
City of Redondo Beach



Municipal Greenhouse Gas Emissions Inventory Report

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City of Redondo Beach Municipal Inventory Report

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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 next year discussed is 2007, an interim year that shows progress made since the baseline year. Lastly, 1990 data is included to review historical GHG levels. Emissions data located in the appendix D is organized in the same way to maintain consistency.

I. Executive Summary

A. Project Background

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

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

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

South Bay cities began the process of assessing their GHG emissions by joining ICLEI—Local Governments for Sustainability, an international association of city and county governments that have made a commitment to sustainable development.⁴ Through ICLEI, South Bay cities gained access to tools and resources such as the Clean Air Climate Protection (CACP) software, which enables cities to quantify their emissions. 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 Redondo Beach will take 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 The Cool Cities Pledge was developed to encourage cities to endorse the U.S. Mayors Climate Protection Agreement and create their own greenhouse gas reduction activities.

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

Another resource utilized to conduct the municipal inventory was the Local Government Operations Protocol (LGOP).⁵ The protocol was developed in partnership by ICLEI, the California Air Resources Board (CARB), the California Climate Action Registry (CCAR), and The Climate Registry (TCR) to enable local governments to measure and report emissions in a consistent and transparent way. The protocol is a program neutral guide that was developed so that cities can follow internationally recognized GHG accounting and reporting principles.

B. Purpose of Conducting a GHG Emissions Inventory

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

C. Scope of the GHG Emissions Inventory

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

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

The City gathered information from a variety of sources, including consumption data from utility companies, fuel data

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

⁶ See appendix F for descriptions on climate change legislation.

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

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 traveled⁸ 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 Report⁹ which entails reporting on three of the six internationally-recognized GHGs regulated under the Kyoto Protocol.¹⁰ The benefit of this reporting option is that it allows a city to capture the majority of its emissions while familiarizing staff with the process of conducting an inventory so that in the future a more detailed level of reporting can be accomplished. The more comprehensive report entails accounting for all six 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 coefficients¹¹ 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 (CO₂e).¹² It helps to simplify by looking at just one number for climate action planning; however, ICLEI believes that the most accurate description of emissions requires separate accounting by scope,¹³ which can be found in appendix A of this report.

The inventory results should be thought of as an approximation of the GHG emissions emitted in the years inventoried. The results should be used as a policy and planning tool rather than a precise measurement of GHGs. All the data sources used to capture the equivalent emissions emitted, also referred to as activity data, have been noted in the appendix B. This shows transparency when accounting for emissions. Similarly, appendix C discloses the formulas and emissions factors used to arrive at the equivalent GHG emissions. To the extent possible, recommended data and methods in the LGOP were used, but in some cases the suggested alternative 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 Redondo Beach generated approximately 8,591 metric tons of CO₂e in the baseline year, 2005; this total is equivalent to the GHG emissions generated from the electricity use of 1,116 homes for one year.¹⁴
- There was an overall 6.1% increase in GHG emissions between the baseline year 2005 and the interim year 2007.

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

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

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

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

¹² Equivalent Carbon Dioxide (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.

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

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

- Emissions resulting from electricity use increased 2.6% and emissions resulting from natural gas consumption increased 26.3% between the years 2005 and 2007.
- Emissions resulting from City Fleet vehicles decreased 0.3%, while emissions related to Transit Fleet vehicles increased by 57.1% between the years 2005 and 2007.
- Under a business-as-usual scenario, the City can expect emissions to rise to 9,727 metric tons of CO₂e by 2012 that is equivalent to the annual GHG emissions from 1,860 passenger vehicles; and 10,046 metric tons of CO₂e by 2015, equivalent to the annual GHG emissions from 1,921 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 Green Task Force Report 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 how often they re-inventory GHG emissions, but ICLEI recommends doing so every few years to make sure the City stays on target to reach short and long-term goals. Refining the gathering and management of data for the next inventory should start with good internal communication between departments working together to ensure that the appropriate records are set aside or entered into the 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.

II. Local Government Profile Information

Local Government Description

The City of Redondo Beach is located in the South Bay portion of Los Angeles County and spans 6.3 square miles. According to the State Department of Finance, Redondo Beach has a population of 67,488 as of January 1, 2008. The City is divided into five districts and operates under a Council-Manager form of government. One council person is elected from each district and serves a term of four years, with a limit of two full terms. The Mayor is elected by the City at large and is also limited to serving two, four year terms. Other elected officials are the City Treasurer, City Attorney, and City Clerk – all serving terms of four years, but without term limits. The City Council is responsible for, among other things, passing ordinances, adopting the budget, establishing policy, appointing committees/commissions, and appointing the City Manager.

In addition to sitting as the governing board of the City, the Mayor and City Council act as the Board of Directors for various component units of the City: the Redondo Beach Housing Authority, the Redondo Beach Public Financing Authority, the Parking Authority of the City of Redondo Beach, and the Redevelopment Agency of the City of Redondo Beach. The City Manager is responsible for carrying out the policies and ordinances of the City Council and for appointing the heads of the City's various departments.

The City's Mission Statement is as follows: The City of Redondo Beach is committed to providing the finest services to enhance the quality of life for those who live, work, visit and play in our community.

Local Government History

Redondo Beach does not have one key year in its history, it has several. Over the centuries the City was inhabited by Native Americans, was a booming trade center for oil and lumber, and was fashioned as a popular resort town.

Before 1784, Native Americans occupied the Redondo area. They lived off the sea and made use of the inland salt flats. This Native American land became Rancho San Pedro in 1784 when the Spanish government in California made it part of a large land grant to the Juan Jose Dominguez family.

In 1890, the magnificent 225 room Hotel Redondo opened. The City was becoming "The Place" for tourists. Railroads and steamships brought people in by the thousands, in addition to freight loads of oil and lumber. At this time, Redondo was the first port of Los Angeles County. Steamers from the Pacific Steamship Company stopped at Redondo four times a week, at one of three piers, as part of its regular run between San Francisco and San Diego. The Redondo Railway Company and the Santa Fe Railroad left Los Angeles daily for Redondo at regular intervals. Eventually, the City was served by Henry Huntington's Big Red Electric Cars.

On April 18, 1892, Redondo voters adopted cityhood by a vote of 177-10. Around the turn of the century, Redondo's importance in trade began to decline with the opening of the San Pedro Harbor in 1899. By 1912, the Pacific Steamship Company stopped calling at Redondo. Lumber schooners continued to use Pier No. 3 at Topaz Street until the railroad pulled out in 1926. Because of prohibition, the \$250,000 Hotel Redondo closed its doors and in 1925 was sold for scrap lumber at a price of \$300.

Big time gambling, complete with mobsters and shooting incidents, found its way to Redondo during the Depression. Chip games, bingo parlors, and a casino were run in full view of the law between 1936 and 1940. For a fare of 25 cents, a water-taxi would transport visitors to the gambling ship Rex which operated three miles off shore.

Redondo’s population boomed in the ‘50s and ‘60s. In 1890, the population was 668; in 1940 it was 13,092; and in 1965 it was 54,772. Today, Redondo Beach citizens number almost 68,000. Still known as a tourist and resort town, the City can boast of piers with fishing and amusements, a Saltwater Lagoon reminiscent of the old plunge, many fine food restaurants and hotels, and a beautiful harbor.

Today, much of the Redondo Beach lifestyle is a blend of the neighborhoods, activities and people of the neighboring South Bay Beach Cities. South Redondo is a quiet, "bike to the grocery store" community. Several close-knit neighborhoods exist, and the area is popular for families with children. While primarily residential, North Redondo also contains the City’s major industrial, commercial, and cultural space. Aerospace, engineering and transportation firms can be found along the City’s northern edge. In addition, North Redondo is the home to the South Bay Galleria Shopping Center and the revitalized Artesia Boulevard. The Redondo Beach Performing Arts Center serves as the home to the Civic Light Opera of the South Bay Cities and attracts patrons from across the South Bay. North Redondo is home to nearly two-thirds of the children in Redondo Beach.

Primary Services

The City provides a full range of municipal services. Services include public safety (police and fire protection), recreation and community services, library, parks, maintenance and improvement of streets and infrastructure, planning and zoning, housing, economic development, transit, and general government. The City also operates and maintains a harbor under a trust agreement with the State of California.

Department	Primary Services
General Administration	City Clerk, City Manager, City Council, City Treasurer, City Attorney, Human Resources, Information Technology and Finance.
Redondo Beach Police Department	The Redondo Beach Police Department (RBPd) includes approximately 164 employees operating in four divisions: Patrol, Investigations, Administrative Services, and Management Services. The department’s mission states: “The Police Department will forge a partnership and problem solving relationship between the police and the community to control and prevent crime and to maintain and improve public safety through strategic planning, innovation, and proactive programs in an environment where people are treated with dignity, equality and respect.”
Redondo Beach Fire Department	The Redondo Beach Fire Department (RBFd) employs 68 personnel operating out of two fire stations and a Harbor Patrol Facility. RBFd personnel are trained to provide the community with the highest level of fire, medical, and rescue assistance.
Engineering & Building Services	The mission of the Engineering and Building Services Department is “To ensure that public and private facilities are constructed in a safe and cost-effective manner.” The Building Division is responsible for the health, safety and welfare of the public as it relates to buildings and structures on private property. Through the enforcement of adopted codes, the Building Division enforces standards related to building, plumbing, mechanical, electrical installations and accessibility and energy compliance. The Engineering Division oversees public and private improvements in the public right-of-way and the development and implementation of the Capital Improvement Program. The Division is also responsible for the maintenance and upgrade to the City’s public infrastructure and provides engineering support to other City Departments.
Planning	The Planning Department is composed of the Planning and Code Enforcement Divisions. The Planning Division’s primary responsibility is planning the future land use for the City. This division analyzes data and makes recommendations to the Planning Commission and City Council. Planning is responsible for the development and implementation of the General Plan, land use regulations through zoning and subdivision codes, and environmental impact assessment.
Public Works	Under the supervision of the Public Works Director, the department provides maintenance

