City of Manhattan Beach

Municipal Greenhouse Gas Emissions 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] including the City of Manhattan Beach. 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 Manhattan Beach has taken to reduce its impact

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

on the environment and promote change within the community.

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

It is important to conduct a routine re-inventory to measure progress and recalculate the baseline year using current emission factors. In this way, a city can ensure it is on target with its goals and utilizing the most up-to-date methodology. To conduct a re-inventory, data was reviewed for the years 1990 and 2005 and gathered for 2007. The baseline year 2005 serves 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. The data collected for the year 2007 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 previously 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

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.

used to establish and organize its emissions by "scopes."[7] In this way, a city can separately account for its direct and indirect emissions in a tiered fashion. It also establishes a foundation for following reporting standards in the LGOP.

The City gathered information from a variety of sources, including consumption data from utility companies, fuel data from internal city records, data on waste and other services from contract service providers. A characterization study from the California Integrated Waste Management Board was utilized to capture waste composition and employee commute surveys were administered to capture emissions data from vehicle miles traveled[8] where no records were available. This data was then utilized to quantify GHG emissions. Following ICLEI program-specific requirements, this report is considered to be a Quick Action Report[9] which entails reporting on 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 6 Kyoto Protocol Gases. When the City conducts its re-inventory to ensure that it is inline with its emission reduction goals, the City will be able to consider producing a comprehensive report by adding data on the additional gases.

D. Inventory Methodology

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

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

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

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

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

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

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

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

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

E. Key Highlights and Findings

- The City of Manhattan Beach generated approximately 5,517 metric tons of CO_2e in the baseline year, 2005; this is equivalent to the GHG emissions generated by electricity use of 765 homes for one year.[14]
- There was an overall 6.2% decrease in GHG emissions between the baseline year 2005 and the interim year 2007. This was largely due to scope 3 fuel sources from contract vehicles.
- Emissions resulting from electricity use increased 14.3% and emissions resulting from natural gas consumption increased 41.5% between the years 2005 and 2007.
- Under a business-as-usual scenario, the City can expect emissions to rise to 5,450 metric tons of CO2e by 2012 that is equivalent to the annual GHG emissions from 998 passenger vehicles; and 5,586 metric tons of CO2e by 2015, equivalent to the annual GHG emissions from 1,023 passenger vehicles if the City does nothing to reduce its emissions.

E. Future Steps

Being proactive is the best way to curb GHG emissions and positively influence change within the community. 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 re-inventory complete, the City can continue to work towards short and long-term reduction targets for municipal operations. Located in section four, is a summary of the City's existing and planned efforts. 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.

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

II. Local Government Profile Information

A. Local Government Description

The City of Manhattan Beach, a General Law City, has a five-member City Council, elected at large to formulate policy for the City. Each member serves a nine (9) month mayoral position during their four (4) year term. The City Council is advised by a variety of appointed Boards and Commissioners. The City Council appoints a City Manager who is responsible for daily operations. The City Manager is responsible for implementing City Council's policies as well as providing management to the City's seven departments. The City Manager is also responsible for development of the City's budget, including a five-year capital expenditure program.

The City has a long history of environmental sensitivity and activism, as a community and as a city government. The City Council has made sustainability a priority goal, and over half of the Council's work plan relates to green issues. The City developed the Working Toward A Greater, Greener Manhattan Beach report as a first step in creating an environmental plan for the City. This report documents the City's current environmentally friendly practices and identifies other best management practices that the City can consider adopting to enhance our environmental programs. Two important actions taken as a result of this report are the hiring of an Environmental Programs Manager to coordinate the City's green policies, and the creation of a community Environmental Task Force to analyze priority environmental issues and make recommendations to City Council. The work of the Task Force, Environmental Programs Manager, and related Department staff has resulted in the recent passage of two environmental ordinances: a Water Conservation Ordinance, and a Sustainable Building Ordinance.

The City of Manhattan Beach has always been sensitive about the environment, implementing a variety of programs considered environmentally friendly. The City's General Plan, which lays out the long-term goals, programs and policies for future development, contains a number of policies which support a "greener" Manhattan Beach. These include:

- Implementing construction and demolition programs that require enhanced recycling efforts
- Implementing storm drain programs to protect our ocean and coastal beaches
- Using reclaimed water to irrigate many of our green spaces
- Encouraging maximum recycling in all sectors of the community, including residential, commercial, industrial, institutional, and construction
- Purchasing more recycled and environmentally friendly products
- Purchasing alternative fuel, hybrid and gas efficient vehicles when possible
- Installing energy and water saving devices in City buildings where possible

B. Local Government History

Manhattan Beach, a thriving 3.88 square mile coastal community, is often referred to as the Pearl of the South Bay. The people who live and work in Manhattan Beach view the City with a special reverence and work hard to preserve its beauty and charm. The City's focus is becoming more global as we rise to the challenge of preserving more than what lies within Manhattan Beach's borders.

In the 2006 Resident Satisfaction Survey, protecting the beaches and ocean from pollution rated as a top priority, with 91% of residents indicating that this was very or extremely important to them in preserving the quality of life in Manhattan Beach. In the spirit of preserving this and other natural resources, and under the direction of City Council, the City of Manhattan Beach has committed to embracing additional measures that will reduce the negative impacts

of its operations on the environment.

In the Fall of 2006, several local residents approached the City Council asking that they consider endorsing the United States Mayors Climate Protection Agreement, which focuses on climate change and the need for all cities to reduce greenhouse gas emissions. After researching the Agreement, the City Council adopted a resolution endorsing the US Mayors Climate Protection Agreement in January 2007. Although this resolution focuses solely on greenhouse gas emissions, it was the catalyst for comprehensively evaluating the City's environmental programs, policies and goals. Following this directive, the City of Manhattan Beach has committed to reducing greenhouse gas emissions at least 7% below 1990 levels through the development of a local Climate Action Plan.

Primary Services

Department	Primary Services
General Administration	City Council, City Manager, City Clerk, City Attorney, Finance, and Human Resources
Community Development	Community Development provides the community with a "one stop operation" for customers to obtain the necessary permits for construction and other private property activities. This is accomplished through planning, building and safety, code enforcement, traffic engineering, and the administration of these department divisions. Community Development is responsible for reviewing all private development proposals, and issuing building permits and other similar permits. Staff enforces building regulations per the City's Zoning Ordinance, and performs plan review, permitting, and inspections. The Department also conducts special studies and prepares ordinances related to land use and building regulations as directed by the City Council.
Manhattan Beach Fire Department	The Manhattan Beach Fire Department (MBFD) provides a wide array of emergency response and support services to the community. MBFD consists of two fire stations and thirty career Firefighters who are trained to provide the community with the highest level of fire, medical, and rescue assistance. Department personnel are also actively involved in other areas such as instructing Manhattan Beach citizens in survival skills and emergency preparation through the Community Emergency Response Team (CERT), serving on technical rescue teams, and inspecting businesses for fire safety. Firefighters also volunteer on the MBFD Green Team to seek out ways to incorporate environmentally friendly practices into the department's daily operations.
Manhattan Beach Police Department	The Police Department is headquartered at a new, state-of-the-art Police and Fire Safety Facility, housing the latest in public safety technology. MBPD employs approximately 63 sworn and 35 civilian full-time employees, and operates under two divisions - Administration/Investigations and Field Operations. The Department's mission is: "To protect life, property and liberty while providing excellent service and developing problem solving partnerships within the community."
Parks and Recreation	The vision of the Parks and Recreation department is to "Create Community and Quality of Life Through People, Parks and Programs." Parks and Recreations is responsible for some of the City's most visible programs including: Aquatics, Cultural Arts, Older Adults Program, Sports and Fitness, Teen Programs, and Youth Camps. The department oversees information dissemination to the community by postings signs/notices, runs City classes, and organizes community events such as AVP, Hometown Fair, Earth Day, etc.
Public Works	Under the supervision of the Public Works Director, plans and maintains all phases of street operations including street sweeping and the maintenance of lighting, traffic signs and signals. The department has responsibility for supervising street-related capital improvement projects as well as all programs and activities associated with public transportation, trash and recycling collection, water conservation, and storm water pollution. The Department contracts out the management of its storm water services for adherence to the NPDES permit and participation in the Clean Bay Restaurant Certification program.

III. Municipal Emissions Inventory Results

A. Inventory Introduction and Results

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

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

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

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

2005

Baseline Year

Results from the 2005 municipal inventory represent the year chosen as a baseline year, which will serve as a foundation for setting short and long-term emissions reduction targets. For this year, there was 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

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

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

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

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

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.

In 2005, the City of Manhattan Beach GHG emissions totaled 5,517 metric tons of CO_2e. This number includes both direct and indirect sources of emissions, as shown in Table 1. This total is equivalent to the GHG emissions emitted from the electricity use of 765 homes for one year. Looking at the scopes within the table, the smallest portion 23.5% (scope 1 total) were emissions generated from a combination of natural gas use for buildings and facilities, streetlights, water delivery, and fuels for the vehicle fleet. Emissions emitted from electricity use accounted for 33.5% (scope 2 total) of the total emissions. The largest portion 43% (scope 3 total) were emissions due to a combination of employee commuting, contract service vehicles, and waste (refuse collected from City bins). Within scope 3, contract service vehicles were responsible for the largest share at 27.2%. The most significant source of fuel emissions came from liquefied natural gas which produced approximately 960 metric tons of CO_2e in 2005.

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 Manhattan Beach used 6,081,080 kWh of electricity at a cost of approximately $882,966. In this same year, the City consumed 56,301 therms of natural gas costing $57,402.

