# City of Hermosa Beach

## Municipal Greenhouse Gas Emissions Inventory Report

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# City of Hermosa Beach 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 Hermosa 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 Hermosa Beach will take to reduce its impact on

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

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

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

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

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

6 See appendix F for descriptions on climate change legislation.

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

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 six Kyoto Protocol Gases. When the city conducts its re-inventory to ensure that it is inline with its emission reduction goals, the city will be able to consider producing a comprehensive report by adding data on the additional gases.

## D. Inventory Methodology

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

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

## E. Key Highlights and Findings

- The City of Hermosa Beach generated approximately 1,508 metric tons of $CO_2e$ in the baseline year, 2005; this is equivalent to the GHG emissions generated by electricity use of 209 homes for one year.[14]
- There was an overall 2.9% increase in GHG emissions between the baseline year 2005 and the interim year

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

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

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

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

12 Equivalent Carbon Dioxide (CO2e) the universal unit for comparing emissions of different GHGs expressed in terms of the GWP of one unit of carbon dioxide, Local Government Operation Protocol, Glossary.

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

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

2007. This was largely due to scope 1 natural gas and fuel sources.

- Emissions resulting from electricity use decreased 1.3% and emissions resulting from natural gas consumption increased 120.6% between the years 2005 and 2007.
- Results from the employee commute survey indicate 45.7% of respondents are interested in participating in a ridesharing program.
- Under a business-as-usual scenario, the City can expect emissions to rise to 1,632 metric tons of CO2e by 2012 that is equivalent to the annual GHG emissions from 299 passenger vehicles; and 1,666 metric tons of CO2e by 2015, equivalent to the annual GHG emissions from 305 passenger vehicles if the city does nothing to reduce its emissions.

## E. Future Steps

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

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

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

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

# II. Local Government Profile Information

## Local Government Description

Previously renowned for fields of grain and now known for its warm summers and incredible surf, Hermosa Beach is a City that has utilized its natural resources from the beginning. Now a part of The Energy Coalition, Gas Company and SCE's Community Energy Partnership, Hermosa Beach is working closely with diverse cities within the SCE territory to deliver energy savings through direct installation of energy efficiency measures, creating an educational energy curriculum taught in the 4th through 8th grades, and generating an overall awareness of an energy efficient lifestyle through events and promotions.

The City aims to serve the citizens of Hermosa Beach with pride and excellence, our city government officials and employees are dedicated to providing leadership and services that keep Hermosa Beach as one of the friendliest beach city communities.

## Local Government History

As the nineteenth incorporated city of the Los Angeles County in 1907, the City of Hermosa Beach celebrated its 100 year anniversary on January 14, 2007. The name Hermosa is a Latin word meaning "beautiful", an accurate depiction of this city bordered by Manhattan Beach to the north and Redondo Beach to the south. Situated on the Pacific Ocean, the City consists of one-and-one-half square miles with gentle western sea breezes.

The first pier was constructed entirely of wood (even to the pilings) in 1904, it extended five hundred feet out into the ocean. By 1913, the old pier was partly washed away. A new pier was built of concrete and paved with asphalt through its 1,000 feet length.

## Primary Services

| Department | Primary Services |
|---|---|
| Administration | General Administration –City Clerk, City Manager, City Council and Finance. |
| Police Department | HB Police Department provides services to maintain public safety. |
| Fire Services | Hermosa Beach Fire Department provides services with 18 fire suppression personnel. |
| Streets & Parks | HB Public Works Department provides street maintenance and operation of all city facilities and properties. This Department is also responsible for engineering services, park grounds, sewage collection and traffic control services. |
| Planning | The Community Development Department provides services on matter related to land use and development. |
| Building & Safety | The Building and Safety Division within the Community Development Department conduct building plan checks, building inspections and enforces the building codes. |
| Public Works | HB Public Works Department is responsible for operation of all city facilities and properties. This Department also provide engineering services, sewage collection and traffic control services. |
| Transit | LA County MTA (Metro) provides services along commercial corridors in the City and additional transit services is provided by the Beach Cities Transit. |

# III. Municipal Emissions Inventory Results

## A. Inventory Introduction and Results

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

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

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

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

2005

**Baseline Year**

Results from the 2005 municipal inventory represent the year chosen as a baseline year, which will serve as a foundation for setting short and long-term emissions reduction targets. For this year, there was sufficient data available to conduct an accurate inventory. It is important to keep in mind that scope 3 emissions included in the baseline year are estimates based upon information provided by contract service providers and from surveying

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 Hermosa Beach GHG emissions totaled 1,508 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 209 homes for one year. Looking at the scopes within the table, the smallest portion 11.4% (scope 1 total) were emissions generated from a combination of natural gas use for buildings and facilities and from fuels for the vehicle fleet. Emissions emitted from electricity use accounted for 45.2% (scope 2 total) of the total emissions. The second largest portion 43.3% (scope 3 total) were emissions due to a combination of employee commuting, contract service vehicles, and waste (refuse collected from City bins).

Energy/Fuel use and cost information has been listed for the purpose of planning and tracking energy measures' cost effectiveness. During 2005, City of Hermosa Beach used 2,242,628 kWh of electricity at a cost of $ 317,565. In this same year, the city consumed 5,383 therms of natural gas costing $ 4,039.

**Table 1. Municipal Inventory Summary 2005**[19]

| Hermosa 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 | 29 | 1.9% | Natural Gas | 5,383 therms | $ 4,039 | 538 |
| **City Vehicle Fleet** | | | | | | |
| City Vehicle Fleet[20] | **144** | **9.5%** | | | | **1,984** |
| | 117 | | Gasoline | 12,664.62 gal | n/a | 1,612 |
| | 26 | | Diesel | 2,583.89 gal | n/a | 358 |
| | 1 | | CNG | 111.32 gal | n/a | 14 |
| **Total Scope 1 Emissions** | **173** | **11.4%** | **-** | **-** | **$ 4,039** | **2,522** |
| | | | | | | |
| **Scope 2 Emissions** | | | | | | |
| **Buildings & Facilities** | | | | | | |
| Buildings & Facilities | 272 | 18% | Electricity | 895,746 kWh | $ 121,260 | 3,057 |
| **Streetlights & Traffic Signals** | | | | | | |
| Traffic Signals/Controllers | 39 | 2.6% | Electricity | 128,686 kWh | $ 13,720 | 439 |
| Streetlights[21] | 255 | 16.9% | Electricity | 835,651 kWh | $ 126,152 | 2,852 |
| Other Outdoor Lighting[22] | 110 | 7.3% | Electricity | 365,512 kWh | $ 53,223 | 1,238 |
| **Water Delivery** | | | | | | |
| Sprinkler/Irrigation Control | 4 | 0.3% | Electricity | 11,525 kWh | $ 2,044.70 | 39 |
| Lift Stations | 2 | 0.1% | Electricity | 5,508 kWh | $ 1,165.58 | 19 |
| **Total Scope 2 Emissions** | **682** | **45.2%** | **-** | **2,242,628 kWh** | **$ 317,565** | **7,644** |
| | | | | | | |

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

20 See appendix D, Emissions Data, to review fuel emissions per department.

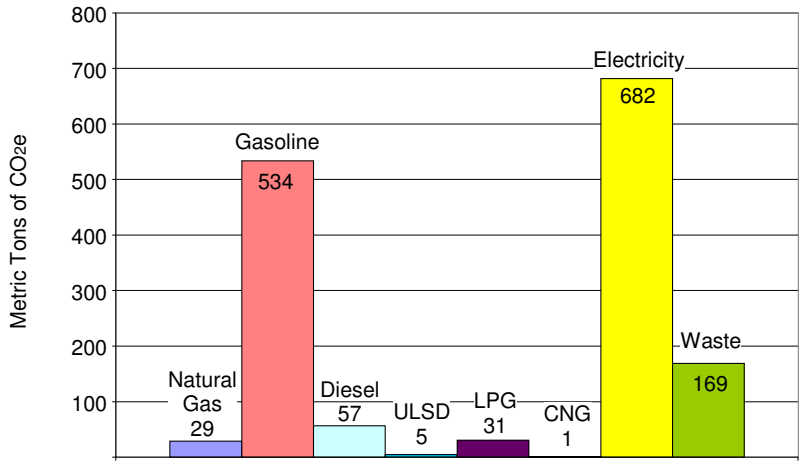
21 City owned streetlights and Southern California Edison owned streetlights have been combined in the total shown here. See appendix D, Emissions Data, to review individual emissions in the Streetlights and Traffic Signals category.

22 Parking lot lighting, Mixed Landscape, decorative lighting, and misc. lighting have been combined in the total shown here. See appendix D, Emissions Data, to review individual emissions in the Streetlights and Traffic Signals category.

| **Scope 3 Emissions** | | | | | | |
|---|---|---|---|---|---|---|
| **Employee Commute** | | | | | | |
| Employee Commute | **399** | **26.5%** | | **820,954 VMT** | n/a | **5,490** |
| | 384 | | Gasoline | 794,170 VMT | | 5,292 |
| | 10 | | Diesel | 17,856 VMT | | 132 |
| | 5 | | ULSD | 8,928 VMT | | 66 |
| **Vehicles—Contract Service Providers** | | | | | | |
| Contract Service Vehicles | **85** | **5.6%** | - | - | n/a | **1,208** |
| | 33 | | Gasoline | 3,640 gal | | 452 |
| | 21 | | Diesel | 2,057 gal | | 286 |
| | 31 | | LPG | 5,127 gal | | 470 |
| **Solid Waste** | | | | | | |
| Waste | 169 | 11.2% | - | 666.4 tons | n/a | n/a |
| **Total Scope 3 Emissions** | **653** | **43.3%** | **-** | **-** | - | **6,698** |
| **Total Emissions** | **1,508** | **100%** | - | **-** | **$ 321,604** | **16,864** |

Figure 1 illustrates emissions by source. Electricity was the highest source of emissions followed by gasoline. Waste resulted in the third largest source of emissions. It was estimated that 666.4 tons of waste generated by city operated and owned facilities was sent to a landfill. A breakdown of the waste composition can be found in appendix D, based on a solid waste characterization study for public administration from the California Integrated Waste Management Board website.

