadena Citywide Travel Model was used to determine the average percent of trips originating from within Pasadena and the average percent of trips coming from outside the City for a majority of the events. According to the model, 16% of VMT on all roads in Pasadena (including both freeways and surface streets) comes from internal-external driving; 23% comes from external-internal driving; 26% comes from internal-internal driving; and 36% comes from external-external driving. When external-external trips are excluded from this total because they are not arriving or departing from Pasadena, it is estimated that 40% of event attendees [ $26/(16+23+26)=40\%$ ] come from inside Pasadena and 60% of event attendees [ $(16+23)/(16+23+26)=60\%$ ] come from outside Pasadena. This process was used to estimate the percent of persons traveling from inside Pasadena for the following events:

- Rose Bowl Flea Market (12 events in 2009)
- UCLA Football Games (6 events in 2009)
- July 4<sup>th</sup> Americafest (1 event in 2009)
- High School Football (1 event in 2009)
- US Marine Corps Color, Drum, Bugle, Silent Drill Corp (1 event in 2009)

For the International Soccer events and the U2 concert, it was assumed that only 5% of the attendees came from Pasadena given the size of the events and the likelihood these events would be regional draws unlike the more local events.



### ***Rose Bowl Flea Market***

The Rose Bowl Flea Market is held on the second Sunday of the month, twelve months a year. According to attendance records provided by the City of Pasadena, the average attendance each month is 12,366, including approximately 10,000 visitors and 2,500 vendors.

### ***UCLA Football***

UCLA typically holds five to seven football games at the Rose Bowl each year, depending on their schedule. In 2009, six UCLA football games were played at the Rose Bowl, with an average of 53,868 visitors to each game, based on 2009 attendance figures provided by the City of Pasadena.

### ***International Soccer***

Three international soccer games were held at the Rose Bowl in 2009. The total attendance at these events was 149,886 according to attendance data provided by the City of Pasadena.

### ***July 4<sup>th</sup> Americafest***

The Americafest is held every year at the Rose Bowl to commemorate the July 4<sup>th</sup> holiday. The number of attendees in 2009 was 18,842 according to the City of Pasadena.

### ***High School Football***

In 2009, one high school football game was held at the Rose Bowl. The attendance at this event was 7,980 according to attendance data provided by the City of Pasadena.

### ***United States Marine Corp (USMC) Event***

In 2009, the Rose Bowl hosted the USMC Color Detachment, Drum and Bugle Corp Silent Drill. There were 4,603 attendees at this event according to attendance data provided by the City of Pasadena.

### ***U2 Concert***

A U2 Concert was held at the Rose Bowl in 2009. The attendance at the event was 95,770 according to attendance data provided by the City of Pasadena.

## **CALCULATIONS**

### ***Rose Parade VMT***

Internal origin VMT = Total Attendees \* Percent with internal origin \* Percent traveling by car  
/ AVO \* Average trip length  
= 402,300 \* 12% \* 95% / 3.5 \* 8.3 = 108,759 miles/year



External origin VMT = Total Attendees \* Percent with external origin \* Percent traveling by car / AVO \* Average trip length \* 50% RTAC reduction  
= 402,300 \* 88% \* 95% / 3.5 \* 29.7 \* 50% = 1,426,970 miles/year

Motor coach VMT = Total Attendees \* Percent traveling by motor coach / AVO \* Average trip length  
= 402,300 \* 4% / 40 \* 16.64 = 6,694 miles/year

***Rose Bowl VMT***

Internal origin VMT = Total Attendees \* Percent with internal origin \* Percent traveling by car / AVO \* Average trip length  
= 84,269 \* 5% \* 95% / 3.5 \* 8.3 = 9,492 miles/year

External origin VMT = Total Attendees \* Percent with external origin \* Percent traveling by car / AVO \* Average trip length \* 50% RTAC reduction  
= 84,269 \* 95% \* 95% / 3.5 \* 29.7 \* 50% = 322,681 miles/year

Motor coach VMT = Total Attendees \* Percent traveling by motor coach / AVO \* Average trip length  
= 84,269 \* 4% / 40 \* 16.64 = 1,402 miles/year

***Post Parade VMT***

Internal origin VMT = Total Attendees \* Percent with internal origin \* Percent traveling by car / AVO \* Average trip length  
= 59,591 \* 7% \* 95% / 3.5 \* 8.3 = 9,398 miles/year

