City of Rancho Palos Verdes

Municipal Greenhouse Gas Emissions Inventory Report

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City of Rancho Palos Verdes Emissions Inventory Report

Table of Contents

Appendices

List of Tables

List of Figures

How to read this report:

The following emissions inventory report includes data for the years 1990, 2005, and 2007. It is organized however starting with the year 2005 because it is the baseline year that will be used to set emission goals. The next year discussed is 2007, an interim year that shows progress made since the baseline year. Lastly, 1990 data is included to review historical GHG levels. Emissions data located in the appendix D is organized in the same way to maintain consistency.

I. Executive Summary

A. Project Background

There are a number of actions taking place in the State of California with respect to climate change and the reduction of greenhouse gas emissions (GHG). With the passage of the California Global Warming Solutions Act of 2006 Assembly Bill (AB) 32 the State of California established a 'first-in-the-world' comprehensive program of regulatory and market mechanisms to achieve real, quantifiable, cost-effective reductions of GHG emissions. The legislation directs the California Air Resources Board (CARB) to oversee its implementation, requiring California to reduce its GHG emissions to 1990 levels by 2020. Local governments in the State of California have an important role to play in helping the State reach its reduction goals.

Since the passage of AB 32 the framework of emissions reduction strategies have been adopted in the AB 32 Scoping Plan. The Scoping Plan includes a range of actions both mandated and voluntary, providing the main strategies for California to meet its reduction goal. The plan encourages local governments to set a GHG reduction target and develop a plan of action for government and community-wide emissions. More recently, Senate Bill (SB) 375 provides a path to achieve AB 32 through transportation (one of the largest sources of GHG emissions) and land use strategies.[1] The bill takes a regional approach to achieving results and establishes a process for CARB to develop GHG emissions reduction targets for each region. While there is no specific number that a local government must reduce its emissions to, it is still crucial that local governments develop strategies to reduce their emissions and comply with regional targets as they develop.

The increasing interest in climate change has engendered South Bay communities to form active, involved citizen groups that have advocated that their cities begin the process of creating Climate Action Plans.[2] A number of South Bay cities signed the "Cool Cities" pledge.[3] By committing to reduce global warming emissions cities will be implementing solutions to make themselves more sustainable and energy efficient. In the spring of 2008 the South Bay Cities Council of Governments (SBCCOG) coordinated efforts to respond to AB 32 by assisting South Bay cities with the process of conducting a GHG emissions inventory. In this way, South Bay cities will be in a better position to respond to the challenges and impact legislation related to climate change. Additionally, GHG inventories will be a useful tool to help South Bay cities measure their progress to meet regional reduction goals.

South Bay cities began the process of assessing their GHG emissions by joining ICLEI—Local Governments for Sustainability, an international association of city and county governments that have made a commitment to sustainable development.[4] Through ICLEI, South Bay cities gained access to tools and resources such as the Clean Air Climate Protection (CACP) software, which enables cities to quantify their emissions. Another resource utilized to conduct the municipal inventory was the Local Government Operations Protocol (LGOP).[5] The protocol was developed in partnership by ICLEI, the California Air Resources Board (CARB), the California Climate Action Registry (CCAR), and The Climate Registry (TCR) to enable local governments to measure and report emissions in a

1 See appendix F for more information on Climate Change legislation.

2 ICLEI-Local Governments for Sustainability was formerly known as the International Council for Local Environmental Initiatives, defines a Climate Action Plan (CAP) as a set of policies and measures designed to meet emissions reduction targets by a designated target year. A CAP must include a timeline, breakdown of actions and estimated benefits of each action compared to the baseline, a description of financing mechanisms, and an assignment of responsibility to departments and staff, and should incorporate public awareness and education efforts.

3 The Cool Cities Pledge was developed to encourage cities to endorse the U.S. Mayors Climate Protection Agreement and create their own greenhouse gas reduction activities.

4 Visit the ICLEI website to learn more about the organization at http://www.icleiusa.org/about-iclei/iclei-by_region/california-region

5The Local Government Operations Protocol can be viewed with this link http://www.climateregistry.org/resources/docs/protocols/industry/local-gov/lgo_protocol_september2008.pdf

consistent and transparent way. The protocol is a program neutral guide that was developed so that cities can follow internationally recognized GHG accounting and reporting principles.

B. Purpose of Conducting a GHG Emissions Inventory

One of the first steps a city takes towards protecting the environment from global warming and promoting environmental stewardship is to identify and account for the sources of emissions in its own backyard including municipal and community-wide emissions. Conducting an emissions inventory creates a pathway for cities to develop emissions documentation to better manage foreseeable regulatory programs at the Federal, State or regional levels. By being proactive and creating this documentation cities can begin to refine the collection and management of emissions data thereby improving the quality of future inventories. A municipal inventory allows a city to quantify the emissions it is responsible for from individual buildings and facilities, vehicle fleet, transit, waste, etc., giving the City insight into the relationship between improving efficiency and reducing emissions. Once a municipal inventory has been completed a city can identify and evaluate specific areas within municipal operations that are inefficient to then target. Utilizing the inventory to document and formulate a plan of action to address these inefficiencies gives the City an opportunity to lead by example, and promote education and outreach within the community.

C. Scope of the GHG Emissions Inventory

To create an inventory, data was gathered for the years 1990, 2005, and 2007. The year 2005 was selected as the baseline year and will serve as a reference year to measure future progress and establish short-term and long-term reduction target years. Although an estimate of 1990 data is shown to capture historical GHG emissions, and where possible, to be used for the purpose of comparing data between years, a reduction target should be set from the baseline year. The year 2005 was chosen because it allowed the City to gather the earliest, most accurate and reliable data. Data was also collected for the year 2007. This year is considered an interim year to monitor energy use changes that may have occurred since the baseline year 2005. It is useful to review data from this year because it shows progress made that will count towards any reduction goal set. Additionally and where available, data was also collected from the year 1990 to estimate the City's historical GHG emissions at that time. The year 1990 is significant in that it represents a reference year for several key pieces of climate change legislation such as the United Nations Framework Convention on Climate Change (UNFCCC), the Kyoto Protocol agreement, and the U.S. Mayors' Climate Protection Agreement.[6] However, it was difficult to find accurate data going back as far as 1990 and so comparisons have been made in areas where data is reliable. The precise emissions emitted in 1990 were unable to be determined, thus the decision was made to use the baseline year 2005 data as the benchmark for setting targets.

Following the LGOP guidance for local governments, the City selected an operational control approach to define its organizational boundaries. What this means is that the City identified what emissions it should account for in its municipal inventory based on what facilities and operations it owns or controls. The City's operational boundaries are used to establish and organize its emissions by "scopes."[7] In this way, a city can separately account for its direct and indirect emissions in a tiered fashion. It also establishes a foundation for following reporting standards in the LGOP.

The City gathered information from a variety of sources, including consumption data from utility companies, fuel data from internal city records, data on waste and other services from contract service providers. A characterization study from the California Integrated Waste Management Board was utilized to capture waste composition and employee commute surveys were administered to capture emissions data from vehicle miles traveled[8] where no records were

6 See appendix F for descriptions on climate change legislation.

7 See section 3, Inventory Results Introductions for more information on scopes of emissions.

8 See Appendices B and C for a description of data sources and methodologies used.

available. This data was then utilized to quantify GHG emissions. Following ICLEI program-specific requirements, this report is considered to be a Quick Action Report[9] which entails reporting on 3 of the 6 internationally-recognized GHGs regulated under the Kyoto Protocol.[10] The benefit of this reporting option is that it allows a city to capture the majority of its emissions while familiarizing staff with the process of conducting an inventory so that in the future a more detailed level of reporting can be accomplished. The more comprehensive report entails accounting for all 6 Kyoto Protocol Gases. When the City conducts its re-inventory to ensure that it is inline with its emission reduction goals, the City will be able to consider producing a comprehensive report by adding data on the additional gases.

D. Inventory Methodology

This Quick Action report includes municipal results for the three years inventoried; including detailed reports, located in appendix A, for each year, which shows the GHGs separately as prescribed by ICLEI in the LGOP. As a framework for this report, the LGOP was utilized as a resource as was the Local Government Operations Standard Inventory Report Template. ICLEI provided the technical assistance and the software to accomplish the municipal inventory. The CACP 2009 software is consistent with LGOP standards with respect to the emission coefficients[11] and methodology employed by the software to calculate the equivalent GHGs. It is important to note that GHG emissions with different global warming potential are shown as one roll-up number known as a carbon dioxide equivalent unit (CO_2e).[12] It helps to simplify by looking at just one number for climate action planning; however, ICLEI believes that the most accurate description of emissions requires separate accounting by scope,[13] which can be found in appendix A of this report.

The inventory results should be thought of as an approximation of the GHG emissions emitted in the years inventoried. The results should be used as a policy and planning tool rather than a precise measurement of GHGs. All the data sources used to capture the equivalent emissions emitted, also referred to as activity data, have been noted in the appendix B. This shows transparency when accounting for emissions. Similarly, appendix C discloses the formulas and emissions factors used to arrive at the equivalent GHG emissions. To the extent possible, recommended data and methods in the LGOP were used, but in some cases the suggested alterative methods were necessary to use when recommended data could not be found, appendices B and C give a description of the data and methodologies used.

E. Key Highlights and Findings

- The City of Rancho Palos Verdes generated approximately 2,324 metric tons of CO_2e in the baseline year, 2005; this is equivalent to the GHG emissions generated by electricity use of 322 homes for one year.[14]
- There was an overall 1.4% decrease in GHG emissions between the baseline year 2005 and the interim year 2007. This was largely due to scope 3 diesel fuel sources from contract service vehicles.
- 4.1% growth of GHG emissions came from electricity use between the years 2005 to 2007.
- Results from the employee commute survey indicate 40.8% of respondents are interested in participating in a ridesharing program.
- Under a business-as-usual scenario, the City can expect emissions to rise to 2,451 metric tons of CO2e by 2012

9 To read more about ICLEI's Quick Action Report see Appendix C in the Local Government Operations Protocol. The Quick Action Report entails reporting only on Carbon dioxide (CO2); Methane (CH4); Nitrous oxide (N2O).

10 The internationally-recognized greenhouse gases regulated under the Kyoto Protocol are Carbon dioxide (CO2); Methane (CH4); Nitrous oxide (N2O); Hydrofluorocarbons (HFCs); Perfluorocarbons (PFCs); and Sulfur hexafluoride (SF6), Local Government Operations Protocol, page 11.

11 Coefficients or emissions factors as they are known are multiplied by the data in order to arrive at an equivalent GHG emissions number.

12 Equivalent Carbon Dioxide (CO_2e) the universal unit for comparing emissions of different GHGs expressed in terms of the GWP of one unit of carbon dioxide, Local Government Operation Protocol, Glossary.

13 See ICLEI Reporting Requirements, Appendix C, Local Government Operations Protocol.

14 The EPA Greenhouse Gas Equivalencies Calculator was utilized to help visualize and understand GHG emission results.

that is equivalent to the annual GHG emissions from 449 passenger vehicles; and 2,534 metric tons of CO2e by 2015, equivalent to the annual GHG emissions from 464 passenger vehicles if the City does nothing to reduce its emissions.

E. Future Steps

The next step will be to conduct a community-scale inventory to assess GHG emissions related to residential, commercial, industrial, transportation, and waste sectors. Once completed, these inventories provide the basis for the creation of a Climate Action Plan, which will include measures and policies to reduce emissions in both municipal operations and through community actions.

Climate action work is important and with the municipal inventory complete, the City can select a short and long-term reduction target for municipal operations. Before deciding on a target, the City should review the business-as-usual forecast graph, located in section three, to see what its emissions will look like in the years 2012 and 2015. The City will also want to think about measures and policies that might be included in the climate action plan to reach an adopted goal. Located in section four, is a summary of the City's existing and planned efforts to get the process started. It is important to anticipate and leave enough time to achieve whatever goal is set. An example of a short-term reduction target might be 20% below 2005 baseline levels by the year 2012. In general, ICLEI recommends the further away a target year the more emissions the City will want to reduce. A good example of an end date of a long-term target that is in-line with the State's AB 32 target would be 2020. How the City goes about adopting a reduction target depends on what works best for the City.

Being proactive is the best way to curb GHG emissions and positively influence change within the community. The Climate Action Plan development requires several steps and may include creating a review committee (consisting of city staff), defining current measures, developing new measures, developing an implementation plan, community outreach strategies, and developing ongoing tracking. Now is a good time to consider what municipal measures and policies planned or existing should be included in the climate action plan. It is important to consider time, resources, cost, and the possible GHGs reduction scenario of each individual measure, as they will all be factors in the decision-making process for the City to reach its goals.

Now that the first step has been taken, it is vital to continue to develop inventory reporting skills. It is up to the City how often they re-inventory GHG emissions, but ICLEI recommends doing so every few years to make sure the City stays on target to reach short and long-term goals. Refining the gathering and management of data for the next inventory should start with good internal communication between departments working together to ensure that the appropriate records are set aside or entered into the ICLEI data collection forms. Working together is the best way to fine tune reporting skills and work towards creating a comprehensive report as outlined in the LGOP under ICLEI program requirements.

II. Local Government Profile Information

A. Local Government Description

The City of Rancho Palos Verdes is located on the Palos Verdes Peninsula in the southwestern tip of Los Angeles County. The City covers 13.6 square miles of land and has 7.5 miles of coastline; a population of 41,145 was reported by the 2000 census. With its magnificent views, mild coastal climate, excellent school system, natural open space areas, and low-density residential character, the Peninsula is a very desirable place to live.

Local Government History

The City of Rancho Palos Verdes was the last of the four Palos Verdes Peninsula cities to incorporate. Each of the four Peninsula cities incorporated for the same basic reason—control of land use planning and implementation of local policies. Palos Verdes Estates was incorporated in 1939, Rolling Hills and Rolling Hills Estates in 1957, and Rancho Palos Verdes on September 7, 1973.

