City of Palos Verdes Estates

Municipal Greenhouse Gas Emissions Inventory Report

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May 2009

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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 Local Government Operations Protocol suggests that a baseline year represent complete and accurate data. The year 2005 was recommended per ICLEI based upon the Protocol and was also used per SBCCOG recommendations in order to remain consistent within the South Bay region. 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 have made this pledge. 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.[3] 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. By joining ICLEI and adopting a resolution, South Bay cities have committed to ICLEI's Five Milestone Climate Protection Methodology, which includes: conducting a baseline emissions inventory and forecast, adopting an emissions reduction target for the forecast year, developing a local Climate Action Plan, implementing the local Climate Action Plan, and monitoring and verifying results. These milestones are the five steps the City of Palos Verdes Estates plans to take in order to reduce its impact on the environment and promote change within the community.

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

Another resource utilized to conduct the municipal inventory was the Local Government Operations Protocol (LGOP).[4] 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 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, which is what is recommended by the Local Government Operations Protocol. The year 2005 was recommended per ICLEI based upon the Protocol and was also used per SBCCOG recommendations in order to remain consistent within the South Bay region. 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.[5] However, it was difficult to find accurate data dating as far back 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

4The Local Government Operations Protocol can be viewed with this link http://www.climateregistry.org/resources/docs/protocols/industry/local-gov/lgo_protocol_september2008.pdf

5 See appendix F for descriptions on climate change legislation.

used to establish and organize its emissions by "scopes."[6] 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[7] where no records were 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[8] which entails reporting on 3 of the 6 internationally-recognized GHGs regulated under the Kyoto Protocol.[9] 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[10] 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).[11] 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,[12] 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 Palos Verdes Estates generated approximately 644 metric tons of CO_2e in the baseline year, 2005;

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

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

8 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).

9 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.

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

11 Equivalent Carbon Dioxide (CO2e) 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.

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

this is equivalent to the GHG emissions generated by electricity use of 89.3 homes for one year.[13]

- There was an overall 5.2% increase in GHG emissions between the baseline year 2005 and the interim year 2007. This was mainly due to scope 1 fuel use (gasoline) and scope 2 electricity use in buildings.
- While there was no use of mass transit, results from the employee commute survey indicate only 10% of respondents carpooled to the worksite in both 2005 and 2007.
- Under a business-as-usual forecast, the City can expect emissions to rise to 702 metric tons of CO_2e by 2012 that is equivalent to the annual GHG emissions from 129 passenger vehicles; and 725 metric tons of CO_2e by 2015, equivalent to the annual GHG emissions from 133 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, 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. The formation of a green task force or environmental advisory committee is a good place to get the development of this process started.

Now that the first step has been taken, it is vital to continue to develop inventory reporting skills. It is up to the City as to how often they re-inventory GHG emissions, but ICLEI recommends doing so every few years, while the Local Government Operations Protocol recommends an inventory conducted annually to make sure the City stays on target to reach short and long-term goals. An internal Environmental Advisory Committee can comprehensively discuss the results of this report and determine the frequency of reporting based upon the needs of the City. 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 new 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.

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

II. Local Government Profile Information

A. Local Government Description

The City of Palos Verdes Estates is located on the northwestern coast of the Palos Verdes Peninsula, in southern California. The City faces the Pacific Ocean, and there are several accessible beaches although most of the predominantly rocky shoreline is marked by high cliffs. The City is residential, with no traffic lights and relatively limited commercial areas around Malaga Cove and Lunada Bay. The City is approximately 4.75 square miles and has a population 14,046.[14]

As a "general law city" Palos Verdes Estates provides services to the public mandated by the California State Code. The City's authorized legislative body is the City Council, which consists of five residents elected at large on a non-partisan ballot for four year overlapping terms. Each year one member of the Council is selected by the Council to serve as Mayor and one as Mayor Pro Tempore. City Council elections are the first Tuesday following the first Monday in March of odd numbered years.

The City of Palos Verdes Estates' mission statement is as follows:
Guided by the highest principles of public policy and law, our mission is to provide pre-eminent service to the Community, City Council and Fellow Employees with a commitment to integrity, competence and cooperation.

Local Government History

Palos Verdes Estates first functioned as an unincorporated community. The Palos Verdes Homes Association was established in 1923 to enforce the Protective Deed Restrictions set forth in the early planning and development of this city. At that time, the Homes Association was liable for taxes on all parkland and after the economic crash in 1929, the Association owed those taxes to Los Angeles County. The residents were afraid that the parklands might be sold for payment and as a result, voted for the City to be incorporated in 1939. The parklands were then deeded to the new City in 1940 by the Homes Association thus creating a unique community of rolling landscapes.

The community was originally laid out and landscaped by the famous Olmsted Brothers. Gently winding roadways, green hillsides, and pathways framed by trees beautifully define the setting for this city. A full 28% of the land area was dedicated to be permanent open space so that the lush surroundings would be preserved.

Primary Services

Department	Primary Services
Administration	General Administration –City Clerk, City Manager, City Council and Finance.
Palos Verdes Police Department	Provides safety and security within the community. The Police Department also provides services to the senior citizen community through a program called PVECares.
Fire Services	Contracted with Los Angeles County Fire District
Streets & Parks	Maintain the community as a whole, post signs/notices, oversee City clean-up projects, and maintain the Peacock population.
Planning	Contracted with Charles Abbott Associates. Staff reviews and approves new development projects within the City as well as enforces building regulations per the City's Zoning Ordinance.
Building & Safety	Contracted with Charles Abbott Associates. Staff performs plan review, permitting, and inspections.
Public Works	Contracted with Charles Abbott Associates. Staff permits and inspects capital Improvements and improvements within City property.
Transit	Provided by Metro and Palos Verdes Transit Authority

14 Per 2008 Southern California Association of Governments (SCAG) profile.

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, by scope, 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 emission 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 use in 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. 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. The Local Government Operations Protocol and ICLEI suggest that a baseline year represents complete and accurate data. The year 2005 was recommended per ICLEI based upon the Protocol and was also used per SBCCOG recommendations in order to remain consistent within the South Bay region. It is important to keep in mind that some emissions data 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 information that the City

15 Each greenhouse gas has a different global warming potential based on its ability to trap heat in the atmosphere, CO2e 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.

may want to consider when developing or evaluating measures or policies.

In 2005, the City of Palos Verdes Estates GHG emissions totaled 644 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 89.3 homes for one year. Looking at the scopes within the table, the second largest portion 35.9% (scope 1 total) were emissions generated by a combination of natural gas use and fuel for city vehicles. Approximately 35 vehicles from the Police, Administrative, and Streets and Parks Department were included in the make up of this total. Electricity usage accounted for 19.1% (scope 2 total) 15.7% of electricity generated emissions were from building use. The largest portion 45.1% (scope 3 total) were 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 where available for the purpose of planning and tracking energy measures' cost effectiveness. In 2005, the City of Palos Verdes Estates used 405,514 kWh of electricity at a cost of $52,924. In this same year, the City used 2,606 therms of natural gas and spent $ 3,358.