External origin VMT = Total Attendees \* Percent with external origin \* Percent traveling by car / AVO \* Average trip length \* 50% RTAC reduction  
= 59,591 \* 93% \* 95% / 3.5 \* 29.7 \* 50% = 223,381 miles/year

Motor coach VMT = Total Attendees \* Percent traveling by motor coach / AVO \* Average trip length  
= 59,591 \* 4% / 40 \* 16.64 = 992 miles/year

***Float Decorating VMT***

Internal origin VMT = Total Attendees \* Percent with internal origin \* Percent traveling by car / AVO \* Average trip length \* Annual occurrences  
= 20,536 \* 14% \* 99% / 1.5 \* 8.3 \* 12 = 188,994 miles/year



External origin VMT = Total Attendees \* Percent with external origin \* Percent traveling by car / AVO \* Average trip length \* 50% RTAC reduction \* Annual occurrences  
= 20,536 \* 86% \* 99% / 1.5 \* 29.7 \* 50% \* 12 = 2,077,141 miles/year

***Rose Bowl Flea Market VMT***

Internal origin VMT = Total Attendees \* Percent with internal origin \* Percent traveling by car / AVO \* Average trip length \* Annual occurrences  
= 12,366 \* 40% \* 99% / 2 \* 8.3 \* 12 = 243,867 miles/year

External origin VMT = Total Attendees \* Percent with external origin \* Percent traveling by car / AVO \* Average trip length \* 50% RTAC reduction \* Annual occurrences  
= 12,366 \* 60% \* 99% / 2 \* 29.7 \* 50% \* 12 = 654,475 miles/year

***UCLA Football VMT***

Internal origin VMT = Total Attendees \* Percent with internal origin \* Percent traveling by car / AVO \* Average trip length \* Annual occurrences  
= 53,868 \* 40% \* 99% / 3.5 \* 8.3 \* 6 = 303,250 miles/year

External origin VMT = Total Attendees \* Percent with external origin \* Percent traveling by car / AVO \* Average trip length \* 50% RTAC reduction \* Annual occurrences  
= 53,868 \* 60% \* 99% / 3.5 \* 29.7 \* 50% \* 6 = 814,567 miles/year

***International Soccer***

Internal origin VMT = Total Attendees \* Percent with internal origin \* Percent traveling by car / AVO \* Average trip length \* Annual occurrences  
= 49,962 \* 5% \* 99% / 3.5 \* 8.3 \* 3 = 17,594 miles/year

External origin VMT = Total Attendees \* Percent with external origin \* Percent traveling by car / AVO \* Average trip length \* 50% RTAC reduction \* Annual occurrences  
= 49,962 \* 95% \* 99% / 3.5 \* 29.7 \* 50% \* 3 = 598,106 miles/year

***July 4<sup>th</sup> Americafest***

Internal origin VMT = Total Attendees \* Percent with internal origin \* Percent traveling by car / AVO \* Average trip length \* Annual occurrences  
= 18,842 \* 40% \* 99% / 3.5 \* 8.3 \* 1 = 17,694 miles/year

External origin VMT = Total Attendees \* Percent with external origin \* Percent traveling by car / AVO \* Average trip length \* 50% RTAC reduction \* Annual occurrences



$$= 18,842 * 60\% * 99\% / 3.5 * 29.7 * 50\% * 1 = 47,487 \text{ miles/year}$$

### **High School Football**

Internal origin VMT = Total Attendees \* Percent with internal origin \* Percent traveling by car / AVO \* Average trip length \* Annual occurrences  
= 7,980 \* 40% \* 99% / 3.5 \* 8.3 \* 1 = 7,494 miles/year

External origin VMT = Total Attendees \* Percent with external origin \* Percent traveling by car / AVO \* Average trip length \* 50% RTAC reduction \* Annual occurrences  
= 7,980 \* 60% \* 99% / 3.5 \* 29.7 \* 50% \* 1 = 20,112 miles/year

### **USMC Color, Drum, Bugle, and Silent Drill**

Internal origin VMT = Total Attendees \* Percent with internal origin \* Percent traveling by car / AVO \* Average trip length \* Annual occurrences  
= 4,603 \* 40% \* 99% / 2 \* 8.3 \* 1 = 4,323 miles/year

External origin VMT = Total Attendees \* Percent with external origin \* Percent traveling by car / AVO \* Average trip length \* 50% RTAC reduction \* Annual occurrences  
= 4,603 \* 60% \* 99% / 2 \* 29.7 \* 50% \* 1 = 11,061 miles/year