	<p>services to the City's infrastructure. Divisions within the department include: Sewer/Storm Drain Maintenance, Harbor/Pier Maintenance, Street Maintenance, Parks Maintenance, Building Occupancy, Solid Waste/Recycling and Fleet Services.</p>
<p>Recreation & Community Services</p>	<p>The mission of the Recreation and Community Services Department is "To enrich and improve the quality of life in Redondo Beach by providing excellent recreation and cultural programs, activities, facilities, and social and family services in accordance with the values of the community." The department oversees programs including: Aquatics, Cultural Arts, Older Adults Program, Sports and Fitness, Teen Programs, and Youth Camps. The Community Development Block Grant and Housing Authority are also housed in the department.</p>
<p>Harbor, Business and Transit</p>	<p>The Harbor, Business and Transit Department is made up of three distinct divisions. The Harbor Division oversees maintenance, operations, and development on the Redondo Beach Pier and in the Harbor area. The Business Division is tasked with economic development in the City and outreach to the City's business community. The Transit Division operates Beach Cities Transit as well as other transportation programs within the City. The Department's mission is "To improve the quality of life for residents, businesses and visitors of Redondo Beach by facilitating business development and redevelopment opportunities, providing enhanced customer-oriented public transportation services and efficiently managing the City's Harbor and other properties and resources."</p>
<p>Library</p>	<p>The mission of the Redondo Beach Library Department states that "The Redondo Beach Public Library provides services and materials to persons of all ages in a friendly atmosphere for the purpose of meeting the informational, educational, recreational, and cultural needs of Redondo Beach residents." In addition to the Main Library located in the Redondo Beach Civic Center, the City is also currently building a new, LEED certified, North Branch Library</p>

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 CO₂-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 approach¹⁷ a local government chooses to define its boundaries. The LGOP recommends an operational approach for local governments wherein a city defines its scopes by what they own and operate. In this way, the City can account for direct and indirect emissions separately.

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

Cities also have a level of control over activities that are associated with indirect emissions, known as scope 2. These emissions are associated with the consumption of purchased electricity, steam, heating, or cooling.¹⁸ The difference between the scopes is that these sources are owned or controlled by another entity. Still, a city will want to develop measures to reduce emissions within this scope. Indirect emissions are also associated with scope 3, however scope 3 emissions are related to activities that the City does not own or operate, such as emissions from contracted services, employee commuting, or waste disposal. As an ICLEI member, scope 3 reporting is considered optional, but good to include as it may be policy relevant. City staff decided what data to include for contract providers (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 CO₂-equivalent, adjacent is the percentage represented by each sector, source of emissions, energy and fuel use, the equivalent one million British thermal units, and the cost where data was available. This information is shown for the purpose of targeting, planning, and then tracking energy and cost-saving measures. To learn where specific data was obtained and how it was computed, refer to the appendices sections B and C.

2005

Baseline Year

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

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.

In 2005, the City of Redondo Beach GHG emissions totaled 8,591 metric tons of CO₂e. 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 1,116 homes for one year. Looking at the scopes within the table, the smallest portion 17.7% (scope 1 total) were emissions generated from a combination of natural gas use for buildings and facilities, generators, and fuels from the City and Transit fleet vehicles. Emissions emitted from electricity use accounted for 34.7% (scope 2 total) of the total emissions. The largest portion 48.4% (scope 3 total) were emissions due to a combination of employee commuting, contract service vehicles, and waste (refuse collected from City bins).

Energy/Fuel use and cost information has been listed for the purpose of planning and tracking energy measures' cost effectiveness. During 2005, the City of Redondo Beach used 9,595,179 kWh of electricity at a cost of \$1,316,220.65. In this same year, the City used 58,223 therms of natural gas costing \$63,351.

Table 1. Municipal Inventory Summary 2005¹⁹

Redondo Beach Municipal GHG Emissions 2005						
Sector	MT CO ₂ e	Percent CO ₂ e (% CO ₂ e)	Source	Energy/Fuel Use	Energy/Fuel Use Cost	Energy Equivalent (MMBtu)
Scope 1 Emissions						
Buildings & Facilities						
Buildings & Facilities	311	3.6%	Natural Gas	58,223 therms	\$63,351	5,823
	2	0.0%	Propane	390 gal	\$1,861	36
Emergency Generators	11	0.1%	Diesel	1200 gal	n/a	166
City Vehicle Fleet						
City Vehicle Fleet ²⁰	960	11.2%	-	-	\$261,939.46	13,294
	706		Gasoline	77,007.26 gal	\$194,971.80 ²¹	9,694
	231		Diesel	22,837 gal	\$62,192.11	3,169
	23		CNG	3,470 gal equiv.	\$4,775.55	431
Transit Fleet						
	238	2.8%	-	-	\$48,743.08	3,952
	40		Gasoline	4,480 gal	\$11,558.76	557
	198		CNG	27,341 gal equiv.	\$37,184.32	3,395
Total Scope 1 Emissions	1,522	17.7%	-	-	\$375,895	23,271
Scope 2 Emissions						
Buildings & Facilities						
Buildings & Facilities ²²	1,196	13.9%	Electricity	3,936,848 kWh	\$526,742.63	13,436
Streetlights & Traffic Signals						
Traffic Signals/Controllers	101	1.2%	Electricity	333,873 kWh	\$40,327.17	1,139
Streetlights ²³	1,163	13.5%	Electricity	3,829,280 kWh	\$550,561.15	13,069
Park Lighting	48	0.6%	Electricity	156,420 kWh	\$34,853.10	534
Other Outdoor Lighting	299	3.5%	Electricity	982,014 kWh	\$112,017.54	3,351
Water Delivery						

¹⁹ For each inventory summary see appendix D, Emissions Data, to review individual energy use and cost per item.

²⁰ See appendix D, Emissions Data, to review fuel emissions per department; both highway vehicles, non-highway vehicles, agricultural and construction equipment have been included in the city fleet category.

²¹ The total shown here does not include the cost of gasoline for Harbor Patrol boats.

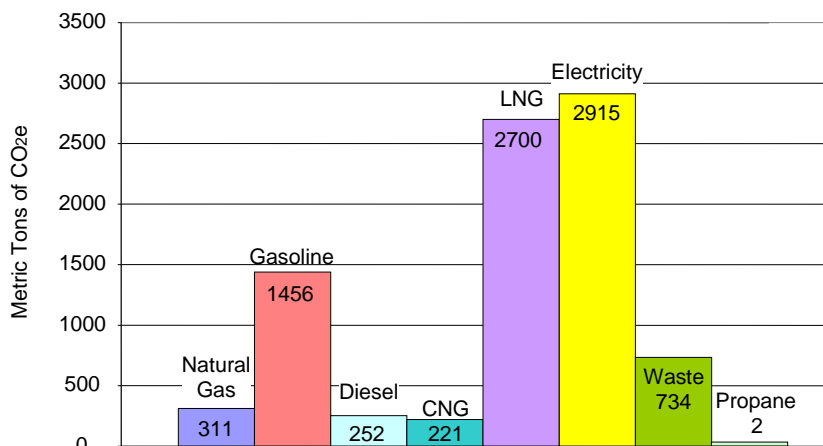
²² Building & Facility accounts may include lights and water delivery devices located on the same metered account.

²³ City owned streetlights and Southern California Edison owned streetlights have been combined in the total shown here. See appendix D, Emissions Data, to review individual emissions in the Streetlights and Traffic Signals category.

Water Pump/Irrigation Control	101	1.2%	Electricity	332,202 kWh	\$46,751.81	1,134
Sewer Pumps	7	0.1%	Electricity	24,542 kWh	\$4,967.25	84
Total Scope 2 Emissions	2,915	34.7%	-	9,595,179 kWh	\$1,316,220.65	32,747
Scope 3 Emissions						
Employee Commute						
Employee Commute	606	7.1%	Gasoline	1,251,819 VMT	n/a	8,356
Vehicles—Contract Service Providers						
Contract Service Vehicles	2,814	32.8%	-	-	n/a	34,439
	104		Gasoline	11,568 gal	-	1,437
	10		Diesel	949 gal	-	132
	2,700		LNG	264,603 gal equiv.	-	32,870
Solid Waste						
Waste	734	8.5%	-	2,896 tons	n/a	n/a
Total Scope 3 Emissions	4,154	48.4 %	-	-	-	42,795
Total Emissions	8,591	100%	-	-	\$1,692,116	98,813

Figure 1 illustrates emissions by source. Electricity was the highest source of emissions followed by LNG and gasoline. Waste resulted in the fourth largest source of emissions. It was estimated that 2,896 tons of waste generated by city operated and owned facilities was sent to a landfill. A breakdown of the waste composition can be found in appendix D, based on a solid waste characterization study for public administration from the California Integrated Waste Management Board website.

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



Figures 2 and 3 illustrate a percentage breakdown of each sector from Table 1. ICLEI asks its members to report on scopes 1 and 2 where scope 3 is optional; therefore, data 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 32.8% of emissions are from contract service vehicles that work within the City’s boundaries, 8.5% from waste, and 7.1% 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, fuels, and electricity generated emissions. Electricity in scope 2 accounts for 65.8% of emissions and scope 1 emissions from fuel and natural gas sources accounts for the remaining 34.2% of emissions.