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




Figures 2 and 3 below illustrate a percentage breakdown of each sector from Table 1. ICLEI asks its members to report on scopes 1 and 2 where scope 3 is optional; therefore, data below is organized to reflect this criteria. Figure 2 shows all scopes, where as Figure 3 concentrates only on scopes 1 and 2 – functions that a city has more influence on. Figure 2 indicates 5.6% of emissions are from contract service vehicles that work within the city's boundaries, 11.2% from waste, and 26.5% 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 79.8% of emissions and scope 1 emissions from fuel and natural gas sources accounts for the remaining 20.2% of emissions.

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

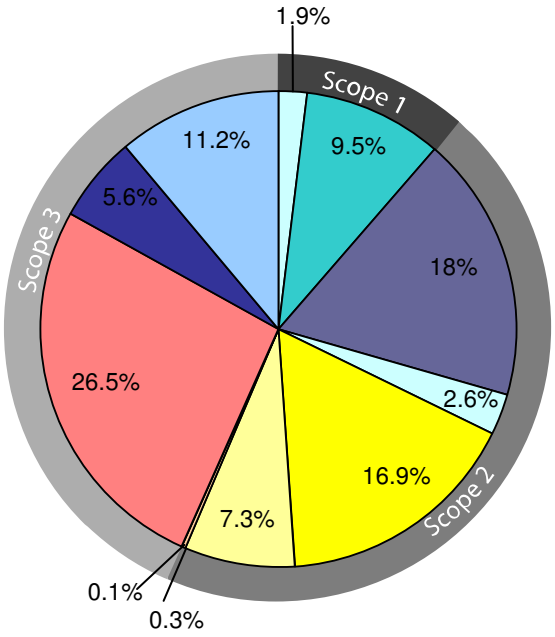
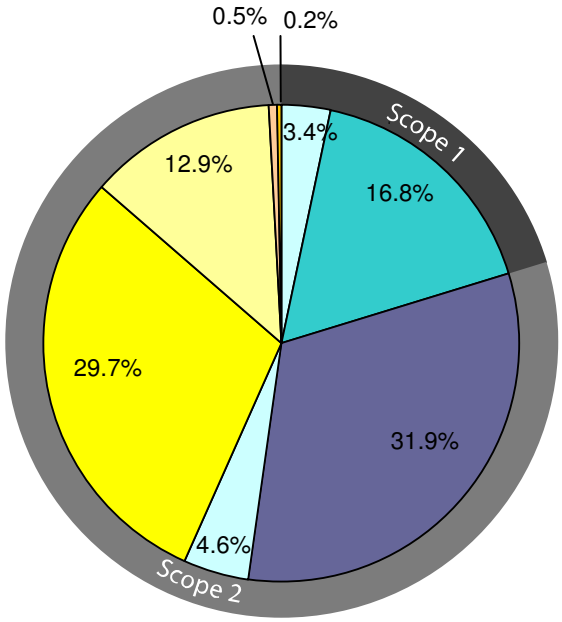
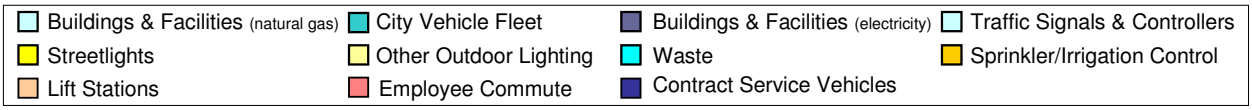



**Figure 3. Emissions by Sector 2005**
(including only direct and indirect sources from scopes 1 and 2)




2007
## Interim Year

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

In 2007, the City of Hermosa Beach GHG emissions totaled 1,552 metric tons of $CO_2e$ including both direct and indirect sources of emissions—this number is equivalent to the emissions produced from 176,163 gallons of gasoline consumed. The year 2007 represents a 2.9% increase in emissions from the baseline year. Looking at the scopes within the table, emissions generated from natural gas and fuel sources accounted for 16% (scope 1 total) of the emissions inventoried in 2007. Emissions from electricity use decreased from the baseline year contributing 43.3% (scope 2 total) to the total emissions. The second largest portion of emissions came from a combination of employee commuting, contract service vehicles, and waste at 40.7% (scope 3 total). In 2007, the City of Hermosa Beach used 2,294,368 kWh of electricity costing approximately $ 361,712. In this same year, the city consumed 11,977 therms of natural gas at a cost of $ 9,515.

**Table 2. Municipal Inventory Summary 2007**[23]

| Hermosa 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 | 64 | 4.1% | Natural Gas | 11,977 therms | $ 9,515 | 1,198 |
| **City Vehicle Fleet** | | | | | | |
| City Vehicle Fleet[24] | **184** | **11.9%** | | | | **2,536** |
| | 157 | | Gasoline | 17,406.1 gal | n/a | 2,164 |
| | 26 | | Diesel | 2,583.89 gal | n/a | 358 |
| | 1 | | CNG | 111.32 gal | n/a | 14 |
| **Total Scope 1 Emissions** | **248** | **16%** | **-** | **-** | **$ 9,515** | **3,734** |
| | | | | | | |
| **Scope 2 Emissions** | | | | | | |
| **Buildings & Facilities** | | | | | | |
| Buildings & Facilities | 273 | 17.6% | Electricity | 932,207 kWh | $ 130,940 | 3,182 |
| **Streetlights & Traffic Signals** | | | | | | |
| Traffic Signals/Controllers | 37 | 2.4% | Electricity | 125,011 kWh | $ 14,720 | 427 |
| Streetlights[25] | 244 | 15.7% | Electricity | 833,834 kWh | $ 153,937 | 2,846 |
| Other Outdoor Lighting[26] | 118 | 7.6% | Electricity | 401,604 kWh | $ 60,914 | 1371 |
| **Water Delivery** | | | | | | |
| Sprinkler/Irrigation Control | 0.7 | 0.0% | Electricity | 255 kWh | $ 604 | 1 |
| Lift Stations | 0.3 | 0.0% | Electricity | 1,457 kWh | $ 597 | 5 |
| **Total Scope 2 Emissions** | **673** | **43.3%** | **-** | **2,294,368 kWh** | **$ 361,712** | **7,832** |
| | | | | | | |
| **Scope 3 Emissions** | | | | | | |
| **Employee Commute** | | | | | | |
| Employee Commute | **379** | **24.4%** | | **795,907 VMT** | n/a | **5,232** |
| | 360 | | Gasoline | 760,056 VMT | | 4,970 |
| | 14 | | Diesel | 26,923.5 VMT | | 197 |
| | 5 | | ULSD | 8,928 VMT | | 65 |
| **Vehicles—Contract Service Providers** | | | | | | |
| Contract Service Vehicles | **85** | **5.5%** | - | - | n/a | **1,208** |
| | 33 | | Gasoline | 3,640 gal | | 452 |
| | 21 | | Diesel | 2,057 gal | | 286 |
| | 31 | | LPG | 5,127 gal | | 470 |
| **Solid Waste** | | | | | | |
| Waste | 167 | 10.8% | - | 659.7 tons | n/a | n/a |
| **Total Scope 3 Emissions** | **631** | **40.7%** | **-** | **-** | - | **6,531** |
| **Total Emissions** | **1,552** | **100%** | - | **-** | **$ 371,227** | **137,672** |

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

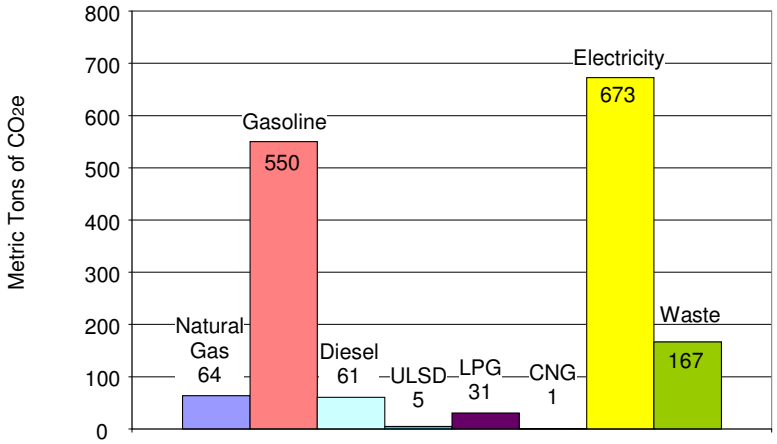
24 See appendix D, Emissions Data, to review fuel emissions per department.

25 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.

26 Parking lot lighting, Mixed Landscape, decorative lighting, and misc. lighting have been combined in the total shown here. See appendix D, Emissions Data, to review individual emissions in the Streetlights and Traffic Signals category.

Figure 4 shows an increase in emissions from natural gas, gasoline, and diesel sources. Electricity generated emissions decreased while ULSD, LPG, and CNG sources from contract service vehicles remained the same. It was estimated that 659.7 tons of waste generated by city operated and owned facilities was sent to a landfill.