### **U2 Concert**

Internal origin VMT = Total Attendees \* Percent with internal origin \* Percent traveling by car / AVO \* Average trip length \* Annual occurrences  
= 95,770 \* 5% \* 99% / 2 \* 8.3 \* 1 = 11,242 miles/year

External origin VMT = Total Attendees \* Percent with external origin \* Percent traveling by car / AVO \* Average trip length \* 50% RTAC reduction \* Annual occurrences  
= 95,770 \* 95% \* 99% / 2 \* 29.7 \* 50% \* 1 = 382,161 miles/year





# APPENDIX D

GHG ACCOMPLISHMENTS  
(2007-2011)



# Pasadena GHG Accomplishments (2007-2011)

## Provided by the City of Pasadena

This appendix lists accomplishments from 2007-2011 that result in GHG emissions reductions. For the purposes of a climate action plan, the accomplishments that occurred after the GHG emissions inventory baseline year could be credited to meeting an established target.

## ENERGY

### 2007

- Restored the City Hall building to be 20% more energy efficient than the California energy standards (Title 24) and use approximately half of the electricity it used prior to the retrofit.
  - City Hall is the first municipal facility to use 100% Green Power provided by Pasadena Water and Power.
  - City Hall features several high-efficiency plumbing fixtures such as zero-consumption urinals, dual-flush toilets, dual-valve flush-o-meters, lavatories, sinks, and showers which will reduce water use by more than 40 percent compared to a conventional building.
  - Drip irrigation was installed in the landscaped areas at the courtyard.
  - The City Hall building is expected to receive LEED (Leadership in Environmental Energy Design) certification in 2008.
- Provided incentive rebates for 15 residential solar installations.
- Completed a Municipal-Owned Facilities Solar Study identifying available roof space at City-owned facilities for solar installation.
- Signed approximately 200 green power customers.
- Provided \$100,000 worth of incentives to the Northwest Innovation Center for incorporating a host of energy and water efficiency measures and obtaining LEED Gold rating.
- Partnered with the Mothers Club in the renovation of their new building. The building is expected to receive LEED Gold rating in 2008.
- Installed Thermal Energy Systems at Hill Library. These Freon-free systems are being used to reduce energy costs by allowing energy-intensive, electrically driven cooling equipment to be operated off peak hours when electricity rates are lower.
- Installed automatic temperature control systems in all City owned buildings. This system controls the temperature by monitoring climate conditions within the building and resets the system automatically when the temperature fluctuates.
- Implemented Green Building Energy Efficiency. Green Building projects are required to achieve 14% energy efficiency over Title 24.
- Replaced half of all traffic signal lamps with energy efficient Light-Emitting Diodes (LEDs).
- Provided home energy audits to assist customers in identifying energy saving measures
- Began purchasing and installing new eco-friendly, low-mercury fluorescent light bulbs to replace existing fluorescent bulbs. Lighting fixtures at Linda Vista library, the PW Building, and Fire Station #33 were retrofitted to accommodate green bulbs.

### 2008

- Achieved LEED Gold certification for the historic City Hall, which is now 20 percent more energy efficient than state standards.

- Created a new Commercial Energy Efficiency Partnering Program, with rebates for any permanently installed energy-saving technology. The 2008 installations alone are expected to save over 7 MW of energy each year.
- Sparked a wave of solar installations with the new Pasadena Solar Initiative Program, advancing Pasadena closer to its goal of 14 megawatts of solar power by 2017.
- Partnered with Caltech to secure the City's first large-scale solar power purchase agreement, providing the campus with 320,000 kilowatt-hours of clean power through a state-of-the-art rooftop solar system.
- Contracted a purchase of 30,000 MWh of power generated by methane gas emitted from the Skunk Creek Landfill. Online by 2010, the project will cut the City's annual greenhouse gas emissions by 16,500 tons per year and provide enough energy to power 5,000 homes.
- Invested \$57,000 to illuminate all City libraries with 100 percent green power, joining City Hall, Kaiser Permanente, Caltech Housing, Huntington Hospital and more than 1,500 customers City-wide in purchasing renewable energy.
- Issued "The Power of 10 Challenge" with the delivery of free compact-fluorescent light bulbs (CFLs) City-wide. The program encourages 53,000 Pasadena households to switch to 10 CFLs, with the City-wide goal of eliminating 10,000 tons of greenhouse gas emissions annually.
- Partnered with Heritage Housing Partners in the design and construction of the Fair Oaks Court Affordable Housing Project, including energy and water efficiency measures from top to bottom and achieving Energy Star Certification.
- Launched a community effort to craft a new 20-year Integrated Resource Plan (IRP) to ensure reliable and environmentally responsible electric service, competitive rates and energy independence.