Figure 2. Emissions by Sector 2005

(including all direct and indirect sources from scopes 1, 2, & 3)

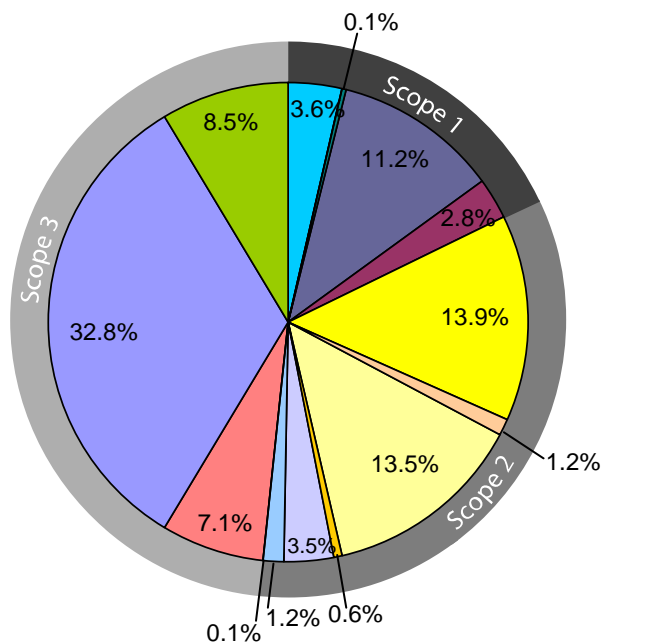
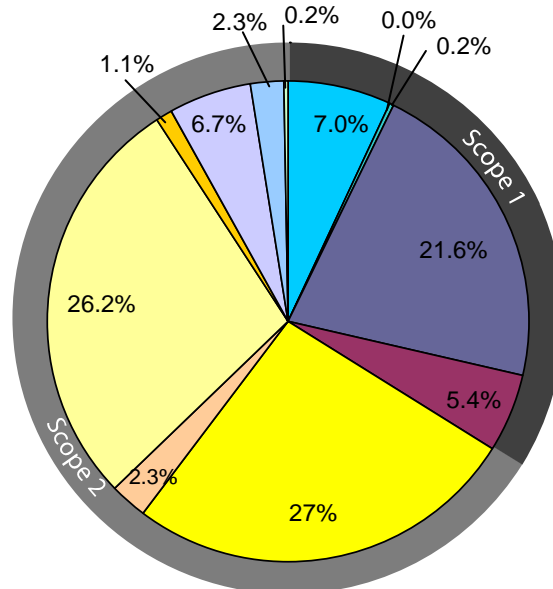


Figure 3. Emissions by Sector 2005

(including only direct and indirect sources from scopes 1 and 2)



Buildings & Facilities (natural gas)	Generators	City Vehicle Fleet	Transit Fleet
Buildings & Facilities (electricity)	Traffic Signals & Controls	Streetlights	Park Lights
Other Outdoor Lighting	Water pumps/Irrigation Control	Sewer Pumps	Employee Commute
Contract Service Vehicles	Waste	Buildings & Facilities (propane)	

2007

Interim Year

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

In 2007, the City of Redondo Beach GHG emissions totaled 9,119 metric tons of CO₂e including both direct and indirect sources of emissions—this number is equivalent to the emissions produced from 1,025,759 gallons of gasoline consumed. The year 2007 represents a 6.1% increase in emissions from the baseline year. Looking at the scopes within the table, emissions generated from natural gas and fuel sources accounted for 19% (scope 1 total) of the emissions inventoried in 2007. Emissions from electricity use increased from the baseline year contributing 32.9% (scope 2 total) to the total emissions. The largest portion of emissions came from a combination of employee commuting, contract service vehicles, and waste at 48.1% (scope 3 total).

In 2007, the City of Redondo Beach used 10,191,755 kWh of electricity costing \$1,526,834. In this same year, the City used 79,039 therms of natural gas at a cost of \$77,712.

Table 2. Municipal Inventory Summary 2007

Redondo Beach Municipal GHG Emissions 2007						
Sector	MT CO ₂ e	Percent CO ₂ e (% CO ₂ e)	Source	Energy/Fuel Use	Energy/Fuel Use Cost	Energy Equivalent (MMBtu)
Scope 1 Emissions						
Buildings & Facilities						
Buildings & Facilities	393	4.3%	Natural Gas	79,039 therms	\$77,712	12,971
	1	0.0%	Propane	251 gal	\$974.11	23
Emergency Generators	11	0.1%	Diesel	1,200 gal	n/a	166
City Vehicle Fleet						
City Vehicle Fleet ²⁴	957	10.5%	-	-	\$267,384.05	13,442
	687		Gasoline	76,482.40 gal	\$198,918.12 ²⁵	9,501
	201		Diesel	19,794 gal	\$53,246.69	2,745
	69		CNG	11,358 gal equiv.	\$15,219.24	1,196
Transit Fleet						
	374	4.1%	-	-	\$95,594.11	6,298
	38		Gasoline	4,345 gal	\$11,601.71	540
	336		CNG	62,681 gal equiv.	\$83,992.40	5,758
Total Scope 1 Emissions	1,736	19%	-	-	\$441,664	32,900
Scope 2 Emissions						
Buildings & Facilities						
Buildings & Facilities ²⁶	1,306	14.3%	Electricity	4,437,015 kWh	\$630,312	15,234
Streetlights & Traffic Signals						
Traffic Signals/Controllers	95	1.0%	Electricity	324,163 kWh	\$44,727	1,106
Streetlights ²⁷	1,165	12.8%	Electricity	3,982,952 kWh	\$664,603	13,593
Park Lighting	46	0.5%	Electricity	156,818 kWh	\$32,181	535
Other Outdoor Lighting	292	3.2%	Electricity	996,308 kWh	\$110,335	3,400
Water Delivery						
Water Pump/Irrigation Control	80	1.0%	Electricity	271,716 kWh	\$40,596	927
Sewer Pump	7	0.1%	Electricity	22,783 kWh	\$4,081	78
Total Scope 2 Emissions	2,991	32.9%	-	10,191,755 kWh	\$1,526,835	34,873
Scope 3 Emissions						
Employee Commute						
Employee Commute	732	8.0%	-	1,528,597 VMT	n/a	10,117
	724		Gasoline	1,527,802 VMT	-	10,007
	8		Diesel	795 VMT	-	110
Vehicles—Contract Service Providers						
Contract Service Vehicles	2,919	32%	-	-	n/a	35,717
	103		Gasoline	11,387 gal	-	1,415
	11		Diesel	1,131 gal	-	157
	2,805		LNG	274,865 gal equiv.	-	34,145
Solid Waste						
Waste	741	8.1%	-	2,922 tons	n/a	n/a
Total Scope 3 Emissions	4,392	48.1%	-	-	-	45,834
Total Emissions	9,119	100%	-	-	\$1,968,499	113,607

24 See appendix D, both highway vehicles, non-highway vehicles, agricultural and construction equipment have been included in the City fleet category.

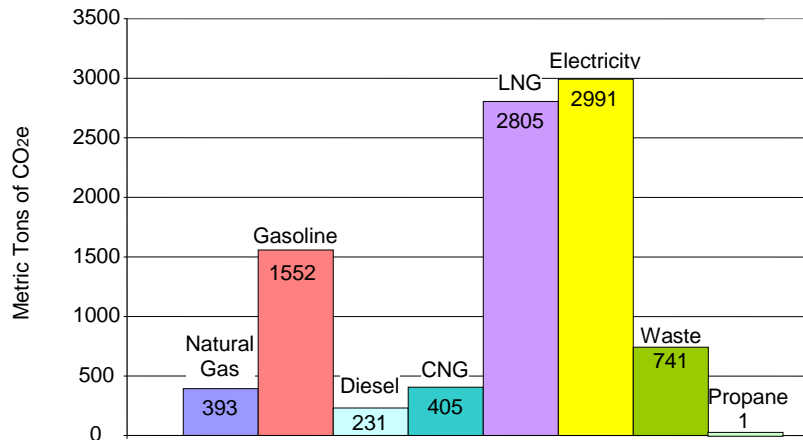
25 The total shown here does not include the cost of gasoline for Harbor Patrol boats.

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

27 City owned streetlights and Southern California Edison owned streetlights have been combined in the total shown here, see appendix D, Emissions Data.

Figure 4 shows an increase in emissions from natural gas, gasoline, CNG, LNG, electricity and waste sources. In this years, emissions from propane and diesel decreased. It was estimated that 2,922 tons of waste generated by city operated and owned facilities was sent to a landfill.

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



Similar to 2005, Figures 5 and 6 illustrate a percentage breakdown of each sector from Table 2. Figure 5 indicates 32% of emissions are from contract service vehicles, 8.1% from waste, and 8% of emissions resulted from employee commuting. Figure 6 shows electricity in scope 2 accounts for 63.3% of emissions and fuels and natural gas from scope 1 contributed to the remaining 36.7% of emissions.

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

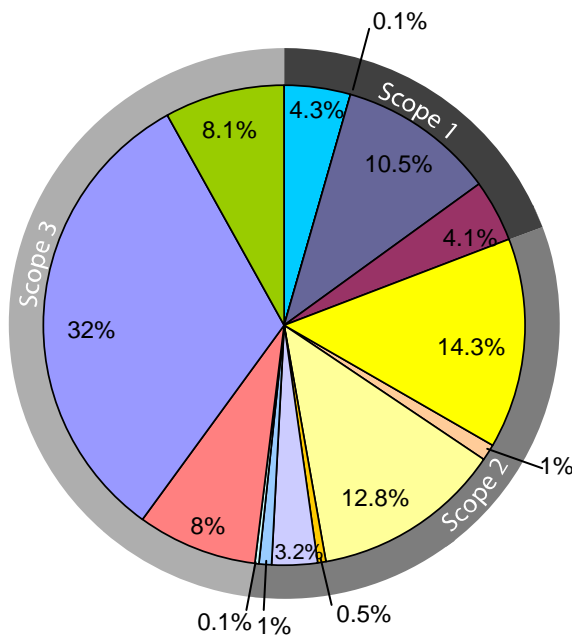
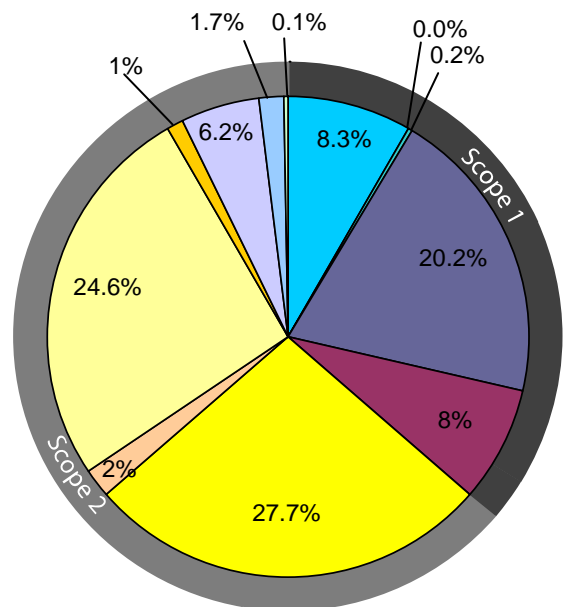


Figure 6. Emissions by Sector 2007
(including only direct and indirect sources from scopes 1 and 2)



Buildings & Facilities (natural gas)	Generators	City Vehicle Fleet	Transit Fleet
Buildings & Facilities (electricity)	Traffic Signals & Controls	Streetlights	Park Lights
Other Outdoor Lighting	Water pumps/Irrigation Control	Sewer Pumps	Employee Commute
Contract Service Vehicles	Waste	Buildings & Facilities (propane)	

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.²⁸ 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 than back-casting to 1990. As previously stated the reduction target should 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 4,629 metric tons of CO₂e, as shown in Table 3. This number is equivalent to the annual GHG emissions from 885 passenger vehicles. Looking at the scopes within the table, emissions emitted from natural gas and fuel sources accounted for 18% (scope 1 total) of the total. Emissions emitted from electricity use accounted for 56.7% (scope 2 total) of the total. Emissions generated by employee commuting contributed 25.3% (scope 3 total) to the remaining total.