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




Similar to 2005, Figures 5 and 6 illustrate a percentage breakdown of each sector from Table 2. Figure 5 indicates 5.5% of emissions are from contract service vehicles, 10.8% from waste, and 24.4% of emissions resulted from employee commuting. Figure 6 shows electricity in scope 2 accounts for 73% of emissions and fuels and natural gas from scope 1 contributed to the remaining 27% of emissions.

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

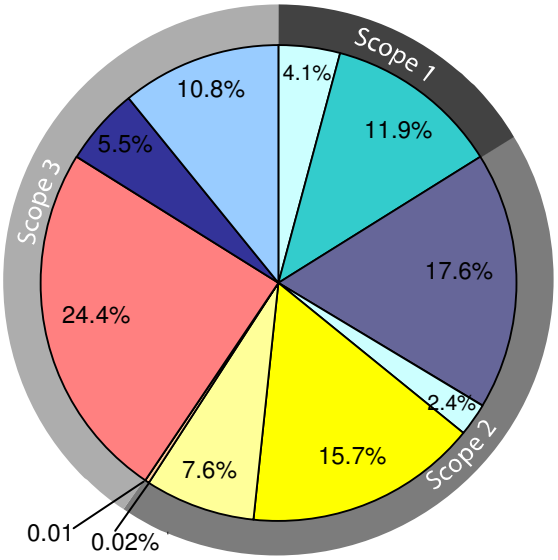
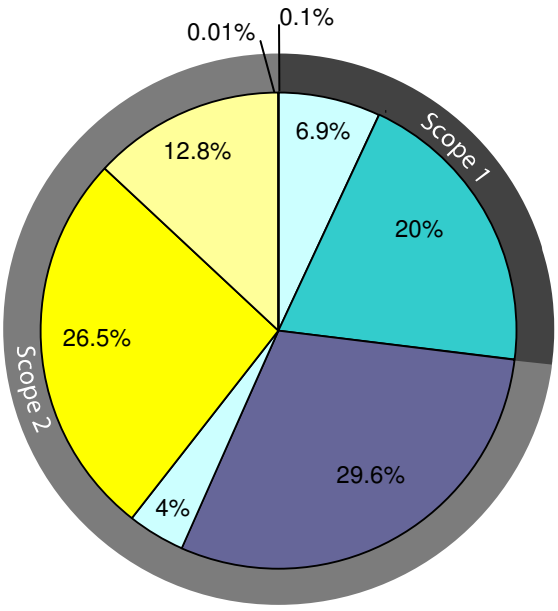
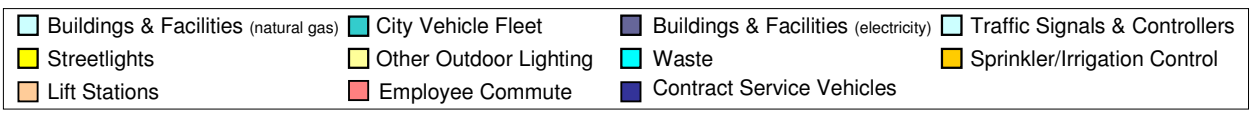



**Figure 6. Emissions by Sector 2007**
(including only direct and indirect sources from scopes 1 and 2)



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 for this year to review, where possible, the historical GHG levels; however, it was difficult to find accurate data, with the exception of electricity, and "back-casting" or creating a rough estimate of emissions is not recommended in the LGOP.[27] Therefore comparisons have been made in areas where data is reliable. As suggested in the protocol, it is better to concentrate on developing a high-quality, comprehensive inventory with reliable data rather then back-casting to 1990. As previously stated the reduction target should be set from 2005 levels, but the 1990 information has been included to make GHG level comparisons with recent years where possible.

Based on the data that was available for 1990, the GHG emissions identified totaled 1,100 metric tons of CO2e, as shown in Table 3. This number is equivalent to the annual GHG emissions from 201 passenger vehicles. Looking at the scopes within the table, emissions generated from natural gas contributed 0.1% (scope 1 total) to the total emissions.[28] Emissions emitted from electricity use accounted for 42.9% (scope 2 total) of the total. Emissions from employee commuting at 57% (scope 3 total) contributed to the remaining total. The City of Hermosa Beach used 1,001,092 kWh of electricity costing $ 105,990 in this year.

**Table 3. Municipal Inventory Summary 1990**[29]

| Hermosa 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 | 1 | 0.1% | Natural Gas | 115.56 therms | n/a | 12 |
| **Total Scope 1 Emissions** | **1** | **0.1%** | **-** | **115.56 therms** | **-** | **12** |
| | | | | | | |
| **Scope 2 Emissions** | | | | | | |
| **Buildings & Facilities** | | | | | | |
| Buildings & Facilities | 382 | 34.7% | Electricity | 811,589 kWh | $ 83,596 | 2,770 |
| **Streetlights & Traffic Signals** | | | | | | |
| Traffic Signals/Controllers | 29 | 2.6% | Electricity | 61,858 kWh | $ 6,657 | 211 |
| Streetlights[30] | 2 | 0.2% | Electricity | 3,364 kWh | $ 595 | 11 |
| Other Outdoor Lighting[31] | 58 | 5.3% | Electricity | 122,600 kWh | $ 14,471 | 419 |
| **Water Delivery** | | | | | | |
| Sprinkler/Irrigation Control | 0.4 | 0.0% | Electricity | 127 kWh | $ 233 | 0 |

27 See LGOP inventory guidelines, page 12.

28 Southern California Gas no longer possesses official customer records going back to 1990 due to document retention policies. SoCalGas located some casual records that go back to 1990 which was the basis for the gas information provided for 1990.

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

30 City owned streetlights are shown in the total seen here.

31 Parking lot lighting, Mixed Landscape, decorative lighting, and misc. lighting have been combined in the total shown here. See appendix D, Emissions Data, to review individual emissions in the Streetlights and Traffic Signals category.

| | | | | | | |
|---|---|---|---|---|---|---|
| Lift Stations | 0.6 | 0.1% | Electricity | 1,554 kWh | $ 437 | 5 |
| **Total Scope 2 Emissions** | **472** | **42.9%** | **-** | **1,001,092 kWh** | **$ 105,990** | **3,428** |
| | | | | | | |
| **Scope 3 Emissions** | | | | | | |
| **Employee Commute** | | | | | | |
| Employee Commute | 627 | 57% | gasoline | 1,099,680 VMT | n/a | 8,568 |
| **Total Scope 3 Emissions** | **627** | **57%** | | | | **8,568** |
| **Total Emissions** | **1,100** | **100%** | - | **-** | **$ 105,990** | **12,008** |

## 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 28.5%. Improvements shown in buildings and facilities may be the result of energy efficiency technology upgrades. Emissions from employee commuting decreased 38.7% (refer to appendix C, for additional information).

Overall emissions from electricity use decreased 1.3% from 2005 to 2007. Emissions from natural gas use increased by 120.6% (refer to appendix D, to review energy use per building). Fleet vehicle emissions from gasoline sources increased while emissions from diesel remained the same. Fuel sources from contract service vehicles remained the same while waste and employee commute emissions decreased.

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

| **Electricity** | **MT$CO_2e$ 1990** | **MT $CO_2e$ 2005** | **Percentage Change** | **MT $CO_2e$ 2005** | **MT $CO_2e$ 2007** | **Percentage Change** |
|---|---|---|---|---|---|---|
| **Buildings & Facilities** | 382 | 273 | -28.5% | 272 | 273 | +0.3% |
| **Traffic Signals & Controllers** | 29 | 39 | +34.4% | 39 | 37 | -5.1% |
| **Streetlights** | 2 | 255 | +12,650%[32] | 255 | 244 | -4.3% |
| **Other Outdoor Lighting** | 58 | 110 | +89.6% | 110 | 118 | +7.2% |
| **Sprinkler/Irrigation Control** | 0.4 | 4 | +900% | 4 | 0.7 | -82.5% |
| **Lift Stations** | 0.6 | 2 | +233% | 2 | 0.3 | -85% |
| **Total** | **472** | **682** | **+44.4%** | **682** | **673** | **-1.3%** |
| **Natural Gas** | | | | | | |
| **Buildings & Facilities** | 1 | 29 | - | 29 | 64 | +120.6% |
| **Fuel** | | | | | | |
| **Gasoline, City Vehicle Fleet** | - | 117 | - | 117 | 157 | +34.1% |
| **Diesel, City Vehicle Fleet** | - | 26 | - | 26 | 26 | - |
| **CNG, City Vehicle Fleet** | - | 1 | - | 1 | 1 | - |
| **Gasoline, Contract Services** | - | 33 | - | 33 | 33 | - |
| **Diesel, Contract Services** | - | 21 | - | 21 | 21 | - |
| **LPG, Contract Services** | - | 31 | - | 31 | 31 | - |
| **Gasoline, Employee Commute** | 627 | 384 | -38.7% | 384 | 360 | -6.2% |
| **Diesel, Employee Commute** | - | 10 | - | 10 | 21 | +1.1% |
| **ULSD, Employee Commute** | - | 5 | - | 5 | 31 | +520% |
| **Waste** | | | | | | |
| **Waste Management** | - | 169 | - | 169 | 167 | -1.1% |