Table 1. Municipal Inventory Summary 2005

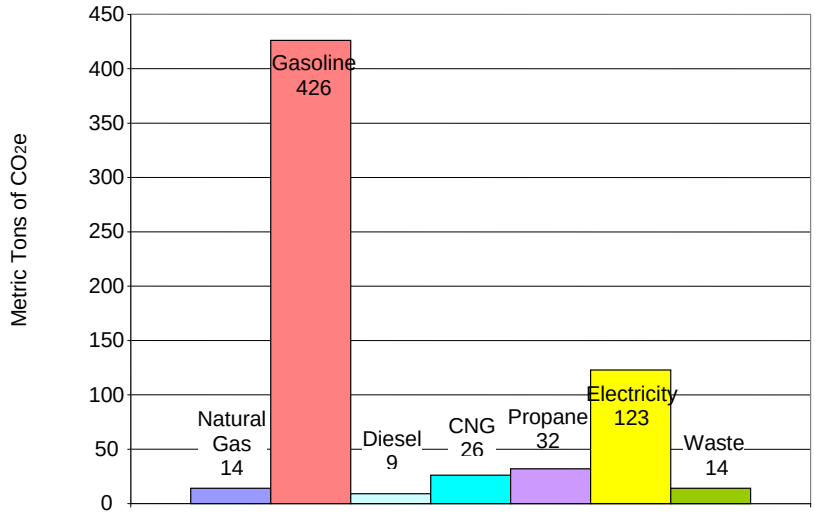
PVE Municipal GHG Emissions 2005						
Sector	**MT CO_2e**	**Percent CO_2e (% CO_2e)**	**Source**	**Energy/Fuel Use**	**Energy/Fuel Use Cost**	**Energy Equivalent** (MMBtu)
Scope 1 Emissions						
Buildings & Facilities						
Buildings & Facilities	**14**	2.2%	Natural Gas	2,606 therms	**$ 3,358**	261
City Vehicle Fleet						
City Vehicle Fleet	**217**	**33.7%**	-	-	**$45,194**	**2,985**
	215		Gasoline	23,834 gal	$ 44,763	2,962
	2		Diesel	165 gal	$ 431	23
Total Scope 1 Emissions	**231**	**35.9%**	**-**	**-**	**$ 48,552**	**3,246**
Scope 2 Emissions						
Buildings & Facilities						
Buildings & Facilities[19]	**101**	15.7%	Electricity	333,680 kWh	$ 40,316	1,139
Streetlights & Traffic Signals						
Streetlights	**2**	0.3%	Electricity	5,640 kWh	$ 592	19
Water Delivery						
Sprinkler/Irrigation Control	**17**	2.6%	Electricity	55,207 kWh	$ 10,180	187
Park Irrigation	**3**	0.5%	Electricity	10,987 kWh	$ 1,836	37
Total Scope 2 Emissions	**123**	**19.1%**	**-**	**405,514 kWh**	**$ 52,924**	**1,382**
Scope 3 Emissions						
Employee Commute						
Employee Commute	**148**	**23%**		**292,875 VMT**	n/a	**2,043**
	141		Gasoline	279,155 VMT		1,942
	7		Diesel	13,720 VMT		101
Vehicles—Contract Service Providers						
Contract Service Vehicles	**128**	**19.9%**			n/a	**1,883**
	70		Gasoline	3,569.93 gal		965
	26		CNG	7,764.26 gal equiv		443

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

	32		Propane	5,181.44 gal		475
Solid Waste						
Waste	**14**	2.2%		36 tons	n/a	n/a
Total Scope 3 Emissions	**290**	**45.1 %**	-	-	-	**3,926**
Total Emissions	**644**	**100%**	-	**-**	**$ 101,476**	**8,554**

Figure 1 illustrates emissions by source. The main sources of emissions were from fuel use, gasoline ranking the highest, primarily from City fleet vehicles. Waste resulted in one of the lowest sources of emissions. It was estimated that 36 tons of waste generated by a city operated and owned facility was sent to a landfill. A breakdown of the waste composition can be found in appendix D, 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 below illustrate a percentage breakdown of each 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 19.9% of emissions are from contract service vehicles that work within the City's boundaries, 2.2% from waste, and 23% are the result of employee commuting. While a city may not have the same degree of control over these sources, there is still an opportunity to create initiative programs or policies that will engender climate-friendly practices. Figure 3 is comprised of natural gas, fuel, and electricity emissions, 40% of which are the result of electricity consumption. It can be seen that buildings account for the largest share within the electricity category. In scope 1, 60% of emissions came from fuel and natural gas sources combined.

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

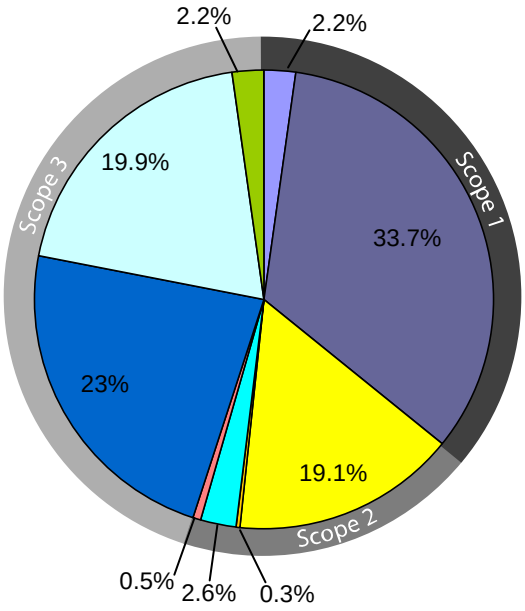
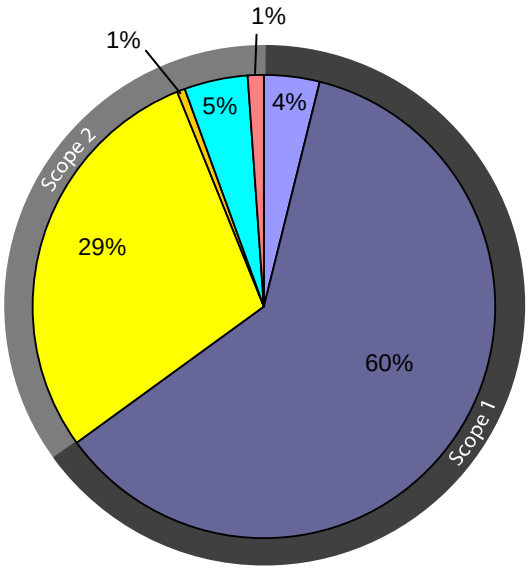
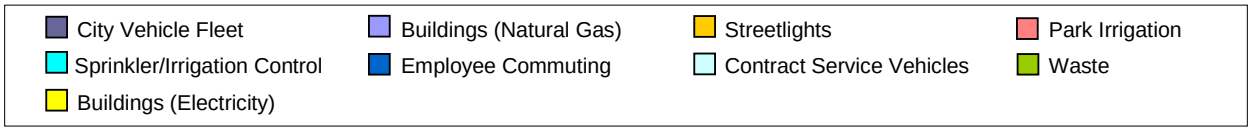


Figure 3. Emissions by Sector 2005
(including only direct and indirect sources from scopes 1 and 2)





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, and source of emissions to capture a broad picture of the data.