Table 3. Municipal Inventory Summary 1990

Redondo Beach Municipal GHG Emissions 1990						
Sector	MT CO ₂ e	Percent CO ₂ e (% CO ₂ e)	Source	Energy/Fuel Use	Energy/Fuel Use Cost	Energy Equivalent (MMBtu)
Scope 1 Emissions						
Buildings & Facilities						
Buildings & Facilities	2	0.0%	Natural Gas	392 therms	n/a	39
City Vehicle Fleet						
City Vehicle Fleet ²⁹	829	18%	-	-	\$115,097	11,335
	652		Gasoline	73,285 gal	\$94,538	8,921
	177		Diesel	15,937 gal	\$20,559	2,414
Total Scope 1 Emissions	831	18%	-	-	\$115,097	11,374
Scope 2 Emissions						
Buildings & Facilities						
Buildings & Facilities ³⁰	1,007	22%	Electricity	2,141,762 kWh	\$210,701.97	7,310
Streetlights & Traffic Signals						
Traffic Signals/Controllers	323	7.0%	Electricity	687,942 kWh	\$75,469.95	2,348
Streetlights	253	5.5%	Electricity	537,611 kWh	\$67,993.90	1,835
Park Lighting	142	3.1%	Electricity	302,748 kWh	\$34,541.13	1,033
Other Outdoor Lighting	582	12.4%	Electricity	1,211,007 kWh	\$100,422.32	4,227
Water Delivery						
Water Pump/Irrigation Control	314	6.7%	Electricity	668,523 kWh	\$72,695.87	2,282
Sewer Pump	5	0.0%	Electricity	9,884 kWh	\$1,431.82	34

²⁸ See LGOP inventory guidelines, page 12.

²⁹ See appendix D, Emissions Data, to review fuel emissions per department; both highway vehicles, non-highway vehicles, agricultural and construction equipment have been included in the city fleet category.

³⁰ Building & Facility accounts may include lights and water delivery devices located on the same metered account.

Total Scope 2 Emissions	2,626	56.7%	-	5,559,477 kWh	\$563,256.96	19,069
Scope 3 Emissions						
Employee Commute						
Employee Commute	1,172	25.3%	-	2,090,837 VMT	n/a	16,014
	1,171		Gasoline	2,090,401 VMT	-	16,004
	1		Diesel	436 VMT	-	10
Total Scope 3 Emissions	1,172	25.3%	-	-	-	16,014
Total Emissions³¹	4,629	100%	-	-	\$678,354	46,457

³¹ The summed total shown here does not reflect the total emissions emitted in the year 1990 because not all of the data from this year could be located.

B. Emissions Trends

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

Between a 15-year span from 1990 to 2005 electricity emissions have increased by 11%. The percentage change for natural gas has not been listed since only casual records could be found for 1990 and was therefore difficult to compare with 2005 where complete records could be found. Emissions from fuel sources increased 8.2% and 30.5% respectively.³² Emissions from employee commuting decreased 48.2%.³³

From 2005 to 2007 overall emissions from electricity use increased 2.6%. Emissions from natural gas use increased by 26.3% (refer to appendix D, to review energy use per building). City Fleet emissions from gasoline and diesel sources decreased while CNG emissions rose 2%. Transit Fleet emissions from diesel sources rose 69.6%. LNG and gasoline fuel from contract service vehicles increased by 10% and 3.8% respectively. Employee commute emissions from gasoline vehicles increased 19.4%. Emissions related to refuse decreased 0.9%.

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

Electricity	MTCO ₂ e 1990	MT CO ₂ e 2005	Percentage Change	MT CO ₂ e 2005	MT CO ₂ e 2007	Percentage Change
Buildings & Facilities	1007	1196	+18.7%	1196	1306	+9.1%
Traffic Signals & Controllers	323	101	-68.7%	101	95	-5.9%
Streetlights	253	1163	+359.6%	1163	1165	+0.1%
Park Lighting	142	48	-66.1%	48	46	-4.1%
Other Outdoor Lighting	582	299	-46.6%	299	292	-2.3%
Water Pumps/Irrigation Control	144	101	-29.8%	101	80	-20.7%
Sewer Pumps	5	7	+40%	7	7	-
Total	2,626	2,915	+11%	2,915	2,991	+2.6%
Natural Gas						
Buildings & Facilities	2	311	-	311	393	+26.3%
Fuel						
Propane, Buildings & Facilities	-	2	-	2	1	-50.0%
Gasoline, City Vehicle Fleet	652	706	+8.2%	706	687	-2.6%
Diesel, City Vehicle Fleet	177	231	+30.5%	231	201	-12.9%
CNG, City Vehicle Fleet	-	23	-	23	69	+2%
Diesel, Generators	-	11	-	11	11	-
Gasoline, Transit Fleet	-	40	-	40	38	-5%
Diesel, Transit Fleet	-	198	-	198	336	+69.6%
Gasoline, Contract Services	-	104	-	104	103	-0.9%
Diesel, Contract Services	-	10	-	10	11	+10%
LNG, Contract Services		2700	-	2700	2805	+3.8%
Gasoline, Employee Commute	1171	606	-48.2%	606	724	+19.4%
Diesel, Employee Commute	1	-	-	-	8	-
Waste						
Waste	-	734	-	734	741	+0.9%

³² Fuel quantities for 1990 were based on proxy year data from 1994, the earliest fuel records available.

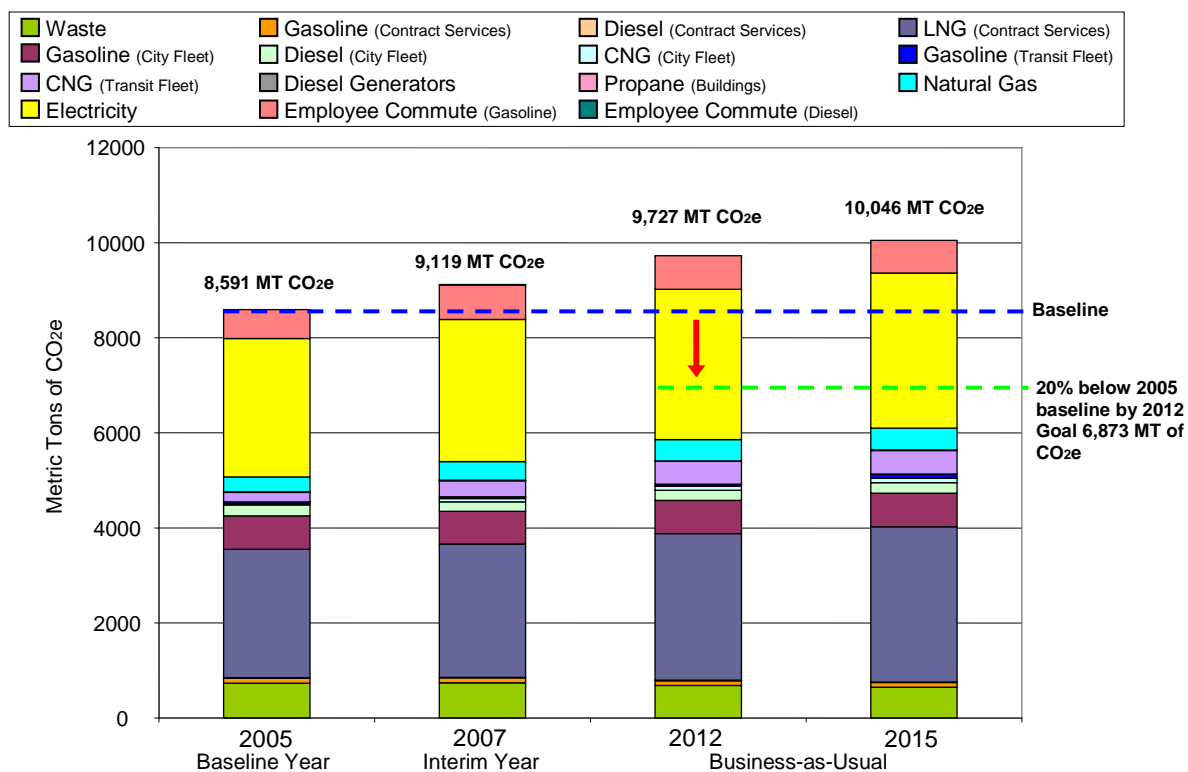
³³ Employee commute estimates were based on the AQMD 1990 Trip Reduction Plan AVR survey required under Rule 308 (refer to appendix C, for additional information).

C. Forecasting and Setting GHG Emissions Reduction Targets

The business-as-usual forecast shown in Figure 7 is a prediction of the likely increase in GHG emissions from municipal operations and services. The emissions shown here represent the business-as-usual forecast for the years 2012 and 2015 if the City does nothing to decrease its GHG emissions. The City can expect GHG emissions levels to increase to 9,727 metric tons of CO₂e by 2012 and 10,046 metric tons of CO₂e 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.

To ensure the City reaches its emission reduction goal 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 based on 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 make certain 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 6,873 metric tons of CO₂e.

Figure 7. Business-as-Usual Forecast³⁴



34 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 CO₂e emissions. The metric tons of CO₂e totals listed here are summed totals of the estimated emissions of each gas based on their global warming potential.