Table 1. Municipal Inventory Summary 2005[19]

Manhattan Beach Municipal GHG Emissions 2005						
Sector	**MT CO_2e**	**Percent CO_2e (% CO_2e)**	**Source**	**Energy/Fuel Use**	**Energy/Fuel Use Cost**	**Energy Equivalent** (MMBtu)
Scope 1 Emissions						
Buildings & Facilities						
Buildings & Facilities	121	2.2%	Natural Gas	22,767 therms	$24,978	2,277
City Vehicle Fleet						
City Vehicle Fleet	**1,021**	**18.5%**	-	-	-	**11,647**
	800		Gasoline (G)	88,778 gallons	n/a	11,028
	196		ULSD (D)	19,331 gallons	n/a	196
	25		CNG	4,228 therms	$3,734	423
Streetlights & Traffic Signals						
Gas Lamps	155	2.8%	Natural Gas	29,187 therms	$28,448	2919
Water Delivery						
Pump Stations/Boosters[20]	1	0.0%	Natural Gas	119 therms	$242	12
Total Scope 1 Emissions	**1,298**	**23.5%**		**56,301 therms** (**88,778 G** / **19,331 D**)	**$57,402**	**16,855**
Scope 2 Emissions						
Buildings & Facilities						
Buildings & Facilities	684	12.4%	Electricity	2,250,269 kWh	$363,297	7,680
Streetlights & Traffic Signals						
Traffic Signals/Controllers	67	1.2%	Electricity	219,439 kWh	$23,611	749
Streetlights[21]	348	6.3%	Electricity	1,145,935 kWh	$209,128	3,911
Parking Lot Lighting	158	3.0%	Electricity	520,477 kWh	$63,998	1,776
Other Outdoor Lighting	8	0.1%	Electricity	27,160 kWh	$8,433	93

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

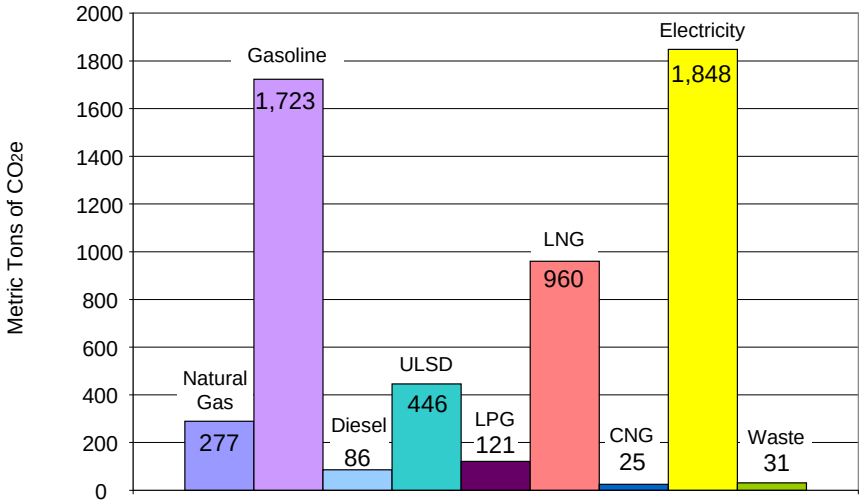
20 For scopes 1 and 2, water pumping stations, boosters, and MWD Turnout valves have been combined in the total shown here.

21 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 Delivery						
Sprinkler/Irrigation Control	32	0.6%	Electricity	104,090 kWh	$12,019	355
Pump Stations/Boosters	497	9.0%	Electricity	1,635,992 kWh	$175,584	5,584
Storm Water Pumps	19	0.3%	Electricity	62,740 kWh	$9,764	214
Wastewater						
Sewage Pumps	35	0.6%	Electricity	114,978 kWh	$17,131	392
Total Scope 2 Emissions	**1,848**	**33.5%**		**6,081,080 kWh**	**$882,966**	**20,754**
Scope 3 Emissions						
Employee Commute						
Employee Commute	841	15.2%	Gasoline	1,736,058 VMT	n/a	11,589
Vehicles—Contract Service Providers						
Contract Service Vehicles	**1,499**	**27.2 %**	**-**	-	n/a	**19,220**
	82		Gasoline	9,000 gallons	n/a	1,118
	86		Diesel	8,534 gallons	n/a	1,184
	250		ULSD	24,660 gallons	n/a	3,420
	121		LPG	1,330 gallons	n/a	1,810
	960		LNG	198,528 gallons	n/a	11,688
Solid Waste						
Waste	31	0.6%	-	137.6 tons	-	-
Total Scope 3 Emissions	**2,371**	**43%**		-		**30,809**
Total Emissions	**5,517**	**100%**	-	**-**	**$940,368**	**68,418**

Figure 1 illustrates emissions by source. The main sources of emissions came from fuels and electricity, with electricity emissions ranking the highest followed by gasoline. Waste resulted in one of the lowest sources of emissions. It was estimated that 137.6 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)



2 and 3 below illustrate a percentage breakdown of each sector and sub-sector from Table 1. ICLEI asks its members to report on scopes 1 and 2 where scope 3 is optional; therefore, data below is organized to reflect this criteria. Figure 2 shows all scopes, where as Figure 3 concentrates only on scopes 1 and 2 – functions that a city has more influence on. Figure 2 indicates 27.2% of emissions are from contract service vehicles that work within the City's boundaries, 0.6% from waste, and 15.2% 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 58.8% of emissions and scope 1 emissions from fuel and natural gas sources accounts for the remaining 41.2% of emissions.

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

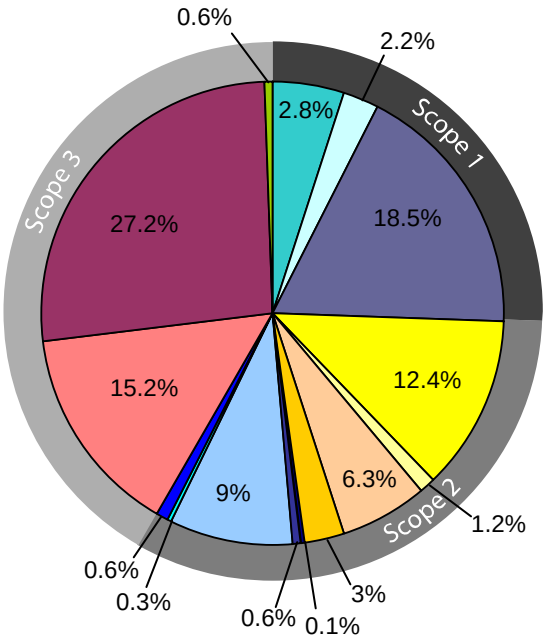
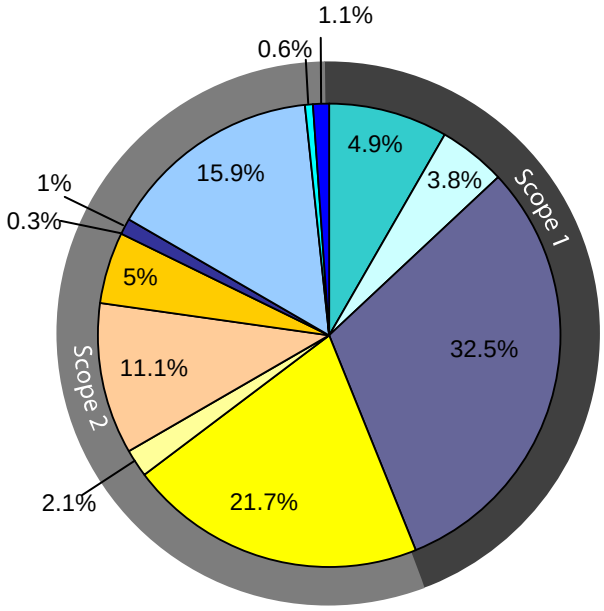


Figure 3. Emissions by Sector 2005
(including only direct and indirect sources from scopes 1 and 2)



Buildings & Facilities (gas)	Streetlights (gas)	City Vehicle Fleet	Pump Stations/Booster (gas)
Buildings & Facilities (electricity)	Traffic Signals & Controllers	Streetlights	Parking Lot Lighting
Other Outdoor Lighting	Sprinkler/Irrigation Control	Pump Stations/Booster	Storm Water Pumps
Sewage pumps	Employee Commute	Contract Services	Waste

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/ fuel use, and cost to capture a broad picture of the data.

In 2007, the City of Manhattan Beach GHG emissions totaled 5,172.2 metric tons of CO_2e including both direct and indirect sources of emissions—this number is equivalent to the emissions produced from 587,083 gallons of gasoline consumed. The year 2007 represents a 6.2% decrease in emissions from the baseline year. Looking at the scopes within the table, emissions generated from natural gas and fuel sources accounted for 25.2% (scope 1 total) of the emissions inventoried in 2007. Emissions from electricity use increased from the baseline year contributing 40.9% (scope 2 total) to the total emissions in 2007. The second largest portion of emissions came from a combination of employee commuting, contract service vehicles, and waste at 34% (scope 3 total). In 2007, the City of Manhattan Beach used 7,220,822 kWh of electricity costing approximately $1,180,833. In this same year, the City consumed 78,326 therms of natural gas at a cost of $72,568.

Table 2. Municipal Inventory Summary 2007[22]

Manhattan Beach Municipal GHG Emissions 2007						
Sector	**MT CO_2e**	**Percent CO_2e (% CO_2e)**	**Source**	**Energy/Fuel Use**	**Energy/Fuel Use Cost**	**Energy Equivalent** (MMBtu)
Scope 1 Emissions						
Buildings & Facilities						
Buildings & Facilities	234	4.5%	Natural Gas	44,231 therms	$43,365	4,424
City Vehicle Fleet						
City Vehicle Fleet	**908**	**17.6%**	-	-	**$272,156**	**12,625**
	737		Gasoline (G)	81,971 gallons	$230,244	10,183
	146		ULSD (D)	14,421 gallons	$38,584	2,000
	25		CNG	4,422 therms	$3,328	442
Streetlights & Traffic Signals						
Gas Lamps	158	3.1%	Natural Gas	29,637 therms	$25,705	2,964
Water Delivery						
Pump Stations/Boosters[23]	0.2	0%	Natural Gas	36 therms	$170	4
Total Scope 1 Emissions	**1,300.2**	**25.2%**		**78,326 therms** (**81,971 G** / **14,421 D**)	**$341,396**	**20,017**
Scope 2 Emissions						
Buildings & Facilities						
Buildings & Facilities	1,044	20.2%	Electricity	3,567,925 kWh	$565,506	12,177
Streetlights & Traffic Signals						
Traffic Signals/Controllers	56	1.1%	Electricity	190,378 kWh	$23,995	650

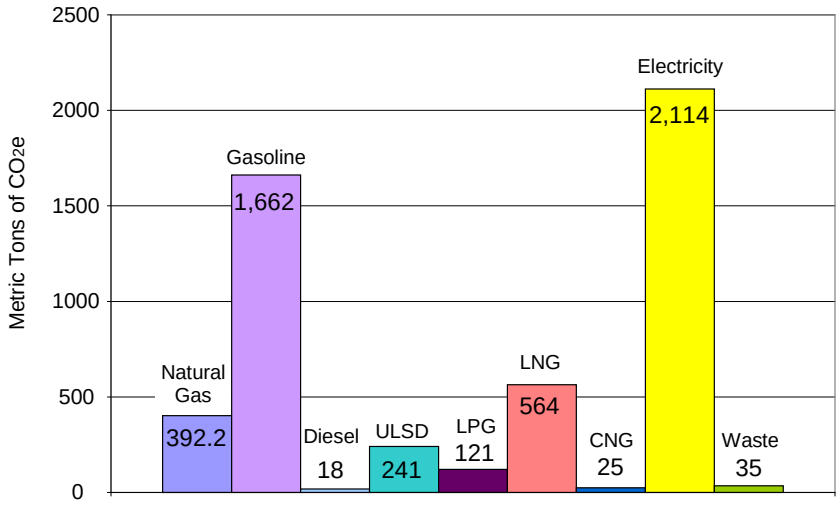
22 See appendix D, Emissions Data, to review individual energy use and cost per item.