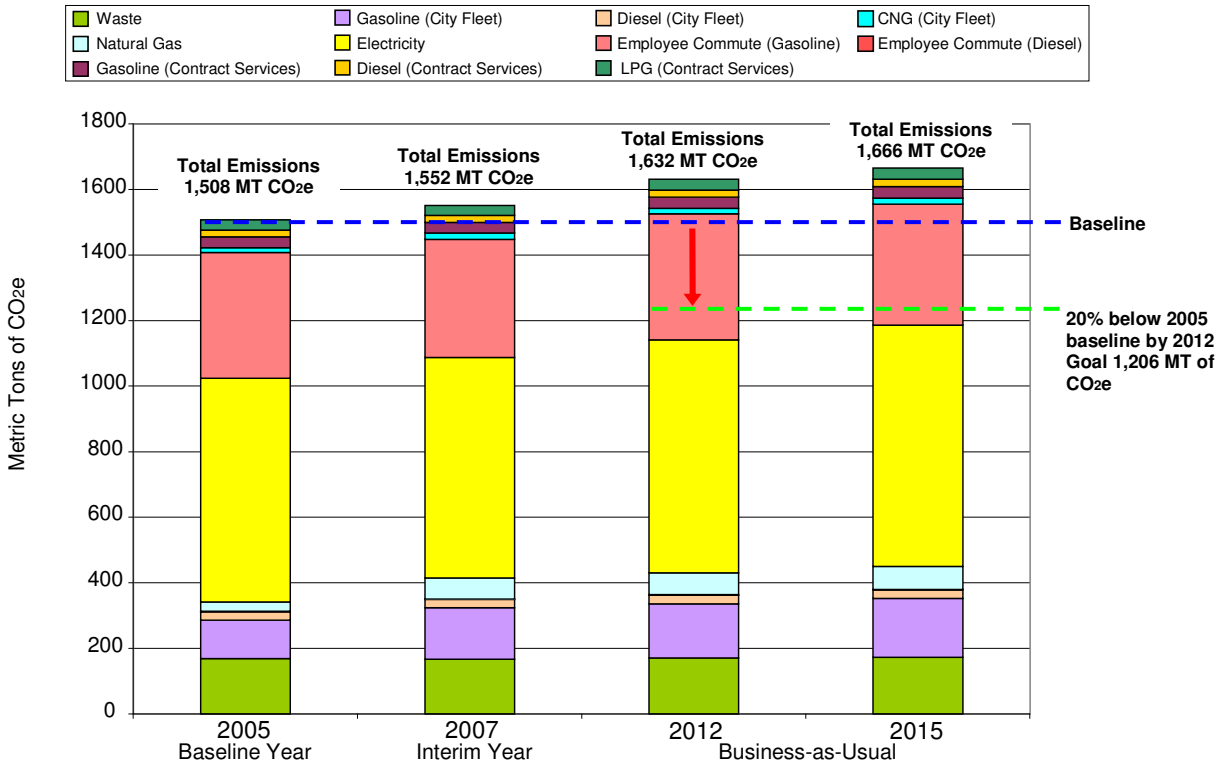
32 In 1990 there were no SCE owned streetlight accounts only City owned streetlights.

## 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 1,632 metric tons of $CO_2e$ by 2012 and 1,666 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 20% below the 2005 baseline levels by 2012. ICLEI recommends setting a long-term target (15-20 years) from the baseline year and a short-term or interim target every 2-3 years to make certain the city continues to reduce its emissions. The further away the goal, the larger amount of reductions should be targeted. The blue line represents the baseline year 2005 calculations from which a reduction target can be determined. The green line represents a possible reduction scenario. If the city were to set an emission target 20% below 2005 levels the goal would be to reduce emissions to 1,206 metric tons of $CO_2e$.

**Figure 7. Business-as-Usual Forecast**[33]




33 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 Hermosa 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*

**Compressed work week schedule:** City hall is closed on Fridays. The 4/10 work schedule practice has been in place since the late 70's in an effort to conserve fuel use related to employees commutes and energy cost in facilities usage.

**Lighting retrofit:** In January 2008, the City completed the replacement of approximately 900 lighting fixtures in City buildings.

**Fee waiver for solar panel installation:** In April 2008, the City Council approved a plan check fee waiver for solar panel installation projects. Nonprofit properties receive a complete fee waiver on both plan check fee and building permit fee.

**Promote alternative energy usage:** The City Council is considering permitting wind turbine to exceed allowable height limit in the City. In depth discussion of the topic is expected to take place at the October, 2009 City Council meeting.

## *B. Solid Waste and Recycling*

**Solid waste franchise agreement with single provider:** Since October 2001, the City's solid waste and recycle services has been provided by Consolidated Disposal Service. All green waste (grass clippings and tree trimmings), plastics and paper are recycled. The solid waste provider also educates residents and businesses on the benefits of recycling through their website, and occasional visits to City sponsored events.

**Construction waste:** All construction and demolition projects of 500 square feet or more in area are required to provide proof of at least 50% recycling of its construction waste or re-used construction materials.

## *C. Sustainable Development*

**Water conservation ordinance**: As the recommendation of the Green Task Force, City Council has directed staff and the Green Task Force to develop a water conservation ordinance to address the state's ongoing drought and water storage conditions. The Green Task Force is hosting a public education workshop and outreach session on the draft ordinance on October 7, 2009.

**Building Upgrades**: Majority of the men restrooms have been upgraded with waterless urinals, other public restrooms in the city are equipped with ultra low-flow toilets.

**New condominium requirement:** In 2007, the City Council adopted an ordinance requiring new residential condominium development to incorporate a minimum of 3 energy saving methods in the projects. A recently completed 8-unit condominium project on 21$^{st}$ Street implemented the following sustainable practices: low flow plumbing fixtures, Energy Star appliances, formaldehyde free insulation and finishes, low VOC interiors paints, adhesive and stains, recycled flooring materials, floor plans that maximize natural light and cross ventilation, cool roof and solar panels.

## *D. Storm Water Management*

The City participates in the National Pollutant Discharge Elimination System (NPDES) requirements and work with consultants to educate developers and property owners to implement Best Management Practices to prevent or reduce the discharge of pollutants to the municipal storm water system to the maximum extent practicable.
In addition, the Planning Department has been working with developers on reducing impervious surface area on construction projects throughout the City.

## *E. Vehicle Fleet*

Currently, the City has 5 compressed natural gas vehicles use by city inspectors and engineers. With funding from South Coast AQMD, the Police Department were able to attain 2 new Ford Escape Hybrid vehicles earlier this year.

## *F. Community Involvement*

**Green Task Force:** In April 2009, the City Council appointed an ad hoc Green Task Force comprised of 9 residents and a Hermosa Beach School District liaison to advise the Council on issues related to sustainable transportation, green building, waste reduction, reuse and recycling, and water issues, including preparation of a climate action plan. The Green Task Force met in May and July 2009 and will meet bimonthly over a two year period.

## *G. Education and Outreach*

**SBESC:** Marketing activities through South Bay Cities Partnership- Published two different ¼ page, full color ads in the Easy Reader weekly paper to promote Energy Efficiency 101/Remodeling residential workshops circulating over 50,000 households in the Hermosa and its' surrounding areas.

**City monthly e-newsletter:** Each issue includes a section called The Green Corner to educate the public on sustainable, energy-saving practices and upcoming workshops/events.

# 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 | **29** | **28** | **0.00269** | **0.00005** |
| Scope 2 | Purchased Electricity | **272** | **270** | **0.01178** | **0.00447** |

| Streetlights and Traffic Signals | | | | | |
|---|---|---|---|---|---|
| Scope 2 | | $CO_2e$ | $CO_2$ | $CH_4$ | $N_2O$ |
| | Purchased Electricity | **404** | **401** | **0.01749** | **0.00663** |

| Water Delivery | | | | | |
|---|---|---|---|---|---|
| Scope 2 | | $CO_2e$ | $CO_2$ | $CH_4$ | $N_2O$ |
| | Purchased Electricity | **6** | **5** | **0.00022** | **0.00008** |

| Vehicle Fleet | | | | | |
|---|---|---|---|---|---|
| Scope 1 | | $CO_2e$ | $CO_2$ | $CH_4$ | $N_2O$ |
| | Mobile Combustion | **144** | **141** | **0.00777** | **0.00853** |
| Scope 3 | **Contract Services** | | | | |
| | Landscape Care | **51** | **50** | **0.00209** | **0.00229** |
| | Clean Street | **34** | **32** | **0.00208** | **0.00550** |

| Solid Waste | | | | | |
|---|---|---|---|---|---|
| Scope 3 | | $CO_2e$ | $CO_2$ | $CH_4$ | $N_2O$ |
| | **Contract Services** | | | | |
| | Consolidated Disposal Services | **169** | **169** | **8.04790** | **-** |

| Employee Commute | | | | | |
|---|---|---|---|---|---|
| Scope 3 | | $CO_2e$ | $CO_2$ | $CH_4$ | $N_2O$ |
| | Employee Commute | **399** | **389** | **0.02371** | **0.02693** |

| Total Emissions | $CO_2e$ | $CO_2$ | $CH_4$ | $N_2O$ |
|---|---|---|---|---|
| Scope 1 | **173** | **169** | **0.01046** | **0.00858** |
| Scope 2 | **682** | **676** | **0.02949** | **0.01118** |
| Scope 3 | **653** | **640** | **8.05757** | **0.03472** |