IV. Summary of Measures and Policies

There are a variety of ways in which the City of Redondo Beach 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

Energy Audits: Conducted energy audit of citywide facilities and improvement projects and established cost saving opportunities as a result including vending machine energy misers, lighting sensors, and outdated equipment and appliance replacement. The City also conducted energy audits of sewer pump stations, signals and street lights. Energy efficiency was achieved using voltage regulators on street lights and back up batteries on traffic signals. The City implemented an outside audit of billing by Southern California Edison that indicated that the City could achieve additional cost savings and energy savings with rate schedule changes and Time of Use program changes which the City then implemented.

Lighting Retrofit: Implemented a lighting retrofit of citywide facilities. The City also converted all traffic signal lights from incandescent to energy-efficient LED.

Building Upgrades: Installed automated energy conserving thermostat controls in citywide facilities and HVAC systems. A new “cool roof” was installed at City Hall which reflects light and heat rather than absorbing it.

Compressed Workweek Schedule: City Hall is closed on alternative Friday's to contribute to energy conservation and cost savings at facilities.

B. Solid Waste and Recycling

Recycling: Redondo Beach recycling programs include curbside recycling, grass recycling, commercial/ industrial recycling, bulky item recycling, electronics recycling, used oil recycling and bus stop cycling. The City also offers recycling programs in all of the schools, green waste disposal, backyard composting, and worm bin classes (including bins sold at reduced prices). The City provides ongoing education for all of the programs to businesses, residents, and the schools. Recent programs include public area recycling containers and computer/electronic recycling round-up events.

Construction and Demolition Program: The City established one of the most successful and well received Construction and Demolition recycling programs and Ordinances in the South Bay.

C. Sustainable Development

North Redondo Beach Bikeway: The City completed construction on a 2.8 mile bikeway to encourage bicycle commuting.

D. Urban Forests

Certified Arborist: The City established a Parks & Urban Forestry Manager position with the requirement that the position hold the credential of Certified Arborist.

Tree Replacement: Developed procedures requiring developers to replace City trees removed through development with new established City trees.

E. Water Usage and Conservation

Water Conservation Efforts: The City implemented water conservation programs including the use of water-less toilets at several City facilities and the introduction of a drought tolerant garden landscape demonstration garden at City Hall. Water conservation was also achieved by adding automated irrigation systems with solar timers in City parks and medians and by the use of reclaimed water at selected parks and medians.

F. Storm Water Management

Four CDS Units: The City actively participates in the National Pollutants Discharge Elimination System (NPDES) requirements. As required by the municipal NPDES permit, Redondo Beach has implemented many measures to control polluted runoff from reaching the ocean. The City has installed 4 Continuous Deflective Separation (CDS) units to intercept trash from the storm water system.

G. Vehicle Fleet

Alternative Fuel Vehicle Fleet: A significant portion of the City's 260 piece City fleet is composed of alternative fueled vehicles. The City also built and operates a Compressed Natural Gas (CNG) fueling facility.

H. Community Involvement

Green Task Force: On January 16, 2007, the City Council established a Green Task Force to educate on the importance of a wide variety of environmental best practices to meet regional, State, and Federal regulations; to advise on how to best prepare for meeting higher environmental standards locally and regionally; and to address environmental disaster mitigation. The Task Force was established for a one-year period and the 15 members were appointed by the Mayor. The Green Task Force's Sustainable City Plan was presented to the City Council on May 13, 2008.

Water Quality Task Force: The City of Redondo Beach Water Quality Task Force was formed in response to serious water quality issues surrounding the City's beaches, harbor and pier. With City leaders taking a facilitative role, this volunteer community stakeholder group was empowered to gain a better understanding of the causes of the water quality issues; encouraged to bring attention to the issues from experts and academics in the field; and charged with formulating a plan to mitigate the threat to our harbor and beaches. A year later, with the list of the 33 recommended projects in hand, the City is benefiting from regional water quality alliances, a pilot water quality project through the University of California, and grant funding to implement water quality improvement projects. In addition, the WQTF has become a model for addressing other priority community concerns.

I. Education and Outreach

Environmental Defenders Program: The City established an environmental education program in the local schools via the Environmental Defenders program.

Community "Greening": The City has implemented selected "greening" projects throughout the community on medians, green belts and parkways.

Community Outreach Events: The City conducts community outreach through an annual Earth Day event and with booths and recycling opportunities at special City events including Lobster Fest, Public Safety Fair, Public Works Week, and Super Bowl 10K Run.

Adopt-A-Median & Adopt-A-Waterway Programs: The City established Adopt-A-Median and Adopt-A-Waterway programs.

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 CO₂e 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 ₂ e	CO ₂	CH ₄	N ₂ O
	Stationary Combustion	324	323	0.03133	0.00070
Scope 2	Purchased Electricity	1196	1187	0.05169	0.01961

Streetlights and Traffic Signals					
Scope 2		CO ₂ e	CO ₂	CH ₄	N ₂ O
	Purchased Electricity	1611	1600	0.06974	0.02645

Water Delivery					
Scope 2		CO ₂ e	CO ₂	CH ₄	N ₂ O
	Purchased Electricity	108	107	0.00469	0.00178

Vehicle Fleet					
Scope 1		CO ₂ e	CO ₂	CH ₄	N ₂ O
	Mobile Combustion	960	941	0.07862	0.05219
Scope 3	Contract Services				
	West Coast Arborist	30	29	0.00270	0.00152
	Consolidated Disposal Services	2784	2572	4.32217	0.39067

Solid Waste					
Scope 3		CO ₂ e	CO ₂	CH ₄	N ₂ O
	Contract Services				
	Consolidated Waste Disposal	734	734	34.97409	-

Employee Commute					
Scope 3		CO ₂ e	CO ₂	CH ₄	N ₂ O
	Employee Commute	606	592	0.03743	0.04272

Transit Fleet					
Scope 1		CO ₂ e	CO ₂	CH ₄	N ₂ O
	Mobile Combustion	238	219	0.37537	0.03553

Total Emissions					
	CO ₂ e	CO ₂	CH ₄	N ₂ O	
Scope 1	1522	1483	0.48532	0.08842	
Scope 2	2915	2894	0.12612	0.04784	
Scope 3	4154	3927	39.33639	0.43491	

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 CO₂e 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 ₂ e	CO ₂	CH ₄	N ₂ O
	Stationary Combustion	405	403	0.06694	0.00141
Scope 2	Purchased Electricity	1306	1298	0.05871	0.02227

Streetlights and Traffic Signals					
Scope 2		CO ₂ e	CO ₂	CH ₄	N ₂ O
	Purchased Electricity	1598	1588	0.07182	0.02724

Water Delivery					
Scope 2		CO ₂ e	CO ₂	CH ₄	N ₂ O
	Purchased Electricity	87	85	0.00387	0.00147

Vehicle Fleet					
Scope 1		CO ₂ e	CO ₂	CH ₄	N ₂ O
	Mobile Combustion	957	937	0.14088	0.04977
Scope 3	Contract Services				
	West Coast Arborist	31	29	0.00275	0.00141
	Consolidated Disposal Services	2888	2668	4.48925	0.40483

Solid Waste Facility					
Scope 3		CO ₂ e	CO ₂	CH ₄	N ₂ O
	Contract Services				
	Consolidated Disposal Services	741	741	35.28809	-

Employee Commute					
Scope 3		CO ₂ e	CO ₂	CH ₄	N ₂ O
	Employee Commute	732	717	0.04250	0.04494

Transit Fleet					
Scope 1		CO ₂ e	CO ₂	CH ₄	N ₂ O
	Mobile Combustion	374	343	0.63408	0.05838

Total Emissions					
		CO ₂ e	CO ₂	CH ₄	N ₂ O
Scope 1		1736	1683	0.8419	0.10956
Scope 2		2991	2971	0.1344	0.05098
Scope 3		4392	4155	39.82259	0.45118

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 CO₂e summed totals of the estimated emissions of gases with different global warming potentials (see appendix E of LGOP). The control approach was utilized to define the City’s scopes of emissions.

Reporting year: 1990

Protocol Used Local: Government Operation Protocol, version 1.0

Control Approach: Operational Control

GHG Emissions Summary (All Units in Metric Tons)

Buildings & Other Facilities					
Scope 1		CO ₂ e	CO ₂	CH ₄	N ₂ O
	Stationary Combustion	2	2	0.00020	0.00000
Scope 2	Purchased Electricity	1007	1001	0.03886	0.01360

Streetlights and Traffic Signals					
Scope 2		CO ₂ e	CO ₂	CH ₄	N ₂ O
	Purchased Electricity	1300	1294	0.05020	0.01757

Water Delivery					
Scope 2		CO ₂ e	CO ₂	CH ₄	N ₂ O
	Purchased Electricity	319	317	0.01231	0.00431

Vehicle Fleet					
Scope 1		CO ₂ e	CO ₂	CH ₄	N ₂ O
	Mobile Combustion	829	808	0.05144	0.06289

Employee Commute					
Scope 3		CO ₂ e	CO ₂	CH ₄	N ₂ O
	Employee Commute	1172	1155	0.10525	0.11230

Total Emissions					
		CO ₂ e	CO ₂	CH ₄	N ₂ O
	Scope 1	831	810	0.05164	0.06289
	Scope 2	2626	2612	0.10137	0.03548
	Scope 3	1172	1155	0.10525	0.11230

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

<p>Description: Consumption data was obtained from Southern California Gas Company.</p> <p>For 1990, Southern California Gas no longer possesses official customer records going back that far 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.</p> <p>Generator fuel data was provided by City staff. Propane fuel data was provided by Amerigas.</p>	<p>Recommended Method Known Natural Gas use</p>
<p>Reference: Chauncy Tou, Energy Programs Advisor Customer Programs, Southern California Gas Company, 213-244-2833, ctou@semprautilities.com. Amerigas contact Sherry Mecca at 800-834-4169.</p>	

Scope 2 Purchased Electricity

<p>Description: Consumption data was obtained from Southern California Edison.</p>	<p>Recommended Method Known electricity use</p>
<p>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.</p>	