Primary Services

Department	Primary Services
Administration	Under the direction of the City Manager, provides day-to-day direction to the City departments and oversees the budget, risk management, community outreach, personnel, employee benefits, and emergency preparedness. It includes the functions of the City Clerk, finance & information technology, and human resources.
Police Department	Contracted from the Los Angeles County Sheriff's Department.
Fire Services	Provided by the Los Angeles County Fire District through a special district.
Recreation and Parks	Responsible for coordinating a comprehensive park system and numerous community activities.
Community Development	Responsible for planning, code enforcement, building and safety, and view restoration.
Public Works	Responsible for city engineering, administering the refuse franchise and recycling activity, grant administration, undergrounding districts, and administering transit coordination. The Public Works Department is also responsible for managing maintenance, engineering, and construction activity in the Redevelopment Agency area.
Transit	Administered by the Public Works department. The City participates in two multi-agency transit systems in the South Bay: the Palos Verdes Peninsula Transit Authority (PVPTA) and the Municipal Area Express (MAX).

III. Municipal Emissions Inventory Results

A. Inventory Introduction and Results

Depicted in this section are tables and graphs that represent and illustrate an approximation of the GHG emissions levels for the three years of data collected. As mentioned in the executive summary, the data findings are expressed in CO_2-equivalent, which is an estimated sum or roll-up number for GHGs with different global warming potential,[15] to make it easier to review, plan, and set targets. Appendix A gives a detailed account of individual GHGs separately for the purpose of establishing good reporting habits. Based on LGOP reporting standards, GHG emissions are organized according to their scope.[16] Scopes are determined based on what control approach[17] a local government chooses to define its boundaries. The LGOP recommends an operational approach for local governments wherein a city defines its scopes by what they own and operate. In this way, the City can account for direct and indirect emissions separately.

Direct emissions are associated with scope 1 and are deemed within the City's control. They are generated by fixed equipment used to produce heat or power from the stationary combustion process and mobile combustion of fuels from city fleet vehicles.

Cities also have a level of control over activities that are associated with indirect emissions, known as scope 2. These emissions are associated with the consumption of purchased electricity, steam, heating, or cooling.[18] The difference between the scopes is that these sources are owned or controlled by another entity. Still, a city will want to develop measures to reduce emissions within this scope. Indirect emissions are also associated with scope 3, however scope 3 emissions are related to activities that the City does not own or operate, such as emissions from contracted services, employee commuting, or waste disposal. As an ICLEI member, scope 3 reporting is considered optional, but good to include as it may be policy relevant. City staff decided what data to include for contract provides (scope 3 emissions) based on whether the information was obtainable, reliable, and relevant.

Tables 1 through 3 are organized by scope, sector, and source of emissions. The data is shown in metric tons of CO_2-equivalent, adjacent is the percentage represented by each sector, source of emissions, energy and fuel use, the equivalent one million British thermal units, and the cost where data was available. This information is shown for the purpose of targeting, planning, and then tracking energy and cost-saving measures. Refer to appendix D to review energy and fuel use per item. To learn where specific data was obtained and how it was computed, refer to the appendices sections B and C.

2005

Baseline Year

Results from the 2005 municipal inventory represent the year chosen as a baseline year, which will serve as a foundation for setting short and long-term emissions reduction targets. For this year, there was adequate data available to conduct an accurate inventory. It is important to keep in mind that scope 3 emissions included in the baseline year are estimates based upon information provided by contract service providers and from surveying employees and should not be thought of as a precise measurement of GHGs, but rather as policy relevant

15 Each greenhouse gas has a different global warming potential based on its ability to trap heat in the atmosphere, CO_2e is the universal unit for comparing emissions of different GHGs global warming potential, see LGOP appendix E, page 166 for more details.

16 The Local Government Operations Protocol follows categorization standards developed by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD).

17 Definitions of inventory approaches are discussed in the LGOP, page 14.

18 See Local Government Operations Protocol for details, page 22.

information that the City may want to consider when developing or evaluating measures or policies.

In 2005, the City of Rancho Palos Verdes GHG emissions totaled 2,324 metric tons of CO_2e. This number includes both direct and indirect sources of emissions, as shown in Table 1. This total is equivalent to the GHG emissions emitted from the electricity use of 322 homes for one year. Looking at the scopes within the table, the smallest portion 1.9% (scope 1 total) were emissions generated from a combination of natural gas use for buildings and facilities and fuel for the vehicle fleet. Approximately seven vehicles from the Public Works and the Park and Recreations Department were included in the inventory. Emissions emitted from electricity use accounted for 26% (scope 2 total) of the total emissions. The largest portion 72.1% (scope 3 total) were emissions due to a combination of employee commuting (see appendix E for employee commuting details), contract service vehicles, and waste (refuse collected from City bins).

Energy/Fuel use and cost information has been listed for the purpose of planning and tracking energy measures' cost effectiveness. During 2005, the City of Rancho Palos Verdes used 1,993,066 kWh of electricity at a cost of $ 359,458.11. In this same year, the City consumed 2,391 therms of natural gas costing $ 3,083.

Table 1. Municipal Inventory Summary 2005[19]

RPV Municipal GHG Emissions 2005						
Sector	**MT CO_2e**	**Percent CO_2e (% CO_2e)**	**Source**	**Energy/Fuel Use**	**Energy/Fuel Use Cost**	**Energy Equivalent** (MMBtu)
Scope 1 Emissions						
Buildings & Facilities						
Buildings & Facilities	13	0.6%	Natural Gas	2,391 therms	$ 3,083	239
City Vehicle Fleet						
City Vehicle Fleet	30	1.3%	Gasoline	3,315.81 gal	$ 8,256.37	411
Total Scope 1 Emissions	**43**	**1.9%**	**-**	**-**	**$ 11,339.37**	**650**
Scope 2 Emissions						
Buildings & Facilities						
Buildings & Facilities[20]	182	7.8%	Electricity	603,832 kWh	$ 82,830.00	2,061
Streetlights & Traffic Signals						
Traffic Signals/Controllers	17	0.7%	Electricity	57,461 kWh	$ 8,020.00	196
Streetlights[21]	374	16.1%	Electricity	1,231,085 kWh	$ 247,471.71	4,202
Water Delivery						
Sprinkler/Irrigation Control	1	0.0%	Electricity	1,332 kWh	$ 3,725.86	5
Water Pumps	3	0.1%	Electricity	6,229 kWh	$ 1,549.52	21
Dewatering Wells	4	0.2%	Electricity	11,553 kWh	$ 2,972.24	39
Wastewater						
Sewage Pumps	25	1.1%	Electricity	81,514 kWh	$12,888.78	278
Total Scope 2 Emissions	**606**	**26%**	**-**	**1,993,066 kWh**	**$ 359,458.11**	**6,802**
Scope 3 Emissions						
Employee Commute						
Employee Commute	207	8.9%	Gasoline	405,885 VMT	n/a	2,851

19 See appendix D, Emissions Data, to review individual energy use and cost per item.

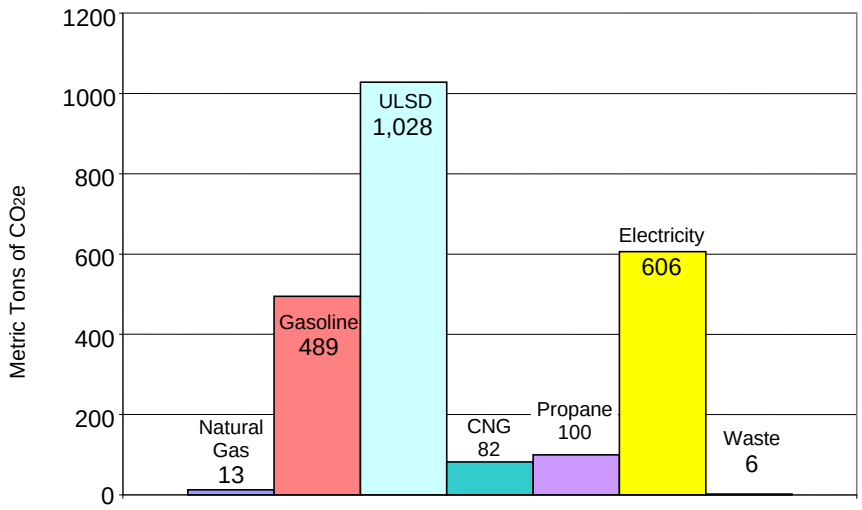
20 Building & Facility accounts may include lights and water delivery devices located on the same metered account.

21 The Streetlight category includes lights used to light sidewalks and roadways for safety. City owned lights and Southern California Edison owned lights utilized for this purpose have been combined in the total shown here. See appendix D, Emissions Data, to review individual emissions in the Streetlights and Traffic Signals category.

Sector	MT CO_2e	Percent CO_2e (% CO_2e)	Source	Energy/Fuel Use	Energy/Fuel Use Cost	Energy Equivalent (MMBtu)
Vehicles—Contract Service Providers						
Contract Service Vehicles	**1,462**	**62.9%**			n/a	**20,405**
	1,028		ULSD	101,226 gal		14,038
	252		Gasoline	11,195.27 gal		3,470
	82		CNG	3,569.93 gal equiv.		1,399
	100		Propane	5,181.44 gal		1,498
Solid Waste						
Waste	6	0.3%		24 tons	n/a	n/a
Total Scope 3 Emissions	**1,675**	**72.1%**	-	-	-	**23,256**
Total Emissions	**2,324**	**100%**	-	**-**	**$ 370,797.48**	**30,708**

Figure 1 illustrates emissions by source. The main sources of emissions were from fuels and electricity, with ULSD ranking the highest. Electricity was the second highest source followed by gasoline. Waste resulted in the lowest source of emissions. It was estimated that 24 tons of waste generated by city operated and owned facilities was sent to a landfill. A breakdown of the waste composition can be found in appendix D, which is based on a solid waste characterization study for public administration from the California Integrated Waste Management Board website.

Figure 1. Emissions by Source 2005
(including all direct and indirect sources)



Figures 2 and 3 illustrate a percentage breakdown of each sector and sub-sector from Table 1. ICLEI asks its members to report on scopes 1 and 2 where scope 3 is optional; therefore, data below is organized to reflect this criteria. Figure 2 shows all scopes, where as Figure 3 concentrates only on scopes 1 and 2 – functions that a city has more influence on. Figure 2 indicates 62.9% of emissions are from contract service vehicles that work within the City's boundaries, 0.3% from waste, and 8.9% are the result of employee commuting. While a city may not have the same degree of control over this source, there is still an opportunity to create initiative programs or policies that will engender climate-friendly practices. Figure 3 is comprised of natural gas, fuels, and electricity generated emissions. Electricity in scope 2 accounts for 93.4% of emissions and scope 1 emissions from fuel and natural gas sources accounts for the remaining 6.6% of emissions.

Figure 2. Emissions by Sector 2005
(including all direct and indirect sources from scopes 1, 2, & 3)

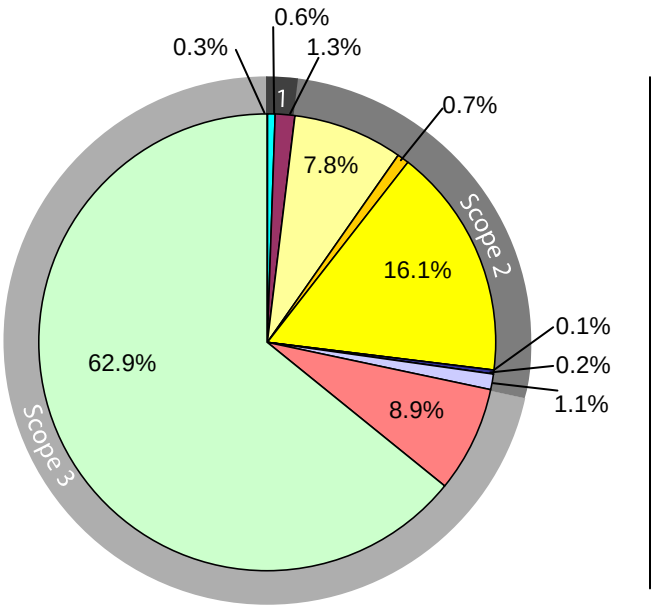
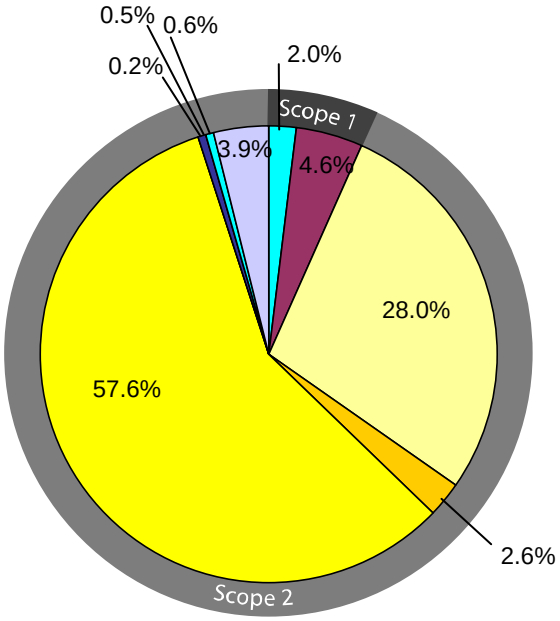


Figure 3. Emissions by Sector 2005
(including only direct and indirect sources from scopes 1 and 2)



2007

Interim Year

The year 2007 was chosen as an interim year to review any energy use changes that may have occurred since the baseline year. ICLEI recommends cities re-inventory every year or two (or as often as possible) to ensure the City is keeping on track with its target. As with the data in 2005, the table below is organized by scope, sector, source of emissions, energy and fuel use, and cost to capture a broad picture of the data.