## 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 | **64** | **63** | **0.00599** | **0.00012** |
| Scope 2 | Purchased Electricity | **273** | **271** | **0.01226** | **0.00465** |

| Streetlights and Traffic Signals | | | | | |
|---|---|---|---|---|---|
| Scope 2 | | $CO_2e$ | $CO_2$ | $CH_4$ | $N_2O$ |
| | Purchased Electricity | **399** | **395** | **0.01790** | **0.00679** |

| Water Delivery Facilities | | | | | |
|---|---|---|---|---|---|
| Scope 2 | | $CO_2e$ | $CO_2$ | $CH_4$ | $N_2O$ |
| | Purchased Electricity | **1** | **0.49800** | **0.00002** | **0.00001** |

| Vehicle Fleet | | | | | |
|---|---|---|---|---|---|
| Scope 1 | | $CO_2e$ | $CO_2$ | $CH_4$ | $N_2O$ |
| | Mobile Combustion | **184** | **180** | **0.00954** | **0.01004** |
| Scope 3 | **Contract Services** | | | | |
| | Clean Street | **34** | **32** | **0.00208** | **0.00550** |
| | Landscape Care | **51** | **50** | **0.00190** | **0.00208** |

| Solid Waste | | | | | |
|---|---|---|---|---|---|
| Scope 3 | | $CO_2e$ | $CO_2$ | $CH_4$ | $N_2O$ |
| | **Contract Services** | | | | |
| | Consolidated Disposal Services | **167** | **167** | **7.970615** | **-** |

| Employee Commute | | | | | |
|---|---|---|---|---|---|
| Scope 3 | | $CO_2e$ | $CO_2$ | $CH_4$ | $N_2O$ |
| | Employee Commute | **379** | **371** | **0.02112** | **0.02223** |

| Total Emissions | $CO_2e$ | $CO_2$ | $CH_4$ | $N_2O$ |
|---|---|---|---|---|
| Scope 1 | **248** | **243** | **0.01553** | **0.01016** |
| Scope 2 | **673** | **666** | **0.03018** | **0.01145** |
| Scope 3 | **631** | **620** | **7.99571** | **0.02981** |

## 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 | **1** | **0.61550** | **0.00006** | **0.000000** |
| Scope 2 | Purchased Electricity | **382** | **380** | **0.01478** | **0.00515** |

| Streetlights and Traffic Signals | | | | | |
|---|---|---|---|---|---|
| Scope 2 | | $CO_2e$ | $CO_2$ | $CH_4$ | $N_2O$ |
| | Purchased Electricity | **92** | **87** | **0.00341** | **0.00119** |

| Water Delivery Facilities | | | | | |
|---|---|---|---|---|---|
| Scope 2 | | $CO_2e$ | $CO_2$ | $CH_4$ | $N_2O$ |
| | Purchased Electricity | **1** | **0.05940** | **0.00000** | **0.00000** |

| Employee Commute | | | | | |
|---|---|---|---|---|---|
| Scope 3 | | $CO_2e$ | $CO_2$ | $CH_4$ | $N_2O$ |
| | Employee Commute | **627** | **607** | **0.05537** | **0.05907** |

| Total Emissions | | | | | |
|---|---|---|---|---|---|
| | | $CO_2e$ | $CO_2$ | $CH_4$ | $N_2O$ |
| | Scope 1 | **1** | **0.6** | **0.00006** | **0.0000** |
| | Scope 2 | **472** | **467** | **0.01818** | **0.00634** |
| | Scope 3 | **627** | **607** | **0.05537** | **0.05907** |

# Appendix B—Activity Data Disclosure

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

## A. Buildings & Other Facilities

Scope 1 Stationary Combustion

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

Scope 2 Purchased Electricity

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

## C. Water Delivery and Wastewater

Scope 2 Purchased Electricity

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

## D. Vehicle Fleet

Scope 1 Mobile Combustion

| **Description:** City staff collected data from departmental and maintenance records. Fuel estimates were based on annual mileage traveled and vehicle fuel economy. | **Alternative Method** Fuel estimates based on annual mileage and vehicle fuel economy |
|---|---|
| **Reference:** Eva Choi, Assistant Planner, (310) 318-0242 | |

## E. Employee Commute

Scope 3 Employee Commute

| **Description:** Employee commute results were determined by conducting a survey of employee commute distance, mode and frequency for the years 2007 and 2005. The online website Survey Monkey was utilized to conduct the survey www.surveymonkey.com |
|---|
| **Reference:** Eva Choi, Assistant Planner, (310) 318-0242 |

## F. Other Scope 3 Emissions

Scope 3 Emissions From Contracted Services

| **Description:** Clean Street, Vehicle Fleet Chase Harris provided vehicle descriptions, fuel quantity, and number of vehicles that operate within the city's boundaries. |
|---|
| **Reference:** Chase Harris, Operations Manager, 310-538-5888 x105 1937 West 169th Street, Gardena, Ca 90247 |

Scope 3 Emissions From Contracted Services

| |
|---|
| **Description:** Landscaping, Vehicle Fleet<br>Dave Evans provided vehicle descriptions, fuel quantity, and number of vehicles that operate within the city's boundaries. |
| **Reference:** Evans, Dave G Dave_Evans@lanscare.com |

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

## A. Scope 1 Stationary Combustion

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

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

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

## B. Scope 1 Mobile Combustion

| **Description of Computational Method:** | **Alternative Method** |
|---|---|
| Fuel estimates were based on distance<br>Gallons= Distance / [(City FE x City %) + (Highway FE x HWY %)]<br>Vehicle fuel economy data was obtained from the EPA website, www.fueleconomy.gov. It was assumed vehicles were driven on city streets 100% of the time. | Alternative emissions factors, Table G.13 of the LGOP |

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

**Reference:** Data was provided by Eva Choi, Assistant Planner, (310) 318-0242

## C. Scope 2 Purchased Electricity

| **Description of Computational Method:** | **Recommended Method** |
|---|---|
| Table G.5 Utility-Specific Verified Electricity CO2 Emissions Factors (2000-2006), LGOP pg. 174. | Utility-Specific verified emission factors used |

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

TableG.6 California Grid Average Electricity Emissions Factors (1990-2004) emissions factors from the year 2004

34 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.

was used for both 2005 and 2007.

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

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

## D. Scope 3 Waste Related Emissions

**Description of Computational Method:**
For both years, waste estimates were based on the volume and frequency of waste collected from city building/facility bins. It was assumed containers were 100% full at time of pick-up. For 2007, municipal employee growth rates were utilized to estimate changes in waste generated from city operated buildings.

There was an estimated 75% methane recovery at the landfill where the waste was taken.

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

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

**Reference:** Eva Choi, Assistant Planner, (310) 318-0242

## E. Scope 3 Employee Commute

**Description of Computational Method:**

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

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

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

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

2007—140 FT and 44 PT employees with 78 responses is a 42.3% response rate. The remaining 57.7% of VMT was estimated based on survey responses for a total VMT of 795,907. Assumptions: gasoline, drove alone, passenger vehicle (2.36 x 337,249=795,907 Total VMT)

2005—140 FT and 46 PT employees with 69 responses is a 36.5% response rate. The remaining 63.5% of VMT was estimated based on survey responses for a total VMT of 820,954. Assumptions: gasoline, drove alone, passenger vehicle (2.73 x 300,716=820,954 Total VMT)

1990—170 FT and 67 PT employees. The number of employees in 1990 and the average VMT from the 2007 survey responses were used to estimate the year 1990. Assumptions: gasoline, drove alone, passenger vehicle.

**Reference:** Eva Choi, Assistant Planner, (310) 318-0242

# 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.[35]

| Sources of Emissions 2005 | Source | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Energy/ Fuel Use | Energy/ Fuel Use Cost ($) |
|---|---|---|---|---|---|---|
| **Buildings and Facilities** | | | | | | |
| Base 3 | Electricity | 3 | 0.2 | 30 | 8,697 kWh | $1,223 |
| | Natural Gas | 1 | 0.1 | 16 | 161therms | $33 |
| Civic Center | Electricity | 136 | 9.2 | 1524 | 446,480 kWh | $53,922 |
| | Natural Gas | 11 | 0.7 | 201 | 2,013 therms | $1,627 |
| Clark Building | Electricity | 4 | 0.3 | 48 | 14,012 kWh | $2,160 |
| | Natural Gas | 3 | 0.2 | 54 | 538 therms | $351 |
| Community Center | Electricity | 86 | 5.8 | 961 | 281,575 kWh | $42,890 |
| | Natural Gas | 5 | 0.4 | 96 | 962 therms | $732 |
| Fire Dept/FOL | Electricity | 9 | 0.6 | 96 | 28,186 kWh | $4,214 |
| | Natural Gas | 5 | 0.4 | 94 | 937 therms | $741 |
| Kiwanis/Rotary Building | Electricity | 5 | 0.4 | 60 | 17,480 kWh | $2,481 |
| Pier | Electricity | 6 | 0.4 | 72 | 21,040 kWh | $2,664 |
| Prospect Hills Storage | Electricity | 1 | 0 | 6 | 1,705 kWh | $402 |
| Public Works Yard | Electricity | 13 | 0.9 | 150 | 43,835 kWh | $6,459 |
| | Natural Gas | 4 | 0.3 | 77 | 772 therms | $555 |
| Park Facilities | Electricity | 10 | 0.7 | 112 | 32,736 kWh | $4,845 |
| **Streetlights & Traffic Signals** | | | | | | |
| Traffic Signals/Controllers | Electricity | 39 | 2.6 | 439 | 128,686 kWh | $13,720 |
| **Streetlights:** | | | | | | |
| Streetlight | Electricity | 113 | 8.2 | 1266 | 370,899 kWh | $30,022 |
| Streetlight SCE Owned | Electricity | 141 | 9.5 | 1586 | 464,752 kWh | $96,130 |
| **Other Outdoor Lighting:** | | | | | | |
| Parking Lot Lighting | Electricity | 58 | 3.9 | 656 | 192,120 kWh | $23,510 |
| Mixed Landscape Lighting | Electricity | 44 | 3.0 | 487 | 145,647 kWh | $24,705 |
| Decorative & Misc. Lighting | Electricity | 8 | 0.6 | 95 | 31,237 kWh | $5,008 |