B. Street Lighting and Traffic Signals

Scope 2 Purchased Electricity

<p>Description: Consumption data was obtained from Southern California Edison.</p> <p>Note: Accounts owned by SCE were included but recorded separately.</p>	<p>Recommended Method Known electricity use</p>
<p>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.</p>	

C. Water Delivery and Wastewater

Scope 2 Purchased Electricity

<p>Description: Consumption data was obtained from Southern California Edison.</p>	<p>Recommended Method Known electricity use</p>
<p>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.</p>	

D. Vehicle Fleet

Scope 1 Mobile Combustion

<p>Description: City staff collected data from fuel tracking system.</p>	<p>Recommend Method known fuel use</p>
<p>Reference: Jon Emerson, Public Works, jon.emerson@redondo.org 310-318-0686 x4151</p>	

E. Solid Waste Facilities

Scope 3 Waste Related

<p>Description: City staff collected data from waste hauler Consolidated Disposal Services. City of Redondo Beach 2007—2922 Refuse 2005—2896 Refuse</p> <p>No records could be found for 1990 City operated and owned facilities.</p> <p>Solid Waste Characterization was obtain from the California Integrated Waste Management Board http://www.ciwmb.ca.gov/wastechar/BizGrpCp.asp</p>
<p>Reference: Jon Emerson, Public Works, jon.emerson@redondo.org 310-318-0686 x4151</p>

F. Employee Commute

Scope 3 Employee Commute

<p>Description: Vehicle miles traveled were determined based on the South Coast Air Quality Management District's 2202 and 1990 Trip Plan Reduction, Average Vehicle Ridership (AVR) survey.</p>
<p>Reference: Brad Lindahl, Capital Projects Program Manager, brad.lindahl@redondo.org, 310-372-1171 ext.2286</p>

G. Other Scope 3 Emissions

Scope 3 Emissions From Contracted Services

<p>Description: West Coast Arborist, Vehicle Fleet West Coast Arborist provided information on vehicle type, number of vehicles, and fuel quantity of services vehicles that operate within the City's boundaries.</p>
<p>Reference: Jon Emerson, jon.emerson@redondo.org 310-318-0686 x4151</p>

Scope 3 Emissions From Contracted Services

<p>Description: Consolidated Disposal Service, Vehicle Fleet Consolidated Disposal Service provided information on vehicle type, number of vehicles, and fuel quantity of services vehicles that operate within the City's boundaries. .</p>
<p>Reference: Jon Emerson, Public Works, jon.emerson@redondo.org 310-318-0686 x4151</p>

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.³⁵ 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

<p>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.</p> <p>Criteria Air Pollutants, Table 3. NERC Western Systems Coordinating Council/CNV 1990- 2005 2007 inventory-2005 CAP emissions factors 2005 inventory-2005 CAP emissions factors 1990 inventory-1990-2003 emissions factors</p>	<p>Recommended Method Default emission factors, Table G.1 and Table G.3 of the LGOP</p>
<p>Reference: Consumption data was provided by Chauncy Tou, Energy Programs Advisor Customer Programs, Southern California Gas Company, 213-244-2833, ctou@semprautilities.com.</p>	

B. Scope 1 Mobile Combustion

<p>Description of Computational Method: City staff provided data on known fuel use and cost from fuel tracking system records. Fuel quantities for 1990 were based on proxy year data from 1994, the earliest fuel records available. Alternate Emissions Factors were used based on Table G.13 of the LGOP, Alternate Methodology for Highway Vehicles by Inventory Year, pg. 180.</p>	<p>Alternative Method Alternative emissions factors, Table G.13 of the LGOP</p>
<p>Reference: Data was provided by Jon Emerson, jon.emerson@redondo.org 310-318-0686 x4151</p>	

C. Scope 2 Purchased Electricity

<p>Description of Computational Method: Table G.5 Utility-Specific Verified Electricity CO2 Emissions Factors (2000-2006), LGOP pg. 174. For 2005 inventory Southern California Edison, 2005 emission factors were used; For 2007, inventory Southern California Edison, 2006 emissions factors were used. Table G.6 California Grid Average Electricity Emissions Factors (1990-2004) emissions factors from the year 2004 was used for both 2005 and 2007.</p>	<p>Recommended Method Utility-Specific verified emission factors used</p>
<p>The year 1990 emissions factors from Table G.6 were used for the 1990 inventory.</p>	

³⁵ 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.

Reference: Consumption data provided by Larry Sutton, Account Executive, Southern California Edison, 714-973-5660 PAX 52660 and 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:

City of Redondo Beach

2007—2922 Refuse

2005—2896 Refuse

There was an estimated 75% methane recovery at the landfill where the waste was taken, LGOP page 93.

No records could be found for 1990 City operated and owned facilities.

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

Reference: Data was provided by Jon Emerson, Public Works, jon.emerson@redondo.org, 310-318-0686 x4151

E. Scope 3 Employee Commute

Description of Computational Method:

Vehicle miles traveled were determined based on the South Coast Air Quality Management District's 2202 and 1990 Trip Plan Reduction, Average Vehicle Ridership (AVR) surveys.

Alternative Method

Alternative emissions factors, Table G.13, LGOP

Utilizing AVR survey results it was estimated that on average employees worked 42.5 weeks, meaning 32.5 days were deducted from the possible number of working days in a year. It was assumed that these absences were due to vacation, sick, personal, and holiday.

2007—Vehicle miles traveled (VMT) was based on the 355 employees reporting to the worksite within the designated peak travel window. However, the actual number of employees reporting to the worksite was 715 (including full and part-time employees). The remaining 49.6% of VMT was estimated based on AVR survey responses for a total VMT of 1,528,597. Assumptions: gasoline, drove alone, passenger vehicle (2.01 x 760,496=1,528,597 Total VMT).

2005—(Proxy year surveys from 2006 were utilized to calculate the VMT for the year 2005). In 2005, there were 382 employees reporting to the worksite within the designated peak travel window. However, the actual number of employees reporting to the worksite was 613 (including full and part-time employees). The remaining 62.3% of VMT was estimated based the on 2006 survey responses for a total VMT of 1,251,819. Assumptions: gasoline, drove alone, passenger vehicle (1.60 x 782,387 =1,251,819 Total VMT).

1990—VMT was based on the 469 employees reporting to the worksite within the designated peak travel window. However, the actual number of employees reporting to the worksite was 769 (including full and part-time employees). The remaining 60.9% of VMT was estimated based on survey responses for a total VMT of 2,136,223. Assumptions: gasoline, drove alone, passenger vehicle (1.64 x 1,302,575=2,136,223 Total VMT).

Reference: Brad Lindahl, Capital Projects Program Manager, brad.lindahl@redondo.org, 310-372-1171 ext.2286

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.³⁶

Sources of Emissions 2005	Source	Equiv CO ₂ (tonnes)	Equiv CO ₂ (%)	Energy (MMBtu)	Energy/Fuel Use	Cost (\$)
Buildings and Facilities						
Civic Center (includes City Hall, Police Station, & Main Library)	Electricity	658	7.1	7391	2,165,565 kWh	\$259,915
	Natural Gas	137	1.5	2585	25,843 therms	\$26,123
Fire Station 1	Electricity	30	0.3	339	99,400 kWh	\$13,269
	Natural Gas	11	0.1	202	2,022 therms	\$2,419
Fire Station 2	Electricity	23	0.2	253	74,224 kWh	\$11,724
	Natural Gas	10	0.1	190	1,897 therms	\$2,313
City Yard	Electricity	39	0.4	443	129,660 kWh	\$20,481
	Natural Gas	1	0	18	181 therms	\$328
City Yard/Garage	Electricity	16	0.2	177	51,900 kWh	\$7,983
	Natural Gas	4	0	76	760 therms	\$1,096
Franklin Community Center	Electricity	8	0.1	91	26,760 kWh	\$6,837
	Natural Gas	18	0.2	347	3,466 therms	\$4,140
Knob Hill Community Center	Electricity	35	0.4	398	116,760 kWh	\$16,237
	Natural Gas	21	0.2	394	3,936 therms	\$4,245
Public Works Warehouse	Electricity	1	0	16	4,630 kWh	\$794
	Natural Gas	0	0	5	54 therms	\$179
Performing Arts Center	Electricity	207	2.2	2331	682,884 kWh	\$100,286
	Natural Gas	50	0.5	949	9,485 therms	\$9,493
Hayward Center	Natural Gas	3	0	58	575 therms	\$801
Harbor Patrol Facility	Electricity	5	0.1	59	17,287 kWh	\$2,481.63
	Propane	2	0	36	390 gal	\$1,861
Transit Terminal	Electricity	18	0.2	204	59,706 kWh	\$8,131.36
Kingsdale Transit Maintenance Facility	Electricity	5	0.1	57	16,652 kWh	\$1,154.63
Harbor Property (leased out)	Electricity	2	0.0	24	7,080 kWh	\$1,515.92
North Branch Library	Electricity	7	0.1	83	24,174 kWh	\$3,434
Veterans Park/Old Library	Electricity	30	0.3	340	99,480 kWh	\$14,841

³⁶ Source of data CACP software output.