23 For scopes 1 and 2, water pumping stations, boosters, and MWD Turnout valves have been combined in the total shown here.

Streetlights[24]	369	7.1%	Electricity	1,260,615 kWh	$275,432	4,302
Parking Lot Lighting	186	3.6%	Electricity	633,082 kWh	$75,014	2,161
Other Outdoor Lighting	5	0.1%	Electricity	17,940 kWh	$8,410	61
Water Delivery						
Sprinkler/Irrigation Control	33	0.6%	Electricity	112,730 kWh	$13,729	385
Pump Stations/Boosters	376	7.3%	Electricity	1,285,068 kWh	$186,590	102
Storm Water Pumps	9	0.2%	Electricity	29,860 kWh	$10,406	4,386
Wastewater						
Sewage Pumps	36	0.7%	Electricity	123,224 kWh	$21,751	421
Total Scope 2 Emissions	**2,114**	**40.9%**		**7,220,822 kWh**	**$1,180,833**	**24,645**
Scope 3 Emissions						
Employee Commute						
Employee Commute	843	16.3%	Gasoline	1,778,461.36 VMT		11,649
Vehicles—Contract Service Providers						
Contract Service Vehicles	**880**	**17.0%**				**11,338**
	82		Gasoline	9,000 gallons	n/a	1,118
	18		Diesel	1,800 gallons	n/a	250
	95		ULSD	9,352 gallons	n/a	1,297
	121		LPG	19,752.53 gallons	n/a	1,810
	564		LNG	116,577 gallons	n/a	6,863
Solid Waste						
Waste	35	0.7%		139.2 tons	n/a	n/a
Total Scope 3 Emissions	**1,758**	**34%**	-	-	**-**	**22,987**
Total Emissions	**5,172.2**	**100%**	-	**-**	**$1,518,383**	**67,649**

Figure 4 shows an increase in emissions from electricity, natural gas, and waste sources while other fuel sources decreased or remained the same. It was estimated 139.2 tons of waste generated by city operated and owned facilities was sent to a landfill.

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



24 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.

Similar to 2005, Figures 5 and 6 illustrate a percentage breakdown of each category from Table 2. Figure 5 indicates 17% of emissions are from contract service vehicles that work within the City's boundaries, 0.7% from waste, and 16.3% are the result of employee commuting. Figure 6 shows electricity in scope 2 accounts for 61.9% of emissions and fuels and natural gas from scope 1 contributed to the remaining 38.1% of emissions.

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

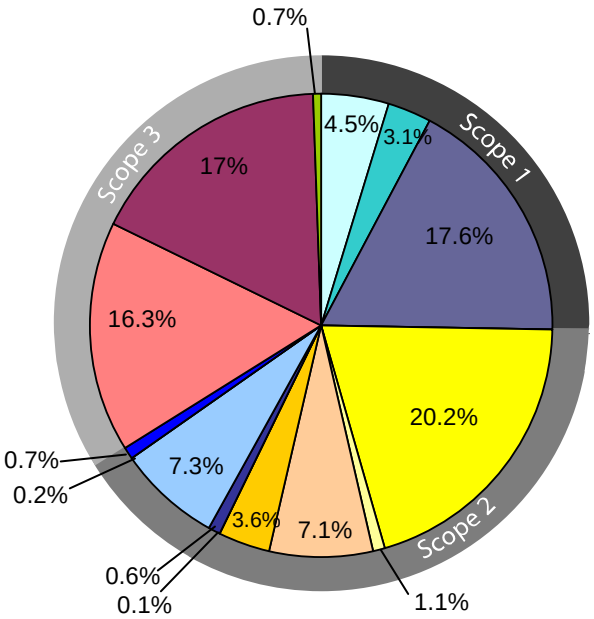
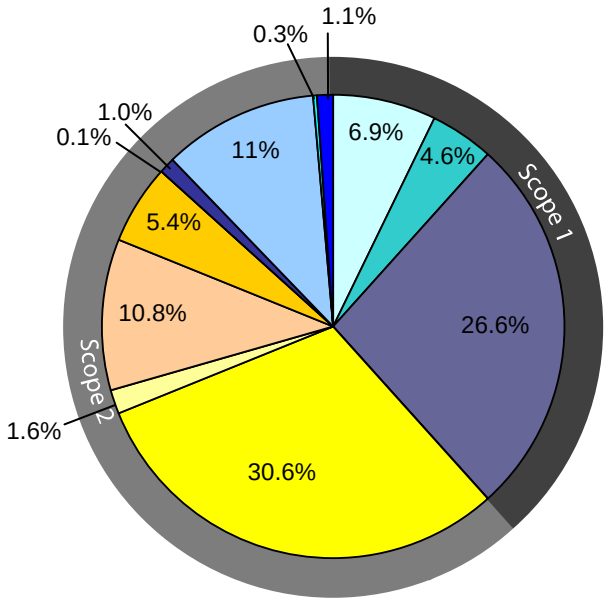
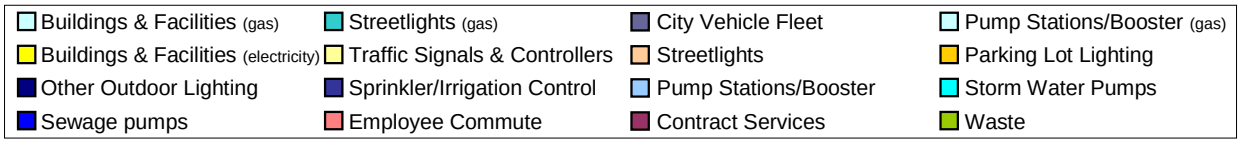


Figure 6. Emissions by Sector 2007
(including only direct and indirect sources from scopes 1 and 2)





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, where possible for 1990 to review the historical GHG levels; however, it was difficult to find accurate data, with the exception of electricity, and "back-casting" or creating a rough estimate of emissions is not recommended in the LGOP.[25] Therefore comparisons have been made in areas where data is reliable. As suggested in the protocol, it is better to concentrate on developing a high-quality, comprehensive inventory with reliable data rather then back-casting to 1990 and therefore the reduction target should be set from 2005 levels.

25 See LGOP inventory guidelines, page 12.

Based on the data that was available for 1990, the GHG emissions identified totaled 4,711 metric tons of CO2e, as shown in Table 3. This number is equivalent to the annual GHG emissions from 863 passenger vehicles. Looking at the scopes within the table, emissions generated from natural gas and fuel sources contributed 24% (scope 1 total) to the total emissions. Emissions emitted from electricity use accounted for 52.3% (scope 2 total). The smallest portion of emissions came from a combination of employee commuting, contract service vehicles, and waste at 23.9% (scope 3 total). The City of Manhattan Beach used 5,274,717 kWh of electricity costing an estimated $372,904. In this same year, the City consumed 65,683 therms of natural gas.

Table 3. Municipal Inventory Summary 1990[26]

Manhattan Beach Municipal GHG Emissions 1990						
Sector	**MT CO_2e**	**Percent CO_2e (% CO_2e)**	**Source**	**Energy/Fuel Use**	**Energy/Fuel Use Cost**	**Energy Equivalent** (MMBtu)
Scope 1 Emissions						
Buildings & Facilities						
Buildings & Facilities	103	2.2%	Natural Gas	19,118 therms	n/a	1,912
City Vehicle Fleet						
City Vehicle Fleet	**785**	16.7%	-	-		**10,763**
	656		Gasoline (G)	72,206 gallons	n/a	8,970
	121		Diesel (D)	11,914 gallons	n/a	1,652
	8		CNG	1,405 therms	n/a	141
Streetlights & Traffic Signals						
Gas Lamps	240	5.1%	Natural Gas	45,141 therms	n/a	4,514
Water Delivery						
Pump Stations/Boosters[27]	0.1	0%	Natural Gas	19 therms	n/a	2
Total Scope 1 Emissions	**1,128.1**	**24%**	**-**	**65,683 therms** (**72,206 G** | **11,914 D**)	**-**	**17,191**
Scope 2 Emissions						
Buildings & Facilities						
Buildings & Facilities	827	17.6%	Electricity	1,760,233 kWh	$183,330	6,006
Streetlights & Traffic Signals						
Traffic Signals/Controllers	222	4.7%	Electricity	473,281 kWh	$48,790	1,615
Streetlights[28]	748	15.9%	Electricity	1,591,576 kWh	n/a	5,432
Parking Lot Lighting	86	1.8%	Electricity	184,563 kWh	$15,782	629
Other Outdoor Lighting	8	0.2%	Electricity	18,080 kWh	$2,131	62
Water Delivery						
Sprinkler/Irrigation Control	1	0%	Electricity	2,072 kWh	$1,667	7
Pump Stations/Boosters	497	10.5%	Electricity	1,057,900 kWh	$100,161	3,611
Storm Water Pumps	41	0.9%	Electricity	88,012 kWh	$10,024	300
Wastewater						
Sewage Pumps	31	0.7%	Electricity	99,000 kWh	$11,019	338
Total Scope 2 Emissions	**2,461**	**52.3%**	**-**	**5,274,717 kWh**	**$372,904**	**18,000**

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

27 For scopes 1 and 2, water pumping stations, boosters, and MWD Turnout valves have been combined in the total shown here.

28 City owned streetlights and Southern California Edison owned streetlights have been combined in the total shown here.

Scope 3 Emissions						
Employee Commute						
Employee Commute	865	18.4%	Gasoline	1,518,528 VMT	-	11,831
Vehicles—Contract Service Providers						
Contract Service Vehicles	**229**	**4.9%**	**-**	-	-	**3,135**
	82		Gasoline	9,000 gallons	n/a	1,118
	147		Diesel	14,540 gallons	n/a	2,017
Solid Waste						
Waste	28	0.6%	-	122.8 tons	n/a	n/a
Total Scope 3 Emissions	**1,122**	**23.9%**	-	**-**		**14,966**
Total Emissions[29]	**4,711**	**100%**	-	**-**	**$372,904**	**50,157**

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

B. Emissions Trends

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

Between a 15-year span from 1990 to 2005 electricity emissions have decreased by 25%. Improvements shown in buildings and facilities, traffic signals/controllers, and streetlight sub-sectors may be the result of energy efficiency technology upgrades. Natural gas use contributed 19.2% less emissions in 2005. Vehicle fleet emissions from all fuel sources increased while contract service vehicles remained the same or decreased.

Overall emissions from electricity use increased 14.3% from 2005 to 2007. The largest contributing sector was buildings and facilities. Natural gas use increased by 41.5%. Fleet vehicle emissions from gasoline and diesel fuel decreased while emissions from CNG remained the same. Fuel sources from contract service vehicles decreased while waste and employee commute emission sources increased.