35 Source of data CACP software output.

| | | | | | | |
|---|---|---|---|---|---|---|
| **Water Delivery** | | | | | | |
| Sprinkler/Irrigation Control | Electricity | 4 | 0.2 | 39 | 11,525 kWh | $2,045 |
| Lift Stations | Electricity | 2 | 0.1 | 19 | 5,508 kWh | $1,166 |
| **Vehicle Fleet** | | | | | | |
| City Hall, Administrative Dept. | Gasoline | 5 | 0.3 | 65 | 522.22 gal | n/a |
| | CNG | 1 | 0.1 | 14 | 111.32 gal | n/a |
| Community Resources Dept. | Gasoline | 4 | 0.2 | 49 | 397.19 gal | n/a |
| Fire Department | Gasoline | 18 | 1.2 | 254 | 2,041.49 gal | n/a |
| | Diesel | 26 | 1.8 | 358 | 2,583.89 gal | n/a |
| Police Department | Gasoline | 62 | 4.2 | 853 | 6553.2 gal | n/a |
| Public Works Dept. | Gasoline | 26 | 1.7 | 356 | 2,865.97 gal | n/a |
| | OFF ROAD Gasoline | 3 | 0.2 | 35 | 284.55 gal | n/a |
| **Vehicle Fleet-Contract Service Providers** | | | | | | |
| Landscape Services | Gasoline | 33 | 2.2 | 452 | 3,640 gal | n/a |
| | Diesel | 18 | 1.2 | 250 | 1,800 gal | n/a |
| Street Sweeping Services | Diesel | 3 | 0.2 | 36 | 257 gal | n/a |
| | LPG | 31 | 2.1 | 470 | 5,127 gal | n/a |
| **Employee Commute** | | | | | | |
| Drove Alone | Gasoline | 379 | 23.4 | 5227 | 783,010 VMT | n/a |
| | Diesel | 10 | 0.7 | 132 | 17,856 VMT | n/a |
| | ULSD | 5 | 0.3 | 66 | 8,928 VMT | n/a |
| | OFF ROAD Gasoline | 4 | 0.2 | 50 | 8,928 VMT | n/a |
| Carpool | Gasoline | 1 | 0.1 | 15 | 2,232 VMT | n/a |
| **Waste** | | | | | | |
| Waste Resources of Gardena | Carbon Dioxide | 169 | 11.2 | 0 | 666.4 tons | n/a |
| Sources: | Food Waste | 18 | n/a | | | |
| | Paper Products | 127 | n/a | | | |
| | Plant Debris | 18 | n/a | | | |
| | Wood/Textiles | 8 | n/a | | | |

| Sources of Emissions 2007 | Source | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Energy/ Fuel Use | Energy/ Fuel Use Cost ($) |
|---|---|---|---|---|---|---|
| **Buildings and Facilities** | | | | | | |
| Base 3 | Electricity | 6 | 0.4 | 66 | 19,403 kWh | $3,207 |
| | Natural Gas | 2 | 0.1 | 38 | 379 therms | $126 |
| Civic Center | Electricity | 140 | 9.1 | 1637 | 479,760 kWh | $57,823 |
| | Natural Gas | 24 | 1.6 | 457 | 4,572 therms | $3,918 |
| Clark Building | Electricity | 3 | 0.2 | 35 | 10,376 kWh | $1,988 |
| | Natural Gas | 6 | 0.4 | 116 | 1,156 therms | $823 |
| Community Center | Electricity | 88 | 5.7 | 1030 | 301,655 kWh | $47,189 |
| | Natural Gas | 9 | 0.6 | 168 | 1,680 therms | $1,278 |
| Fire Dept/FOL | Electricity | 6 | 0.4 | 74 | 21,743 kWh | $3,760 |
| | Natural Gas | 12 | 0.8 | 231 | 2,306 therms | $1,890 |
| Kiwanis/Rotary Building | Electricity | 6 | 0.4 | 68 | 19,960 kWh | $3,289 |
| Prospect Hills Storage | Electricity | 1 | 0 | 8 | 2,208 kWh | $530 |
| Public Works Yard | Electricity | 14 | 0.9 | 161 | 47,300 kWh | $7,965 |
| | Natural Gas | 10 | 0.6 | 188 | 1,884 therms | $1,480 |
| Park Facilities | Electricity | 9 | 0.6 | 102 | 29,802 kWh | $5,189 |
| **Streetlights & Traffic Signals** | | | | | | |
| Traffic Signals/Controllers | Electricity | 37 | 2.4 | 427 | 125,011 kWh | $14,720 |
| **Streetlights:** | | | | | | |
| Streetlight | Electricity | 107 | 6.9 | 1253 | 367,226 kWh | $34,693 |
| Streetlight SCE Owned | Electricity | 137 | 8.8 | 1593 | 466,608 kWh | $119,244 |
| **Other Outdoor Lighting:** | | | | | | |
| Parking Lot Lighting | Electricity | 58 | 3.8 | 679 | 198,900 kWh | $23,665 |
| Mixed Landscape Lighting | Electricity | 43 | 2.6 | 497 | 145,689 kWh | $31,067 |
| Decorative & Misc. Lighting | Electricity | 17 | 1.1 | 195 | 57,015 kWh | $6,181 |
| **Water Delivery** | | | | | | |
| Sprinkler/Irrigation Control | Electricity | 0 | 0 | 1 | 255 kWh | $604 |
| Lift Stations | Electricity | 0 | 0 | 5 | 1,457 kWh | $597 |
| **Vehicle Fleet** | | | | | | |
| City Hall, Administrative Dept. | Gasoline | 5 | 0.3 | 65 | 522.22 gal | n/a |
| | CNG | 1 | 0.1 | 14 | 111.32 gal | n/a |

| Sources of Emissions 2007 | Source | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Energy/ Fuel Use | Energy/ Fuel Use Cost ($) |
|---|---|---|---|---|---|---|
| Community Resources Dept. | Gasoline | 5 | 0.3 | 66 | 530.56 gal | n/a |
| Fire Department | Gasoline | 18 | 1.2 | 254 | 2,041 gal | n/a |
| | Diesel | 26 | 1.7 | 358 | 2,583.89 gal | n/a |
| Police Department | Gasoline | 87 | 5.6 | 1201 | 9,664 gal | n/a |
| Public Works Dept. | Gasoline | 38 | 2.5 | 528 | 4,248.97 gal | n/a |
| | OFF ROAD Gasoline | 4 | 0.2 | 50 | 399.35 gal | n/a |
| **Vehicle Fleet-Contract Service Providers** | | | | | | |
| Landscape Services | Gasoline | 33 | 2.1 | 452 | 3,640 gal | n/a |
| | Diesel | 18 | 1.2 | 250 | 1,800 gal | n/a |
| Street Sweeping Services | Diesel | 3 | 0.2 | 36 | 257 gal | n/a |
| | LPG | 31 | 2.0 | 470 | 5,127 gal | n/a |
| **Employee Commute** | | | | | | |
| Drove Alone | Gasoline | 355 | 22.9 | 4903 | 748,493 VMT | n/a |
| | Diesel | 14 | 0.9 | 197 | 26,923.5 VMT | n/a |
| | ULSD | 5 | 0.3 | 65 | 8,928 VMT | n/a |
| | OFF ROAD Gasoline | 4 | 0.2 | 50 | 8,928 VMT | n/a |
| Carpool | Gasoline | 1 | 0.1 | 17 | 2,635 VMT | n/a |
| **Waste** | | | | | | |
| Waste Resources of Gardena | Carbon Dioxide | 167 | 10.8 | 0 | 660 tons | n/a |
| Sources: | Food Waste | 18 | n/a | | | |
| | Paper Products | 126 | n/a | | | |
| | Plant Debris | 17 | n/a | | | |
| | Wood/Textiles | 6 | n/a | | | |

| Sources of Emissions 1990 | Source | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Energy/ Fuel Use | Energy/ Fuel Use Cost ($) |
|---|---|---|---|---|---|---|
| **Buildings and Facilities** | | | | | | |
| Base 3 | Electricity | 10 | 0.9 | 73 | 21,486 kWh | $2,507 |
| | Natural Gas | 0 | 0 | 1 | 10 therms | n/a |
| Civic Center | Electricity | 204 | 18.5 | 1479 | 433,232 kWh | $38,083 |
| | Natural Gas | 0 | 0 | 2 | 19 therms | n/a |
| Clark Building | Electricity | 12 | 1.1 | 85 | 24,992 kWh | $3,008 |
| | Natural Gas | 0 | 0 | 3 | 29 therms | n/a |
| Community Center | Electricity | 91 | 8.3 | 659 | 192,955 kWh | $23,559 |
| | Natural Gas | 0 | 0 | 4 | 39 therms | n/a |
| Fire Dept/FOL | Electricity | 3 | 0.3 | 22 | 6,393 kWh | $823 |
| | Natural Gas | 0 | 0 | 1 | 12 therms | n/a |
| Kiwanis/Rotary Building | Electricity | 13 | 1.2 | 96 | 28,120 kWh | $3,282 |
| Pier | Electricity | 29 | 2.6 | 207 | 60,720 kWh | $6,738 |
| Public Works Yard | Electricity | 14 | 1.3 | 103 | 30,282 kWh | $3,707 |
| | Natural Gas | 0 | 0 | 1 | 7 therms | n/a |
| Park Facilities | Electricity | 6 | 1.3 | 46 | 13,409 kWh | $1,888.20 |
| **Streetlights & Traffic Signals** | | | | | | |
| Traffic Signals/Controllers | Electricity | 29 | 2.6 | 211 | 61,858 kWh | $6,657 |
| **Streetlights:** | | | | | | |
| Streetlight | Electricity | 2 | 0.1 | 11 | 3,364 kWh | $595 |
| **Other Outdoor Lighting:** | | | | | | |
| Mixed Landscape Lighting | Electricity | 52 | 1.5 | 375 | 109,820 kWh | $12,708.26 |
| Decorative & Misc. Lighting | Electricity | 6 | 0.5 | 44 | 12,780 kWh | $1,763 |
| **Water Delivery** | | | | | | |
| Sprinkler/Irrigation Control | Electricity | 0 | 0 | 0 | 127 kWh | $233 |
| Lift Stations | Electricity | 1 | 0.1 | 5 | 1,554 kWh | $437 |
| **Employee Commute** | | | | | | |
| Drove Alone | Gasoline | 627 | 57.1 | 8568 | 1,099,680 VMT | n/a |