	Natural Gas	14	0.2	265	2,650 therms	\$3,246
Parks & Recreations:						
Wilderness Park	Electricity	11	0.1	121	35,310 kWh	\$6,479
	Natural Gas	3	0	59	590 therms	\$793
Alta Vista Park	Electricity	13	0.1	143	41,850 kWh	\$7,318
Anderson Park	Electricity	1	0	9	2,609 kWh	\$489
	Natural Gas	8	0.1	147	1,467 therms	\$1,916
Perry Park	Electricity	14	0.1	154	45,000 kWh	\$6,489
	Natural Gas	4	0	70	695 therms	\$1,130
Aviation Gymnasium	Electricity	55	0.6	623	182,520 kWh	\$29,122
	Natural Gas	23	0.2	436	4,358 therms	\$4,732
Parks Yard	Electricity	7	0.1	76	22,167 kWh	\$3,121
Seaside Lagoon	Electricity	9	0.1	107	31,230 kWh	\$4,641
	Natural Gas	1	0	24	244 therms	\$397
Generators:						
Harbor Department	Diesel	2	0	33	240 gal	N/A
Fire/Police Department	Diesel	2	0	33	240 gal	N/A
Public Works Department	Diesel	7	0.1	100	720 gal	N/A
Streetlights & Traffic Signals						
Traffic Signals/Controllers	Electricity	101	1.2	1139	333,873 kWh	\$40,327.17
Streetlights:						
City Owned Streetlights	Electricity	655	7.6	7905	2,157,045 kWh	\$215,525.16
Streetlight SCE Owned	Electricity	508	5.9	5707	1,672,235 kWh	\$335,036
Park Lighting:						
Park Lighting	Electricity	48	0.6	534	156,420 kWh	\$34,853
Other Outdoor Lighting:						
RB Pier/Parking Structures	Electricity	299	3.5	3352	982,014 kWh	\$112,017.54
Water Delivery Facilities						
Sewer Pump	Electricity	7	0.1	84	24,542 kWh	\$4,967
Water Pump/Irrigation Control	Electricity	101	1.2	1134	332,202 kWh	\$46,752
Vehicle Fleet						
EB Engineering Dept	CNG	3	0	58	243 gal	\$627
	Gasoline	22	0.2	298	2,396 gal	\$6,183

Fire Department	Diesel	97	1	1331	9,589 gal	\$23,781
	Gasoline	26	0.3	363	2,923 gal	\$7,542
Harbor Patrol Boats	Gasoline (off road)	22	0.3	302	2,472.26 gal	n/a
IT Department	Gasoline	1	0	13	107 gal	\$276
Police Department	CNG	1	0	24	190 gal	\$258
	Diesel	1	0	20	143 gal	\$354
	Gasoline	429	4.6	5917	47,628 gal	\$122,880
	Gasoline (off road)	9	0.1	126	1,016 gal	\$2622
Planning Department	CNG	0	0	9	71 gal	\$97
	Gasoline	4	0	60	486 gal	\$1,253
Public Works Department	CNG	19	0.2	340	2,739 gal	\$3,780
	Diesel	127	1.4	1733	12,494 gal	\$29,104
	Gasoline	168	1.8	2313	18,621 gal	\$48,043
	Diesel (off road)	6	0.1	85	611 gal	\$8,953
	Gasoline (off road)	9	0.1	129	1036 gal	\$2,674
RC Department	Gasoline	12	0.1	168	1,356 gal	\$3,499
Transit Fleet						
	CNG	198	2.3	3395	27,341 gal	\$37,184
	Gasoline	40	0.5	557	4,480 gal	\$11,559
Vehicle Fleet – Contract Services						
West Coast Arborist	Diesel	22	0.2	306	2206 gal	n/a
	Diesel (off road)	10	0.1	132	949 gal	n/a
Consolidated Disposal Services	Gasoline	84	1.0	1163	9,362 gal	n/a
	LNG	2700	31.4	32870	264,603 gal	n/a
Employee Commute						
Drove Alone	Gasoline	591	6.9	8144	1,220,089 VMT	n/a
Carpool	Gasoline	15	0.2	212	31,707 VMT	n/a
Public Transportation	Diesel	0	0.0	3	23.4 VMT	n/a
Waste						
Consolidated Disposal Service, LLC/Allied Waste, LLC	Carbon Dioxide	734	8.5			
Sources:	Food Waste	78				
	Paper Products	553				
	Plant Debris	77				
	Wood/Textiles	27				

Sources of Emissions 2007	Source	Equiv CO ₂ (tonnes)	Equiv CO ₂ (%)	Energy (MMBtu)	Energy/Fuel Use	Cost (\$)
Buildings and Facilities						
Civic Center (includes City Hall, Police Station, & Main Library)	Electricity	705	9.7	8225	2,409,861 kWh	\$324,453
	Natural Gas	177	2.4	3328	33,277 therms	\$30,863
Fire Station 1	Electricity	31	0.4	361	105,720 kWh	\$14,191
	Natural Gas	11	0.1	203	2,032 therms	\$2,313
Fire Station 2	Electricity	24	0.3	276	80,760 kWh	\$12,808
	Natural Gas	11	0.2	212	2,115 therms	\$2,447
City Yard	Electricity	48	0.7	560	164,095 kWh	\$24,262
	Natural Gas	1	0	19	188 therms	\$332
City Yard/Garage	Electricity	18	0.2	205	59,920 kWh	\$8,487
	Natural Gas	1	0	22	223 therms	\$494
Franklin Community Center	Electricity	8	0.1	90	26,471 kWh	\$6,463
	Natural Gas	21	0.3	398	3,975 therms	\$4,081
Knob Hill Community Center	Electricity	30	0.4	346	101,418 kWh	\$15,024
	Natural Gas	24	0.3	457	4,573 therms	\$4,609
Performing Arts Center	Electricity	257	3.5	3000	879,100 kWh	\$128,295
	Natural Gas	97	1.3	1827	18,268	\$16,370
Public Works Warehouse	Electricity	6	0.1	68	19,847 kWh	\$3,269
	Natural Gas	0	0	0	0 therms	\$127
Hayward Center	Natural Gas	4	0.1	74	743 therms	\$992
Harbor Patrol Facility	Electricity	6	0.1	68	19,863 kWh	\$3,269
	Propane	1	0	23	251 gal	\$974.11
Transit Terminal	Electricity	17	0.2	201	58,878 kWh	\$8,648
Kingsdale Transit Maintenance Facility	Electricity	7	0.1	78	22,751 kWh	\$1,821
North Branch Library	Electricity	6	0.1	69	20,079 kWh	\$3,353
Veterans Park/Old Library	Electricity	22	0.3	261	76,492 kWh	\$13,106
	Natural Gas	1	0	5630	5,630 therms	\$5,943
Parks & Recreations:						
Parks Yard	Electricity	5	0.1	57	16,572 kWh	\$2,838
Seaside Lagoon	Electricity	10	0.1	111	32,576 kWh	\$5,675
	Natural Gas	2	0	37	371 therms	\$530
Wilderness Park	Electricity	14	0.2	164	48,150 kWh	\$7,735
	Natural Gas	1	0	23	233 therms	\$377
Alta Vista Park	Electricity	13	0.1	151	44,289 kWh	\$7,301

Anderson Park	Electricity	1	0	6	1,880 kWh	\$479
	Natural Gas	6	0.1	109	1,090 therms	\$1,442
Perry Park	Electricity	11	0.2	128	37,640 kWh	\$6,490
	Natural Gas	7	0.1	131	1,308 therms	\$1,816
Aviation Gymnasium	Electricity	62	0.8	719	210,653 kWh	\$32,344
	Natural Gas	27	0.4	501	5,013 therms	\$4,976

Generators:

Harbor Department	Diesel	2	0	33	240 gal	n/a
Fire/Police Department	Diesel	2	0	33	240 gal	n/a
Public Works Department	Diesel	7	0.1	100	720 gal	n/a

Streetlights & Traffic Signals

Traffic Signals/Controllers	Electricity	95	1.0	1106	324,163 kWh	\$44,727
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Streetlights:

City Owned Streetlights	Electricity	671	7.4	7828	3,982,952 kWh	\$664,603
Streetlight SCE Owned	Electricity	494	5.4	5765	1,689,289 kWh	\$420,399

Park Lighting:

Park Lighting	Electricity	46	0.5	535	156,818 kWh	\$32,181
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Other Outdoor Lighting:

RB Pier/Parking Structures	Electricity	292	3.2	3400	996,308 kWh	\$110,335
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Water Delivery Facilities

Sewer Pump	Electricity	7	0.1	78	22,783 kWh	\$4,081
Water Pump/Irrigation Control	Electricity	80	0.9	927	271,716 kWh	\$40,596

Vehicle Fleet

EB Engineering Dept	CNG	5	0.1	87	698 gal	\$935
	Gasoline	26	0.4	363	2,919 gal	\$7,795
Fire Department	Diesel	104	1.4	1424	10,269 gal	\$27,623
	Gasoline	31	0.4	432	3,477 gal	\$9,283
Harbor Patrol Boats	Gasoline (off road)	17	0.2	239	1922.4 gal	n/a
Police Department	CNG	21	0.3	357	2,871 gal	\$3,847
	Diesel	3	0	41	295 gal	\$793
	Gasoline	315	4.3	4357	35,072 gal	\$93,643
	Gasoline (off road)	16	0.2	217	1,750 gal	\$4,515
Planning Department	CNG	1	0	12	99 gal	\$133

	Gasoline	2	0	23	189 gal	\$504
Public Works Department	CNG	42	0.6	740	5,959 gal	\$7,985
	Diesel	91	1.3	1241	8,951 gal	\$24,078
	Gasoline	231	3.2	3191	25,689 gal	\$68,590
	Diesel (off road)	3	0	39	279 gal	\$752
	Gasoline (off road)	36	0.5	506	4,074 gal	\$10,879
RC Department	Gasoline	13	0.2	173	1,389 gal	\$3,709

Transit Fleet

	CNG	336	3.7	5758	62,681 gal	\$83,992
	Gasoline	39	0.4	540	4,345 gal	\$11,602

Vehicle Fleet – Contract Services

West Coast Arborist	Diesel (off road)	12	0.2	157	1,131 gal	n/a
	Gasoline	19	0.3	259	1,317 gal	n/a
Consolidated Disposal Services	LNG	2805	30.8	34,145	274,865 gal	n/a
	Gasoline	84	0.9	1156	9,303 gal	n/a

Employee Commute

Drove Alone	Gasoline	700	7.7	9671	1,476,529 VMT	n/a
Carpool	Gasoline	24	0.3	336	51,272 VMT	n/a
Public Transportation	Diesel	8	0.1	110	795 VMT	n/a

Waste

Consolidated Disposal Service, LLC/Allied Waste, LLC	Carbon Dioxide	741	8.5			
Sources:	Food Waste	79				
	Paper Products	558				
	Plant Debris	77				
	Wood/Textiles	27				