In 2007, the City of Palos Verdes Estates GHG emissions totaled 678 metric tons of CO_2e[20] including both direct and indirect sources of emissions—this is equivalent to the emissions produced from 76,958 gallons of gasoline consumed. The year 2007 represents an overall 5.2% increase in emissions from the baseline year. Looking at the scopes within the table, the second largest portion of emissions came from natural gas and vehicle fleet fuel use at 38.4% (scope 1 total), emissions from electricity were at 20.3% (scope 2 total), and the largest portion was employee commute, waste, and contract service vehicles at 41.3% (scope 3 total). Emissions from scopes 1 and 3 increased from the baseline year due to most significantly the rise in fuel use for vehicles. The increase in scope 1 can partially be attributed to the three additional vehicles included in the inventory that year. In this same year, the total emissions from the consumption of electricity rose by 11.3% while costs increased 21%.

20 Emissions are aggregated and reported in terms of carbon dioxide equivalent units, or CO2e. Converting all GHG emissions to carbon dioxide equivalent units allows for the consideration of different GHG in comparable terms. For example, methane is 21 times more potent than carbon dioxide in its ability to trap heat, so ICLEI's emissions software converts one ton of methane emission to 21 tons CO2e.

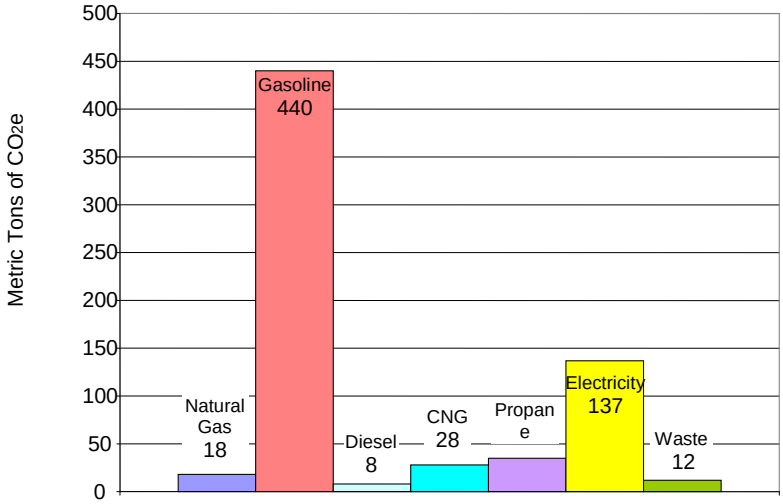
Table 2. Municipal Inventory Summary 2007

PVE 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	**18**	2.7%	Natural Gas	3,288 therms	**$ 3,824**	333
City Vehicle Fleet						
City Vehicle Fleet	**242**	**35.7%**		-	**$ 54,958**	**3,337**
	240		Gasoline	26,670.64 gal	$ 54,448	3,314
	2		Diesel	165 gal	$ 510	23
Total Scope 1 Emissions	**260**	**38.4%**	**-**	**-**	**$58,782**	**3,670**
Scope 2 Emissions						
Buildings & Facilities						
Buildings & Facilities[21]	**117**	17.3%	Electricity	400,800 kWh	$ 50,128	1,368
Streetlights & Traffic Signals						
Streetlights	**2**	0.3%	Electricity	5,640 kWh	$ 739	19
Water Delivery						
Sprinkler/Irrigation Control	**14**	2.1%	Electricity	48,218 kWh	$ 10,461	165
Park Irrigation	**4**	0.6%	Electricity	12,832 kWh	$ 2,552	44
Total Scope 2 Emissions	**137**	**20.3%**	**-**	**467,490 kWh**	**$ 63,880**	**1,596**
Scope 3 Emissions						
Employee Commute						
Employee Commute	**130**	**19.0 %**		**251,692 VMT**	n/a	**1,795**
	124		Gasoline	241,402 VMT		1,720
	6		Diesel	10,290 VMT		75
Vehicles—Contract Service Providers						
Contract Service Vehicles	**139**	**20.5%**			n/a	**2,046**
	76		Gasoline	8,437.24 gal		1,048
	28		CNG	3,879.19 gal equiv.		482
	35		Propane	5,630.36 gal		516
Solid Waste						
Waste	**12**	1.8%		34 tons	n/a	n/a
Total Scope 3 Emissions	**281**	**41.3%**	-	-	-	**3,841**
Total Emissions	**678**	**100%**	-	**-**	**$ 122,662**	**9,107**

21 See appendix D, Emissions Data, to review individual energy use and cost per building.

Figure 4 shows an incremental growth in emissions from all sources with the exception of diesel and waste. It was estimated that 34 tons of waste was generated in that year. The decrease in emissions related to waste correlates with the decrease in employees that worked in that year.

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 sector from Table 2. Figure 5 indicates 20.5% of emissions are from contract service vehicles, 1.8% from waste, and 19% resulted from employee commuting. Figure 6 shows a shift in usage within the electricity sector as less emissions were caused by sprinkler and irrigation control while emissions from building use rose. Scope 1 emissions from natural gas and fuel use rose from the baseline year.

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

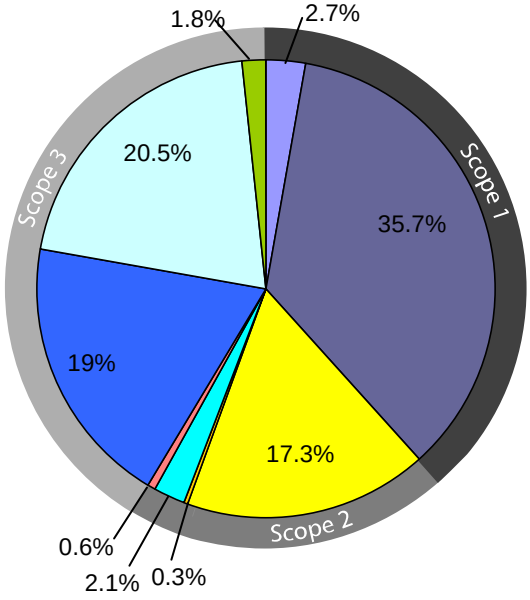
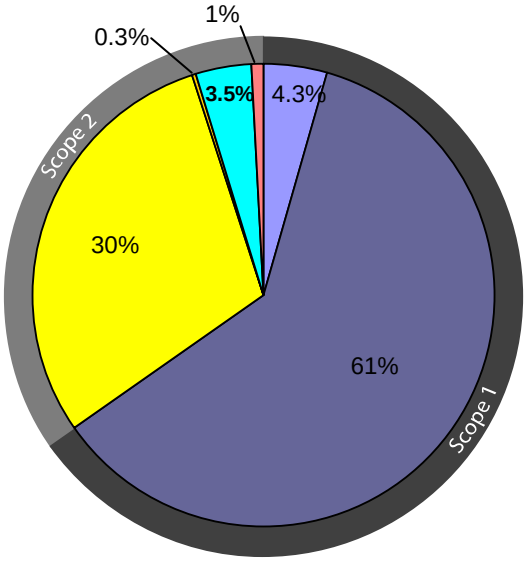
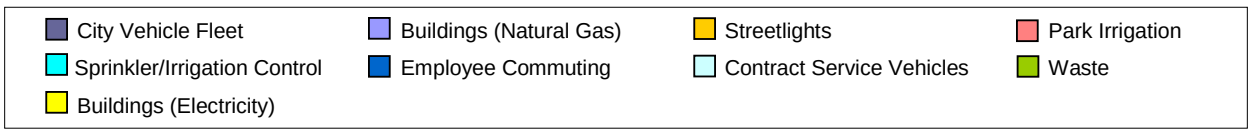


Figure 6. Emissions by Sector 2007
(including only direct and indirect sources from scopes 1 and 2)





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.[22] 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. As previously stated the reduction target will be set from 2005 levels, but the 1990 information has been included to make GHG level comparisons with recent years where possible.