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

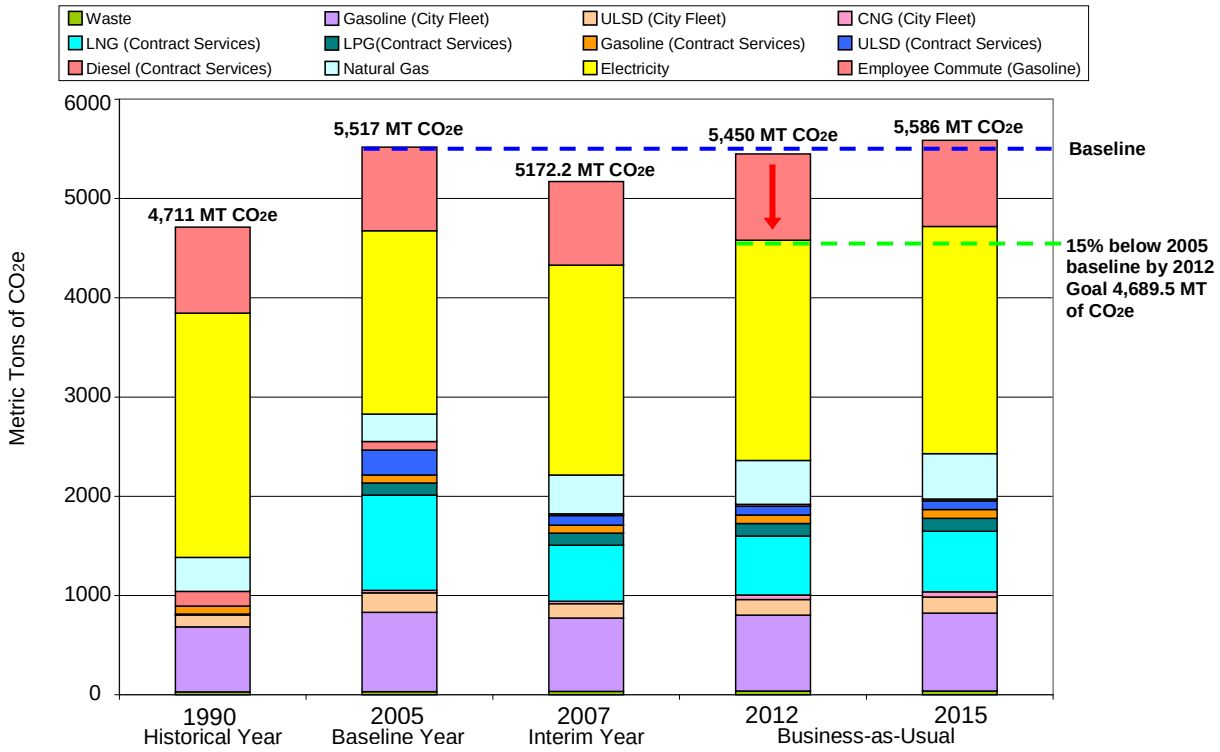
Electricity	**MTCO_2e 1990**	**MT CO_2e 2005**	**Percentage Change**	**MT CO_2e 2005**	**MT CO_2e 2007**	**Percentage Change**
Buildings & Facilities	827	684	-17.2%	684	1,044	+52.6%
Traffic Signals & Controllers	222	67	-69.8%	67	56	-16.4%
Streetlights	748	348	-53.4%	348	369	+6.0%
Parking Lot Lighting	86	158	-83.7%	158	186	+17.7%
Other Outdoor Lighting	8	8	-	8	5	-37.5%
Sprinkler/Irrigation Control	1	32	+3100%	32	33	+3.1%
Pump Stations/Boosters	497	497	-	497	376	-24.3%
Storm Water Pumps	41	19	-53.6%	19	9	-52.6%
Sewage Pumps	31	35	+13%	35	36	+2.8%
Total	**2,461**	**1,848**	**-25%**	**1,848**	**2,114**	**+14.3%**
Natural Gas						
Buildings & Facilities	103	121	-17.4%	121	234	+93.3%
Natural Gas Lamps	240	155	-35.4%	155	158	+2%
Pump Stations/Boosters	0.1	1	+900%	1	0.2	-800%
Total	**343.1**	**277**	**-19.2%**	**277**	**392.2**	**+41.5%**
Fuel						
Gasoline, City Vehicle Fleet	656	800	+22%	800	737	-7.8%
Diesel, City Vehicle Fleet	121	196	+62%	196	146	-25.5%
CNG, City Vehicle Fleet	8	25	+212%	25	25	-
Gasoline, Contract Services	82	82	-	82	82	-
Diesel, Contract Services	147	86	-41.4%	86	18	-79%
ULSD, Contract Services	-	250	-	250	95	-62%
LPG, Contract Services	-	121	-	121	121	-
LNG, Contract Services	-	960	-	960	564	-41.2%
Gasoline, Employee Commute	865	841	-2.7%	841	843	+0.2%
Waste						
Waste Management	28	31	+10.7%	31	35	+13%

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 5,450 metric tons of CO_2e by 2012 and 5,586 metric tons of CO_2e by 2015. Several indicators are taken into consideration for predicting anticipated emissions growth, such as, energy usage trends between the baseline year and the interim year (where possible historical year data is taken into account), assumptions about future energy consumption based on the expansion of municipal facilities and operations, new programs that may increase the use of energy, and any anticipated increase in municipal staff. By developing a business-as-usual forecast of emissions, the City can identify a target year to reduce emissions and develop the appropriate measures and policies to target specific areas.

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 15% 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 15% below 2005 levels the goal would be to reduce emissions to 4,689.5 metric tons of CO_2e.

Figure 7. Business-as-Usual Forecast[30]



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

IV. Summary of Measures and Policies

There are a variety of ways in which the City of Manhattan 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

The City of Manhattan Beach is committed to energy conservation in all of its facilities and structures, as well as in its daily operations. These facilities include parks and recreation buildings, fire and police stations, parking structures, sewer lift stations, public works yard, wells, pump houses, and general civic office space.

Energy Audit: In 1995, Manhattan Beach undertook its first major step towards citywide energy conservation by employing the services of Honeywell to analyze all City facilities, and develop a performance based proposal to retrofit or replace less energy efficient equipment. The comprehensive study included analyses of electrical and natural gas bills, existing lighting, motorized equipment, and heating and ventilation equipment. The City is now under going a Level III Energy Audit with PE Consulting. The audit will include detailed anticipated carbon emission offsets, cost per ton to achieve these offsets, strategies to implement retrofits or new construction, and recommendations regarding prioritizing energy conservation measures (ECMs).

Fee waiver for solar power installation: In March, 2008 the City approved the initial waiver of solar permit fees. In 2007, before the waiver was in place, the City issued 13 permits; in 2008, following the waiver, the City issued 34 permits. The fees charged average $648 per project, and the value for the permits issued in 2008 was approximately $22,000. After a one-year review period, the permit fee waiver appeared to be an effective incentive to promote sustainable building. In February 2009, City Council voted to extend the plan check and permit fee waiver for solar panel installation indefinitely.

Lighting retrofit: Where practical, existing lighting fixtures were retrofitted from the older T-12 fluorescent lamps and magnetic ballasts to the then new T-8 fluorescent lamps and electronic ballasts. Specular reflectors (chromed grates) were also installed to further enhance light distribution. Where retrofitting was not an option, light fixtures were replaced in their entirety. Incandescent fixtures, whether for perimeter, interior, or security lighting, were also replaced with compact fluorescents or high intensity discharge (HID) lamps, such as high pressure sodium (HPS) lamping.

Efficient Street Lighting: The City is illuminated at night by approximately 1,800 Edison streetlights and 700 City streetlights. An additional 200 Los Angeles County streetlights are located at signalized intersections to provide traffic safety lighting. There are also approximately 115 natural gas lamps operating in a specialized district in the City. Although the majority of the City's streetlights are owned and operated by SCE, Manhattan Beach is billed for their electricity usage on an averaged annualized basis. The City applied for stimulus grant funding to replace existing City-owned streetlighting with energy efficient lighting. The project will reduce an estimated 3,100 metric tons of CO2e each year.

LED Traffic Signals: The City has 49 signalized intersections, some of which have been retrofitted either completely or partially from incandescent bulbs to Light Emitting Diode (LED) cluster lighting, reducing their energy usage by about 90%. The City is working with the County of Los Angeles to replace existing traffic signals with LED lighting in an effort to become more energy efficient and reduce GHG emissions.

Installing High Efficiency Motors: Variable frequency drives (VFDs) and high efficiency motors were fitted to frequently used electric motors and pumps, especially at sewer and water pumping facilities. These new motors and drives not only save energy, but because the rotation speed can be variably controlled, they allow for more exacting control schemes.

Heating and Air Conditioning system upgrades: Inefficient, aging, heating ventilation and air conditioning systems (HVAC) were replaced and/or updated. Stand alone package units (the type most familiar to homeowners), were replaced with newer units that had higher SEER ratings (seasonal energy efficiency ratio, equivalent of Energy Star ratings, specifically designated for HVAC equipment). Chiller and compressor motors were fitted with VFDs where practicable and older variable air volume boxes (VAV) were replaced with more modern and efficient models. When combined with modern direct digital controllers (DDC), HVAC control became more reliable and precise.

Building upgrades: The new Public Safety Facility employed several newer technologies to achieve energy efficiency, including design criteria specified by a by a Leadership in Energy and Environmental Design (LEED) certified architect. During the design process of the facility, Southern California Edison provided in-depth computer modeling to help the City evaluate potential energy savings while also considering other potential, unwanted impacts of the design.

B. Solid Waste and Recycling

Solid waste franchise agreement with single provider: The City has extended its contract with Waste Management until April 30, 2011, at which point a determination will be made to renew the contract or begin the bidding process. The solid waste provider services approximately 500 trash and 140 recycling containers for the City. The hauler also educates residents and businesses on the benefits of recycling through their website, mailers, and occasional visits to homes and businesses. In 2008, the City's solid waste diversion rates are as follows: Single Family Residential - 57% diversion rate; Commercial [Businesses, Multi Family, Schools, Public Containers] - 16% diversion rate; Construction & Demolition - 70+% diversion rate.

Recycled Waste: The City's recycling efforts are comprehensive and include residential curbside recycling, commercial recycling, green waste and composting, household hazardous waste collection, construction and demolition debris management, school based recycling, and education. Like solid waste, virtually all of the City's recycled waste is managed through a contract with Waste Management as is a portion of the City's public education program.