## Criteria Air Pollutants[36]

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.[37] 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 | 855 | 533 | 526 | 62 | 440 |
| Streetlights & Traffic Signals | 1,208 | 806 | 765 | 86 | 665 |
| Water Delivery | 15 | 10 | 10 | 1 | 8 |
| Vehicle Fleet | 1,766 | 81 | 10,464 | 1,196 | 61 |
| Employee Commute | 2,619 | 143 | 27,457 | 2,832 | 70 |
| Total | 6,463 | 1,554 | 39,203 | 4,175 | 1,228 |

| **Criteria Air Pollutants 2007** | NOx (lbs) | SOx (lbs) | CO (lbs) | VOC (lbs) | PM10 (lbs) |
|---|---|---|---|---|---|
| Building and Facilities | 1,001 | 542 | 559 | 68 | 447 |
| Streetlights & Traffic Signals | 1,232 | 822 | 780 | 88 | 679 |
| Water Delivery | 2 | 1 | 1 | 0 | 1 |
| Vehicle Fleet | 1,834 | 94 | 13,098 | 1,447 | 54 |
| Employee Commute | 2,392 | 136 | 26,283 | 2,665 | 70 |
| Total | 6,462 | 1,594 | 40,721 | 4,267 | 1,249 |

| **Criteria Air Pollutants 1990** | NOx (lbs) | SOx (lbs) | CO (lbs) | VOC (lbs) | PM10 (lbs) |
|---|---|---|---|---|---|
| Building and Facilities | 687 | 555 | 442 | 50 | 418 |
| Streetlights & Traffic Signals | 173 | 140 | 111 | 13 | 105 |
| Water Delivery | 1 | 1 | 1 | 0 | 1 |
| Employee Commute | 4,775 | 204 | 55,463 | 5,850 | 615 |
| Total | 5,635 | 900 | 56,017 | 5,914 | 615 |

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

37 Source of data CACP software output.

# Appendix E—Results from Employee Commute Survey

An employee commute survey was conducted for the years 2007 and 2005 in order to gather scope 3 GHG emissions based on vehicle miles traveled by employees. In 2007, there were approximately 140 full-time and 44 part-time employees; however, only 78 employees that took the survey worked for the City in 2007 resulting in a 42.3% response rate. For 2005, there were 140 full-time employees and 46 part-time employees; however, there were only 68 employees that took the survey who worked for the City in 2005 resulting in a 36.5% response rate. To capture the remaining VMT for the total number of employees that worked in those years, estimates were derived from the survey responses. Assumptions for the estimated portion include: employees drove alone in gasoline run passenger vehicles.[38]

Employee commute information is considered policy relevant and may be utilized to reduce GHG emissions through potential measures captured in the climate action plan. Additionally, this information may be useful for planning strategies to comply with SB 375.[39] For questions 5 and 15, the miles were grouped to identify individuals that were potential walkers, cyclists, carpools, public transit users, and vanpoolers: 0-1 (potential walkers), 2-3 miles (potential bicyclists; 4-8 miles (potential transit users); 9-19 (potential carpoolers); and 20-40 miles and above (long distance carpools and vanpools).

Based on information provided by respondents in the year 2007, 42.3% of employees traveled 337,249 vehicle miles. Within the 42.3% response rate, 2.5% of employees carpooled to the worksite, 50% of them were two-person carpools, and 29.4% of employees lived within a range of 4 to 8.9 miles from the worksite. Results from question 11 indicate 45.7% of all respondents who were surveyed are interested in participating in a ridesharing program.

In the year 2005, 36.5% of employees traveled 300,716 vehicle miles. Within the 36.5% response rate, 1.2% of employees carpooled to the worksite, 100% of them were two-person carpools, and 25% of employees lived within a range of 4 to 8.9 miles and 40 miles and above from the worksite.

## A. 2007 Survey Results[40]

**1. Employee Information**

| | Response Percent | Response Count |
|---|---|---|
| Name: | 100.0% | 81 |
| Dept: | 100.0% | 81 |
| *answered question* | | 81 |
| *skipped question* | | 0 |

38 See appendix C to review details.

39 See appendix F for description of the legislation.

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

**2. What city did you live in?**

| | Response Percent | Response Count |
|---|---|---|
| City: | 100.0% | 81 |
| ZIP Code: | 100.0% | 81 |
| *answered question* | | 81 |
| *skipped question* | | 0 |

**Cities Listed in Survey:**
**Alhambra, Carson, Costa Mesa, Duarte, Fontana, Gardena, Harbor City, Hawthorne, Hermosa, Huntington Beach, La Habra, La Mirada, Laguna Niguel, Lancaster, Lawndale, Lomita, Long Beach, Los Angeles, Malibu, Manhattan Beach, Newbury Park, Norwalk, Orange County, Pasadena, Rancho Cucamunga. Rancho Palos Verdes, Redondo Beach, San Juan Capistrano, San Pedro, Santa Monica, Seal Beach, Somis, Torrance, West Covina**

**3. Did you work for the city in 2007?**

| | Response Percent | Response Count |
|---|---|---|
| **Yes** | **96.3%** | **78** |
| No | 3.7% | 3 |
| *answered question* | | 81 |
| *skipped question* | | 0 |

**4. What was your workweek schedule?**

| | Response Percent | Response Count |
|---|---|---|
| 3/36 work week (2 days off) | 9.9% | 8 |
| **4/40 work week (1 day off)** | **59.3%** | **48** |
| 9/80 work week (1 day off every other week) | 2.5% | 2 |
| Regular work week | 9.9% | 8 |
| Other (such as fire personnel compressed schedules) | 21.0% | 17 |
| *answered question* | | 81 |

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

**337,249 vehicle miles traveled represents a 42.3% response rate**
**(795,907 estimated total VMT based on number of full-time and part-time employees)**

| Commute distance range from worksite (one way) | Response Percent | Response Count |
|---|---|---|
| **0-1.9 miles** | 3.8% | 3 |
| 2-3.9 miles | 5.1% | 4 |
| 4-8.9 miles | **29.4%** | **23** |
| 9-19.9 miles | 19.2% | 15 |
| 20-40.9 miles | 20.5% | 16 |
| 41 miles and above | 22.0% | 17 |
| *Number of respondents that worked for the city in 2007* | | **78** |

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

**Day(s) a week**

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Response Count |
|---|---|---|---|---|---|---|---|---|
| Drive alone to work? | 6.4% (5) | 7.7% (6) | 19.2% (15) | **59.0% (46)** | 6.4% (5) | 0.0% (0) | 1.3% (1) | 78 |
| Carpool/Vanpool to work? | 0.0% (0) | 0.0% (0) | 0.0% (0) | **50.0% (1)** | **50.0% (1)** | 0.0% (0) | 0.0% (0) | 2 |
| Take public transportation to work? | 0.0% (0) | 0.0% (0) | 0.0% (0) | 0.0% (0) | **100.0% (1)** | 0.0% (0) | 0.0% (0) | 1 |
| Bicycle to work? | **50.0% (1)** | **50.0% (1)** | 0.0% (0) | 0.0% (0) | 0.0% (0) | 0.0% (0) | 0.0% (0) | 2 |
| Walk to work? | **66.7% (2)** | 33.3% (1) | 0.0% (0) | 0.0% (0) | 0.0% (0) | 0.0% (0) | 0.0% (0) | 3 |
| Use another form of transportation to get to work? | 0.0% (0) | 0.0% (0) | 0.0% (0) | 0.0% (0) | 0.0% (0) | 0.0% (0) | 0.0% (0) | 0 |
| Noncommuting (such as 24 shift where you sleep at station)? | **33.3% (1)** | 0.0% (0) | **33.3% (1)** | **33.3% (1)** | 0.0% (0) | 0.0% (0) | 0.0% (0) | 3 |
| | | | | | | | *answered question* | **81** |
| | | | | | | | *skipped question* | **0** |

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

| 2.5% of respondents who worked for the city in 2007 participated in carpooling | Response Percent | Response Count |
|---|---|---|
| **2 person** | 50% | 1 |
| 3 person | 50% | 1 |
| *answered question* | | **2** |

| | |
|---|---|
| *skipped question* | 76 |

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

| Green Line, MTA | Response Count |
|---|---|
| | 2 |
| *answered question* | 2 |
| *skipped question* | 79 |