Based on the data that was available for 1990, the GHG emissions identified totaled 192 metric tons of CO2e (scope 2 totaled), as shown in Table 3. This is equivalent to the annual GHG emissions from 35.2 passenger vehicles. Electricity use in this year was notably higher than in more recent years. Emissions from building electricity are the highest equal to 159 metric tons of CO_2e. Reduction in emissions since 1990 may be the result of energy efficiency projects related to lighting upgrades. Emissions related to streetlight use have stayed relatively small. Emissions in the area of sprinkler and irrigation control have steadily declined from 1990 through 2007. Even with five additional accounts added after 1990 a 43% decrease in emissions occurred between 1990 and 2005.

Table 3. Municipal Inventory Summary 1990

PVE Municipal GHG Emissions 1990						
Sector	**MT CO_2e**	**Percent CO_2e (% CO_2e)**	**Source**	**Energy/Fuel Use**	**Energy/Fuel Use Cost**	**Energy Equivalent** (MMBtu)
Scope 2 Emissions						
Buildings & Facilities						
Buildings & Facilities	**159**	19.3%	Electricity	337,980 kWh	$ 31,459	1,153
Streetlights & Traffic Signals						
Streetlights	**3**	0.3%	Electricity	5,640 kWh	$ 592	19
Water Delivery						
Sprinkler/Irrigation Control	**30**	2.3%	Electricity	62,786 kWh	$ 8,333	214
Total Scope 2 Emissions	**192**	**22.6%**	**-**	**406,406 kWh**	**$ 40,384**	**1,596**
Total Emissions[23]	**192**	**22.6%**	-	**406,406 kWh**	**$ 40,384**	**1,596**

22 See LGOP inventory guidelines, page 12.

23 The summed totals shown here do not reflect the total emissions emitted in the year 1990 as not all of the data from that year was available.

B. Emissions Trends

Represented in Table 4 are the emissions trends from 1990 to 2005 (where reliable data existed) organized by source of emission. Table 5 shows the emissions trends from 2005 to 2007 also organized by source.

Table 4. Emissions Trends 1990-2005

Electricity	MTCO_2e 1990	MT CO_2e 2005	Percentage Change
Buildings & Facilities	159	101	-36.4%
Streetlights	3	2	-33%
Sprinkler/Irrigation Control	30	17	-43%
Park Irrigation	--	3	--
Total	**192**	**123**	**-36%**

Table 5. Emissions Trends 2005-2007

Electricity	MTCO_2e 2005	MTCO_2e 2007	Percentage Change
Buildings & Facilities	101	117	+15.8%
Streetlights	2	2	--
Sprinkler/Irrigation Control	17	14	-17.6%
Park Irrigation	3	4	+33%
Total	**123**	**137**	**+11.3%**
Natural Gas			
Buildings & Facilities	14	18	+28.5%
Fuel			
Gasoline, City Fleet	215	240	+11.6%
Diesel, City Fleet	2	2	--
Gasoline, Employee Commute	141	124	-12%
Diesel, Employee Commute	7	6	-14.2%
Gasoline, Contract Services	70	76	+8.5%
CNG, Contract Services	26	28	+7.6%
Propane, Contract Services	32	35	+9.3%
Waste			
	14	12	-14.2%

Between a 15 year span from 1990 to 2005 electricity emissions have gone down by 36%, even with the addition of park irrigation accounts. Significant improvements can be seen in both sprinkler/irrigation control and in the buildings category. In 1990 there were approximately three accounts related to buildings and facilities and by 2005 the number of accounts had been reduced to just two accounts for City Hall. The facility no longer listed in the consumption data, Palos Verdes Stables, was only responsible for a small fraction of emissions, approximately 4 metric tons of CO_2e. The 36.4% reduction in building emissions may be the result of energy efficiency upgrades—In 1990, City Hall electricity usage per person was equal to 4.1 metric tons of CO_2e and cost $779.5 and in 2005, electricity usage per person was equal to 2.7 metric tons of CO_2e and cost $1,060.9 (refer to appendix D, indicator inputs, for additional analysis based on statistics provided by the City and from consumption data).

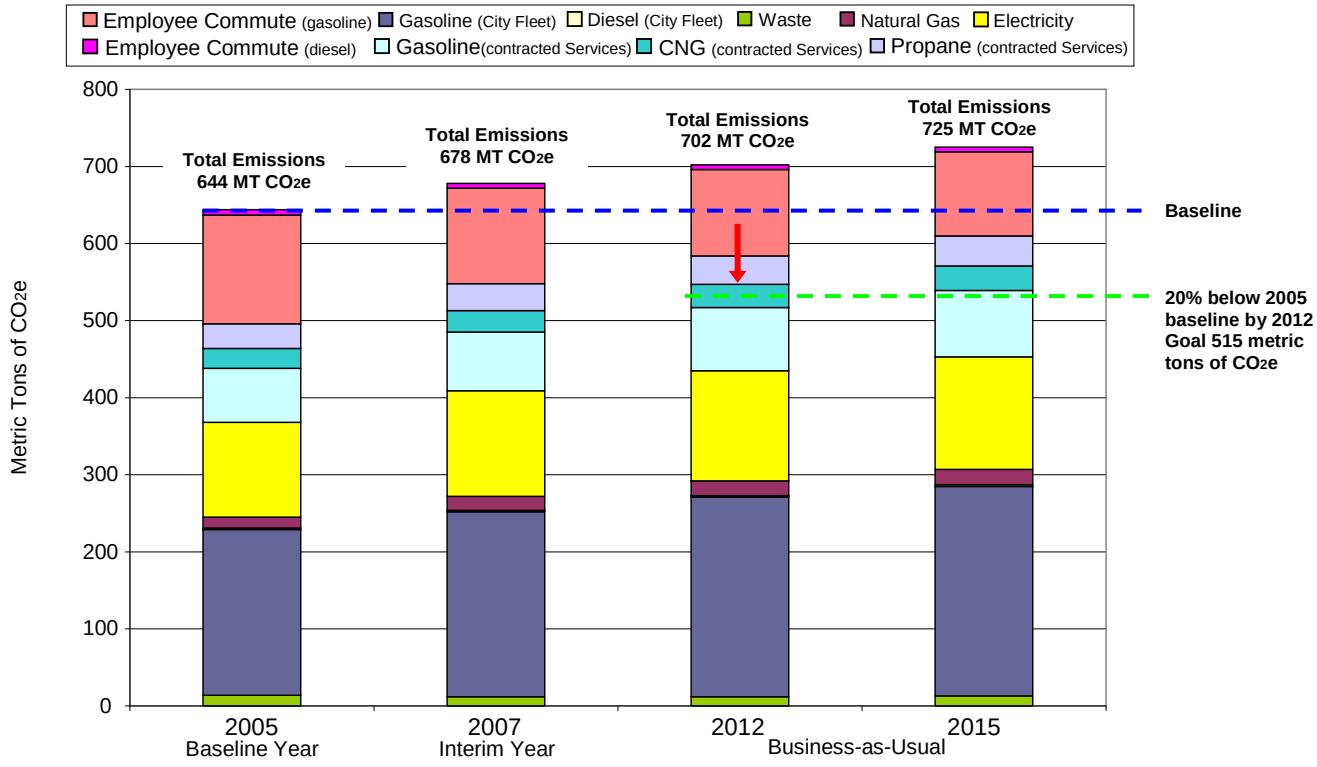
Overall emissions from electricity use rose 11.3% from 2005 to 2007 resulting in additional emissions. However, there was a 17.6% decrease in sprinkler/irrigation control emissions. In 2007, City Hall electricity emissions increased to 3.1 metric tons of CO_2e per person and the average cost of activities per person also rose by $258.30. Gasoline emissions from City vehicle increased 11.6% from 2005 to 2007. The average emissions per City vehicle was 12.7 metric tons of CO_2e at an estimated cost of $2658.40 per vehicle. By 2007 the average emissions per City vehicle was 14.2 and the cost had increased by $574.40 per vehicle. In the employee commute category, the 2005 average reveals 2.3 metric tons of CO_2e was emitted per vehicle which is slightly elevated from the 2007 number, 2.2 metric tons of CO_2e per vehicle (refer to appendix D, indicator inputs). All types of fuel related to contract service provider's vehicles increased. In the waste category, there was an estimated 14.2% decrease in emissions from the amount of waste generated between 2005 to 2007.