In 2007, the City of Rancho Palos Verdes GHG emissions totaled 2,290 metric tons of CO_2e including both direct and indirect sources of emissions—this total is equivalent to the emissions produced from 259,932 gallons of gasoline consumed. The year 2007 represents a 1.4% decrease in emissions from the baseline year. Looking at the scopes within the table, emissions generated from natural gas and fuel sources remained the same at 1.9% (scope 1 total). Approximately ten vehicles from the Public Works, Planning, Building & Code Enforcement, and the Park & Recreations Department combined were included in the inventory. Emissions from electricity use increased from the baseline year contributing 27.5% (scope 2 total) to the total emissions. The largest portion of emissions came from a combination of employee commuting, contract service vehicles, and waste at 70.6% (scope 3 total). In 2007, the City of Rancho Palos Verdes used 2,154,513 kWh of electricity at a cost of $ 445,470.47. In this same year, the City consumed 3,507 therms of natural gas at a cost of $4,125.

Table 2. Municipal Inventory Summary 2007[22]

RPV Municipal GHG Emissions 2007						
Sector	**MT CO_2e**	**Percent CO_2e (% CO_2e)**	**Source**	**Energy/Fuel Use**	**Energy/Fuel Use Cost**	**Energy Equivalent** (MMBtu)
Scope 1 Emissions						
Buildings & Facilities						
Buildings & Facilities	19	0.9%	Natural Gas	3,507 therms	$4,125	351
City Vehicle Fleet						
City Vehicle Fleet	24	1.0%	Gasoline	2,737.62 gal	$ 8,295.18	340
Total Scope 1 Emissions	**43**	**1.9%**	**-**	**-**	**$12,420.18**	**691**
Scope 2 Emissions						
Buildings & Facilities						
Buildings & Facilities[23]	220	9.6%	Electricity	751,034 kWh	$102,822.22	2,563
Streetlights & Traffic Signals						
Traffic Signals/Controllers	15	0.7%	Electricity	52,711 kWh	$8,446.48	180
Streetlights[24]	360	15.7%	Electricity	1,229,175 kWh	$306,897.39	4,195
Water Delivery						
Sprinkler/Irrigation Control	1	0.0%	Electricity	2,728 kWh	$4,390.88	9
Water Pumps	3	0.1%	Electricity	7,255 kWh	$1,879.58	25
Dewatering Wells	3	0.1%	Electricity	10,930 kWh	$3,409.00	37
Wastewater						
Sewage Pumps	29	1.3%	Electricity	100,680 kWh	$17,624.92	344
Total Scope 2 Emissions	**631**	**27.5%**	**-**	**2,154,513 kWh**	**$ 445,470.47**	**7,353**
Scope 3 Emissions						
Employee Commute						
Employee Commute	**228**	**10%**	-	**447,433 VMT**	-	**3,153**
	228		Gasoline	446,565 VMT		3,148
	0		Diesel	868 VMT		5
Vehicles—Contract Service Providers						
Contract Service Vehicles	**1,381**	**60.3%**			n/a	**19,329**
	917		ULSD	90,259 gal		12,517
	266		Gasoline	11,318.25 gal		3,664
	89		CNG	3,879.20 gal equiv.		1,520
	109		Propane	5,630.36 gal		1,628
Solid Waste						
Waste	7	0.3%		26.2 tons	n/a	n/a
Total Scope 3 Emissions	**1,616**	**70.6%**	-	-	-	**22,482**
Total Emissions	**2,290**	**100%**	-	**-**	**$ 457,890.65**	**30,526**

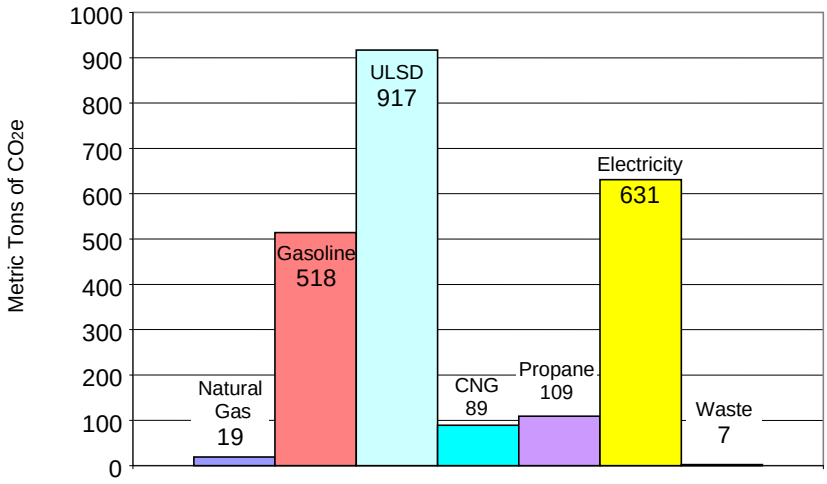
22 See appendix D, Emissions Data, to review individual energy use and cost per item.

23 Building & Facility accounts may include lights and water delivery devices located on the same metered account.

24 The Streetlight category includes lights used to light sidewalks and roadways for safety. City owned lights and Southern California Edison owned lights utilized for this purpose have been combined in the total shown here. See appendix D, Emissions Data, to review individual emissions in the Streetlights and Traffic Signals category.

Figure 4 shows a decrease in emissions from diesel sources and an increase in emissions from all other fuel sources, natural gas, and electricity. It was estimated 26.2 tons of waste generated by city operated and owned facilities was sent to a landfill.

Figure 4. Emissions by Source 2007
(including all direct and indirect sources)



Similar to 2005, Figures 5 and 6 illustrate a percentage breakdown of each category from Table 2. Figure 5 indicates 61.3% of emissions are from contract service vehicles that work within the City's boundaries, 0.1% from waste, and 8.7% are the result of employee commuting. Figure 6 shows a shift in electricity generated emissions as buildings and facilities emissions increased, streetlight emissions decreased. Scope 1, natural gas related emissions increased while fuel related emissions decreased.

Figure 5. Emissions by Sector 2007
(including all direct and indirect sources from scopes 1, 2, & 3)

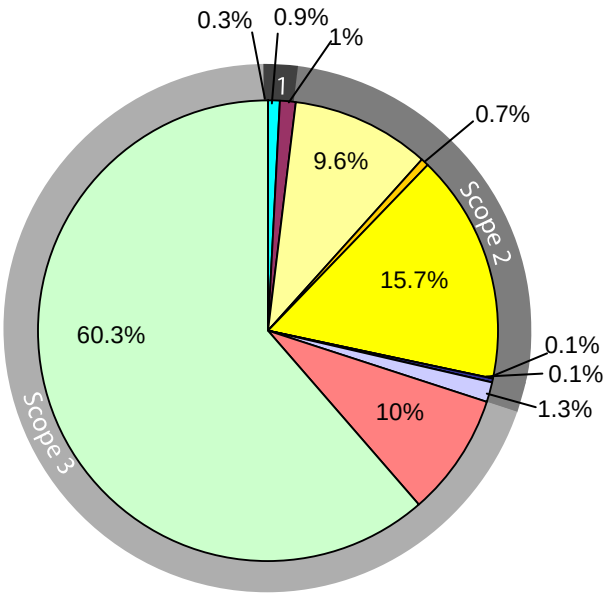
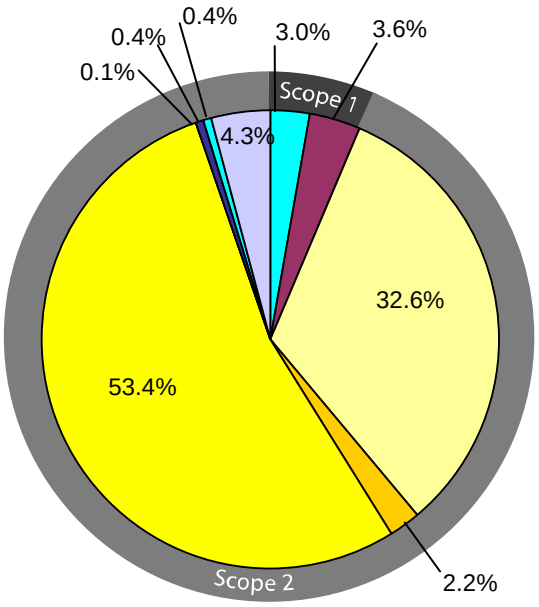


Figure 6. Emissions by Sector 2007
(including only direct and indirect sources from scopes 1 and 2)



1990

Historical Year

Looking back to 1990, this year is a benchmark for several key pieces of climate change legislation, such as the Kyoto Protocol as mentioned in the executive summary. Located in appendix F are brief descriptions pertaining to some of the historical policies that have set 1990 as a benchmark for reducing GHG emissions. Data was collected for this year to review, where possible, the historical GHG levels; however, it was difficult to find accurate data, with the exception of electricity, and "back-casting" or creating a rough estimate of emissions is not recommended in the LGOP.[25] Therefore comparisons have been made in areas where data is reliable. As suggested in the protocol, it is better to concentrate on developing a high-quality, comprehensive inventory with reliable data rather then back-casting to 1990 and therefore the reduction target should be set from 2005 levels.

Based on the data that was available for 1990, the GHG emissions identified totaled 351.2 metric tons of CO2e, as shown in Table 3. Scope 2 totaled 350 metric tons of CO_2e. This amount is equivalent to the annual GHG emissions from 64 passenger vehicles. Emissions generated from the buildings and facilities sector were the highest, equal to 243 metric tons of CO_2e. Only partial records were found for natural gas. The 0.2 metric tons of CO_2e listed reflects the emissions based on casual records from the Southern California Gas Company. Scope 3 emissions from a contract service provider's vehicles amounts to 1 metric ton of CO_2e.

Table 3. Municipal Inventory Summary 1990

RPV Municipal GHG Emissions 1990						
Sector	**MT CO_2e**	**Percent CO_2e** (% CO2e)	**Source**	**Energy/Fuel Use**	**Energy/Fuel Use Cost**	**Energy Equivalent** (MMBtu)
Scope 1 Emissions						
Buildings & Facilities						
Buildings & Facilities	0.2	0.8%	Natural Gas	21 therms	n/a	2
Total Scope 1 Emissions	**0.2**	**1.9%**	**-**	**21 therms**	**-**	**2**
Scope 2 Emissions						
Buildings & Facilities						
Buildings & Facilities[26]	243	69.2%	Electricity	517,682 kWh	$58,019.00	1,767
Streetlights & Traffic Signals						
Traffic Signals/Controllers	76	21.6%	Electricity	161,480 kWh	$16,902.00	551
Water Delivery						
Sprinkler/Irrigation Control	9	2.6%	Electricity	18,179 kWh	$3,766.04	62
Water Pumps	3	0.9%	Electricity	7,343 kWh	$1,038.90	25
Dewatering Wells	10	2.8%	Electricity	21,768 kWh	$2,876.00	74
Wastewater						
Sewage Pumps	9	2.6%	Electricity	20,138 kWh	$2,465.93	69
Total Scope 2 Emissions	**350**	**99.7%**	**-**	**746,590 kWh**	**$ 85,067.87**	**2,548**
Scope 3 Emissions						
Vehicles—Contract Service Providers						
Contract Service Vehicles	1	0.3%	Gasoline	86 gal	n/a	11
Total Scope 3 Emissions	**1**	**0.3%**	-	**86 gallons**	-	**11**
Total Emissions[27]	**351.2**	**100%**	-	**-**	**$ 85,067.87**	**2,561**

25 See LGOP inventory guidelines, page 12.

26 Building & Facility accounts may include lights and water delivery devices located on the same metered account.

27 The summed totals shown here do not reflect the total emissions emitted in the year 1990 because not all of the data from that year could be located.

B. Emissions Trends

Represented in Table 4 are the emissions trends from 1990 to 2005 (where reliable data existed) and emissions trends from 2005 to 2007 organized by source of emission.

Between a 15-year span from 1990 to 2005 electricity emissions have increased by 73%. Improvements shown in the buildings & facilities sector may be the result of energy efficiency technology upgrades. With natural gas, since only casual records were found for 1990 it was difficult to compare with 2005 where complete records could be found, therefore the percentage change was not listed.

Overall emissions from electricity use increased 4.1% from 2005 to 2007 resulting in additional emissions. Natural gas use related to buildings & facilities increased by 46.1% (refer to appendix D, emissions data, to review the individual energy use). Fleet vehicle emissions from gasoline decreased by 20%. Fuel sources from contract service vehicles increased by 9% and 5.5% respectively. Gasoline related to employee commute vehicles increased 5.5% (refer to appendix E, for additional information). Emissions related to waste increased by 16.6% (refer to appendices C & D, for additional information).