Sources of Emissions 1990	Source	Equiv CO ₂ (tonnes)	Equiv CO ₂ (%)	Energy (MMBtu)	Energy/Fuel Use	Cost (\$)
Buildings and Facilities						
Civic Center (includes City Hall, Police Station, & Main Library)	Electricity	542	3.6	3937	1,153,630 kWh	\$100,094
	Natural Gas	0	0	9	87 therms	n/a
Fire Station 1	Electricity	62	0.4	453	132,600 kWh	\$12,284
	Natural Gas	0	0	0	3 therms	n/a
Fire Station 2	Electricity	26	0.2	187	54,840 kWh	\$5,687
	Natural Gas	0	0	2	18 therms	n/a
City Yard	Electricity	7	0	54	15,781 kWh	\$1,871
City Yard/Garage	Electricity	26	0.2	189	55,320 kWh	\$6,853
	Natural Gas				N/A	n/a
Knob Hill Community Center	Electricity	36	0.2	262	76,640 kWh	\$8,756
	Natural Gas	0	0	2	18 therms	n/a
Parks Yard	Electricity	9	0.1	67	19,741 kWh	\$2,313
Performing Arts Center	Electricity	79	0.5	575	168,360 kWh	\$18,896
	Natural Gas	0	0	4	0	n/a
Public Works Warehouse	Electricity	9	0.1	66	19,291 kWh	\$2,261
Hayward Center	Natural Gas	0	0	1	9 therms	n/a
Harbor Patrol Facility	Electricity	5	0.1	37	10,842 kWh	\$1,319.11
Transit Terminal	Electricity	49	1.2	356	104,364 kWh	\$11,864
North Branch Library	Electricity	9	0.1	62	18,090 kWh	\$2,127
Veterans Park/Old Library	Natural Gas				144 therms	n/a
Parks & Recreations:						
Wilderness Park	Electricity	42	0.3	303	88,890 kWh	\$10,327
	Natural Gas	0	0	0	2 therms	n/a
Anderson Park	Natural Gas	0	0	3	26 therms	n/a
Perry Park	Electricity	14	0.1	105	30,740 kWh	\$3,775
	Natural Gas	0	0	3	33 therms	n/a
Aviation Gymnasium	Electricity	74	0.5	539	158,040 kWh	\$17,319
	Natural Gas	0	0	0	4 therms	n/a
Seaside Lagoon	Electricity	16	0.1	118	34,518 kWh	\$4,837
	Natural Gas	0	0	1	5 therms	n/a
Streetlights & Traffic Signals						
Traffic Signals/Controllers	Electricity	323	7.0	2,348	687,942 kWh	\$75,469.95

Streetlights:						
City Owned Streetlights	Electricity	253	5.4	1835	537,611 kWh	\$67,993.90
Park Lighting:						
Park Lighting	Electricity	142	3.1	1033	302,748 kWh	\$34,541
Other Outdoor Lighting:						
RB Pier/Parking Structures	Electricity	582	12.5	4227	1,238,553 kWh	\$103,751.61

Water Delivery Facilities						
Water Pump/Irrigation Control	Electricity	314	6.8	2282	668,523 kWh	\$72,695.87
Sewer pumps	Electricity	5	0.1	34	9,884 kWh	\$1,434.82

Vehicle Fleet						
Administration	Gasoline	4	0	58	465 gal	\$600
EB Engineering Dept	Gasoline	21	0.1	286	2,301 gal	\$2,968
Fire Department	Diesel	76	0.5	1034	4,065 gal	\$5,244
	Gasoline	11	0.1	153	4,626 gal	\$5,968
Police Department	Gasoline	369	2.4	5048	40,633 gal	\$52,417
	Gasoline (off road)	10	0.1	144	1,163 gal	\$1,500
Planning Department	Gasoline	1	0	15	122 gal	\$158
Public Works Department	Diesel	101	0.7	1380	11,872 gal	\$15,316
	Gasoline	211	1.4	2872	23,119 gal	\$29,823
	Gasoline (off road)	17	0.1	239	1,922.00 gal	\$2,480.00
RC Department	Gasoline	8	0.1	106	855 gal	\$1,103

Employee Commute						
Drove Alone	Gasoline	1171	25.2	16004	2,054,196 VMT	n/a
Carpool	Gasoline	21	0.4	282	36,205 VMT	n/a
Public Transportation	Diesel	1	0.0	10	436 VMT	n/a

Criteria Air Pollutants³⁷

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.³⁸ 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	5,207	2,415	2,622	361	2,003
Streetlights & Traffic Signals	4,700	3,135	2,976	335	2,588
Water Delivery	316	211	200	23	174
Vehicle Fleet	7,330	420	51,956	5,512	302
Employee Commute	4,070	218	43,660	4,477	94
Transit Fleet	2,232	36	6,714	1,013	12
Total	23,855	6,435	108,128	11,721	5,173

Criteria Air Pollutants 2007	NOx (lbs)	SOx (lbs)	CO (lbs)	VOC (lbs)	PM10 (lbs)
Building and Facilities	6,873	2,775	3,227	460	2,297
Streetlights & Traffic Signals	4,841	3,229	3,065	345	2,665
Water Delivery	261	174	165	19	144
Vehicle Fleet	6,076	382	48,997	5,066	212
Employee Commute	4,843	262	53,392	5,376	119
Transit Fleet	3,631	54	9,909	1,580	16
Total	26,525	6,876	118,755	12,846	5,453

Criteria Air Pollutants 1990	NOx (lbs)	SOx (lbs)	CO (lbs)	VOC (lbs)	PM10 (lbs)
Building and Facilities	1,843	1,490	1,185	135	1,122
Streetlights & Traffic Signals	2,373	1,924	1,529	174	1,450
Water Delivery	582	472	375	43	355
Vehicle Fleet	7,789	731	52,836	6,120	460
Employee Commute	9,094	391	105,440	11,124	174
Total	21,681	5,008	161,365	17,596	3,561

³⁷ To review definitions and acronyms for criteria air pollutants refer to appendices sections G and H.

³⁸ Source of data CACP software output.

Appendix E—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.³⁹

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.

³⁹ 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 (UNFCCC) 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 F—Abbreviations and Acronyms⁴⁰

Btu	British thermal unit
CH ₄	methane
CO	carbon monoxide
CO ₂	carbon dioxide
CO ₂ e	carbon dioxide equivalent
FE	Fuel Economy
GHG	greenhouse gas
HFC	hydrofluorocarbon
MMBtu	1 million British thermal unit
NO _x	oxides of nitrogen
N ₂ O	nitrous oxide
PFC	perfluorocarbon
PM ₁₀	particulate matter smaller than ten microns in diameter
SF ₆	sulfur hexafluoride
SO _x	sulfur oxides
VOC	volatile organic compounds

Appendix G—Glossary of Terms⁴¹

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	CO ₂ 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 (CO ₂)	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 CO ₂ is equal to 1.)

⁴⁰ Abbreviations and acronyms are from the Local Government Operations Protocol, version 1.0

⁴¹ Definition are from the Local Government Operations Protocol, version 1.0 and ICLEI's Cities for Climate Protection Milestone Guide.

CO2 equivalent (CO2e)	The universal unit for comparing emissions of different GHGs expressed in terms of the GWP of one unit of carbon dioxide.
Control approach	An emissions accounting approach for defining organizational boundaries in which an entity reports 100 percent of the GHG emissions from operations under its financial or operational control.
Criteria Air Pollutants	The term criteria air pollutants refers to pollutants that are regulated under the U.S. Clean Air Act. As with carbon dioxide, the major sources of these pollutants are fossil fuels. Most measures that reduce carbon dioxide emissions also reduce criteria air pollutants. Criteria air pollutants include nitrogen oxides (NOx), volatile organic compounds (VOCs), carbon monoxide (CO), sulfur oxides (SOx), and particulate matter smaller than ten microns in diameter (PM-10). The CACP software provides estimated emissions of CAPs as well as GHGs for emissions analyses and reduction benefits of measures.
Direct emissions	Emissions from sources within the reporting entity's organizational boundaries that are owned or controlled by the reporting entity, including stationary combustion emissions, mobile combustion emissions, process emissions, and fugitive emissions. All direct emissions are Scope 1 emissions, with the exception of biogenic CO2 emissions from biomass combustion.
Emission factor	A unique value for determining an amount of a GHG emitted on a per unit activity basis (for example, metric tons of CO2 emitted per million Btus of coal combusted, or metric tons of CO2 emitted per kWh of electricity consumed).
Facility	Any property, plant, building, structure, stationary source, stationary equipment or grouping of stationary equipment or stationary sources located on one or more contiguous or adjacent properties, in actual physical contact or separated solely by a public roadway or other public right-of way, and under common operational or financial control, that emits or may emit any greenhouse gas.
Global warming potential (GWP)	The ratio of radiative forcing (degree of warming to the atmosphere) that would result from the emission of one mass-based unit of a given G GHG compared to one equivalent unit of carbon dioxide (CO2) over a given period of time.
Greenhouse gases (GHGs)	For the purposes of this Protocol, GHGs are the six gases identified in the Kyoto Protocol: carbon dioxide (CO2), nitrous oxide (N2O), methane (CH4), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF6).
Indirect emissions	Emissions that are a consequence of activities that take place within the organizational boundaries of the reporting entity, but that occur at sources owned or controlled by another entity. For example, emissions of electricity used by a manufacturing entity that occur at a power plant represent the manufacturer's indirect emissions.
Inventory	A comprehensive, quantified list of an organization's GHG emissions and sources.

Inventory boundary	An imaginary line that encompasses the direct and indirect emissions included in the inventory. It results from the chosen organizational and operational boundaries.
Methane (CH ₄)	One of the six primary GHGs, consisting of a single carbon atom and four hydrogen atoms, possessing a GWP of 21, and produced through the anaerobic decomposition of waste in landfills, animal digestion, decomposition of animal wastes, production and distribution of natural gas and petroleum, coal production, and incomplete fossil fuel combustion.
Metric ton (MT, tonne)	Common international measurement for the quantity of GHG emissions, equivalent to about 2,204.6 pounds or 1.1 short tons.
Mobile combustion	Emissions from the combustion of fuels in transportation sources (e.g., cars, trucks, buses, trains, airplanes, and marine vessels) and emissions from non-road equipment such as equipment used in construction, agriculture, and forestry. A piece of equipment that cannot move under its own power but that is transported from site to site (e.g., an emergency generator) is a stationary, not a mobile, combustion source.
Nitrous oxide (N ₂ O)	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 CO ₂ 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.