## **2009**

- Adopted a new 20 year energy plan setting significantly higher targets for renewable energy (green power), greenhouse gas reductions, solar installations and energy efficiency.
- Increased state-qualifying renewable energy to 8%.
- Completed a contract to purchase six megawatts (MW) of wind power.
- Completed a contract to purchase 6.6 MW of energy generated from waste conversion at the Ameresco Chiquita Landfill.
- Saved a total of 22,060 MWh of energy use -13,766 MWh in the commercial sector, 338 MWh in municipal buildings and 7,956 MWh in the residential sector.
- Provided 16,000 residential households with 224,000 efficient compact fluorescent light bulbs.
- Reduced peak power demand by 5.42 MW annually through residential and business energy programs.
- Doubled the number of rebate assisted solar installations City-wide from 26 to 52.
- Built the first building-integrated photovoltaic (BIPV) solar system for a new bus shelter at the Lake Avenue Metro Gold Line station. The 20-kilowatt project is the first PWP-owned solar system. The canopy will generate about 30,000 kilowatt-hours of energy each year, enough to power six homes.
- Reduced energy and roof maintenance costs through the installation of "cool roof" coatings at City facilities. Cool roofs reflect damaging ultraviolet and infrared sunlight reducing environmental impact.

## **2010**

- The City saved nearly 22,000 Megawatt-hours of energy with help from Water and Power customers and increased its renewable, clean sources of energy while reducing greenhouse gas emissions.
- Caltech completed six solar energy projects that boosted Pasadena's clean-energy cache by 1.1 Megawatts. The campus now generates enough to power 400 homes each year.
- Completed more than 100 new solar installations City-wide to reach a milestone: 2 Megawatts of solar power capacity installed under the Pasadena Solar Initiative. Rebates now extend to low-income and affordable-housing customers.
- Celebrated "Greening the Earth Day" community festival, powered with 100 percent solar energy.
- Reduced energy use of Pasadena Central Library. Thirty-two 800-watt light fixtures were replaced with 78-watt lights, saving 122,824 kilowatt-hours per year. New energy-efficient air conditioning saves 128,503 kilowatt hours per year.
- Upgraded to a more energy efficient air conditioning system at the Allendale Branch Library, saving 11,370 kilowatt-hours per year.
- Replaced four pendant 320-watt lights in the towering lobby at police headquarters with 56-watt lights, saving 4,625 kilowatt-hours per year.
- Installed a high-tech energy management system at the police department's indoor firing range cutting costs by 10 percent.
- Installed three new energy-efficient cool roofs at Robinson and Villa Parke community centers and the Lamanda Park Branch Library.
- Adopted energy efficiency goals of cutting energy use by 14,500 Megawatt-hours and demand by 3.3 Megawatts per year through 2013.
- Conducted a Small Business Lighting Use and Energy Survey in partnership with Outward Bound Adventures, Inc., a local nonprofit, for 200 small businesses.
- Partnered with California Energy Commission (CEC) staff to complete energy audits at four municipal facilities.
- Installed efficient variable frequency drives on the City Hall fountain pump motors, saving 12,149 kilowatt-hours per year.
- Replaced incandescent exit signs with LED exit signs at 11 municipal buildings.

## **2011**

- Amended the Light and Power Rate Ordinance.
- La Paz Solar Tower Project.
- Purchased biogas fuel to generate renewable electricity
- 25,000 Pasadena W&P residential electric customers, selected at random, received personalized Home Energy Reports (pilot program) aimed at reducing home energy use.
- Purchased energy efficient retrofit street light luminaires.
- Westridge School's LEED® Platinum certified Upper School science building has been awarded the 2011 Pasadena & Foothill Chapter American Institute of Architects (AIA) Merit Award. Westridge holds the distinction of having completed the first building the City to be LEED certified to the Platinum level (*Community Level*).
- Robinson Laboratory for Astrophysics at Caltech awarded LEED Platinum for its energy savings.