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 City of Palos Verdes Estates does not anticipate any significant growth. Even with little to no growth expected, 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 702 metric tons of CO_2e by 2012 and 725 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 515 metric tons of CO_2e.

Figure 7. Business-as-Usual Forecast[24]



24 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 CO_2e 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 Palos Verdes Estates 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

Prior to the City's involvement with ICLEI, the City Council approved a project to retrofit city hall in 2005. An assessment was performed by a consulting firm which provided feedback on various opportunities for city hall to become more energy efficient. Among other modifications, the City upgraded lighting fixtures, installed sensors on exhaust fans, and installed vending machine controllers. Our streetlights and decorative lights were also replaced with LEDs. Staff has been educated to turn off lights, computers, and any other equipment when not in use. We plan to obtain an updated energy audit so that we can take advantage of the newest products and information on the market today.

B. Solid Waste and Recycling

The City utilizes recycled paper for our newsletter and most of our office supplies are comprised of recycled content. We also provide free recycling, free green waste, and free e-waste disposal to our residents through our refuse hauler contract.

C. Sustainable Development

The Public Works Department utilized slurry seal comprised of recycled tires. Recently, a solar crosswalk was installed on Palos Verdes Drive West near Lunada Bay Park.

D. Urban Forests

Approximately 28% of Palos Verdes Estates is Open Space. More than 75% of the landscaping utilized in this area is low water use or drought-tolerant planting.

E. Water Usage and Conservation

With the support of the West Basin Municipal Water District and the Water Replenishment District of Southern California, the City is currently exploring the feasibility of utilizing reclaimed water at the Palos Verdes Golf Club.

F. Storm Water Management

We currently require Standard Urban Stormwater Mitigation Plans for all projects that have a minimum slope of 25% as well as projects that are adjacent to or discharging directly to an Environmentally Sensitive Area. Since the City is mostly comprised of Single Family Residences, new industrial or commercial developments are not common. However, should any project increase storm water run-off such as a new parking lot or automotive service station, then a mitigation plan will be required.

G. Vehicle Fleet and City-Contracted Service

The Police Department has 3 hybrid vehicles and a CNG (Compressed Natural Gas) parking enforcement vehicle. Another CNG vehicle is utilized for daily city inspections.

H. Education and Outreach

City staff has attended and assisted in the coordination of various green workshops to better understand the different approaches to green building and sustainable practices. We have been in discussion with the other three Peninsula

cities (Rancho Palos Verdes, Rolling Hills, and Palos Verdes Estates) regarding a consistent green building program. Furthermore, we have two staff members that are actively involved in the South Bay Green Task Force.

The City publishes a newsletter six times per year. Each issue includes a section to educate the public on sustainable, energy-saving practices.

The City works closely with the South Bay Environmental Services Center to increase the City's energy efficiency by promoting educational outreach and introducing energy efficient technologies for businesses and residents.

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	**14**	**13.82743**	**0.001303**	**0.00002**
Scope 2	Purchased Electricity	**101**	**100.75985**	**0.004389**	**0.001664**

Streetlights and Traffic Signals					
Scope 2		CO_2e	CO_2	CH_4	N_2O
	Purchased Electricity	**2**	**1.70308**	**0.00007**	**0.00002**

Water Delivery					
Scope 2		CO_2e	CO_2	CH_4	N_2O
	Purchased Electricity	**20**	**19.87506**	**0.00086**	**0.00032**

Vehicle Fleet					
Scope 1		CO_2e	CO_2	CH_4	N_2O
	Mobile Combustion	**217**	**211.53325**	**0.01288**	**0.01533**

Transit Fleet

Scope 3		CO_2e	CO_2	CH_4	N_2O
	Contract Services				
	Palos Verdes Peninsula Transit Authority	**128**	**121.88189**	**0.055538**	**0.01542**

Solid Waste

Scope 3		CO_2e	CO_2	CH_4	N_2O
	Contract Services				
	Norcal	**14**	**0**	**0.00027**	**0**

Employee Commute

Scope 3		CO_2e	CO_2	CH_4	N_2O
	Employee Commute	**148**	**145.01577**	**0.00851**	**0.01005**

Total Emissions

	CO_2e	CO_2	CH_4	N_2O
Scope 1	**231**	**225.36069**	**0.01419**	**0.01535**
Scope 2	**123**	**122.33800**	**0.00532**	**0.00202**
Scope 3	**290**	**266.89766**	**0.064318**	**0.02547**

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	**18**	**17.66898**	**0.00166**	**0.00003**
Scope 2	Purchased Electricity	**117**	**116.5882**	**0.00527**	**0.00199**

Streetlights and Traffic Signals					
Scope 2		CO_2e	CO_2	CH_4	N_2O
	Purchased Electricity	**2**	**1.64061**	**0.00007**	**0.00002**

Water Delivery					
Scope 2		CO_2e	CO_2	CH_4	N_2O
	Purchased Electricity	**18**	**17.75876**	**0.00080**	**0.00030**

Vehicle Fleet					
Scope 1		CO_2e	CO_2	CH_4	N_2O
	Mobile Combustion	**242**	**236.51000**	**0.01367**	**0.01505**

Transit Fleet

Scope 3		CO_2e	CO_2	CH_4	N_2O
	Contract Services				
	Palos Verdes Peninsula Transit Authority	**139**	**132.44404**	**0.06003**	**0.01611**

Solid Waste

Scope 3		CO_2e	CO_2	CH_4	N_2O
	Contract Services				
	Norcal	**12**	**0**	**0.00026**	**0**

Employee Commute

Scope 3		CO_2e	CO_2	CH_4	N_2O
	Employee Commute	**130**	**127.43740**	**0.00693**	**0.00791**

Total Emissions

	CO_2e	CO_2	CH_4	N_2O
Scope 1	**260**	**254.17898**	**0.01534**	**0.01509**
Scope 2	**137**	**135.98759**	**0.00233**	**0.00614**
Scope 3	**281**	**259.88144**	**0.06722**	**0.02402**

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 2		CO_2e	CO_2	CH_4	N_2O
	Purchased Electricity	**159**	**158.07907**	**0.00613**	**0.00214**

Streetlights and Traffic Signals					
Scope 2		CO_2e	CO_2	CH_4	N_2O
	Purchased Electricity	**3**	**2.63792**	**0.00010**	**0.00003**

Water Delivery					
Scope 2		CO_2e	CO_2	CH_4	N_2O
	Purchased Electricity	**30**	**29.36609**	**0.001139**	**0.00039**

Total Emissions					
		CO_2e	CO_2	CH_4	N_2O
	Scope 1	-	-	-	-
	Scope 2	**192**	**190.08309**	**0.00737**	**0.00258**
	Scope 3	-	-	-	-

Appendix B—Activity Data Disclosure

Listed below are the data sources. Activity data refers to consumption data such as fuel or electricity use 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.	**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

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:

The City provided cost and quantity of gasoline used for the years 2007 and 2005. No records could be found for diesel, therefore, proxy year data from 2008 was utilized to estimate fuel use for the years 2007 and 2005. In 2008 the City purchased 3, 55-gallon drums of diesel. It was assumed that for 2005 and 2007 the purchase was the same.