Table 4. Emissions Trends 1990-2005 and 2005-2007

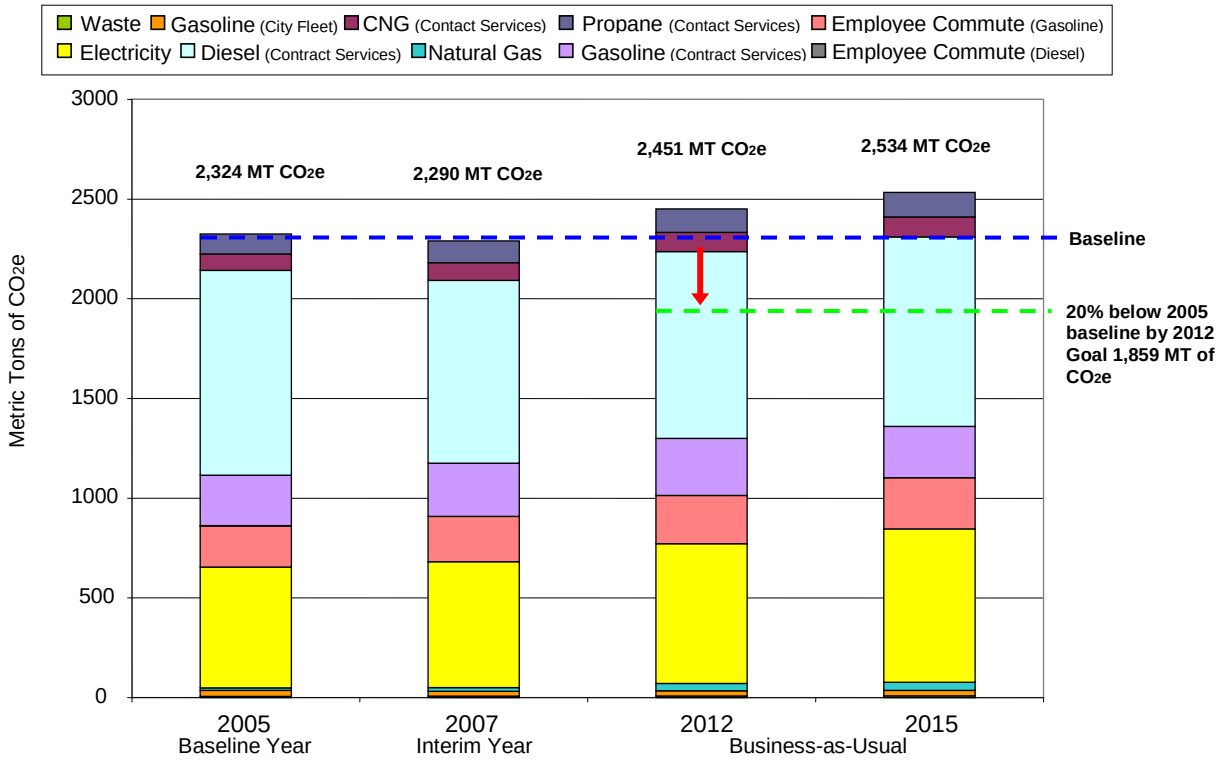
Electricity	**MTCO_2e 1990**	**MT CO_2e 2005**	**Percentage Change**	**MT CO_2e 2005**	**MT CO_2e 2007**	**Percentage Change**
Buildings & Facilities	243	182	-25.1%	182	220	-9.8%
Traffic Signals & Controllers	76	17	-77.6%	17	15	-11%
Streetlights	-	374	-	374	360	-3.7%
Sprinkler/Irrigation Control	9	1	-88%	1	1	-
Water Pumps	3	3	-	3	3	-
Dewatering Wells	10	4	-60%	4	3	-25%
Sewage Pumps	9	25	+177%	25	29	+16%
Total	**350**	**606**	**+73%**	**606**	**631**	**+4.1%**
Natural Gas						
Buildings & Facilities	2	13	-	13	19	+46.1%
Fuel						
Gasoline, City Vehicle Fleet	-	30	-	30	24	-20%
Propane, Contract Services	-	100	-	100	109	+9.0%
Gasoline, Contract Services	1	252	-	252	266	+5.5%
ULSD, Contract Services	-	1,028	-	1,028	917	-10.7%
Gasoline, Employee Commute	-	252	-	252	266	+5.5%
Waste						
Waste Management	-	6	-	6	7	+16.6%

C. Forecasting and Setting GHG Emissions Reduction Targets

The business-as-usual forecast shown in Figure 7 is a prediction of the likely increase in GHG emissions from municipal operations and services. The emissions shown here represent the business-as-usual forecast for the years 2012 and 2015 if the City does nothing to decrease its GHG emissions. The City can expect GHG emissions levels to increase to 2,451 metric tons of CO_2e by 2012 and 2,534 metric tons of CO_2e by 2015. Several indicators are taken into consideration for predicting anticipated emissions growth, such as, energy usage trends between the baseline year and the interim year (where possible historical year data is taken into account), assumptions about future energy consumption based on the expansion of municipal facilities and operations, new programs that may increase the use of energy, and any anticipated increase in municipal staff. By developing a business-as-usual forecast of emissions, the City can identify a target year to reduce emissions and develop the appropriate measures and policies to target specific areas.

Before deciding on an emissions target it may be helpful to look at individual measures that are planned for implementation and quantify those measures in order to see how much of a reduction can be expected from a given measure. Figure 7 illustrates a possible reduction scenario if the City were to set a reduction goal of 20% below the 2005 baseline levels by 2012. ICLEI recommends setting a long-term target (15-20 years) from the baseline year and a short-term or interim target every 2-3 years to help ensure the City continues to reduce its emissions. The further away the goal, the larger amount of reductions should be targeted. The blue line represents the baseline year 2005 calculations from which a reduction target can be determined. The green line represents a possible reduction scenario. If the City were to set an emission target 20% below 2005 levels the goal would be to reduce emissions to 1,859 metric tons of CO_2e.

Figure 7. Business-as-Usual Forecast[28]



28 The Business-as-Usual (BAU) forecast includes emissions from scopes 1, 2, and 3. A compound annual growth rate formula and the weighted averages between data sets were used to forecast municipal operation growth. Emission factors from 2007 were used to determine the equivalent CO_2e emissions. The metric tons of CO2e totals listed here are summed totals of the estimated emissions of each gas based on their global warming potential.

IV. Summary of Measures and Policies

There are a variety of ways in which the City of Rancho Palos Verdes is moving towards becoming a more sustainable city. Policies, measures and plans the City is currently working on will help the City reach its adopted emissions reduction goals. Below is a summary of historic and current measures organized into categories to help with the planning of the climate action document.

A. Energy Efficiency

Lighting Retrofit: Recently replaced existing T12 fluorescent lamps with third generation T8 lamps with extra efficient ballasts and replaced florescent exist signs with more efficient Light Emitting Diode (LED) signs. The City is also planning additional upgrades to its lighting systems including additional LED lights, occupancy sensors, and daylight sensing dimmable ballasts.

Compressed Workweek Schedule: City employees work a 9/80 schedule to contribute to energy conservation and cost savings at facilities.

Heating and Air Conditioning System Upgrades: Planning to upgrade Heating, Ventilation, and Air Conditioning (HVAC) systems at various city buildings with compressor management units (CMU's), demand ventilation controls, and/or UVC Emitters on Cooling Coils for improved energy efficiency.

Traffic Lights: All city traffic lights were upgraded to energy efficient LED lights within the past five years.

B. Solid Waste and Recycling

Curbside Recycling: Offer curbside pickup of green waste, electronics waste, and recyclables including newspaper, mixed paper, cardboard, glass bottles and jars, aluminum cans, plastic containers, tin/steel cans, used oil, and oil filters.

Recyclers of the Month Program: Award two residents $250 at each council meeting for participating in the curbside recycling program.

Composting: Offer residents a maximum $70 rebate toward the purchase of one composting bin and encourage residents to leave grass clipping on their lawns to decompose.

Right-of-way Litter Abatement Employ workers to pick up litter in city right-of-ways.

Hazardous Waste: Participate annually in the county hazardous waste round up and promote proper disposal of hazardous waste through flyers, the City newsletter, and the City website.

C. Sustainable Development

Green Building: Developed a Green Building Program that encourages the development of efficient and sustainable commercial or residential structures that have been specifically designed to minimize their use of non-renewable energy, natural resources, and toxic chemicals. Participation in the City's Green Building Construction program awards property owners a faster process and up to a 50% rebate on permitting fees.

Rubberized Asphalt Concrete: Utilize Rubberized Asphalt Concrete (RAC) made of recycled tires on arterial resurfacing projects.

D. Urban Forests

Palos Verdes Nature Preserve: Set aside 1,200 acres of passive open space that contains many endangered species and sensitive habitats.

Costal Sage Scrub Habitat: Protected nearly 1,000 acres of coastal sage scrub habits and the endangered species it supports through a municipal ordinance

E. Storm Water Management

National Pollutant Discharge Elimination System (NPDES): The City continues to be in full compliance with provisions of the NPDES Permit.

Water Quality and Flood Protection Program: Serves to ensure that the Storm Drain User Fee is spent for the replacement, refurbishment, repair and maintenance of City-owned storm drain facilities.

Street Sweeping: Conduct annual pre-rain sweeps between Oct 15 and November 1 of all non-residential roadways as well as normal monthly sweeping of residential streets, bi-monthly sweeping of non-residential areas and parking lots, and weekly sweeping of high density commercial areas.

Catch Basin Maintenance: Vacuum out each catch basin in the City before the rainy season and place silt screens near construction sites to filter runoff water. The City is also beginning to install screens in catch basins and will have screens installed in all catch basins within ten years.

Toxic Runoff: Minimize the use of herbicides and pesticides on city property. The City uses goat herds or mechanical techniques to control weed growth whenever possible to limit the use of herbicides.

F. Vehicle Fleet and City-Contracted Service

Trash and Recycling Fleet: Requesting alternative fuel vehicles in our upcoming contracts for residential solid waste disposal and recycling services.

City Fleet: The City purchases hybrid vehicles for its own city fleet.

Street Sweeping Fleet: The City's street sweeping contractors use alternative fuel vehicles that meet AQMD standards.

Palos Verdes Peninsula Transit Authority: Utilizes alternative fuel vehicles that meet AQMD standards such as Compressed Natural Gas (CNG) Liquefied Propane Gas (LPG), and gasoline vehicles.

G. Education and Outreach

Waste Removal & Recycling Webpage: Provides information and links on reduction, recycling, conservation, and proper disposal of different material on the Waste Removal & Recycling page of the City's website.

Storm Water Pollution Prevention Material: Distribute brochures on storm water pollution prevention to construction, landscaping, and food service professionals and residents.

Used Oil and Filter Program Public Outreach Materials: Distribute refuse bill inserts containing used oil and filter recycling information and household hazardous waste roundup and composting workshop dates. The City also distributes leaky car postcards, storm water pollution prevention/used oil recycling awareness calendars, oil containers, and promotional and educational items at curbside and at various public events.

School Assemblies: Organized and/or promoted school assemblies regarding recycling, storm water pollution prevention, and used oil recycling

Used Oil Media Campaign: Contributed to the Los Angeles County's regional used oil recycling media campaign

Point Vicente Interpretive Center: Provides museum exhibits and docent guided tours focused on marine life and environmental protection.

Lower Point Vicente Annenberg Project: Partnering with the Annenberg Foundation to provide a center with museum exhibits and educational events on wildlife, animal care, and habitat restoration.

Appendix A—Greenhouse Gas Municipal Inventory Details

A. Greenhouse Gas Report 2005—Baseline Year

The year 2005 represents the baseline year for the GHG inventory and will be used to set an emissions reduction target and track progress of emissions goals. Below are the GHG inventory details. This level of reporting is referred to as a quick action report wherein three of the six internationally-recognized GHGs regulated under the Kyoto Protocol (carbon dioxide, methane, and nitrous oxide) are reported separately in metric tons and aggregated with other gases not listed here to show the CO_2e summed totals of the estimated emissions of gases with different global warming potentials (see appendix E of LGOP). The control approach was utilized to define the City's scopes of emissions.

Reporting year: 2005
Protocol Used Local: Government Operation Protocol, version 1.0
Control Approach: Operational Control

GHG Emissions Summary (All Units in Metric Tons)

Buildings & Other Facilities					
Scope 1		CO_2e	CO_2	CH_4	N_2O
	Stationary Combustion	**13**	**12**	**0.001196**	**0.00002**
Scope 2	Purchased Electricity	**182**	**182**	**0.00794**	**0.00301**

Streetlights and Traffic Signals					
Scope 2		CO_2e	CO_2	CH_4	N_2O
	Purchased Electricity	**391**	**389**	**0.016950**	**0.006429**

Water Delivery Facilities					
Scope 2		CO_2e	CO_2	CH_4	N_2O
	Purchased Electricity	**8**	**6**	**0.00025**	**0.00009**

Wastewater Facilities					
Scope 2		CO_2e	CO_2	CH_4	N_2O
	Purchased Electricity	**25**	**24**	**0.00107**	**0.00040**

Vehicle Fleet					
Scope 1		CO_2e	CO_2	CH_4	N_2O
	Mobile Combustion	**30**	**29**	**0.00160**	**0.00222**
Scope 3	**Contract Services**				
	Bennet Landscaping	**1**	**0.75723**	**0.00483**	**0.00532**
	Waste Management Vehicles	**1,058**	**1056**	**0.00483**	**0.00532**

Transit Fleet					
Scope 3		CO_2e	CO_2	CH_4	N_2O
	Mobile Combustion				
	Palos Verdes Peninsula Transit	**403**	**384**	**0.17164**	**0.04775**

Solid Waste					
Scope 3		CO_2e	CO_2	CH_4	N_2O
	Contract Services				
	Waste Management	**6**	**6**	**0.289841**	**-**

Employee Commute					
Scope 3		CO_2e	CO_2	CH_4	N_2O
	Employee Commute	**207**	**202**	**0.01241**	**0.01476**

Total Emissions	CO_2e	CO_2	CH_4	N_2O
Scope 1	**43**	**41**	**0.00280**	**0.00224**
Scope 2	**606**	**602**	**0.02621**	**0.00994**
Scope 3	**1,616**	**1649**	**0.478721**	**0.06783**

B. Greenhouse Gas Report 2007— Interim Year

The year 2007 represents data collected from an interim year to review any changes in GHG emissions that may have occurred since the baseline year. The recommended operational control approach was used to define the City's boundaries. Below are the GHG inventory details. This level of reporting is referred to as a quick action report wherein three of the six internationally-recognized GHGs regulated under the Kyoto Protocol (carbon dioxide, methane, and nitrous oxide) are reported separately in metric tons and aggregated with other gases not listed here to show the CO_2e summed totals of the estimated emissions of gases with different global warming potentials (see appendix E of LGOP). The control approach was utilized to define the City's scopes of emissions.