## **WASTE REDUCTION**

### **2007**

- Over 40 million pounds of construction and demolition debris materials were recycled from construction projects in Pasadena.
- The Big Belly came to Pasadena in 2007 - The City piloted four Big Belly solar powered trash compactors, placed at various locations. These environmentally sound compactors run off of solar power and require less service pick-ups, reducing greenhouse gas emissions.
- The forestry program recycled 85 percent of all green waste accumulated by City crews, converting waste into mulch for ground cover in the City's natural areas, parkways and frontage roads.
- The City held quarterly electronic waste collection events, collecting over 182,000 pounds of electronic waste.
- The City implemented use of 100% recycled janitorial paper products in all City facilities.
- The City implemented a battery recycling program, identifying public sites (Central Library, Jackie Robinson Center and Villa Park Community Center) to host the "Big Green Box" - the box collects up to 44 pounds of household batteries. Over 2000 lbs. of batteries and cell phones were collected.
- The City expanded its recycling program at special events and at the Rose Bowl, purchasing 120 easily transportable recycling containers, placed at special events throughout the City to collect beverage containers. Over half a million beverage containers were collected in Fiscal Year 2007.
- The Planning & Development Department banned Styrofoam products from its offices. Employees were encouraged to use reusable wares.
- Pasadena Water and Power expanded its recycling program to its leased City office spaces, providing blue desk-side recycling containers to each employee to capture all paper, plastic, aluminum, glass, and cardboard products.
- In 2007 the City amended its code to place a limit on the amount of waste haulers which could operate in the City. The City has 32 licensed waste haulers operating in the City which represent 160 trash trucks operating within the City, which causes significant air pollution, road damage, noise pollution, and congestion.
- Pasadena's libraries are reducing paper waste. Hold and Overdue notifications are being sent via email, saving postcards and postage.
- The Department of Public Health implemented Electronic Death Registration which reduces use of paper by eliminating draft paper certificates; eliminates faxing of draft certificates and eliminates unnecessary trips by funeral home/mortuaries to the Vital Records Office.

### **2008**

- Diverted 12,000 pounds of trash for recycling during the 2008 Rose Bowl Game and collected and recycled 480,000 beverage containers during the 2008 UCLA football season.
- Increased the diversion rate requirements of licensed waste haulers.
- Installed recycling stations adjacent to the athletic fields at Memorial Park, Victory Park, Allendale Park and Brookside Park.
- Collected 207,273 pounds of household hazardous waste and 74,089 pounds of electronic waste during free collection events.
- Introduced a new Battery and Compact Fluorescent Lamp recycling program, with 12 convenient collection points throughout the City for residents and business owners.

- Recycled 85% of all green waste collected by City crews; converting waste into mulch for ground cover in the City's natural areas, parkways and frontage roads.
- Launched a program to provide free one-quart "sharp waste" containers for the safe disposal of needles, and other medical supplies used at home by residents.
- Joined Green Cities California in pledging to only purchase 100% post-consumer recycled copy paper, saving 8.6 million pounds of greenhouse gas emissions, 19.6 million gallons of water, 11.5 million kilowatt hours of electricity and 67,000 trees.

## **2009**

- Reached a 21% reduction in per capita solid waste disposal from the FY05 baseline year.
- Diverted 66% of the City's waste from landfills.
- Placed 40 Big Belly Solar Compacters throughout the City. The environmentally sound trash containers run off of solar power, compacting the waste, resulting in 80 percent less service pick-ups and reduced greenhouse gas emissions.
- Collected over 68,000 pounds of electronic equipment for recycling at two electronic waste collection events.
- Recycled over 31 million pounds of debris material from private and public construction projects in Pasadena.
- Recycled 1,100 gallons of motor oil from residents through the curbside oil collection program.
- Reduced municipal paper waste through the implementation of the PayMode direct deposit system to process vendor payments for Section 8 housing payments. Electronic payments are more secure, save money and conserve resources by eliminating printing and mailing checks.