Recommend Method
Financial records for gasoline
Alternative Method
Proxy year fuel use data for diesel

Reference: Data was provided by Alexa Davis, Administrative Analyst (310) 378-0383 ext. 2222

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: Data was provided by Alexa Davis, Administrative Analyst (310) 378-0383 ext. 2222

E. Solid Waste Facilities

Scope 3 Waste Related

Description:

Waste estimates for City Hall were based on information received from Norcal Disposal; 233 lbs. per bin; 2 bins picked up 3 times a week totaling 36 tons of waste per year.

There was an estimated 65% methane recovery at the landfill where the waste was taken.

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: Norcal Waste Disposal Services

F. Other Scope 3 Emissions

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. PVE shares this service with three other cities on the peninsula and Los Angeles County. Estimates were based on the population as per census. PVE contribution amounts to 20.24% of the total data.

Reference: John Meyer, Mobility Advancement Group, (760) 751-7061, jmco@cox.net

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.[25] 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: 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.	**Recommended Method** Default emission factors, Table G.1 and Table G.3 of the LGOP
Reference: 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: For gasoline, City fleet fuel consumption and cost were obtained from financial records. Fuel and cost were broken down according to department usage i.e., Streets/Parks/City Hall 20% usage, Police Department 80% usage. For Diesel, 2008 proxy year data was used; 3, 55-gallon drums are purchased each year. The average regional cost per gallon was obtained from the Energy Information Administration http://tonto.eia.doe.gov/dnav/pet/pet_pri_gnd_a_epmr_pte_cpgal_a.htm. Alternate Emissions Factors were used based on Table G.13 of the LGOP, Alternate Methodology for Highway Vehicles by Inventory Year, pg. 180.	**Alternative Method** Alternative emissions factors, Table G.13 of the LGOP
Reference: Data was provided by Alexa Davis, Administrative Analyst (310) 378-0383 ext. 2222	

25 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.

C. Scope 2 Purchased Electricity

Description of Computational Method:
Table G.5 Utility-Specific Verified Electricity CO_2 Emissions Factors (2000-2006), LGOP pg. 174
For 2005 inventory Southern California Edison, 2005 emission factors were used

Recommended Method
Utility-Specific verified emission factors 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.

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 of Computational Method:

Waste estimates for City Hall were based on information received from Norcal Disposal; 233 lbs. per bin; 2 bins picked up 3 times a week totaling 36 tons of waste per year.

The average waste per capita was used to calculate waste in 2007. In 2005, there were 60 full-time and 5 part-time employees. In 2007, there were 56 full-time and 6 part-time employees which accounts for the slight decrease in waste generated at City Hall in that year.

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

Reference: Alexa Davis, Administrative Analyst (310) 378-0383 ext. 2222

E. Scope 3 Employee Commute

Description of Computational Method:

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

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

Utilizing employee benefits information, it was estimated that on average employees worked 49 weeks, which means 15 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.

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

2007--62 employees (FT & PT) with 30 responses is a 48% response rate. The remaining 52% of VMT was estimated based on survey responses for a total VMT of 251,692.48. Assumptions: gasoline, drove alone, passenger vehicle (2.08 x 121,006=251,692.48 Total VMT)

2005--65 employees (FT & PT) with 19 responses is a 29% response rate. The remaining 71% of VMT was estimated based on survey responses for a total VMT of 292,874.72. Assumptions: gasoline, drove alone, passenger vehicle (3.44 x 85,138=292,874.72 Total VMT)

Reference: Alexa Davis, Administrative Analyst (310) 378-0383 ext. 2222

F. Scope 3 Emissions From Contracted Services

Scope 3 Emissions From Contracted Services

Description of Computational Method: Palos Verdes Peninsula Transit Authority, Transit Fleet

PV Transit provided records for the years 2007 and 2005 on the total fuel quantity, cost, and vehicle miles traveled. PVE share of fuel use amounts to 20.24% which is based on the population per census.

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

Reference: John Meyer, Mobility Advancement Group, (760) 751-7061, jmco@cox.net

Appendix D—Emissions Data

The municipal inventory report was based on data collected from electricity, natural gas consumption, fuels, and other 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 source, equivalent metric tons of carbon dioxide emissions, energy equivalent in MMBtu, energy/ fuel use, and cost where known.[26]

Sources of Emissions 2005	Source	Equiv CO_2 (tonnes)	Equiv CO_2 (%)	Energy (MMBtu)	Energy/ Fuel Use	Energy/ Fuel Use Cost ($)
Buildings and Facilities						
City Hall	Electricity	101	15.7	1139	333,680 kWh	$40,316
	Natural Gas	14	2.2	261	2,606 therms	$3,358
Streetlights & Traffic Signals						
Streetlights	Electricity	2	0.3	19	5,640 kWh	$592
Water Delivery						
Park Irrigation	Electricity	3	0.5	37	10,987 kWh	$1,836
Sprinkler/Irrigation Control	Electricity	17	2.6	187	55,027 kWh	$10,180
Vehicle Fleet						
City Hall Vehicles	Gasoline	2	0.3	30	238.34 gal	$448
Police Department	Gasoline	172	26.7	2,369	19,067.20 gal	$35,810
Streets and Parks Department	Gasoline	41	6.3	563	4,528.46 gal	$8,505
	Diesel	2	0.3	23	165 gal	$431
Employee Commute						
Drove Alone	Gasoline	134	20.9	1,852	269,159 VMT	n/a
	Diesel	7	1.2	101	13,720 VMT	n/a
Carpool	Gasoline	7	1.0	90	9,996 VMT	n/a
Contract Service Providers						
Palos Verdes Transit Authority Fleet	CNG	26	4.0	443	7,764.26 gal equiv.	n/a
	Gasoline	70	10.9	965	3,569.93 gal	n/a
	Propane	32	5.0	475	5,181.44 gal	n/a
Waste						
Norcal	Carbon Dioxide	14	2.2		36 tons	n/a
	Methane	0.00027				
Sources:	Food Waste	1				
	Paper Products	11				
	Plant Debris	1				