Reporting year: 2007
Protocol Used Local: Government Operation Protocol, version 1.0
Control Approach: Operational Control

GHG Emissions Summary (All Units in Metric Tons)

Buildings & Other Facilities					
Scope 1		CO_2e	CO_2	CH_4	N_2O
	Stationary Combustion	**19**	**18**	**0.00175**	**0.00003**
Scope 2	Purchased Electricity	**220**	**218**	**0.00987**	**0.00374**

Streetlights and Traffic Signals					
Scope 2		CO_2e	CO_2	CH_4	N_2O
	Purchased Electricity	**375**	**372**	**0.016862**	**0.00639**

Water Delivery Facilities					
Scope 2		CO_2e	CO_2	CH_4	N_2O
	Purchased Electricity	**7**	**7**	**0.00027**	**0.00010**

Wastewater Facilities					
Scope 2		CO_2e	CO_2	CH_4	N_2O
	Purchased Electricity	**29**	**29**	**0.00132**	**0.00050**

Vehicle Fleet					
Scope 1		CO_2e	CO_2	CH_4	N_2O
	Mobile Combustion	**24**	**24**	**0.00126**	**0.00160**
Scope 3	**Contract Services**				
	Bennet Landscaping	**1**	**0.77484**	**0.000003**	**0.00005**
	Waste Management Vehicles	**942**	**940**	**0.004118**	**0.00440**

Transit Fleet					
Scope 3		CO_2e	CO_2	CH_4	N_2O
	Mobile Combustion				
	Palos Verdes Peninsula Transit	**438**	**417**	**0.185510**	**0.04985**

Solid Waste					
Scope 3		CO_2e	CO_2	CH_4	N_2O
	Contract Services				
	Waste Resources	**7**	**7**	**0.316409**	**-**

Employee Commute					
Scope 3		CO_2e	CO_2	CH_4	N_2O
	Employee Commute	**228**	**223**	**0.01275**	**0.01442**

Total Emissions					
		CO_2e	CO_2	CH_4	N_2O
	Scope 1	**43**	**42**	**0.00302**	**0.00164**
	Scope 2	**631**	**628**	**0.028341**	**0.01075**
	Scope 3	**1,616**	**1589**	**0.51879**	**0.06872**

C. Greenhouse Gas Report 1990—Historical Year

The year 1990 represents a reference year for several key pieces of climate change legislation such as the United Nations Framework Convention on Climate Change (UNFCCC), the Kyoto Protocol agreement, and the U.S. Mayors' Climate Protection Agreement. Where available and reliable information could be found historical GHG emissions have been recorded below. Carbon dioxide, methane, and nitrous oxide are reported separately in metric tons and aggregated with other gases not listed here to show the CO_2e summed totals of the estimated emissions of gases with different global warming potentials (see appendix E of LGOP). The control approach was utilized to define the City's scopes of emissions.

Reporting year: 1990
Protocol Used Local: Government Operation Protocol, version 1.0
Control Approach: Operational Control

GHG Emissions Summary (All Units in Metric Tons)

Buildings & Other Facilities					
Scope 1		CO_2e	CO_2	CH_4	N_2O
	Stationary Combustion	**0.2**	**0.10612**	**0.00001**	**0.00000**
Scope 2	Purchased Electricity	**243**	**242**	**0.00939**	**0.00328**

Streetlights and Traffic Signals					
Scope 2		CO_2e	CO_2	CH_4	N_2O
	Purchased Electricity	**76**	**75**	**0.00293**	**0.00102**

Water Delivery Facilities					
Scope 2		CO_2e	CO_2	CH_4	N_2O
	Purchased Electricity	**22**	**22**	**0.00008**	**0.00030**

Wastewater Facilities					
Scope 2		CO_2e	CO_2	CH_4	N_2O
	Purchased Electricity	**9**	**9**	**0.00036**	**0.00012**

Vehicle Fleet					
Scope 3	Mobile Combustion	CO_2e	CO_2	CH_4	N_2O
	Contract Services				
	Bennet Landscaping	**1**	**0.75723**	**0.00005**	**0.00008**

Total Emissions				
	CO_2e	CO_2	CH_4	N_2O
Scope 1	**0.2**	**0.10612**	**0.00001**	**0.0000**
Scope 2	**350**	**349**	**0.013546**	**0.004741**
Scope 3	**1**	**0.75723**	**0.00005**	**0.00008**

Appendix B—Activity Data Disclosure

Listed below are the data sources. Activity data refers to consumption data such as fuel or electricity used which results in GHG emissions. In an effort to establish good reporting habits, improve the quality of future inventories, and to comply with the overarching reporting principles mentioned in the LGOP - relevance, completeness, consistency, transparency, and accuracy - this information has been recorded. This information is grouped by scope and source of emission. Descriptions of data sources and the methodology used to obtain information are listed here. Indicated in the upper right-hand corner is the methodology used and whether or not it is a recommended or alternative method as prescribed by the LGOP. In this way, the City will be able to improve its data collection process if an alternative method is listed. It is important to note that scope 3 emissions are considered optional reporting.

A. Buildings & Other Facilities

Scope 1 Stationary Combustion

Description: Consumption data was obtained from Southern California Gas Company. Southern California Gas no longer possesses official customer records going back to 1990 due to document retention policies. SoCalGas located some casual records that go back to 1990 which was the basis for the gas information provided for 1990.	**Recommended Method** Known Natural Gas use
Reference: Chauncy Tou, Energy Programs Advisor Customer Programs, Southern California Gas Company, 213-244-2833, ctou@semprautilities.com.	

Scope 2 Purchased Electricity

Description: Consumption data was obtained from Southern California Edison.	**Recommended Method** Known electricity use
Reference: Larry Sutton, Account Executive, Southern California Edison, 714-973-5660 PAX 52660 Maya R. Aubrey, Analyst-Program/Project, Southern California Edison, (909) 357-6536 PAX 16036, Maya.Aubrey@sce.com.	

B. Street Lighting and Traffic Signals

Scope 2 Purchased Electricity

Description: Consumption data was obtained from Southern California Edison. Note: Accounts owned by SCE were included but recorded separately.	**Recommended Method** Known electricity use
Reference: Larry Sutton, Account Executive, Southern California Edison, 714-973-5660 PAX 52660 Maya R. Aubrey, Analyst-Program/Project, Southern California Edison, (909) 357-6536 PAX 16036, Maya.Aubrey@sce.com.	

C. Water Delivery and Wastewater

Scope 2 Purchased Electricity

Description:
Consumption data was obtained from Southern California Edison.

Recommended Method
Known electricity use

Reference: Larry Sutton, Account Executive, Southern California Edison, 714-973-5660 PAX 52660
Maya R. Aubrey, Analyst-Program/Project, Southern California Edison, (909) 357-6536 PAX 16036, Maya.Aubrey@sce.com.

D. Vehicle Fleet

Scope 1 Mobile Combustion

Description:
City staff provided data on the annual dollars spent for fuel collected from City purchasing records.

Alternative Method
Fuel estimates based on dollars spent

Reference: Data was provided by Gary Gyves, Senior Administrative Analyst, 310-544-5213

E. Solid Waste Facilities

Scope 3 Waste Related

Description:
Ms. Janetzke provided landfill information. Since 2004, El Sobrante Landfill has operated 3 gas-to-energy generators that transform landfill gas into energy. By converting waste gas into energy, El Sobrante Landfill is managing its waste in a more effective and efficient manner. The landfill gas is collected and processed in an environmentally responsible way and provides electricity, which would otherwise come from the use of fossil fuels. El Sobrante Landfill generates approximately 3.84 megawatts of electricity, which is then fed directly into the local Southern California Edison grid where it is used to meet the power demands of approximately 6,000 local homes a year.

Waste estimates were based on waste disposal rates per employee obtain from the California Integrated Waste Management Board. No records could be found for 1990 City operated and owned facilities.

Solid Waste Characterization was obtain from the California Integrated Waste Management Board http://www.ciwmb.ca.gov/wastechar/BizGrpCp.asp

Reference: Crystal Janetzke, Waste Management 310-522-6593

F. Transit Fleet

Scope 3 Emissions From Contracted Services

Description: Palos Verdes Peninsula Transit Authority, Transit Fleet John Meyer provided data on fuel quantity, fuel cost, and vehicle miles traveled for PV Transit vehicles. RPV shares this service with three other cities on the peninsula and Los Angeles County. Estimates were based on the population as per census. RPV contribution amounts to 63.85% of the total data.
Reference: John Meyer, Mobility Advancement Group, (760) 751-7061, jmco@cox.net

G. Other Scope 3 Emissions

Description: Waste Management, Vehicle Fleet Ms. Janetzke provided information on vehicle type, number of vehicles, fuel quantity, and fuel cost for the Waste Management vehicles that operate within the City's boundaries.
Reference: Crystal Janetzke, Waste Management 310-522-6593, CJanetzke@wm.com

Scope 3 Emissions From Contracted Services

Description: Bennet Landscaping, Vehicle Fleet Karen Carrier provided vehicle descriptions, fuel quantity, and number of vehicles that operate within the City's boundaries.
Reference: Karen Carrier, Bennet Landscaping, 310-534-3543 x 104

Scope 3 Employee Commute

Description: Employee commute results were determined by conducting a survey of employee commute distance, mode and frequency for the years 2007 and 2005. The online website Survey Monkey was utilized to conduct the survey www.surveymonkey.com
Reference: Gary Gyves, Senior Administrative Analyst, 310-544-5213

Appendix C—Methodology/Emissions Factors Disclosure

It is considered good practice to disclose all methodologies employed to calculate emissions. Listed below are the formulas used to determine the equivalent emissions. Emissions factors refer to a unique value used to determine the amount of a GHG emitted on a per unit activity basis. They are used to convert activity data, like energy usage, into the associated GHG emissions.[29] In compliance with the LGOP and ICLEI program reporting requirements listed below and organized by scope are descriptions of computational methods and emission factors used to arrive at the equivalent GHG emissions. Indicated in the top right corner is the method used and whether it is considered to be a recommended or alternate method based on the LGOP standards. In this way, the City will be able to improve its data collection where an alternative method is listed. It is important to note that scope 3 emissions are considered optional reporting.

A. Scope 1 Stationary Combustion

Description of Computational Method:	**Recommended Method**
Table G.1 of the LGOP, Default factors for CO2 emissions, pg. 170 and Table G.3 of the LGOP, Default CH4 and N2O emissions factors by fuel type and sector, pg. 172.	Default emission factors, Table G.1 and Table G.3 of the LGOP

Criteria Air Pollutants, Table 3. NERC Western Systems Coordinating Council/CNV 1990- 2005
2007 inventory-2005 CAP emissions factors
2005 inventory-2005 CAP emissions factors
1990 inventory-1990-2003 emissions factors

Reference: Consumption Data was provided by Chauncy Tou, Energy Programs Advisor Customer Programs, Southern California Gas Company, 213-244-2833, ctou@semprautilities.com.

B. Scope 1 Mobile Combustion

Description of Computational Method:	**Alternative Method**
Fuel estimates were based on annual dollars spent Estimated fuel use (gallons)=(dollars spent-taxes)/ Fuel cost($/gallon). The average regional cost per gallon of fuel type was obtained from the Energy Information Administration http://tonto.eia.doe.gov/dnav/pet/pet_pri_gnd_a_epmr_pte_cpgal_a.htm.	Alternative emissions factors, Table G.13 of the LGOP

Alternate Emissions Factors were used based on Table G.13 of the LGOP, Alternate Methodology for Highway Vehicles by Inventory Year, pg. 180.

Reference: Data was provided by Gary Gyves, Senior Administrative Analyst, 310-544-5213

C. Scope 2 Purchased Electricity

Description of Computational Method:	**Recommended Method**
Table G.5 Utility-Specific Verified Electricity CO_2 Emissions Factors (2000-2006), LGOP pg. 174.	Utility-Specific verified emission factors

For 2005 inventory Southern California Edison, 2005 emission factors were used; For 2007, inventory Southern California Edison, 2006 emissions factors were used.

TableG.6 California Grid Average Electricity Emissions Factors (1990-2004) emissions factors from the year 2004 was used for both 2005 and 2007.

29 A full description of emissions factor can be found on page 27 of the Local Government Operations Protocol. Emission factors are determined by means of direct measurement, laboratory analyses or calculations based on representative heat content and carbon content.

The year 1990 emissions factors from Table G.6 were used for the 1990 inventory.

Reference: Larry Sutton, Account Executive, Southern California Edison, 714-973-5660 PAX 52660
Maya R. Aubrey, Analyst-Program/Project, Southern California Edison, (909) 357-6536 PAX 16036, Maya.Aubrey@sce.com.

D. Scope 3 Waste Related Emissions

Description:
The 2007 estimate is based on 50 full-time and 31 part-time employees, for a total of 81 employees. Waste disposal rates for public administration from CIWMB were utilized, 0.4 tons waste/employee/year = tons. The 2005 estimates based on 50 full-time and 20 part-time employees, for a total of 70 employees. An assumption was made for part-time employees, multiplying half the employees with the 0.4 waste rate.
2007=26.2 tons
2005=24 tons
Estimated 75% methane recovery at the landfill where the waste was taken.

Solid Waste Characterization, Waste Disposal Rates for Public Administration was obtain from the California Integrated Waste Management Board http://www.ciwmb.ca.gov/wastechar/disprate.htm

Solid Waste Characterization for public administration http://www.ciwmb.ca.gov/wastechar/BizGrpCp.asp

Reference: Gary Gyves, Senior Administrative Analyst, 310-544-5213

E. Scope 3 Employee Commute

Description of Computational Method:
The online website Survey Monkey was utilized to conduct an employee commute the survey http://www.surveymonkey.com

Alternative Method
Alternative emissions factors, Table G.13, LGOP

Utilizing employee benefits information, it was estimated that on average employees worked 46.5 weeks, which means 28 days were deducted from the 260 possible working days in a year. It was assumed that these absences were due to vacation, sick, personal, and holiday.