## **2010**

- Set up 13 temporary recycling stations at the Rose Bowl to improve recycling efforts.
- Increased efforts to promote cardboard recycling at the Rose Bowl, which resulted in collecting about 32,000 pounds of cardboard after eight home games. In addition, about 338,000 beverage containers, or about 45,000 pounds, were collected during the football season.
- Provided printing services for Pasadena Unified School District, using 30% recycled paper.
- Recycled about 18.7 million pounds of debris material from private and public construction projects.
- Cut the number of paper checks issued by the City with more electronic payments and invoicing, and a debit-card-based Cash Pay program.
- Approved funding to initiate the City's Zero Waste Strategic Plan, a study to achieve zero waste by 2040.
- Promoted community e-waste collections that recycled about over 120,000 pounds of electronic equipment.
- Recycled 860 gallons of motor oil from residents through a curbside oil collection program.
- Collected about 81,000 gallons of hazardous waste in partnership with the county.
- Partnered with a contingent of California cities, to study the effects of plastic and paper shopping bags.

## **2011**

- Ocean Blue Environmental Services – provided waste management and emergency services for Broadway, Glenarm, and Azusa Power Plants.

- Resurfaced City streets at various locations – reuse of recycled rubber tires in paving material (reduction of tires from landfill and methane gas from environment).
- Prohibited the distribution of single-use plastic carryout bags for consumer use and established a charge on single-use paper carryout bags.
- Contracted service for development of a zero waste strategic plan

## TRANSPORTATION

### **2007**

- On May 17, 2007 the Department of Transportation (DOT) and the Fire Department organized the City's 17th Annual Celebration of "Bike to Work Day". Every year City of Pasadena employees join thousands of Californians riding their bicycles to work to promote healthy living and an environmentally friendly commute. DOT is actively encouraging the public to circulate within the City without the use of cars. Outreach events such as the annual "Bike to Work Day", distribution of the City Bicycle Map through local businesses, and the annual "Bicycle Rodeo" target kids of all ages and encourage the increased use of an alternate mode of transportation.
- DOT staff continues to provide a leadership role in the Pasadena TMA to support regulated developments and employers to cultivate, implement and market alternative transportation programs for their tenants and employees (through Metro Employer Programs) that reinforce compliance with the SCAQMD's Rule 2202 Employee Commute Reduction Program and the County's Congestion Management Program/City of Pasadena's Trip Reduction Ordinance, by facilitating the bi-monthly TMA meetings that are attended by approximately 40 local businesses and are hosted by participating businesses. In addition, the Department of Transportation continues to enforce compliance with the outlined carpool parking requirements by surveying approximately 30 regulated carpool sites annually.
- The City Council was presented with 12 traffic reduction strategies on City streets. On April 21, 2007, DOT staff facilitated a joint meeting of the City Council and Transportation Advisory Commission to review the proposed strategies and get community input on the strategies. The twelve strategies discussed involved the following: charge the right price for curb parking, return the meter revenue to the neighborhoods that generate it, invest a portion of parking revenues in transportation demand management programs, provide universal transit passes, require the unbundling of parking costs, require parking cash-out, strengthen transportation demand management requirements, improve transit, improve bicycle and pedestrian facilities and programs, remove minimum parking requirements for off-street parking, set maximum parking requirements, and establish congestion pricing.
- The Department of Public Works has converted six refuse collection trucks from diesel power to dual fuel utilizing Compressed Natural Gas and diesel in order to reduce diesel exhaust.
- In the Holly Street Garage, three public parking spaces will be designated for "Qualified Green Vehicles", which are approved by the California Air Resources Board Zero Emission Vehicles (ZEV), or have an American Council for an Energy Efficient Economy (ACEEE) green score of 40 or more. Although the spaces have not been assigned, these spaces would be closer to exits from the structure or the parking garage stairs.
- For City vehicle purchases, preference is given to environmentally friendly and fuel efficient vehicles. Vehicle standards include the preference for purchasing hybrids whenever feasible. In 2007 Building Systems and Fleet Maintenance purchased 5 hybrid vehicles, extending the City's fleet to 45 green vehicles.
- The City is building a compressed natural gas fueling station at the City yards, funded by the Mobile Source Reduction Committee (MSRC). The system will utilize natural gas to fuel the



City's compressed natural gas fleet. This project supports the Conservation Element of the General Plan through utilization of low-emissions vehicles to promote air quality which enhances the environment and protects health and welfare. It also supports the Land Use Element policy to improve air quality in Pasadena and the region through usage of low emissions vehicles.

- City's Area Rapid Transit System (ARTS) buses run on clean "green" fuel. Twelve buses use bio-diesel also known as vegetable oil; five buses are hybrid – running on electric and gas; and two of the buses run on compressed natural gas.
- DOT continues to promote the use of public transit through the "Try Transit" program through the Pasadena Transportation Management Association (TMA). Seven regulated sites have participated since September 2006 – Art Center College of Design, One Colorado, Huntington Hospital, Macy's, Fidelity, Avery Dennison, and EarthLink. This program promotes the sale of ARTS bus ticket books to employers to encourage employees to use transit to get to and from work.