26 Source of data CACP software output.

Sources of Emissions 2007	Source	Equiv CO_2 (tonnes)	Equiv CO_2 (%)	Energy (MMBtu)	Energy/ Fuel Use	Energy/ Fuel Use Cost ($)
Buildings and Facilities						
City Hall	Electricity	117	17.3	1,368	400,800 kWh	$50,128
	Natural Gas	18	2.6	329	3,288 therms	$3,777
City Residence	Natural Gas	0	0	4	42 therms	$47
Streetlights & Traffic Signals						
Streetlights	Electricity	2	0.2	19	5,640 kWh	$739
Water Delivery						
Park Irrigation	Electricity	4	0.6	44	12,832 kWh	$2,552
Sprinkler/Irrigation Control	Electricity	14	2.1	165	48,218 kWh	$10,461
Vehicle Fleet						
City Hall Vehicles	Gasoline	10	1.5	136	1,092.4 gal	$2,230
Police Department	Gasoline	192	28.3	2,648	21,315.20 gal	$43,515
Streets and Parks Department	Gasoline	38	5.7	530	4,263.04 gal	$8,703
	Diesel	2	0.2	23	165.00 gal	$510
Employee Commute						
Drove Alone	Gasoline	117	17.3	1,621	229,936 VMT	n/a
	Diesel	6	0.8	75	10,290 VMT	n/a
Carpool	Gasoline	7	1.1	99	11,466 VMT	n/a
Contract Service Providers						
Palos Verdes Transit Authority Fleet	CNG	28	4.2	482	3879.19 gal eq.	n/a
	Gasoline	76	11.2	1,048	8437.24 gal	n/a
	Propane	35	5.1	516	5630.36 gal	n/a
Waste						
Norcal	Carbon Dioxide	12	1.8		34 tons	n/a
	Methane	0.00026				
Sources:	Food Waste	1				
	Paper Products	10				
	Plant Debris	1				
	Wood/Textile	0				

Sources of Emissions 1990	Source	Equiv CO_2 (tonnes)	Equiv CO_2 (%)	Energy (MMBtu)	Energy/ Fuel Use	Energy/ Fuel Use Cost ($)
Buildings and Facilities						
City Hall	Electricity	155	81.1	1,125	329,720 kWh	$29,621
Palos Verdes Stables	Electricity	4	2.0	28	8,260 kWh	$1,838
Streetlights & Traffic Signals						
Streetlights	Electricity	3	1.4	19	5,640 kWh	$592
Water Delivery						
Sprinkler/Irrigation Control	Electricity	30	15.4	214	62,786 kWh	$8,333

Criteria Air Pollutants[27]

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.[28] 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	340	199	199	23	164
Vehicle Fleet	1,373	78	14,904	1,533	32
Employee Commute	939	51	2,146	230	10
Streetlights & Traffic Signals	5	3	9,877	1,023	26
Water Delivery	58	39	37	4	32
Transit Fleet	1,539	28	6,875	1,003	11
Total	4,253	395	31,894	3,587	268

Criteria Air Pollutants 2007	NOx (lbs)	SOx (lbs)	CO (lbs)	VOC (lbs)	PM10 (lbs)
Building and Facilities	411	239	239	28	197
Vehicle Fleet	1,488	86	17,031	1,719	36
Employee Commute	755	44	8,581	872	21
Streetlights & Traffic Signals	5	3	3	0	3
Water Delivery	54	36	34	4	30
Transit Fleet	1,642	30	7,423	1,078	11
Total	4,356	438	33,312	3,702	298

Criteria Air Pollutants 1990	NOx (lbs)	SOx (lbs)	CO (lbs)	VOC (lbs)	PM10 (lbs)
Building and Facilities	290	235	187	21	177
Streetlights & Traffic Signals	5	4	3	0	3
Water Delivery	54	44	35	4	33
Total	349	283	225	26	213

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

28 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.[29]

Sources of Emissions 2005		Equiv CO_2 (tonnes)	Energy (MMBtu)	Cost ($)
Buildings and Facilities				
City Hall – Natural Gas				
	Per 1000 sq. ft.	0	0.0	$0.3
	Per hour of operation	0	0.0	$0.3
	Per occupant	0.4	6.9	$88.4
City Hall – Electricity				
	Per 1000 sq. ft.	0	0.1	$3.7
	Per hour of operation	0	0.1	$3.9
	Per occupant	2.7	30.0	$1,060.9
Sector Average				
	Per 1000 sq. ft.	0	0.1	$1.8
	Per hour of operation	0	0.1	$2.0
	Per occupant	1.5	18.4	$574.7
Streetlights & Traffic Signals				
Streetlights				
	Per streetlight account	1.7	19.2	$592.0
Sector Average				
	Per streetlight account	1.7	19.2	$592.0
Vehicle Fleet				
City Hall Vehicles				
	Per vehicle	2.1	29.6	$447.6
Police Department				
	Per vehicle	15.6	215.3	$3,255.4
Streets & Parks Department				
	Per vehicle	8.5	117.1	$1787.1
Sector Average				
	Per vehicle	12.7	175.5	$2,658.4
Employee Commute				
Carpool Group				
	Per vehicle	3.3	45.0	n/a
Drove Alone				
	Per vehicle	2.3	31.0	n/a
Sector Average				
	Per vehicle	2.3	3.5	n/a
Sources of Emissions 2007		**Equiv CO_2 (tonnes)**	**Energy (MMBtu)**	**Cost ($)**
Buildings and Facilities				
City Hall – Natural Gas				
	Per 1000 sq. ft.	0	0.0	$0.3

29 Source of data CACP software output.

	Per hour of operation	0	0.0	$0.3
	Per occupant	0.5	8.7	$99.4
City Hall – Electricity				
	Per 1000 sq. ft.	0	0.1	$4.2
	Per hour of operation	0	0.1	$4.5
	Per occupant	3.1	36.0	$1,319.2
Sector Average				
	Per 1000 sq. ft.	0	0.1	$2.2
	Per hour of operation	0	0.1	$2.4
	Per occupant	1.8	22.3	$709.3
Streetlights & Traffic Signals				
Streetlights				
	Per streetlight account	1.7	19.2	$739.0
Sector Average				
	Per streetlight account	1.7	19.2	$739.0
Vehicle Fleet				
City Hall Vehicles				
	Per vehicle	4.9	67.9	$1,115.0
Police Department				
	Per vehicle	19.2	264.8	$4,351.5
Streets & Parks Department				
	Per vehicle	8.0	110.5	$1,842.6
Sector Average				
	Per vehicle	14.2	196.2	$3,232.8
Employee Commute				
Carpool Group				
	Per vehicle	1.8	24.7	n/a
Drove Alone				
	Per vehicle	2.1	29.3	n/a
Sector Average				
	Per vehicle	2.2	3.5	n/a

Sources of Emissions 1990		**Equiv CO_2 (tonnes)**	**Energy (MMBtu)**	**Cost ($)**
Buildings and Facilities				
City Hall				
	Per 1000 sq. ft.	0	0.1	$2.5
	Per hour of operation	0	0.1	$2.7
	Per occupant	4.1	29.6	$779.5
Sector Average				
	Per 1000 sq. ft.	0	0.1	$2.5
	Per hour of operation	0	0.1	$2.7
	Per occupant	4.1	29.6	$779.5
Streetlights & Traffic Signals				
Streetlights				
	Per streetlight account	2.7	19.2	$592
Sector Average				
	Per streetlight account	2.7	19.2	$592

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 56 full-time and 6 part-time employees; however, only 30 employees took the survey resulting in a 48% response rate. For 2005, there were 60 full-time and 5 part-time employees; however, there were only 19 employees that took the survey who worked for the City in 2005 resulting in a 29% 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.[30]

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.[31] 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 (potential walkers), 2-3 miles (potential bicyclists; 4-8 miles (potential transit users); 9-19 (potential carpoolers); and 20-40 miles and above (long distance carpools and vanpools).