Respondents who drove city vehicles, or were not employed by the City in the years surveyed, walked, bicycled, or used another form of transportation were excluded from the emissions inventory.

VMT calculations for public transit were based on information from Scott Greene of LA County Metropolitan Transportation Authority (Metro). In 2005 and 2007 the standard transit bus had 40 seats per bus. The standard for the Green Line is 76 seats per rail car.

Alternate Emissions Factors were used based on Table G.13 of the LGOP, Alternate Methodology for Highway Vehicles by Inventory Year, pg. 180.

2007—82 employees (including full and part time employees) with 72 responses is a 84% response rate. The remaining 16% of VMT was estimated based on survey responses for a total VMT of 447,433. Assumptions: gasoline, drove alone, passenger vehicle.
(1.19 x 375,994=447,433Total VMT)

2005—70 employees (including full and part time employees) with 56 responses is a 80% response rate. The remaining 20% of VMT was estimated based on survey responses for a total VMT of 405,885. Assumptions: gasoline, drove alone, passenger vehicle.
(1.25 x 324,708=405,885 Total VMT)

Reference: Gary Gyves, Senior Administrative Analyst, 310-544-5213

Appendix D—Emissions Data

The municipal inventory report was based on data collected from electricity consumption and other energy sources listed in the tables below as reference. Information is organized to be consistent with the order of the report, e.g., baseline year, interim year, and historical year. Emissions sources are organized according to the type of energy or source, equivalent metric tons of carbon dioxide emissions, energy (MMBtu), and the cost of energy where known.[30]

Sources of Emissions 2005	Source	Equiv CO_2 (tonnes)	Equiv CO_2 (%)	Equiv Energy (MMBtu)	Energy/ Fuel Use	Energy/ Fuel Use Cost ($)
Buildings and Facilities						
Abalone Cove State Park	Electricity	3	0.1	32	9,443 kWh	$1,427.0
City Hall	Electricity	70	3	787	230,700 kWh	$27,450.0
Fred Hesse Community Park	Electricity	31	1.3	347	101,689 kWh	$15,782.0
Ladera Linda Park	Electricity	20	0.8	225	65,820 kWh	$10,036.0
	Natural Gas	11	0.4	200	2,001 therms	$2,455.0
Point Vicente Interpretive Center	Electricity	8	0.3	89	26,120 kWh	$3,582.0
	Natural Gas	1	0	12	118 therms	$187.0
TV Channel 33	Electricity	46	1.9	519	151,980 kWh	$18,881.0
Robert Ryan Community Park	Electricity	5	0.2	62	18,080 kWh	$2,589.0
	Natural Gas	1	0.1	27	272 therms	$441.0
Streetlights & Traffic Signals						
Traffic Signals/Controllers	Electricity	17	0.7	196	57,461 kWh	$8,020.0
Streetlights:						
Streetlight	Electricity	17	0.7	196	57,352 kWh	$4,387.0
Streetlight SCE Owned	Electricity	357	15.1	4006	1,173,733 kWh	$243,084.
Water Delivery						
Sprinkler/Irrigation Control	Electricity	1	0	5	1,332 kWh	$3,726.0
Dewatering Well	Electricity	4	0.1	39	11,553 kWh	$2,972.0
Water Pumps	Electricity	3	0.1	21	6,229 kWh	$1,550.0
Wastewater						
Sewer Pump	Electricity	25	1	278	81,514 kWh	$12,889.0
Vehicle Fleet						

30 Source of data CACP software output.

Public Works Department	Gasoline	21	0.9	292	2,354.22 gal	$5,862.0
Recreation and Parks	Gasoline	9	0.4	119	961.59 gal	$2,394.0
Contract Services-Transit Fleet						
Palos Verdes Peninsula Transit Authority	CNG	82	3.4	1399	3,569.93 gal eq	n/a
	Gasoline	221	9.3	3043	7,764.27 gal	n/a
	Propane	100	4.2	1498	5,181.44 gal	n/a
Contract Services						
Bennet Landscaping	Gasoline	1	0	11	86 gal	n/a
Waste Management	Diesel (ULSD)	1028	43.4	14038	101,226 gal	n/a
	Gasoline	30	1.3	416	3,345 gal	n/a
Employee Commute						
Drove Alone	Gasoline	201	8.6	2769	395,590 VMT	n/a
Carpool	Gasoline	6	0.3	82	10,295 VMT	n/a
Waste						
Waste Management	CO_2	6	0.3		24 tons	
Sources:	Food Waste	1				
	Paper Products	5				
	Plant Debris	0				
	Wood/Textiles	0				

Sources of Emissions 2007	Source	Equiv CO_2 (tonnes)	Equiv CO_2 (%)	Equiv Energy (MMBtu)	Energy/ Fuel Use	Energy/ Fuel Use Cost ($)
Buildings and Facilities						
Abalone Cove State Park	Electricity	2	0.1	28	8,165 kWh	$1,460.0
City Hall	Electricity	84	3.7	980	287,040 kWh	$35,564.0
Fred Hesse Community Park	Electricity	30	1.3	352	103,040 kWh	$16,375.0
Ladera Linda Park	Electricity	17	0.8	199	58,249 kWh	$9,707.0
	Natural Gas	12	0.5	228	2,275 therms	$2,542.0
Point Vicente Interpretive Center	Electricity	36	1.6	418	122,520 kWh	$17,980.0
	Natural Gas	5	0.2	96	955 therms	$1,165.0
TV Channel 33	Electricity	46	2	533	156,180 kWh	$19,086.0
Robert Ryan Community Park-1	Electricity	5	0.2	54	15,840 kWh	$2,650.0

	Natural Gas	1	0.1	28	277 therms	$418.0
Streetlights & Traffic Signals						
Traffic Signals/Controllers	Electricity	15	0.7	180	52,711 kWh	$8,446.0
Streetlights:						
Streetlight	Electricity	16	0.7	189	55,272 kWh	$5,229.0
Streetlight SCE Owned	Electricity	344	15.3	4006	1,173,903 kWh	$301,669.
Water Delivery						
Sprinkler/Irrigation Control	Electricity	1	0.1	9	2,728 kWh	$4,391.0
Dewatering Well	Electricity	3	0.1	37	10,930 kWh	$3,409.0
Water Pumps	Electricity	3	0.1	25	7,255 kWh	$1,880.0
Wastewater						
Sewer Pump	Electricity	29	1.3	344	100,680 kWh	$17,625.0
Vehicle Fleet						
Public Works Department	Gasoline	15	0.7	204	1,642.55 gal	$4,977.0
Recreation and Parks	Gasoline	7	0.3	102	821 gal	$2,489.0
Planning & Code Enforcement	Gasoline	2	0.1	34	274 gal	$830.0
Contract Services -Transit Fleet						
Palos Verdes Peninsula Transit Authority	CNG	89	3.9	1520	3,879.20 gal	n/a
	Gasoline	240	10.6	3306	8,437.25 gal	n/a
	Propane	109	4.8	1628	5,630.36 gal	n/a
Contract Services						
Bennet Landscaping	Gasoline	1	0	11	88 gal	n/a
Waste Management	Diesel (ULSD)	917	40.7	12517	90,259 gal	n/a
	Gasoline	25	1.1	347	2,793 gal	n/a
Employee Commute						
Drove Alone	Diesel	0	0	5	732.38 VMT	n/a
	Gasoline	219	9.5	3022	430,701 VMT	n/a
Carpool	Gasoline	9	0.4	126	15,863.48 VMT	n/a
Public Transportation	Diesel	0	0	3	136.01 VMT	n/a

Waste						
Waste Management	CO_2	7	0.3		26.2 tons	n/a
Sources:	Food Waste	1				
	Paper Products	5				
	Plant Debris	1				
	Wood/Textiles	0				

Sources of Emissions 1990	Source	Equiv CO_2 (tonnes)	Equiv CO_2 (%)	Equiv Energy (MMBtu)	Energy/ Fuel Use	Energy/ Fuel Use Cost ($)
Buildings and Facilities						
Abalone Cove State Park	Electricity	1	0.2	5	1,504 kWh	$218.0
City Hall	Electricity	51	14.5	371	108,600 kWh	$12,655.0
Fred Hesse Community Park	Electricity	51	14.4	368	107,740	$12,421.0
Ladera Linda Park	Electricity	71	20.1	514	150,618 kWh	$15,574.0
	Natural Gas	0	0	2	18 therms	n/a
Point Vicente Interpretive Center	Electricity	23	6.5	165	48,400 kWh	$5,467.0
	Natural Gas	0	0	0	1 therms	n/a
TV Channel 33	Electricity	39	11.2	285	83,460 kWh	$9,648.0
Robert Ryan Community Park-1	Electricity	8	2.3	59	17,360 kWh	$2,036.0
	Natural Gas	0	0	0	1 therms	n/a
Streetlights & Traffic Signals						
Traffic Signals/Controllers	Electricity	76	21.6	551	161,480 kWh	$16,902.0
Water Delivery						
Sprinkler/Irrigation Control	Electricity	9	2.4	62	18,179 kWh	$3,766.0
Dewatering Well	Electricity	10	2.9	74	21,768 kWh	$2,876.0
Water Pumps	Electricity	3	1	25	7,343 kWh	$1,039.0
Wastewater						
Sewer Pump	Electricity	9	2.7	69	20,138 kWh	$2,466.0
Contract Services						
Bennet Landscaping	Gasoline	1	0.2	11	86 gal	n/a

Criteria Air Pollutants[31]

Municipal operations are also responsible for emitting criteria air pollutants which have been linked to various environmental and public health problems. The CACP software generates data on these emissions as shown in the tables below.[32] Actions taken to reduce emissions will also reduce criteria air pollutants as well.

Criteria Air Pollutants 2005	NOx (lbs)	SOx (lbs)	CO (lbs)	VOC (lbs)	PM10 (lbs)
Building and Facilities	575	359	349	40	296
Streetlights & Traffic Signals	1,142	762	723	81	629
Water Delivery	17	11	11	1	9
Wastewater	2	2	2	0	1
Vehicle Fleet	17,818	43	17,007	2,094	665
Employee Commute	1,315	74	14,347	1,474	30
Transit Fleet	2,978	89	17,284	2,213	28
Total	23,918	1,386	49,767	5,909	1,697

Criteria Air Pollutants 2007	NOx (lbs)	SOx (lbs)	CO (lbs)	VOC (lbs)	PM10 (lbs)
Building and Facilities	724	446	437	51	368
Streetlights & Traffic Signals	1,136	758	719	81	626
Water Delivery	10	6	6	1	5
Wastewater	89	60	56	6	49
Vehicle Fleet	14,916	37	15,010	1,846	500
Employee Commute	1,364	81	15,799	1,595	32
Transit Fleet	3,142	94	18,627	2,365	27
Total	21,381	1,481	50,655	5,945	1,608

Criteria Air Pollutants 1990	NOx (lbs)	SOx (lbs)	CO (lbs)	VOC (lbs)	PM10 (lbs)
Building and Facilities	444	360	286	33	271
Streetlights & Traffic Signals	139	112	89	10	85
Water Delivery	41	33	26	3	25
Wastewater	17	14	11	1	11
Vehicle Fleet	5	0	56	7	0
Total	646	519	469	54	391

31 To review definitions and acronyms for criteria air pollutants refer to appendices sections G and H.

32 Source of data CACP software output.

Indicator Inputs

Indicator inputs is a term used by ICLEI to describe statistics such as the number of employees that work in a building or how many streetlights are in the City. The CACP software is able to provide an additional analysis based on the statistics entered such as energy use per square foot. These statistics are not necessary to calculate GHGs but they are able to provide additional information which can be useful for tracking progress over time.[33]

Sources of Emissions 2005		Equiv CO_2 (tonnes)	Equiv Energy (MMBtu))	Cost ($)
Buildings and Facilities				
City Hall– Electricity				
	Per 1000 sq. ft.	0	0.3	$10.9
	Per hour of operation	0	0.3	$11.3
	Per occupant	1.1	12.3	$428.9
Fred Hesse Community Park– Electricity				
	Per 1000 sq. ft.	0	0.4	$17.5
	Per hour of operation	0	0.1	$5.0
	Per occupant	15.4	173.5	$7,890.8
Robert Ryan Community Park.– Electricity				
	Per 1000 sq. ft.	0	0	$1.5
	Per hour of operation	0	0	$1.1
	Per occupant	5.5	61.7	$2,589.1
Robert Ryan Community Park.– Natural Gas				
	Per 1000 sq. ft.	0	0	$0.3
	Per hour of operation	0	0	$0.2
	Per occupant	1.4	27.2	$441.0
TV Channel 33— Electricity				
	Per 1000 sq. ft.	0	0.4	$15.2
	Per hour of operation	0	0.2	$7.8
	Per occupant	23.1	259.4	$9,440.5
Point Vicente Interpretive Center – Electricity				
	Per 1000 sq. ft.	0	0.1	$2.5
	Per hour of operation	0	0	$1.2
	Per occupant	2.6	29.7	$1,194.0
Point Vicente Interpretive Center – Natural Gas				
	Per 1000 sq. ft.	0	0	$0.1
	Per hour of operation	0	0	$0.1
	Per occupant	0.2	3.9	$62.3
Ladera Linda Park – Electricity				
	Per 1000 sq. ft.	0	0	$0.5
	Per hour of operation	0	0.2	$10.2
	Per occupant	10	112.3	$5,018.0
Ladera Linda Park – Natural Gas				
	Per 1000 sq. ft.	0	0	$0.1
	Per hour of operation	0	0.2	$2.5
	Per occupant	5.3	100.1	$1,227.5
Abalone Cove State Park– Electricity				
	Per 1000 sq. ft.	0	0.5	$20.4
	Per hour of operation	0	0	$0.9
	Per occupant	2.9	32.2	$1,427.0