## **2008**

- Maintained 60 lane-miles of bikeways and on-street parking for 1,000 bikes.
- Added bike racks to each of the 24 Pasadena Area Rapid Transit Service (ARTS) buses.
- Transported over one million passengers on the ARTS bus system.
- Encouraged Metro to continue bus service on two lines - Line 177 and Line 256 - that were scheduled to be eliminated, and to create a Bus Rapid Transit service along Fair Oaks Avenue, Line 762, a well-traveled and popular commuter route.
- Installed four solar-powered traffic-calming awareness signs. The dynamic, electronic boards alert drivers to their speed.
- Improved Metro Gold Line train service with a new operating schedule that provides service every 7.5 minutes during peak hours.
- Built a safe and secure bike storage area adjacent to the Allen Avenue Gold Line Station.
- Exceeded ridesharing goals set by the South Coast Air Quality Management District. Average Vehicle Ridership (AVR) for this reporting period was 1.72 exceeding the 1.50 AVR goal by 15%.

## **2009**

- Completed construction of a compressed natural gas fueling station which will serve the City's compressed natural gas (CNG) fleet of 21 Public Works vehicles and 2 public transportation buses.
- Increased the City's electric vehicle fleet from 13 to 20 vehicles.
- Continued to phase down sulfur levels in diesel and gasoline fuels, and use advanced emission controls on all public fleets to reduce particulate matter and smog-forming emissions from those fleets by 50% by 2012.
- Installed the first multi-family residential complex electric vehicle charging station at the Westgate Apartments - a green building project.

## **2010**

- Completed the comprehensive Outreach and Metrics Reports for the update of the General Plan Mobility Element.
- Fine tuned the City's Bicycle Master Plan to champion biking for recreation and commuting, increased bicycle safety and parking, and a network of bikeways. This plan would qualify the City for Bicycle Transportation Account funds.

- Forged a steering committee and funded a study for the feasibility of a downtown streetcar, in partnership with the Pasadena Center Operating Company, the Old Pasadena Management District, the Playhouse District Association, the South Lake Avenue Business District and Paseo Colorado.
- Piloted a “road diet” project on Cordova Street from Mentor to Hill avenues, using markings to slow traffic and clear space for bicycles.
- Received a grant for \$114,000 from the California Office of Traffic Safety for Pedestrian Safety at Signalized Intersections.
- Enhanced the Metro Gold Line Fillmore Station Plaza for better traffic circulation, pedestrian safety and water and energy conservation.
- Pursued two Caltrans grants worth \$500,000 to create new street design guidelines and a web-based employee trip reduction toolkit for Pasadena employers.
- Initiated an evaluation of service provision by Foothill Transit for the Pasadena ARTS.
- Partnered with Google and Metro to make sure Pasadena ARTS bus information is accessible through popular phone and online trip planners.
- Received approval from the South Coast Air Quality Management District for the City’s Rule 2202 Employee Commute Reduction Program annual report. The City continues to exceed its target of 1.5 commuters per car, with 1.63 per car at the Civic Center and 2.02 per car at the City Yard.
- Improved traffic mobility by extending Walnut and Kinneloa avenues to provide a smooth connection under the 210 Freeway. The rubberized street pavement used recycled car tires.

## **2011**

- Purchased annual and monthly transit passes for City employees participating in the City’s employee trip reduction program.
- Purchased CNG 25-foot bus for ARTS system.
- Received master agreement with the State of California for state-funded transit projects.

## **WATER**

### **2007**

- The City launched a drought tolerant landscape and irrigation upgrade program to evaluate irrigated landscape areas in parks, medians, City facilities, and public buildings to determine the potential for water conservation through replanting and/or replacement of irrigations systems.
- Hired a full-time Irrigation Coordinator. One of the responsibilities of this position is to investigate ways to reduce water usage in park and non-park areas maintained by park maintenance staff.
- Prepared a draft list of 600 water-wise plants. Staff is working with a consultant to amend this list and group plants by water consumption and compatibility variables.
- Delayed turf renovation projects at Viña Vieja and Villa Parke to reduce the amount of water necessary during the turf reestablishment period.
- Identified three projects where turf is to be eliminated: Turf area in front of the City Yards; 12,000 square feet of turf around the Victory Park Community Center and the elimination of 4500 square feet of turf at Washington Park.
- Began working with Water & Power to develop a GIS-based map of water meters to assist staff in highlighting water usage through park and landscaped areas.
- Began incorporating low-flow design and technology in irrigation projects.
- Continued to convert irrigation systems to operate from weather-based data rather than manually adjusted controls.