Based on information provided by respondents in the year 2007 a total of 121,006 vehicle miles were traveled by employees; 10% of employees carpooled to the worksite, 75% of them were two-person carpools; 41% of employees lived within a range of 4 to 8 miles from the worksite. Results from question 11 indicate 83.3% of respondents are not interested in participating in a ridesharing program.

In the year 2005, vehicle miles traveled totaled 85,138; 10.5% of employees carpooled to the worksite, 50% of them were two-person carpools; 32% of employees lived within a range of 2 to 3 miles and 4 to 8 miles from the worksite.

A. 2007 Survey Results[32]

1. Employee Information

	Response Percent	Response Count
Name:	100.0%	30
Dept:	100.0%	30
answered question		30
skipped question		0

2. What city did you live in?

Anaheim, Huntington Beach, Lakewood, Lomita, Los Angeles, Palos Verdes Estates, Rancho Palos Verdes, Redondo Beach, Rancho Cucamonga, Rolling Hills Estates, San Pedro, Santa Monica, Torrance, and Wilmington	Response Percent	Response Count
City:	100.0%	30
ZIP Code:	100.0%	30
answered question		30
skipped question		0

30 See appendix C for description of the computational method.

31 See appendix F for description of the legislation.

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

3. Did you work for the city in 2007?

	Response Percent	Response Count
Yes	**96.7%**	**29**
No	3.3%	1
answered question		30
skipped question		0

4. What was your workweek schedule?

	Response Percent	Response Count
3/12 work week (3-4 days off)	26.7%	8
4/40 work week (1 day off)	6.7%	2
Regular work week (40 hours)	**56.7%**	**17**
Part-time work week	10.0%	3
Other	0%	0
answered question		30
skipped question		0

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

121,006 vehicle miles traveled represents a 48% response rate
(251,692.48 estimated total VMT based on number of full and part-time employees)

Commute distance range from worksite (one way)	Response Percent	Response Count
0-1 miles	7%	2
2-3 miles	24%	7
4-8 miles	**41%**	**12**
9-19 miles	7%	2
20-40 miles	14%	4
40 miles and above	7%	2
Number of respondents that worked for the city in 2007		29

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?	10.0% (3)	30.0% (0)	20% (6)	16.7 % (5)	**53.3% (16)**	0.0% (0)	0.0% (0)	30
Carpool/Vanpool to work?	20.0% (1)	20.0% (1)	20.0% (1)	**40.0% (2)**	0.0% (0)	0.0% (0)	0.0% (0)	5
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?	**100.0% (1)**	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)	**100% (1)**	0.0% (0)	0.0% (0)	1
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 you 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)	
							answered question	30
							skipped question	0

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

10 % of respondents who worked for the city in 2007 participated in carpooling	Response Percent	Response Count
2 people	**75%**	3
3 people	25%	1
answered question		4
skipped question		26

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

	Response Count
	0
answered question	0
skipped question	30

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)	10.0%	3
Auto-mid size (e.g., Honda Accord, Toyota Camry)	**40.0%**	**12**
Auto-compact (e.g., Honda Civic, Toyota Corolla)	10.0%	3
Light truck/SUV (e.g., Chevy Suburban, Ford Expedition)	33.3%	10
Heavy truck (e.g., Tractor-trailer truck)	0.0%	0
Motorcycle	0.0%	0
Van	3.3%	1
City Vehicle	3.3%	1
Did not drive an automobile	0.0%	0
answered question		30
skipped question		0

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

	Response Percent	Response Count
Gasoline	**93.3%**	**28**
Diesel	3.3%	1
Ultra-low sulfur diesel	3.3%	1
Bio-diesel	0.0%	0
Hybrid	3.3%	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		30
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	16.7%	5
No	**83.3%**	**25**
answered question		30
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.	**60.0%**	**18**
No--Click next and complete information for 2005.	3.3%	1
Other—Did not work for the city in 2005, skip the 2005 section and go to the end and hit done.	36.7%	11
answered question		30
skipped question		0

13. What city did you live in?

Anaheim, Huntington Beach, Lakewood, Los Angeles, Palos Verdes Estates, Redondo Beach, Rancho Cucamonga, Rolling Hills Estates, San Pedro, and Torrance	Response Percent	Response Count
City:	100.0%	4
ZIP Code:	100.0%	4
answered question		4
skipped question		26

14. What was your workweek schedule?

	Response Percent	Response Count
3/12 work week (3-4 days off)	25.0%	1
4/40 work week (1 day off)	0.0%	0
Regular work week (40 hours)	**50.0%**	**2**
Part-time work week	0.0%	0
Other	25.0%	1
answered question		4
skipped question		26

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

85,138 vehicle miles traveled represents a 29% response rate
(292,874.72 estimated total VMT based on number of full and part time employees)

Commute distance range from worksite (one way)	Response Percent	Response Count
0-1 miles	0.5%	1
2-3 miles	**32%**	**6**
4-8 miles	**32%**	**6**
9-19 miles	0.5%	1
20-40 miles	21%	4
40 miles and above	0.5%	1
Number of respondents that worked for the city in 2005		19

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)	0.0% (0)	0.0% (0)	33.3% (1)	**66.7% (2)**	0.0% (0)	0.0% (0)	3
Carpool/Vanpool to work?	0.0% (0)	0.0% (0)	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)	**100% (1)**	0.0% (0)	0.0% (0)	1
Noncommuting (such as 24 shift where you 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								4
skipped question								27

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

10.5 % of respondents who worked for the city in 2005 participated in carpooling	Response Percent	Response Count
2 people	50%	1
3 people	50%	1
answered question		2
skipped question		28

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

	Response Count
	0
answered question	0
skipped question	30

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)	25.0 %	1
Auto-mid size (e.g., Honda Accord, Toyota Camry)	0.0%	0
Auto-compact (e.g., Honda Civic, Toyota Corolla)	0.0%	0
Light truck/SUV (e.g., Chevy Suburban, Ford Expedition)	25.0 %	1
Heavy truck (e.g., Tractor-trailer truck)	0.0%	0
Motorcycle	25.0 %	1
Van	0.0%	0
City Vehicle	0.0%	0
Did not drive an automobile	25.0 %	1
answered question		4
skipped question		26

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

	Response Percent	Response Count
Gasoline	**50.0%**	**4**
Diesel	25.0%	1
Ultra-low sulfur diesel	25.0%	1
Bio-diesel	0.0%	0
Hybrid	0.0%	0
ethanol	0.0%	0
electric	0.0%	0
LPG	0.0%	0
CNG	0.0%	0
Did not drive an automobile	25.0%	1
answered question		4
skipped question		27

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. [33]

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.

33 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[34]

CH4	methane
CO	carbon monoxide
CO2	carbon dioxide
CO2e	carbon dioxide equivalent
FE	Fuel Economy
GHG	greenhouse gas
HFC	hydrofluorocarbon
NOx	oxides of nitrogen
N2O	nitrous oxide
PFC	perfluorocarbon
PM10	particulate matter smaller than ten microns in diameter
SF6	sulfur hexafluoride
SOx	sulfur oxides
VOC	volatile organic compounds

Appendix H—Glossary of Terms[35]

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.)
CO2 equivalent (CO2e)	The universal unit for comparing emissions of different GHGs expressed in terms of the GWP of one unit of carbon dioxide.

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

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

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 (CH4)	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 (N2O)	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.