Residential Waste Collection: **3-cart service**

All green waste (grass clippings and tree trimmings) and other recycling (plastics, paper, etc.) are provided free to our residents through our refuse hauler contract. Due to the area's narrow streets, the sand section neighborhoods receive weekly manual collection services (i.e., each bin is manually dumped into a trash or recycling truck). These residents must provide their own 32-gallon gray trash containers, while Waste Management provides blue recycling and green waste containers. All other areas of the City are serviced weekly using semi-automated collection trucks and are provided a choice of 64 or 96-gallon gray, blue, and green toters (carts with wheels). In 2004, the average resident produced 820 pounds of solid landfill waste. By 2006 this volume had decreased by approximately 6.3% to 769 pounds, suggesting that recycling among residents is improving.

Commercial Waste Collection: The City's commercial waste collection program is incentive based. The size, number of trash cans, and/or cubic yard bins used and the frequency of collection for landfill disposal determine each business's waste collection rate, i.e., those businesses that produce greater amounts of landfill waste pay higher waste collection fees. However, recycling bins and collection services are provided free of charge. In 2006, each of

the City's commercial refuse accounts diverted, on average, 22,045 pounds of waste to recycling, an increase of 3,557 pounds over 2005, but still somewhat less than the City's 50% recycling goal.

Hazardous Waste: On its website, the City highlights locations and opportunities for residents and businesses to dispose of household hazardous waste (HHW), electronic waste (E-waste), and universal waste (U-waste). The City promotes the use of the S.A.F.E. Collection Center at the Hyperion Treatment Plant for hazardous materials that residents wish to dispose of. The City also co-sponsors a HHW collection event each year with the County of Los Angeles, Department of Public Works. In 2009, the City implemented a Pharmaceutical Drop-Box in its Civic Center, as well as provided Battery Collection containers in City facilities for residents to use.

C. Sustainable Development

Environmentally Friendly City Facilities

The new Police and Fire Facility, recently completed in 2006 earned LEED credits for various aspects of its design which used high efficiency lighting, high performance glazing, skylights, integrated daylighting, fly ash cement, and drought-tolerant landscaping. In late 2005, the City's vibrant downtown business district was expanded to include the new Metlox Town Square and 460 space subterranean public parking structure. As a mixed-use development with centralized parking that services not only the Metlox project, but the entire Downtown, the project promotes a pedestrian friendly environment, encouraging residents and visitors to park and walk throughout the Downtown area.

Residential & Commercial Environmentally Friendly Development Practices

The City has several programs and policies in place that either encourage or mandate the implementation of environmentally friendly practices for new and remodel development projects. These include recycling construction debris, preparing homes for solar water heating, complying with the California Energy Code, installing permeable driveways, recycling car wash water, creating pedestrian friendly walkways, and embracing other design guidelines.

- **Construction Debris Recycling**

  Currently, under the City's Construction and Demolition Ordinance, builders must provide verification of recycling debris to achieve or exceed our goal to reuse or recycle at least 50% of project waste.

- **Solar Water Heating**

  The Municipal Code currently requires solar water heater plumbing stub outs for new homes in order to accommodate future solar panels.

D. Urban Forests

Manhattan Beach currently employs many sustainable maintenance practices in its more than 100 acres of parks and open space. Additionally, Manhattan Beach maintains the pier and plays a supporting role in maintaining the 2.1 miles of adjacent County beaches; combined these locations drew an estimated 5.3 million people in 2006. The West Basin Water Reclamation Facility constructed and supplied points of connection for reclaimed water throughout Manhattan Beach starting in 1994. Several of the City's larger parks, school grounds and facilities, totaling more than 77 acres, have been converted to reclaimed water use based on the distance and costs involved in pipeline installation. The City also maintains several areas of drought tolerant plants, including plantings in the downtown district that can highlight the use of drought tolerants to residents. The Manhattan Beach Botanical Garden also works with the City to provide several free educational classes to residents on drought tolerant planting and composting.

E. Storm Water Management

Manhattan Beach has 24.1 miles of storm drains within its jurisdiction. Many of the City's largest storm drain lines (8.5 miles) are owned and operated by the Los Angeles County Department of Public Works (LAC DPW), while the City owns and maintains the remaining 15.6 miles of smaller storm drains, and all 505 associated catch basins. The City actively participates in the National Pollutant Discharge Elimination System (NPDES) requirements. As required by the municipal NPDES permit, Manhattan Beach has implemented many measures to control polluted runoff from reaching the ocean. In addition, the Community Development Department has been working with the Green Building subcommittee of the Environmental Task Force to develop measures to reduce impervious surface area on construction projects that will be included in the Municipal Building Code.

F. Water Usage and Conservation

The City of Manhattan Beach operates its own water utility and provides nearly six million gallons of water per day to meet the needs of its total residential, commercial and open space demand. The City's water supply includes a combination of potable (96.4%) and non-potable (3.6%) water. The majority of the potable water used, nearly 84%, is supplied by the Metropolitan Water District (MWD), while two City wells supply the balance.

Water Conservation Ordinance: In early 2009, the City adopted an update to its existing Water Conservation Ordinance. The ordinances places restrictions, such as limited watering hours, on residents and businesses, as well as additional restrictions for different drought response levels. The conservation ordinance has been received with success by the City's residents. For the months of July and August, the City has seen a 24% reduction in water production when compared to the five-year average for those months. The City is proud of its residents for adhering to the conservation ordinance and making an effort to change their habits to save this precious resource.

G. Vehicle Fleet and City-Contracted Service

Purchasing Fuel-Efficient Vehicles: Currently, the City's fleet includes twenty-two alternative fuel or hybrid vehicles, not including police and fire vehicles. Fifty-five vehicles in the City's fleet are eligible for replacement with a low-emission vehicle. During its replacement cycle, each vehicle is evaluated with fuel economy in mind while also considering the needs of the end user. For example, whenever feasible, maintenance vehicles are purchased with CNG powered engines. The City's fuel efficient fleet includes twelve compressed natural gas (CNG) fueled vehicles (including a CNG Dial-a-Ride bus as well as a CNG maintenance patch truck), five hybrid vehicles, two electric vehicles, and three propane vehicles. The Fire Chief drives a hybrid vehicle, and the Police Department maintains five hybrids and one electric vehicle, including a hybrid vehicle driven by the Police Chief.

- **Fuel-Efficient City-Contracted Service Providers**: The fuel consumption of the City's contract service providers is included in our emissions analysis. This includes Waste Management for trash & recycling, CleanStreet for street sweeping, and Tru Green for landscaping. Ultra Low Sulfur Diesel and Propane were consistently used by the City's service providers in an effort to reduce GHG emissions from their vehicle fleets.

H. Education and Outreach

The City has an extensive and varied public education program highlighting its many environmental efforts. One of the most visible of these efforts is the 19-member resident based Environmental Task Force. The Task Force is arranged into four subcommittees focusing on: Climate Action, Green Building, Solid Waste and Recycling, and Water Conservation and Storm Water Management. The subcommittees meet monthly and then bring their ideas to the entire Task Force during monthly public meetings. The Task Force holds monthly public meetings to discuss priority environmental issues, solicit feedback from the public, and develop recommendations to make to City Council. To date the Task Force has developed and brought forward the Water Conservation Ordinance and the Sustainable Building Standards Ordinance. The Task Force is currently developing other sustainable building measures to include in the City's Building Code, as well as water conservation measures to improve landscaping and the reduction of impervious surfaces. The Task Force will also work with the City's residents and businesses to develop a solid waste reduction goal, and is working on energy efficiency outreach programs.

The City actively participates in promoting the programs of local partners, such as the water conservation programs offered by West Basin and the Metropolitan Water District of Southern California, including high efficiency toilet exchanges, free landscape audits and irrigation controllers, and free water brooms. The City also partners with Los Angeles County to hold an annual hazardous waste round-up at City Hall. To promote the importance of maintaining the quality of our marine environment, the City implements a multi-faceted public education program to inform residents and businesses of how they can partner with the City in pollution prevention. The City also hosted a Reusable Bay Giveaway to encourage residents to bring their own reusable shopping bags with them to prevent plastic bags from ending up in the ocean.

Appendix A—Greenhouse Gas Municipal Inventory Details

A. Greenhouse Gas Report 2005—Baseline Year

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

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

GHG Emissions Summary (All Units in Metric Tons)

Buildings & Other Facilities					
Scope 1		CO_2e	CO_2	CH_4	N_2O
	Stationary Combustion	**121**	**275**	**0.02598**	**0.00052**
Scope 2	Purchased Electricity	**684**	**1955**	**0.15197**	**0.07284**

Streetlights and Traffic Signals					
Scope 1		CO_2e	CO_2	CH_4	N_2O
	Stationary Combustion	**155**	**154**	**0.01459**	**0.00029**
Scope 2	Purchased Electricity	**581**	**577**	**0.02516**	**0.00954**

Water Delivery					
Scope 1		CO_2e	CO_2	CH_4	N_2O
	Stationary Combustion	**1**	**0.63140**	**0.00005**	**0.00000**
Scope 2	Purchased Electricity	**548**	**545**	**0.02377**	**0.00900**

Wastewater					
Scope 2		CO_2e	CO_2	CH_4	N_2O
	Purchased Electricity	**35**	**34**	**0.00151**	**0.00057**

Vehicle Fleet					
Scope 1		CO_2e	CO_2	CH_4	N_2O
	Mobile Combustion	**1,021**	**1000**	**0.09639**	**0.06110**
Scope 3	**Contract Services**				
	Clean Street	**189**	**182**	**0.00820**	**0.02137**
	Tru Green	**100**	**97**	**0.00429**	**0.00614**
	Waste Management	**1,210**	**1135**	**1.53605**	**0.13740**

Solid Waste					
Scope 3		CO_2e	CO_2	CH_4	N_2O
	Contract Services				
	Waste Management	**31**	**31**	**1.46828**	**-**

Employee Commute					
Scope 3		CO_2e	CO_2	CH_4	N_2O
	Employee Commute	**841**	**821**	**0.05191**	**0.05925**

Total Emissions					
		CO_2e	CO_2	CH_4	N_2O
	Scope 1	**1,298**	**1275**	**0.12237**	**0.06162**
	Scope 2	**1,848**	**1836**	**0.08005**	**0.03034**
	Scope 3	**2,371**	**2268**	**3.06872**	**0.22416**

B. Greenhouse Gas Report 2007— Interim Year

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

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

GHG Emissions Summary (All Units in Metric Tons)

Buildings & Other Facilities					
Scope 1		CO_2e	CO_2	CH_4	N_2O
	Stationary Combustion	**234**	**234**	**0.02212**	**0.00044**
Scope 2	Purchased Electricity	**1044**	**1037**	**0.04693**	**0.01780**