33 Source of data CACP software output.

Sector Average				
	Per 1000 sq. ft.	0	0	$0.1
	Per hour of operation	0	0	$0.1
	Per occupant	2.5	4.8	$32.7
Streetlights & Traffic Signals				
Traffic Signals/Controllers				
	Per streetlight account	1.2	14.0	$572.9
Streetlight				
	Per streetlight account	8.7	97.9	$2,193.5
Streetlight SCE Owned				
	Per streetlight account	89.1	1001.5	$60,771.0
Sector Average				
		37.3	218.7	$12,173.7
Vehicle Fleet				
Public Works Department				
	Per vehicle	5.3	73.1	$1,465.5
Parks and Recreation				
	Per vehicle	4.3	59.7	$1,197.2
Sector Average				
	Per vehicle	6.3	24.5	$403.9
Employee Commute				
Carpool Group				
	Per vehicle	2.0	27.5	n/a
Drove Alone				
	Per vehicle	2.9	39.9	n/a
Sector Average				
	Per vehicle	5.8	25.7	n/a

Sources of Emissions 2007		**Equiv CO_2 (tonnes)**	**Equiv Energy (MMBtu)**	**Cost ($)**
Buildings and Facilities				
City Hall– Electricity				
	Per 1000 sq. ft.	0	0	$1.4
	Per hour of operation	0	0.4	$14.6
	Per occupant	1.3	15.3	$555.7
Fred Hesse Community Park– Electricity				
	Per 1000 sq. ft.	0	0.4	$18.1
	Per hour of operation	0	0.2	$10.1
	Per occupant	15.1	175.8	$8,187.5
Robert Ryan Community Park.– Electricity				
	Per 1000 sq. ft.	0	0	$1.5
	Per hour of operation	0	0	$1.1
	Per occupant	4.6	54.1	$2,650.0
Robert Ryan Community Park.– Natural Gas				
	Per 1000 sq. ft.	0	0	$0.2

	Per hour of operation	0	0	$0.2
	Per occupant	1.5	27.7	$418.0
TV Channel 33— Electricity				
	Per 1000 sq. ft.	0	0.4	$15.4
	Per hour of operation	0	0.2	$7.8
	Per occupant	22.9	266.5	$9,543.0
Point Vicente Interpretive Center – Electricity				
	Per 1000 sq. ft.	0	0.3	$12.7
	Per hour of operation	0	0.1	$6.2
	Per occupant	12	139.4	$5,993.3
Point Vicente Interpretive Center – Natural Gas				
	Per 1000 sq. ft.	0	0.1	$0.8
	Per hour of operation	0	0	$0.4
	Per occupant	1.7	31.8	$388.3
Ladera Linda Park – Electricity				
	Per 1000 sq. ft.	0	0	$0.5
	Per hour of operation	0	0.2	$9.8
	Per occupant	8.5	99.4	$4,853.5
Ladera Linda Park – Natural Gas				
	Per 1000 sq. ft.	0	0	$0.1
	Per hour of operation	0	0.2	$2.6
	Per occupant	6.1	113.8	$1,271.0
Abalone Cove State Park– Electricity				
	Per 1000 sq. ft.	0	0.4	$20.9
	Per hour of operation	0	0	$0.9
	Per occupant	2.4	27.9	$1,460.0
Sector Average				
	Per 1000 sq. ft.	0	0	$0.0
	Per hour of operation	0	0	$0.1
	Per occupant	3.1	5.6	$34.3
Streetlights & Traffic Signals				
Traffic Signals/Controllers				
	Per streetlight account	1.1	12.9	$603.3
Streetlight				
	Per streetlight account	8.1	94.3	$2,614.5
Streetlight SCE Owned				
	Per streetlight account	85.9	1001.6	$75,417.3
Sector Average				
		35.8	218	$15,102.1
Vehicle Fleet				
Public Works Department				
	Per vehicle	2.5	34	$829.5
Parks and Recreation				
	Per vehicle	2.5	34	$829.5
Planning & Code Enforcement				
	Per vehicle	2.5	34	$829.5
Sector Average				
	Per vehicle	3.1	12.5	$251.3

Employee Commute				
Carpool Group				
	Per vehicle	1.5	20.9	n/a
Drove Alone				
	Per vehicle	2.6	36.6	n/a
Public Transportation				
	Per vehicle	0.2	3	n/a
Sector Average				
	Per vehicle	2.5	2.4	n/a

Sources of Emissions 1990		Equiv CO_2 (tonnes)	Equiv Energy (MMBtu)	Cost ($)
Buildings and Facilities				
City Hall– Electricity				
	Per 1000 sq. ft.	0	0	$0.5
	Per hour of operation	0	0.2	$5.2
	Per occupant	0.8	5.8	$197.7
Fred Hesse Community Park– Electricity				
	Per 1000 sq. ft.	0.1	0.4	$13.7
	Per hour of operation	0	0.1	$3.9
	Per occupant	25.3	183.9	$6,210.5
Robert Ryan Community Park.– Electricity				
	Per 1000 sq. ft.	0	0	$1.2
	Per hour of operation	0	0	$0.9
	Per occupant	8.2	59.2	$2,035.7
Robert Ryan Community Park.– Natural Gas				
	Per 1000 sq. ft.	0	0	$0.0
	Per hour of operation	0	0	$0.0
	Per occupant	0	0.1	$0.0
TV Channel 33— Electricity				
	Per 1000 sq. ft.	0	0.2	$7.8
	Per hour of operation	0	0.1	$4.0
	Per occupant	19.6	142.4	$4,824.1
Point Vicente Interpretive Center – Electricity				
	Per 1000 sq. ft.	0	0.1	$3.9
	Per hour of operation	0	0.1	$1.9
	Per occupant	7.6	55.1	$1,822.3
Point Vicente Interpretive Center – Natural Gas				
	Per 1000 sq. ft.	0	0	$0.0
	Per hour of operation	0	0	$0.0
	Per occupant	0	0	$0.0
Ladera Linda Park – Electricity				
	Per 1000 sq. ft.	0	0	$0.8
	Per hour of operation	0.1	0.5	$15.8
	Per occupant	35.4	257	$7,787.2
Ladera Linda Park – Natural Gas				
	Per 1000 sq. ft.	0	0	$0.0
	Per hour of operation	0	0	$0.0
	Per occupant	0	0.9	$0.0

Abalone Cove State Park– Electricity				
	Per 1000 sq. ft.	0	0.1	$3.1
	Per hour of operation	0	0	$0.1
	Per occupant	0.7	5.1	$217.7
Sector Average				
	Per 1000 sq. ft.	0	0	$0.0
	Per hour of operation	0	0	$0.0
	Per occupant	3	2.8	$3.0
Streetlights & Traffic Signals				
Traffic Signals/Controllers				
	Per streetlight account	6.3	45.9	$1,408.5
Sector Average				
		12.6	51.9	$1,414.8

Appendix E—Results from Employee Commute Survey

An employee commute survey was conducted for the years 2007 and 2005 in order to gather scope 3 GHG emissions based on vehicle miles traveled by employees. In 2007, there were approximately 55 full-time employees and 31 part-time employees; however, only 72 employees that took the survey worked for the City in 2007 resulting in a 84% response rate. For 2005, there were 50 full-time employees and 20 part-time employees; however, there were only 56 employees that took the survey who worked for the City in 2005 resulting in a 80% response rate. To capture the remaining VMT for the total number of employees that worked in those years, estimates were derived from the survey responses. Assumptions for the estimated portion include: employees drove alone in gasoline run passenger vehicles.[34]

Employee commute information is considered policy relevant and may be utilized to reduce GHG emissions through potential measures captured in the climate action plan. Additionally, this information may be useful for planning strategies to comply with SB 375.[35] For questions 5 and 15, the miles were grouped to identify individuals that were potential walkers, cyclists, carpools, public transit users, and vanpoolers: 0-1.9 (potential walkers), 2-3.9 miles (potential bicyclists; 4-8.9 miles (potential transit users); 9-19.9 (potential carpoolers); and 20-40.9 miles and above (long distance carpools and vanpools).

Based on information provided by respondents in the year 2007, 375,994 vehicle miles were traveled to the worksite; 8.3% of employees carpooled to the worksite, 66% of them were two-person carpools; 34.7% of employees lived within a range of 4 to 8.9 miles from the worksite (potential transit users). Results from question 11 indicate 40.8% of all respondents who were surveyed are interested in participating in a ridesharing program.

In the year 2005, respondents traveled 324,708 vehicle miles to the worksite; 5.3% of employees carpooled to the worksite, 100% of them were two-person carpools; 39% of employees lived within a range of 4 to 8.9 miles from the worksite.

A. 2007 Survey Results[36]

1. Employee Information

	Response Percent	Response Count
Name:	100.0%	76
Dept:	100.0%	76
answered question		76
skipped question		0

34 See appendix C to review details.

35 See appendix F for description of the legislation.

36 Survey Monkey, an online survey website was utilized to conduct the survey and generate graphs www.surveymonkey.com

2. What city did you live in?

	Response Percent	Response Count
City:	100.0%	76
ZIP Code:	100.0%	76
answered question		76
skipped question		0

Cities Listed in Survey:
Carson, Culver City, Dominquez Hills, Downey, Fullerton, Gardena, Harbor City, Hawthorne, Huntington Beach, Inglewood, Lomita, Long Beach, Los Alamitos, Manhattan Beach, Palos Verdes Estates, Pico Rivera, Rancho Palos Verdes, Redondo Beach, Rolling Hills Esstates, San Pedro, Sunland, Torrance Wilmington

3. Did you work for the city in 2007?

	Response Percent	Response Count
Yes	**94.7%**	**72**
No	5.3%	4
answered question		76
skipped question		0

4. What was your workweek schedule?

	Response Percent	Response Count
3/36 work week (2 days off)	0.0%	0
4/40 work week (1 day off)	1.3%	1
9/80 work week (1 day off every other week)	**61.8%**	**47**
Regular work week	1.3%	1
Part time week	34.2%	26
Other (such as fire personnel compressed schedules)	2.6%	2
answered question		76

5. On average, how many miles did you travel to work round trip each day?

375,994 vehicle miles traveled represents a 84% response rate
(447,433 is the estimated total VMT based on the number of full-time and part-time employees)

Commute distance range from worksite (one way)	Response Percent	Response Count
0-1.9 miles	2.7%	2
2-3.9 miles	7.0%	5
4-8.9 miles	**34.7%**	**25**
9-19.9 miles	32.0%	23
20-40.9 miles	21%	15
41 miles and above	2.7%	2
Number of respondents that worked for the city in 2007		72

6. On average, how many days a week did you...

Day(s) a week

	1	2	3	4	5	6	7	Response Count
Drive alone to work?	1.4% (1)	6.8% (5)	9.5% (7)	16.2% (12)	**63.5% (47)**	2.7% (2)	0.0% (0)	74
Carpool/Vanpool to work?	28.6% (2)	**42.9% (3)**	0.0% (0)	14.3% (1)	14.3% (1)	0.0% (0)	0.0% (0)	7
Take public transportation to work?	0.0% (0)	0.0% (0)	**100.0% (1)**	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	1
Bicycle to work?	**100.0% (2)**	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	2
Walk to work?	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0
Use another form of transportation to get to work?	**100.0% (1)**	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	1
Noncommuting (such as 24 shift where you sleep at station)?	0.0% (0)	**100.0% (1)**	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	1
							answered question	76
							skipped question	0

7. If you carpooled/vanpooled, how many other people traveled with you on average? (including you)

Out of 72 respondents who worked for the city in 2007, 8.3% participated in carpooling	Response Percent	Response Count
2 person	**66.0%**	**4**
3 person	33.0%	2
answered question		6
skipped question		72

8. If you used Public Transportation, what is the name of the public transit system?

Long Beach Transit	Response Count
	1
answered question	1
skipped question	75

9. If you drove, what type of vehicle did you drive most often?

	Response Frequency	Response Count
Auto-full size (e.g., Ford Taurus, Lincoln Town Car)	7.9%	6
Auto-mid size (e.g., Honda Accord, Toyota Camry)	**39.5%**	**30**
Auto-compact (e.g., Honda Civic, Toyota Corolla)	27.6%	21
Light truck/SUV (e.g., Chevy Suburban, Ford Expedition)	23.7%	18
Heavy truck (e.g., Tractor-trailer truck)	0.0%	0
Motorcycle	1.3%	1
Van	2.6%	2
City Vehicle	0.0%	0
Did not drive an automobile	0.0%	0
answered question		310
skipped question		0

10. For the vehicle you drove most often, what type of fuel does it use?

	Response Percent	Response Count
Gasoline	**97.4%**	**74**
Diesel	1.3%	1
Ultra-low sulfur diesel	0.0%	0
Bio-diesel	0.0%	0
Hybrid	1.3%	1
ethanol	0.0%	0
electric	0.0%	0
LPG	0.0%	0
CNG	0.0%	0
Did not drive an automobile	0.0%	0
answered question		76
skipped question		0

11. Would you be interested in participating in a ridesharing program i.e., carpooling, vanpooling, walking, bicycling, or using public transit to commute to work?