## **2008**

- Implemented Water Shortage Plan I, urging Pasadena residents and businesses to follow specific, voluntary water-saving measures with the goal of conserving 10%, or about 1.1 billion gallons annually.
- Amended the Green Building Ordinance to require green building projects to achieve a minimum water use reduction of 20% under baseline.
- Secured a grant from the U.S. Department of the Interior's Bureau of Reclamation to merge water use data and satellite photos onto an electronic map of the City to more accurately predict water consumption.
- Offered an extensive list of City rebates on water-saving fixtures. Commercial projects alone in 2008, including more than 500 new high-efficiency toilets in multi-family complexes and commercial buildings, will save over 110 acre feet, or nearly 36 million gallons of water annually.
- Installed low flow water drip tubing that eliminates water runoff and overspray for landscaping design at street medians.
- Improved storm water runoff in the Central Arroyo through the creation of ten new vegetated islands and the installation of permeable pavers in 30 parking spaces at Rose Bowl Parking Lot I.

## **2009**

- Reduced per capita water use to 175 gallons daily, reaching a 12% reduction in FY09 from the FY05 baseline year of 199 gallons daily per capita water use.
- Adopted a Comprehensive Water Conservation Plan which sets goals for reducing City-wide water use by 10%, 20% and 30% in years 2015 and 2020 respectively and details six major strategies for achieving water use reduction.
- Adopted a budget for the construction of the first phase of a recycled water distribution system for landscape irrigation, designed to conserve millions of gallons of drinking water every year.
- Incorporated new technology into municipal facilities to reduce water usage.
- Allocated \$35,000 for affordable housing toilet retrofits.
- Increased distribution of high efficiency showerheads and shower timers.
- Provided a new water savings rebate for synthetic turf.
- Increased the rebate for qualifying weather-based irrigation controllers to \$160 - about half the cost of most models.
- Established a City-wide irrigation crew to prioritize and address irrigation problems.
- Installed weather based automatic irrigation controllers at City parks and landscaped areas.
- Renovated City landscaped areas with water conserving drip irrigation systems.
- Reduced irrigation schedules at all City sports fields and other turf areas and eliminated irrigation during the winter months.

## **2010**

- Engaged the community in crafting a new Water Integrated Resource Plan to ensure a reliable, cost-effective and environmentally responsible supply for the next 25 years. Calling for aggressive conservation and new local sources, the plan is expected to be adopted in early 2011.
- Took the first step in developing a City-wide recycled water system with a feasibility study funded by a state grant.
- Adopted the statewide Water Efficient Landscape Ordinance requiring a detailed water-saving plan before any major landscaping projects are approved.

- Reduced per capita water use to 157 gallons daily, a decrease of about 15 percent from fiscal year 2009.
- Cut overall water use in public areas, including parks and medians, by 20 percent in FY2010 compared to the wettest year in the past five years and by more than 30 percent compared to the driest year during the same time period, thanks to the Calsense Water Management System.
- Enhanced website, pasadenasaveswater.com, with do-it-yourself water conservation videos and a full-color water-smart landscaping guide.
- Installed solar-powered water-saving irrigation controllers at more than 40 sites, primarily along median islands.
- Replaced old inefficient spray heads at the Hastings Branch Library with waterwise nozzles.
- Supported John Muir High School students with training and supplies to build a drought-tolerant campus garden. Students also built a solar-powered concession stand on their own.

## **2011**

- Implemented of the 2010 Urban Water Management Plan.
- Monk Hill Treatment System and Disinfection Facility - Protected the ecological integrity of the City's primary drinking water sources.
- Purchased gas chromatograph/mass spectrometer for Monk Hill Water Treatment system.
- Held free workshop for water-saving alternatives to grass lawns.
- Termination of Level 1 water supply shortage measures (water supply shortage no longer exists).
- Applied for grant with U.S. Department of Interior, Bureau Reclamation for preparation of recycled water project feasibility study.
- Adopted Water Integrated Resources Plan (WIRP).