Streetlights and Traffic Signals					
Scope 1		CO_2e	CO_2	CH_4	N_2O
	Stationary Combustion	**158**	**157**	**0.22581**	**0.058317**
Scope 2	Purchased Electricity	**616**	**611**	**0.02765**	**0.01049**

Water Delivery					
Scope 1		CO_2e	CO_2	CH_4	N_2O
	Stationary Combustion	**0.2**	**0.19102**	**0.00002**	**0.00000**
Scope 2	Purchased Electricity	**418**	**415**	**0.01880**	**0.00712**

Wastewater					
Scope 2		CO_2e	CO_2	CH_4	N_2O
	Purchased Electricity	**36**	**35**	**0.00162**	**0.00061**

Vehicle Fleet					
Scope 1		CO_2e	CO_2	CH_4	N_2O
	Mobile Combustion	**908**	**891**	**0.07602**	**0.04832**
Scope 3	**Contract Services**				
	Clean Street	**121**	**114**	**0.00798**	**0.02116**
	Tru Green	**100**	**97**	**0.00396**	**0.00546**
	Waste Management	**659**	**614**	**0.90181**	**0.08053**

Solid Waste					
Scope 3		CO_2e	CO_2	CH_4	N_2O
	Contract Services				
	Waste Management	**35**	**35**	**1.68108**	**-**

Employee Commute					
Scope 3		CO_2e	CO_2	CH_4	N_2O
	Employee Commute	**843**	**825**	**0.04944**	**0.05229**

Total Emissions					
		CO_2e	CO_2	CH_4	N_2O
	Scope 1	**1300.2**	**1282**	**0.32397**	**0.10707**
	Scope 2	**2114**	**2098**	**0.09500**	**0.03602**
	Scope 3	**1758**	**1685**	**2.64427**	**0.15944**

C. Greenhouse Gas Report 1990—Historical Year

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

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

GHG Emissions Summary (All Units in Metric Tons)

Buildings & Other Facilities					
Scope 1		CO_2e	CO_2	CH_4	N_2O
	Stationary Combustion	**103**	**101**	**0.00956**	**0.00091**
Scope 2	Purchased Electricity	**827**	**823**	**0.03194**	**0.01118**

Streetlights and Traffic Signals					
Scope 1		CO_2e	CO_2	CH_4	N_2O
	Stationary Combustion	**240**	**239**	**0.02257**	**0.00045**
Scope 2	Purchased Electricity	**1064**	**1060**	**0.04114**	**0.01440**

Water Delivery					
Scope 1		CO_2e	CO_2	CH_4	N_2O
	Stationary Combustion	**0.1**	**0.10081**	**0.10107**	**0.00000**
Scope 2	Purchased Electricity	**539**	**537**	**0.02084**	**0.00729**

Wastewater					
Scope 2		CO_2e	CO_2	CH_4	N_2O
	Purchased Electricity	**31**	**30**	**0.00130**	**0.00049**

Vehicle Fleet					
Scope 1		CO_2e	CO_2	CH_4	N_2O
	Mobile Combustion	**785**	**764**	**0.07373**	**0.06355**
Scope 3	**Contract Services**				
	Clean Street	**61**	**60**	**0.00019**	**0.00018**
	Landscape West	**100**	**97**	**0.00595**	**0.00886**
	Waste Management	**68**	**68**	**0.00022**	**0.00022**

Solid Waste					
Scope 3		CO_2e	CO_2	CH_4	N_2O
	Contract Services				
	Waste Management	**28**	**28**	**1.31035**	**-**

Employee Commute					
Scope 3		CO_2e	CO_2	CH_4	N_2O
	Employee Commute	**865**	**838**	**0.07646**	**0.08158**

Total Emissions					
		CO_2e	CO_2	CH_4	N_2O
	Scope 1	**1281.1**	**1104**	**0.20693**	**0.06491**
	Scope 2	**2461**	**2451**	**0.09522**	**0.03336**
	Scope 3	**1122**	**1091**	**1.39317**	**0.00926**

Appendix B—Activity Data Disclosure

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

A. Buildings & Other Facilities

Scope 1 Stationary Combustion

Description:	**Recommended Method**
Consumption data was obtained from Southern California Gas Company. Southern California Gas no longer possesses official customer records going back to 1990 due to document retention policies. SoCalGas located some records that go back to 1990 which was the basis for the gas information provided for 1990.	Known Natural Gas use
Reference: Noreen Chambers, Account Executive (562) 803-7480 phone NChambers@semprautilities.com	

Scope 2 Purchased Electricity

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

B. Street Lighting and Traffic Signals

Scope 2 Purchased Electricity

Description:	**Recommended Method**
Consumption data was obtained from Southern California Edison. Note: Accounts owned by SCE were included but recorded separately. In 1990 Street lighting figures have been estimated, based on billing history from John Haddon.	Known electricity use
Reference: Larry Sutton, Account Executive, Southern California Edison, 714-973-5660 PAX 52660 Maya R. Aubrey, Analyst-Program/Project, Southern California Edison, (909) 357-6536 PAX 16036, Maya.Aubrey@sce.com.	

C. Water Delivery and Wastewater

Scope 2 Purchased Electricity

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

D. Vehicle Fleet

Scope 1 Mobile Combustion

Description:	**Recommended Method**
City fleet data provided from the RTA Fleet Management Software. Fuel data provided from the City's fuel purchase log. 1999 data used for Fuel usage. No earlier data exists about fuel usage or vehicle fleet.	Accounts payable and department records
Reference: Data was provided by Guy Mescheder, Equipment Maintenance Supervisor, 310-802-5330 gmescheder@citymb.info	

E. Solid Waste Facilities

Scope 3 Waste Related

Description:
Ms. Janetzke provided landfill information. Since 2004, El Sobrante Landfill has operated 3 gas-to-energy generators that transform landfill gas into energy. By converting waste gas into energy, El Sobrante Landfill is managing its waste in a more effective and efficient manner. The landfill gas is collected and processed in an environmentally responsible way and provides electricity, which would otherwise come from the use of fossil fuels. El Sobrante Landfill generates approximately 3.84 megawatts of electricity, which is then fed directly into the local Southern California Edison grid where it is used to meet the power demands of approximately 6,000 local homes a year. There was an estimated 95% methane recovery at the landfill where the waste was taken. Solid Waste Characterization was obtain from the California Integrated Waste Management Board http://www.ciwmb.ca.gov/wastechar/BizGrpCp.asp
Reference: Crystal Janetzke, Waste Management 310-522-6593

F. Other Scope 3 Emissions

Scope 3 Emissions From Contracted Services

Description: Waste Management, Vehicle Fleet Vicki Whipple provided information on vehicle type, number of vehicles, fuel quantity, and fuel cost for the Waste Management vehicles that operate within the City's boundaries.
Reference: Vickie Whipple, Waste Management VWippel@wm.com

Description: TruGreen, Vehicle Fleet Sandra Aguilar provided vehicle descriptions, fuel quantity, and number of vehicles that operate within the City's boundaries. Landscape West was the City's provider in 1990 and estimated data was used.
Reference: Sandra Aguilar, Office Manager 310 864-6245 Sandra_Aguilar@landcare.com

Description: Clean Street, Vehicle Fleet Andrew Jacoby provided vehicle descriptions, fuel quantity, and number of vehicles that operate within the City's boundaries.
Reference: Andrew Jacoby, ajacoby@cleanstreet.com

Scope 3 Employee Commute

Description: Employee commute results were determined by conducting a survey of employee commute distance, mode and frequency for the years 2007 and 2005. For 1990, employee data was obtained through a combination of personnel records and interviews with current staff members who were employed by the City in 1990.
Reference: Julie Dahlgren, Management Analyst, (310) 802-5118 jdahlgren@citymb.info

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.[31] In compliance with the LGOP and ICLEI program reporting requirements listed below and organized by scope are descriptions of computational methods and emission factors used to arrive at the equivalent GHG emissions. Indicated in the top right corner is the method used and whether it is considered to be a recommended or alternate method based on the LGOP standards. In this way, the City will be able to improve its data collection where an alternative method is listed. It is important to note that scope 3 emissions are considered optional reporting.

A. Scope 1 Stationary Combustion

Description of Computational Method:	**Recommended Method**
Table G.1 of the LGOP, Default factors for CO2 emissions, pg. 170 and Table G.3 of the LGOP, Default CH4 and N2O emissions factors by fuel type and sector, pg. 172. 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	Default emission factors, Table G.1 and Table G.3 of the LGOP
Reference: Data was provided by Noreen Chambers, Account Executive (562) 803-7480 phone NChambers@semprautilities.com	

B. Scope 1 Mobile Combustion

Description of Computational Method:	**Alternative Method**
Alternate Emissions Factors were used based on Table G.13 of the LGOP, Alternate Methodology for Highway Vehicles by Inventory Year, pg. 180.	Alternative emissions factors, Table G.13 of the LGOP
Reference: Data was provided by Sona Kalapura, Environmental Programs Manager, 310 802-5058	

C. Scope 2 Purchased Electricity

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

D. Scope 3 Waste Related Emissions

Description:
The 2005 estimates based on FT of 269 + PT of 150, for a total of 419 employees. The waste estimate was calculated by multiplying the full-time personnel and the 0.4 tons/employee/year = 137.6 tons

The 2007 estimate is based on 273 full time and 150 part time employees and a CIWMB .4 tons waste/employee/year = 139.2 tons

1990 waste data was estimated based on a full-time staff of 238 and a part-time staff of 138. And a CIWMB disposal

31 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.

rate for Public Administration employees is 0.4 tons/employee/year= 123 tons of waste.

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

Reference: Sona Kalapura, Environmental Programs Manager, 310 802-5058

E. Scope 3 Employee Commute

Description of Computational Method:	**Alternative Method**
Alternate Emissions Factors were used based on Table G.13 of the LGOP, Alternate Methodology for Highway Vehicles by Inventory Year, pg. 180.	Alternative emissions factors, Table G.13, LGOP

Reference: Sona Kalapura, Environmental Programs Manager, 310 802-5058

F. Other Scope 3 Emissions

Description: TruGreen, Vehicle Fleet
Alternate Emissions Factors were used based on Table G.13
of the LGOP, Alternate Methodology for Highway Vehicles by Inventory Year, pg. 180.
Light Trucks Alt Method was used to quantify emissions.

Reference: Sandra Aguilar, Office Manager 310 864-6245 Sandra_Aguilar@landcare.com

Description: Clean Street, Vehicle Fleet
Alternate Emissions Factors were used based on Table G.13
of the LGOP, Alternate Methodology for Highway Vehicles by Inventory Year, pg. 180.
Clean Street was not the City's service provider in 1990.
Heavy Duty Vehicles and Heavy trucks was used to quantify emissions.