	Response Percent	Response Count
Yes	40.8%	31
No	**59.2%**	**45**
answered question		76
skipped question		0

B. 2005 Survey Results

12. If you worked for the city in 2005, would you say your travel to work was about the same as 2007?

	Response Percent	Response Count
Yes—Skip the 2005 section and go to the end and hit done.	**65.8%**	**50**
No—Click next and complete information for 2005.	7.9%	6
Other—Did not work for the city in 2005, skip the 2005 section and go to the end and hit done.	26.3%	20
answered question		76
skipped question		0

13. What city did you live in?

	Response Percent	Response Count
City:	100.0%	9
ZIP Code:	100.0%	9
answered question		9
skipped question		67

Cities Listed in Survey:
Carson, Huntington Beach, Long Beach, Pico Rivera, Redondo Beach, San Pedro, Wilmington

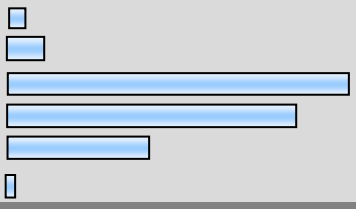
14. What was your workweek schedule?

	Response Percent	Response Count
3/36 work week (2 days off)	9.1%	1
4/40 work week (1 day off)	0.0%	0
9/80 work week (1 day off every other week)	**63.6%**	**7**
Regular work week	18.2%	2
Part time work	9.1%	1
Other (such as fire personnel compressed schedules)	0.0%	0
answered question		11
skipped question		65

15. On average, how many miles did you travel to work round trip each day?

324,708 vehicle miles traveled represents a 80% response rate
(405,885 is the estimated total VMT based on the number of full-time and part-time employees)

Commute distance range from worksite (one way)	Response Percent	Response Count
0-1.9 miles	3.1%	2
2-3.9 miles	7.8%	5
4-8.9 miles	**39.0%**	**25**
9-19.9 miles	34.3%	22
20-40.9 miles	14.0%	9
40 miles and above	1.5%	1
Number of respondents that worked for the city in 2005		64



16. On average, how many days a week did you...

Day(s) a week

	1	2	3	4	5	6	7	Response Count
Drive alone to work?	0.0% (0)	10.0% (1)	0.0% (0)	0.0% (0)	**90.0% (9)**	0.0% (0)	0.0% (0)	10
Carpool/Vanpool to work?	0.0% (0)	25.0% (1)	0.0% (0)	0.0% (0)	0.0% (0))	0.0% (0)	0.0% (0)	0
Take public transportation to work?	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0))	0.0% (0)	0.0% (0)	0
Bicycle to work?	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0
Walk to work?	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0
Use another form of transportation to get to work?	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0
Noncommuting (such as 24 shift where sleep at fire station)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0
answered question								10
skipped question								66

17. If you carpooled/vanpooled, how many other people traveled with you on average? (including you)

Out of 56 respondents who worked for the city in 2005, 5.3% participated in carpooling	Response Percent	Response Count
2 person	**100.0%**	**3**
answered question		3
skipped question		73

18. If you used Public Transportation, what is the name of the public transit system?

	Response Count
	0
answered question	0
skipped question	76

19. If you drove, what type of vehicle did you drive most often?

	Response Percent	Response Count
Auto-full size (e.g., Ford Taurus, Lincoln Town Car)	20.0%	2
Auto-mid size (e.g., Honda Accord, Toyota Camry)	**50.0%**	**5**
Auto-compact (e.g., Honda Civic, Toyota Corolla)	0.0%	0
Light truck/SUV (e.g., Chevy Suburban, Ford Expedition)	20.0%	2
Heavy truck (e.g., Tractor-trailer truck)	0.0%	0
Motorcycle	0.0%	0
Van	10.0%	1
City Vehicle	0.0%	0
Did not drive an automobile	0.0%	0
answered question		10
skipped question		66

20. For the vehicle you drove most often, what type of fuel does it use?

	Response Percent	Response Count
Gasoline	**100.0%**	**10**
Diesel	0.0%	0
Ultra-low sulfur diesel	0.0%	0
Bio-diesel	0.0%	0
Hybrid	5.6%	1
ethanol	0.0%	0
electric	0.0%	0
LPG	0.0%	0
CNG	0.0%	0
Did not drive an automobile	0.0%	0
answered question		10
skipped question		66

Appendix F—Climate Change Action

For reference, listed below are some of the key climate change policies that have been adopted at an international level as well as at State and Regional levels. [37]

AB 811, 2008—Gives counties and local governments authority to create benefit assessment districts which allow property owners to finance energy efficiency upgrades, such as solar panels, efficient air conditioning and ventilation systems, and tankless water heating equipment. Owners may enter a loan contract with a local government and pay it back through their property-tax bill. This legislation will help to reduce GHG emissions and stimulate energy efficiency upgrades.

SB 375 Steinberg, 2008—Advances the State's efforts to achieve the global warming goals consistent with AB 32. It aligns three critical policy areas of importance to local government: (1) regional long-range transportation plans and investments; (2) regional allocation of the obligation for cities and counties to zone for housing; and (3) a process to achieve greenhouse gas emissions reductions targets for the transportation sector.

SB 97 Dutton, 2007—States that GHGs and their effects are subject to the California Environmental Quality Act (CEQA). CEQA requires that agencies identify a given project's potentially significant effects on the environment and mitigate those significant effects whenever feasible. Public agencies such as local governments are therefore obligated to determine whether a given project's climate change-related impacts are significant and to mitigate any significant effects. CARB is responsible for recommending where the threshold of "significance" lies.

SB 107 Simitian, 2006—Requires investor-owned utilities (IOUs) to increase the share of renewable energy sources (e.g., wind, solar, geothermal) in their electricity mix to 20 percent by 2010. Known as the Renewables Portfolio Standard (RPS), the law is intended to decrease California's reliance on fossil fuel and reduce GHG emissions from the electricity sector. As of 2008, about 12 percent of California's electricity demand is met with renewable resources. Governor Schwarzenegger has since called for 33 percent of California's electricity to be provided by renewable sources by 2020.

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

U.S. Mayors' Climate Protection Agreement, 2005—Creates a commitment to strive to meet or beat, by 2012, the Kyoto Protocol target of a seven percent reduction in greenhouse gas emissions below 1990 levels. The agreement was initiated by Seattle Mayor Greg Nickels.

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

37 The California Air Resources Board website was a source of information for the legislation listed above. To find more information on the legislation visit the website at http://www.arb.ca.gov/cc/cc.htm. For more information on the U.S. Mayors' Climate Protection Agreement visit their website at http://usmayors.org/climateprotection/agreement.htm. To learn more about AB 811 visit the Los Angeles County website at http://portal.lacounty.gov/wps/portal/lac/home.

Kyoto Protocol 1997—A protocol to the United Nations Framework Convention on Climate Change (UNFCC) requiring industrialized nations to reduce their collective greenhouse gas emissions 5.2% below 1990 levels. As of January 2007, 162 countries have ratified the Protocol, with the United States and Australia most notably absent from the list.

Rio Earth Summit in 1992—Created the United Nations Framework Convention on Climate Change (UNFCCC). The UNFCCC is a milestone treaty on Climate Change that provides an overall framework for international efforts to mitigate climate change.

Appendix G—Abbreviations and Acronyms[38]

Btu	British thermal unit
CH_4	methane
CO	carbon monoxide
CO2	carbon dioxide
CO_2e	carbon dioxide equivalent
FE	Fuel Economy
GHG	greenhouse gas
HFC	hydrofluorocarbon
MMBtu	1 million British thermal unit
NOx	oxides of nitrogen
N2O	nitrous oxide
PFC	perfluorocarbon
PM10	particulate matter smaller than ten microns in diameter
SF_6	sulfur hexafluoride
SOx	sulfur oxides
VOC	volatile organic compounds

Appendix H—Glossary of Terms[39]

Activity data	Data on the magnitude of a human activity resulting in emissions taking place during a given period of time. Data on energy use, fuel used, miles traveled, input material flow, and product output are all examples of activity data that might be used to compute GHG emissions.
Base year	A specific year against which an entity's emissions are tracked over time.
Base year emissions	GHG emissions in the base year.
Boundaries	GHG accounting and reporting boundaries can have several dimensions, i.e., organizational, operational and geographic. These boundaries determine which emissions are accounted for and reported by the entity.
Biogenic emissions from combustion	CO2 emissions produced from combusting a variety of biofuels and biomass, such as biodiesel, ethanol, wood, wood waste and landfill gas.
Calendar year	The time period from January 1 through December 31.
Carbon dioxide (CO2)	The most common of the six primary GHGs, consisting of a single carbon atom and two oxygen atoms, and providing the reference point for the GWP of other gases. (Thus, the GWP of CO2 is equal to 1.)

38 Abbreviations and acronyms are from the Local Government Operations Protocol, version 1.0

39 Definition are from the Local Government Operations Protocol, version 1.0 and ICLEI's Cities for Climate Protection Milestone Guide.

CO_2 equivalent (CO_2e)	The universal unit for comparing emissions of different GHGs expressed in terms of the GWP of one unit of carbon dioxide.
Control approach	An emissions accounting approach for defining organizational boundaries in which an entity reports 100 percent of the GHG emissions from operations under its financial or operational control.
Criteria Air Pollutants	The term criteria air pollutants refers to pollutants that are regulated under the U.S. Clean Air Act. As with carbon dioxide, the major sources of these pollutants are fossil fuels. Most measures that reduce carbon dioxide emissions also reduce criteria air pollutants. Criteria air pollutants include nitrogen oxides (NOx), volatile organic compounds (VOCs), carbon monoxide (CO), sulfur oxides (SOx), and particulate matter smaller than ten microns in diameter (PM-10). The CACP software provides estimated emissions of CAPs as well as GHGs for emissions analyses and reduction benefits of measures.
Direct emissions	Emissions from sources within the reporting entity's organizational boundaries that are owned or controlled by the reporting entity, including stationary combustion emissions, mobile combustion emissions, process emissions, and fugitive emissions. All direct emissions are Scope 1 emissions, with the exception of biogenic CO2 emissions from biomass combustion.
Emission factor	A unique value for determining an amount of a GHG emitted on a per unit activity basis (for example, metric tons of CO2 emitted per million Btus of coal combusted, or metric tons of CO2 emitted per kWh of electricity consumed).
Facility	Any property, plant, building, structure, stationary source, stationary equipment or grouping of stationary equipment or stationary sources located on one or more contiguous or adjacent properties, in actual physical contact or separated solely by a public roadway or other public right-of way, and under common operational or financial control, that emits or may emit any greenhouse gas.
Global warming potential (GWP)	The ratio of radiative forcing (degree of warming to the atmosphere) that would result from the emission of one mass-based unit of a given G GHG compared to one equivalent unit of carbon dioxide (CO2) over a given period of time.
Greenhouse gases (GHGs)	For the purposes of this Protocol, GHGs are the six gases identified in the Kyoto Protocol: carbon dioxide (CO2), nitrous oxide (N2O), methane (CH4), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF6).
Indirect emissions	Emissions that are a consequence of activities that take place within the organizational boundaries of the reporting entity, but that occur at sources owned or controlled by another entity. For example, emissions of electricity used by a manufacturing entity that occur at a power plant represent the manufacturer's indirect emissions.
Inventory	A comprehensive, quantified list of an organization's GHG emissions and sources.

Inventory boundary	An imaginary line that encompasses the direct and indirect emissions included in the inventory. It results from the chosen organizational and operational boundaries.
Methane (CH_4)	One of the six primary GHGs, consisting of a single carbon atom and four hydrogen atoms, possessing a GWP of 21, and produced through the anaerobic decomposition of waste in landfills, animal digestion, decomposition of animal wastes, production and distribution of natural gas and petroleum, coal production, and incomplete fossil fuel combustion.
Metric ton (MT, tonne)	Common international measurement for the quantity of GHG emissions, equivalent to about 2,204.6 pounds or 1.1 short tons.
Mobile combustion	Emissions from the combustion of fuels in transportation sources (e.g., cars, trucks, buses, trains, airplanes, and marine vessels) and emissions from non-road equipment such as equipment used in construction, agriculture, and forestry. A piece of equipment that cannot move under its own power but that is transported from site to site (e.g., an emergency generator) is a stationary, not a mobile, combustion source.
Nitrous oxide (N_2O)	One of the six primary GHGs, consisting of two nitrogen atoms and a single oxygen atom, possessing a GWP of 310, and typically generated as a result of soil cultivation practices, particularly the use of commercial and organic fertilizers, fossil fuel combustion, nitric acid production, and biomass burning.
Operational boundaries	The boundaries that determine the direct and indirect emissions associated with operations within the entity's organizational boundaries.
Operational control	Full authority to introduce and implement operating policies at an operation.
Organizational boundaries	The boundaries that determine the operations owned or controlled by the reporting entity, depending on the consolidation approach taken.
Perfluorocarbons (PFCs)	One of the six primary GHGs, consisting of a group of man-made chemicals composed of one or two carbon atoms and four to six fluorine atoms, containing no chlorine. Originally introduced as alternatives to ozone depleting substances, PFCs have few commercial uses and are typically emitted as by-products of industrial and manufacturing processes. PFCs have very high GWPs and live a long time in the atmosphere.
Scope	Defines the operational boundaries in relation to indirect and direct GHG emissions.
Scope 1 emissions	All direct GHG emissions, with the exception of direct CO2 emissions from biogenic sources.
Scope 2 emissions	Indirect GHG emissions associated with the consumption of purchased or acquired electricity, heating, cooling, or steam.
Scope 3 emissions	All indirect emissions not covered in Scope 2. Examples include upstream

	and downstream emissions, emissions resulting from the extraction and production of purchased materials and fuels, transport-related activities in vehicles not owned or controlled by the reporting entity, use of sold products and services, outsourced activities, recycling of used products, waste disposal, etc.
Stationary	Neither portable nor self propelled, and operated at a single facility.
Stationary combustion	Emissions from the combustion of fuels to produce electricity, steam, heat, or power using equipment (boilers, furnaces, etc.) in a fixed location.
Sulfur hexafluoride (SF6)	One of the six primary GHGs, consisting of a single sulfur atom and six fluoride atoms, possessing a very high GWP of 23,900, and primarily used in electrical transmission and distribution systems.
Therm	A measure of one hundred thousand (10^5) Btu.