Reference: Andrew Jacoby, ajacoby@cleanstreet.com

Description: Waste Management, Vehicle Fleet
Alternate Emissions Factors were used based on Table G.13
of the LGOP, Alternate Methodology for Highway Vehicles by Inventory Year, pg. 180.
Clean Street was not the City's service provider in 1990.
Heavy Duty Vehicles and Heavy trucks was used to quantify emissions.

Reference: Vickie Whipple, Waste Management VWippel@wm.com

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.[32]

Sources of Emissions 2005	Source	Equiv CO_2 (tonnes)	Equiv CO_2 (%)	Equiv Energy (MMBtu)	Energy/ Fuel Use	Energy/ Fuel Use Cost ($)
Buildings and Facilities						
City Hall	Electricity	243	4.4	2730	799,920 kWh	$94,839
	Natural Gas	32	0.6	605	6,052 therms	$6,092
Creative Arts Center	Electricity	14	0.3	157	45,920 kWh	$7,924
	Natural Gas	6	0.1	104	1,038 therms	$1,279
Fire Station 1 (Temp Facility)	Electricity	13	0.3	143	41,800 kWh	$5,866
Fire Station 2	Electricity	13	0.2	144	42,204 kWh	$6,033
	Natural Gas	5	0.1	101	1,011 therms	$1,263
Joslyn Community Center	Electricity	34	0.6	379	111,000 kWh	$15,681
	Natural Gas	11	0.2	200	1,997 therms	$2,378
Post Office Annex/Chamber of Commerce	Electricity	18	0.3	205	60,120 kWh	$8,491
	Natural Gas	0	0	6	61 therms	$189
Public Works Yard	Electricity	55	1	621	181,920 kWh	$24,350
	Natural Gas	50	0.9	940	9401 therms	$9,551
Police (Temp Facility)	Electricity	23	0.4	256	74,878 kWh	$10,320
Live Oak Park:						
Boy Scout House	Electricity	1	0	12	3,642 kWh	$660
	Natural Gas	2	0	32	322 therms	$485
Dorsey Baseball Field Lights	Electricity	11	0.3	126	36,903 kWh	$9,778
Dorsey Field	Electricity	0	0	0	108 kWh	$177
Hometown Fair	Electricity	0	0	0	99 kWh	$202
Old Recreation Building	Electricity	2	0	22	6,342 kWh	$1,022
Old Recreation Building- 2nd power	Electricity	1	0	11	3,114 kWh	$599
Pony Field Lighting	Electricity	2	0	18	5,160 kWh	$3,499
Tennis Courts Lights	Electricity	18	0.4	200	58,709 kWh	$11,450
Tennis Monitor	Electricity	14	0.3	152	44,560 kWh	$8,250

32 Source of data CACP software output.

Live Oak Park Kiln	Natural Gas	10	0.2	196	1,955 therms	$2,337
Manhattan Heights:						
Manhattan Heights Community Center	Electricity	19	0.3	217	63,520 kWh	$10,651
	Natural Gas	2	0	44	438 therms	$608
Manhattan Heights: Baseball Field Lights	Electricity	6	0.1	62	18,121 kWh	$4,819
	Natural Gas	1	0	22	217 therms	$372
Manhattan Heights: Tennis Courts Lights	Electricity	6	0.1	69	20,102 kWh	$4,523
Manhattan Village Soccer Fields	Electricity	13	0.2	141	41,280 kWh	$8,638
Marine Ave Park:						
Marine Ave Park	Electricity	33	0.8	374	109,500 kWh	$29,743
	Natural Gas	1	0	28	275 therms	$424
Marine Ave Sports Complex	Electricity	46	1.1	521	152,760 kWh	$42,473
Mira Costa Tennis Courts Lights	Electricity	15	0.3	173	50,820 kWh	$16,492
Pier:						
Pier Comfort Station	Electricity	5	0.1	57	16,614 kWh	$2,419
Pier New Electric Room	Electricity	3	0.1	36	10,560 kWh	$1,566
Pier Round House OTS	Electricity	44	0.8	497	145,530 kWh	$17,508
Pier Round House Restaurant	Electricity	7	0.1	76	22,356 kWh	$3,329
Polliwog Park:						
Polliwog Park	Electricity	17	0.3	192	56,400 kWh	$7,629
Polliwog Park Historical House	Electricity	2	0	17	4,999 kWh	$779
Premier Field Restroom Lighting	Electricity	0	0	2	680 kWh	$268
Sand Dune Park:						
Sand Dune Park Building	Electricity	3	0.1	36	10,580 kWh	$1,596
Sand Dune Area Lights	Electricity	2	0	28	8,148 kWh	$1,116
Veteran's Memorial Monument	Electricity	0	0	5	1,473 kWh	$372
Green Belt Code Blue Call Box	Electricity	0	0	1	427 kWh	$233
Streetlights & Traffic Signals						
Traffic Signals/Controllers	Electricity	67	1.6	749	219,439 kWh	$23,611
Streetlights City Owned	Electricity	70	1.3	792	231,930 kWh	$18,961

Streetlights SCE Owned	Electricity	278	6.6	3,119	914,005 kWh	$190,167
Gas Lamps	Natural Gas	155	2.8	2919	29,187 therms	$28,448
Other Outdoor Lighting:						
Begg Field Lights	Electricity	8	0.1	93	27,160 kWh	$8,433
Parking Lot Lighting:						
Parking Lot #2 Lighting	Electricity	3	0	30	8,692 kWh	$1,351
Parking Lot #3 Lighting	Electricity	31	0.6	344	100,935 kWh	$12,757
Parking Lot #4 Lighting	Electricity	7	0.1	79	23,147 kWh	$3,279
Parking Lot Lighting El Porto	Electricity	1	0	16	4,802 kWh	$821
Parking Lot Metlox	Electricity	115	2.1	1288	377,360 kWh	$44,781
Parking Lot Pier Upper South	Electricity	0	0	0	21 kWh	$178
Parking Lot Bayview/12 St	Electricity	0	0	5	1,452 kWh	$253
Parking Lot - Cultural Center	Electricity	1	0	14	4,068 kWh	$578
Water Delivery						
Sprinkler/Irrigation Control	Electricity	32	0.6	355	104,090 kWh	$12,020
Storm Water Pumps	Electricity	19	0.3	214	62,740 kWh	$9,764
Water Pump Stations/Boosters/ MWD Turnout Valve	Electricity	497	9	5584	1,635,992 kWh	$175,584
	Natural Gas	1	0.0	12	119 therms	$242
Wastewater						
SewagePumps	Electricity	35	0.8	392	114,978 kWh	$17,131
Vehicle Fleet						
City Fleet	CNG	25	0.4	423	4,228 therms	$3,734
	Gasoline	800	14.5	11028	88,778 gallons	n/a
	Diesel (ULSD)	196	3.6	2,681	19,331 gallons	n/a
Vehicle Fleet-Contract Services						
TruGreen	Diesel	18	0.3	250	1,800 gallons	n/a
	Gasoline	82	1.5	1,118	9,000 gallons	n/a
Clean Street	LPG	121	2.2	1,810	1,330 gallons	n/a
	Diesel	68	1.2	934	6,734 gallons	n/a
Waste Management	Diesel (ULSD)	250	4.5	3420	24,660 gallons	n/a
	LNG	960	17.4	11,688	198,528 gallons	n/a
Employee Commute						

Employee Commute	Gasoline	841	15.2	11589	1,736,058 VMT	n/a
Waste						
Waste Management	CO_2	31	0.6		137.6 tons of refuse	n/a
Sources:	Food Waste	4	n/a			
	Paper Products	23	n/a			
	Plant Debris	3	n/a			
	Wood/Textiles	1	n/a			

Sources of Emissions 2007	Source	Equiv CO_2 (tonnes)	Equiv CO_2 (%)	Equiv Energy (MMBtu)	Energy/ Fuel Use	Energy/ Fuel Use Cost ($)
Buildings and Facilities						
City Hall	Electricity	195	3.8	2278	667,440 kWh	$82,680
	Natural Gas	26	0.5	492	4,916 therms	$4,819
City Misc.	Electricity	2	0	26	7,485 kWh	$3,760
Creative Arts Center	Electricity	9	0.1	111	32,400 kWh	$6,229
	Natural Gas	7	0.1	139	1,394 therms	$1,687
Fire Station 2	Electricity	13	0.2	150	44,046 kWh	$6,237
	Natural Gas	7	0.1	128	1,282 therms	$1,543
Joslyn Community Center	Electricity	27	0.6	317	92,880 kWh	$14,405
	Natural Gas	10	0.2	183	1,831 therms	$2,080
Post Office Annex/Chamber of Commerce	Electricity	19	0.4	217	63,480 kWh	$8,733
	Natural Gas	0	0	6	64 therms	$195
Public Works Yard	Electricity	55	1.1	645	189,120 kWh	$25,965
	Natural Gas	59	1	1117	11,166 therms	$10,292
Police - 420 15th St	Natural Gas	8	0.1	159	1,589 therms	$1,887
Police and Fire Station	Electricity	453	9.6	5280	1,547,055 kWh	$190,909
	Natural Gas	92	2	1726	17,256 therms	$15,755
Live Oak Park:						
Boy Scout House	Electricity	1	0.0	7	2,029 kWh	$503
Dorsey Baseball Field Lights	Electricity	13	0.2	146	42,859 kWh	$17,230
Dorsey Field	Electricity	0	0	1	212 kWh	$220
Hometown Fair	Electricity	0	0	1	162 kWh	$258
Old Recreation Building	Electricity	1	0	15	4,302 kWh	$856

Old Recreation Building- 2nd power	Electricity	1	0	8	2,440 kWh	$566
Pony Field Lighting	Electricity	6	0.1	71	20,940 kWh	$9,681
Tennis Courts Lights	Electricity	17	0.3	202	59,268 kWh	$16,747
Tennis Monitor	Electricity	14	0.3	168	49,260 kWh	$9,512
Live Oak Park Kiln	Natural Gas	13	0.3	247	2,470 therms	$2,691
Kiln - 1200 Morningside	Natural Gas	6	0.1	122	1,218 therms	$926
Manhattan Heights:						
Manhattan Heights Community Center	Electricity	18	0.3	205	59,920 kWh	$10,701
	Natural Gas	2	0	42	419 therms	$571
Manhattan Heights: Baseball Field Lights	Electricity	4	0.1	47	13,900 kWh	$7,663
	Natural Gas	2	0	30	295 therms	$443
Manhattan Heights: Tennis Courts Lights	Electricity	5	0.1	58	16,966 kWh	$6,568
Manhattan Village Soccer Fields	Electricity	11	0.2	134	39,240 kWh	$9,175
Marine Ave Park:						
Marine Ave Park	Electricity	29	0.6	334	97,980 kWh	$30,966
	Natural Gas	2	0	33	331 therms	$476
Marine Ave Sports Complex	Electricity	42	0.8	490	143,580 kWh	$43,613
Mira Costa Tennis Courts Lights	Electricity	15	0.3	172	50,520 kWh	$17,654
Pier:						
Pier Comfort Station	Electricity	5	0.1	55	15,984 kWh	$2,700
Pier New Electric Room	Electricity	4	0.1	48	14,100 kWh	$2,383
Pier Round House	Electricity	46	0.9	535	156,888 kWh	$19,097
Pier Round House Restaurant	Electricity	5	0.1	53	15,444 kWh	$2,621
Polliwog Park:						
Polliwog Park	Electricity	29	0.6	334	97,840 kWh	$12,432
Polliwog Park Historical House	Electricity	2	0	23	6,636 kWh	$1,217
Premier Field Restroom Lighting	Electricity	0	0	3	836 kWh	$318
Sand Dune Park:						
Sand Dune Park /Area Lights	Electricity	3	0.1	39	11,522 kWh	$3,360
Veteran's Memorial Monument	Electricity	0	0	2	654 kWh	$288
Green Belt Code Blue Call Box	Electricity	0	0	2	537 kWh	$271

Streetlights & Traffic Signals						
Traffic Signals/Controllers	Electricity	56	1.1	650	190,378 kWh	$23,995
Streetlights City Owned	Electricity	71	1.4	833	244,150 kWh	$21,905
Streetlights SCE Owned	Electricity	298	5.8	3,469	1,016,465 kWh	$253,527
Gas Lamps	Natural Gas	158	3.0	2964	29,637 therms	$25,705
Other Outdoor Lighting:						
Begg Field Lights	Electricity	5	0.1	61	17,940 kWh	$8,410
Parking Lot Lighting:						
Parking Lot #2 Lighting	Electricity	3	0.1	31	9,032 kWh	$1,591
Parking Lot #3 Lighting	Electricity	27	0.5	312	91,413 kWh	$10,396
Parking Lot #4 Lighting	Electricity	8	0.1	90	26,451 kWh	$4,300
Parking Lot Lighting El Porto	Electricity	1	0	15	4,312 kWh	$857
Parking Lot Metlox	Electricity	147	2.8	1713	501,840 kWh	$56,662
Parking Lot Pier Upper South	Electricity	0	0	0	34 kWh	$178
Parking Lot Bayview/12 St	Electricity	0	0	0	0 kWh	$314
Parking Lot - Cultural Center	Electricity	0	0	0	0 kWh	$716
Water Delivery						
Sprinkler/Irrigation Control	Electricity	33	0.6	385	112,730 kWh	$13,729
Storm Water Pumps	Electricity	9	0.2	102	29,860 kWh	$10,406
Water Pump Stations/Boosters/ MWD Turnout Valve	Electricity	376	7.3	4386	1,285,068 kWh	$186,590
	Natural Gas	0.2	0	4	36 therms	$170
Wastewater						
Sewage Pumps	Electricity	36	0.7	421	123,224 kWh	$21,751
Vehicle Fleet						
City Fleet	CNG	25	0.5	442	4,422 therms	$3,328
	Diesel (ULSD)	146	2.8	2000	14,421 gallons	$38,584
	Gasoline	737	14.2	10183	81,971 gallons	$230,244
Vehicle Fleet-Contract Services						
TruGreen	Diesel	18	0.4	250	1,800 gallons	n/a
	Gasoline	82	1.6	1118	9,000 gallons	n/a
Clean Street	LPG	121	2.6	1,810	19,752.53 gal	n/a
Waste Management	Diesel (ULSD)	95	1.8	1,297	9,352 gallons	n/a
	LNG	564	10.9	6863	116,577 gallons	n/a

Employee Commute						
Employee Commute	Gasoline	843	16.3	11649	1,778,461.36 VMT	n/a
Waste						
Waste Management	CO_2	35	0.7		139.2 tons of refuse	n/a
Sources:	Food Waste	4	n/a			
	Paper Products	27	n/a			
	Plant Debris	4	n/a			
	Wood/Textiles	1	n/a			

Sources of Emissions 1990	**Source**	**Equiv CO_2 (tonnes)**	**Equiv CO_2 (%)**	**Equiv Energy (MMBtu)**	**Energy/ Fuel Use**	**Energy/ Fuel Use Cost ($)**
Buildings and Facilities						
City Hall	Electricity	295	6.3	2140	627,120 kWh	$58,976
Creative Arts Center	Natural Gas	10	0.2	182	1,822 therms	n/a
Fire Station 1	Electricity	49	1	354	103,640 kWh	$10,215
	Natural Gas	8	0.2	144	1,442 therms	n/a
Fire Station 2	Electricity	19	0.4	140	41,160 kWh	$4,400
	Natural Gas	7	0.1	130	1,300 therms	
Joslyn Community Center	Electricity	54	1.1	393	115,200 kWh	$13,849
	Natural Gas	4	0.1	74	742 therms	n/a
Post Office Annex/Chamber of Commerce	Electricity	23	0.5	167	48,800 kWh	$4,759
	Natural Gas	3	0.1	54	537 therms	
Public Works Yard	Electricity	87	1.8	630	184,560 kWh	$19,716
	Natural Gas	38	0.8	717	7,165 therms	
Police - 1501 PECK	Electricity	152	3.2	1105	323,840 kWh	$28,802
	Natural Gas	16	0.3	293	2,928 therms	
Natural Gas Misc.	Natural Gas	7	0.1	135	1,347 therms	n/a
Live Oak Park:						
Boy Scout House	Electricity	2	0	12	3,596 kWh	$511
	Natural Gas	1	0	14	141 therms	n/a
Old Recreation Building- 2nd power	Electricity	8	0.2	61	17,868 kWh	$2,103
Pony Field Lighting	Electricity	6	0.1	44	12,760 kWh	$1,538
Kiln - 1901 N. Valley	Natural Gas	2	0	34	343 therms	n/a
Manhattan Heights:						

Manhattan Heights Community Center	Electricity	33	0.7	242	70,800 kWh	$7,180
	Natural Gas	5	0.1	99	992 therms	n/a
Manhattan Heights: Baseball Field	Natural Gas	0	0	7	71 therms	n/a
Manhattan Village Soccer Fields	Electricity	13	0.3	95	27,940 kWh	$4,997
Marine Ave Park:						
Marine Ave Park	Electricity	38	0.8	277	81,300 kWh	$14,505
	Natural Gas	2	0	29	288 therms	n/a
Polliwog Park:						
Polliwog Park	Electricity	44	0.9	318	93,120 kWh	$10,507
Polliwog Park Historical House	Electricity	3	0.1	21	6,292 kWh	$812
Premier Field Restroom Lighting	Electricity	0	0	1	364 kWh	$150
Sand Dune Park:						
Sand Dune Park	Electricity	1	0	6	1,873 kWh	$309
Streetlights & Traffic Signals						
Traffic Signals/Controllers	Electricity	222	4.7	1615	473,281 kWh	$48,790
Streetlights City & SCE	Electricity	748	15.9	5432	1,591,576 kWh	n/a
Gas Lamps	Natural Gas	240	5.1	4514	45,141 therms	n/a
Other Outdoor Lighting:						
Begg Field Lights	Electricity	8	0.2	62	18,080 kWh	$2,131
Parking Lot Lighting:						
Parking Lot #2 Lighting	Electricity	7	0.1	53	15,506 kWh	$1,839
Parking Lot #3 Lighting	Electricity	64	1.4	467	136,962 kWh	$10,526
Parking Lot #4 Lighting	Electricity	12	0.2	89	26,186 kWh	$2,648
Parking Lot Lighting El Porto	Electricity	3	0.1	20	5,909 kWh	$769
Water Delivery						
Sprinkler/Irrigation Control	Electricity	1	0	7	2,072 kWh	$1,667
Storm Water Pumps	Electricity	41	0.9	300	88,012 kWh	$10,024
Water Pump Stations/Boosters/ MWD Turnout Valve	Electricity	497	10.5	3611	1,057,900 kWh	$100,161
	Natural Gas	0	0	2	19 therms	n/a
Wastewater						

Sewage Pumps	Electricity	31	0.7	338	99,000 kWh	$11,019
Vehicle Fleet						
City Fleet	CNG	8	0.2	141	1,405 therms	n/a
	Gasoline	656	13.9	8970	72,206 gallons	n/a
	Diesel	121	2.6	1,652	11,914 gallons	n/a
Vehicle Fleet-Contract Services						
Clean Street	Diesel	61	1.3	832	6,000 gallons	n/a
Landscape West	Gasoline	82	1.7	1,118	9,000 gallons	n/a
	Diesel	18	0.4	250	1,800 gallons	n/a
Waste Management	Diesel	68	1.5	935	6,740 gallons	n/a
Employee Commute						
Employee Commute	Gasoline	865	18.4	11,831	1,518,528 VMT	n/a
Waste						
Waste Management	CO_2	28	0.6		122.8 tons of refuse	
Sources:	Food Waste	3	n/a			
	Paper Products	20	n/a			
	Plant Debris	3	n/a			
	Wood/Textiles	1	n/a			

Criteria Air Pollutants[33]

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.[34] 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	2,377	1,346	1,362	163	1,110
Streetlights & Traffic Signals	2,186	1,151	1,201	148	949
Water Delivery	1,600	1,066	1,013	114	880
Wastewater	102	68	65	7	56
Vehicle Fleet	17,071	386	72,770	8,051	571
Employee Commute	5,645	302	60,550	6,209	130
Total	28,981	4,319	136,960	14,692	3,696

Criteria Air Pollutants 2007	NOx (lbs)	SOx (lbs)	CO (lbs)	VOC (lbs)	PM10 (lbs)
Building and Facilities	3,934	2,139	2,201	266	1,764
Streetlights & Traffic Signals	2,360	1,262	1,308	160	1,041
Water Delivery	1,266	844	801	90	697
Wastewater	109	73	69	8	60
Vehicle Fleet	9,043	398	64,280	7,000	338
Employee Commute	5,487	299	62,029	6,242	133
Total	22,169	5,014	130,680	13,767	4,034

Criteria Air Pollutants 1990	NOx (lbs)	SOx (lbs)	CO (lbs)	VOC (lbs)	PM10 (lbs)
Building and Facilities	1,831	1,237	1,056	128	932
Streetlights & Traffic Signals	2,703	1,607	1,449	184	1,211
Water Delivery	985	798	634	72	601
Wastewater	85	69	55	6	52
Vehicle Fleet	11,218	782	67,516	7489	551
Employee Commute	6,593	282	76,588	8,079	125
Total	23,415	4,774	147,297	15,959	3,473

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

34 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. [35]

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.

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

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

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

Appendix F—Abbreviations and Acronyms[36]

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

Appendix G—Glossary of Terms[37]

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

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

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

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

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

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