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

| | Response Frequency | Response Count |
|---|---|---|
| Auto-full size (e.g., Ford Taurus, Lincoln Town Car) | 17.3% | 14 |
| Auto-mid size (e.g., Honda Accord, Toyota Camry) | 28.4% | 23 |
| Auto-compact (e.g., Honda Civic, Toyota Corolla) | 16.0% | 13 |
| **Light truck/SUV (e.g., Chevy Suburban, Ford Expedition)** | **32.1%** | **26** |
| Heavy truck (e.g., Tractor-trailer truck) | 0.0% | 0 |
| Motorcycle | 2.5% | 2 |
| Van | 1.2% | 1 |
| City Vehicle | 4.9% | 4 |
| *answered question* | | 81 |
| *skipped question* | | 0 |

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

| | Response Percent | Response Count |
|---|---|---|
| **Gasoline** | **92.6%** | **75** |
| Diesel | 4.9% | 4 |
| Ultra-low sulfur diesel | 1.2% | 1 |
| Bio-diesel | 0.0% | 0 |
| Hybrid | 1.2% | 1 |
| ethanol | 0.0% | 0 |
| electric | 0.0% | 0 |
| LPG | 0.0% | 0 |
| CNG | 0.0% | 0 |
| *answered question* | | 81 |
| *skipped question* | | 0 |

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

| | Response Percent | Response Count |
|---|---|---|
| Yes | 45.7% | 37 |
| **No** | **53.4%** | **44** |
| *answered question* | | 81 |
| *skipped question* | | 0 |

## B. 2005 Survey Results

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

| | Response Percent | Response Count |
|---|---|---|
| **Yes—Skip the 2005 section and go to the end and hit done.** | **70.4%** | **57** |
| No—Click next and complete information for 2005. | 17.3% | 14 |
| Other—Did not work for the city in 2005, skip the 2005 section and go to the end and hit done. | 12.3% | 10 |
| *answered question* | | 81 |
| *skipped question* | | 0 |

**13. What city did you live in?**

| | Response Percent | Response Count |
|---|---|---|
| City: | 100.0% | 17 |
| ZIP Code: | 100.0% | 17 |
| *answered question* | | 17 |
| *skipped question* | | 64 |

**Cities Listed in Survey:**

**Costa Mesa, Covina, Manhattan Beach, Orange County, Redondo Beach, Seal Beach, Torrance, Ukiah.**

**14. What was your workweek schedule?**

| | Response Percent | Response Count |
|---|---|---|
| 3/36 work week (2 days off) | 11.8% | 2 |
| 4/40 work week (1 day off) | 29.4% | 5 |
| 9/80 work week (1 day off every other week) | 11.8% | 2 |
| **Regular work week** | **35.3%** | **6** |

| | | |
|---|---|---|
| Other (such as fire personnel compressed schedules) | 11.8% | 2 |
| *answered question* | | 17 |
| *skipped question* | | 64 |

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

**300,716 vehicle miles traveled represents a 37% response rate**
**(820,954 estimated total VMT based on number of full-time and part-time employees)**

| Commute distance range from worksite (one way) | Response Percent | Response Count |
|---|---|---|
| **0-1.9 miles** | 6.0% | 4 |
| 2-3.9 miles | 4.4% | 3 |
| 4-8.9 miles | **25%** | **17** |
| 9-19.9 miles | 19.1% | 13 |
| 20-40.9 miles | 20.5% | 14 |
| 40 miles and above | **25%** | **17** |
| *Number of respondents that worked for the city in 2005* | | 68 |

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

**Day(s) a week**

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Response Count |
|---|---|---|---|---|---|---|---|---|
| Drive alone to work? | 12.5% (2) | 0.0% (0) | 18.8% (3) | **31.3% (5)** | **31.3% (5)** | 0.0% (0) | 6.3% (1) | 16 |
| Carpool/Vanpool to work? | 0.0% (0) | 0.0% (0) | 0.0% (0) | 100.0% (1) | 0.0% (0) | 0.0% (0) | 0.0% (0) | 1 |
| Take public transportation to work? | 0.0% (0) | 0.0% (0) | 0.0% (0) | 0.0% (0) | 0.0% (0)) | 0.0% (0) | 0.0% (0) | 0 |
| Bicycle to work? | 0.0% (0) | 0.0% (0) | 0.0% (0) | 0.0% (0) | 0.0% (0) | 0.0% (0) | 0.0% (0) | 0 |
| Walk to work? | 0.0% (0) | 0.0% (0) | 100.0% (1) | 0.0% (0) | 0.0% (0) | 0.0% (0) | 0.0% (0) | 1 |
| Use another form of transportation to get to work? | 0.0% (0) | 0.0% (0) | 0.0% (0) | 0.0% (0) | 0.0% (0) | 0.0% (0) | 0.0% (0) | 0 |
| Noncommuting (such as 24 shift where sleep at fire station) | 0.0% (0) | 0.0% (0) | 0.0% (0) | 0.0% (0) | 0.0% (0) | 0.0% (0) | 0.0% (0) | 0 |
| *answered question* | | | | | | | | 17 |
| *skipped question* | | | | | | | | 64 |

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

| 1.2% of respondents who worked for the city in 2005 participated in carpooling | Response Percent | Response Count |
|---|---|---|
| **2 person** | **100.0%** | **1** |
| *answered question* | | 1 |
| *skipped question* | | 80 |

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

| | Response Count |
|---|---|
| | 0 |
| *answered question* | 0 |
| *skipped question* | 81 |

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

| | Response Percent | Response Count |
|---|---|---|
| Auto-full size (e.g., Ford Taurus, Lincoln Town Car) | 11.8% | 2 |
| Auto-mid size (e.g., Honda Accord, Toyota Camry) | 29.4% | 5 |
| Auto-compact (e.g., Honda Civic, Toyota Corolla) | 17.6% | 3 |
| **Light truck/SUV (e.g., Chevy Suburban, Ford Expedition)** | **41.2%** | **7** |
| Heavy truck (e.g., Tractor-trailer truck) | 0.0% | 0 |
| Motorcycle | 0.0% | 0 |
| Van | 0.0% | 0 |
| City Vehicle | 0.0% | 0 |
| *answered question* | | 17 |
| *skipped question* | | 64 |

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

| | Response Percent | Response Count |
|---|---|---|
| **Gasoline** | **94.1%** | **16** |
| Diesel | 5.9% | 1 |
| Ultra-low sulfur diesel | 0.0% | 0 |
| Bio-diesel | 0.0% | 0 |
| Hybrid | 0.0% | 0 |
| ethanol | 0.0% | 0 |
| electric | 0.0% | 0 |
| LPG | 0.0% | 0 |
| CNG | 0.0% | 0 |
| *answered question* | | 17 |
| *skipped question* | | 64 |

# Appendix F—Climate Change Action

For reference, listed below are some of the key climate change policies that have been adopted at an international level as well as at State and Regional levels. [41]

**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

41 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.

maximum feasible reduction of greenhouse gases from vehicles primarily used for non-commercial transportation by January 2005.

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

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

## Appendix G—Abbreviations and Acronyms[42]

| | |
|---|---|
| Btu | British thermal unit |
| CH4 | methane |
| CO | carbon monoxide |
| CO2 | carbon dioxide |
| CO2e | 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 |
| SF6 | sulfur hexafluoride |
| SOx | sulfur oxides |
| VOC | volatile organic compounds |

## Appendix H—Glossary of Terms[43]

| | |
|---|---|
| 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.) |

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

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

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

| | |
|---|---|
| Inventory boundary | An imaginary line that encompasses the direct and indirect emissions included in the inventory. It results from the chosen organizational and operational boundaries. |
| Methane (CH4) | One of the six primary GHGs, consisting of a single carbon atom and four hydrogen atoms, possessing a GWP of 21, and produced through the anaerobic decomposition of waste in landfills, animal digestion, decomposition of animal wastes, production and distribution of natural gas and petroleum, coal production, and incomplete fossil fuel combustion. |
| Metric ton (MT, tonne) | Common international measurement for the quantity of GHG emissions, equivalent to about 2,204.6 pounds or 1.1 short tons. |
| Mobile combustion | Emissions from the combustion of fuels in transportation sources (e.g., cars, trucks, buses, trains, airplanes, and marine vessels) and emissions from non-road equipment such as equipment used in construction, agriculture, and forestry. A piece of equipment that cannot move under its own power but that is transported from site to site (e.g., an emergency generator) is a stationary, not a mobile, combustion source. |
| Nitrous oxide (N2O) | One of the six primary GHGs, consisting of two nitrogen atoms and a single oxygen atom, possessing a GWP of 310, and typically generated as a result of soil cultivation practices, particularly the use of commercial and organic fertilizers, fossil fuel combustion, nitric acid production, and biomass burning. |
| Operational boundaries | The boundaries that determine the direct and indirect emissions associated with operations within the entity's organizational boundaries. |
| Operational control | Full authority to introduce and implement operating policies at an operation. |
| Organizational boundaries | The boundaries that determine the operations owned or controlled by the reporting entity, depending on the consolidation approach taken. |
| Perfluorocarbons (PFCs) | One of the six primary GHGs, consisting of a group of man-made chemicals composed of one or two carbon atoms and four to six fluorine atoms, containing no chlorine. Originally introduced as alternatives to ozone depleting substances, PFCs have few commercial uses and are typically emitted as by-products of industrial and manufacturing processes. PFCs have very high GWPs and live a long time in the atmosphere. |
| Scope | Defines the operational boundaries in relation to indirect and direct GHG emissions. |
| Scope 1 emissions | All direct GHG emissions, with the exception of direct CO2 emissions from biogenic sources. |
| Scope 2 emissions | Indirect GHG emissions associated with the consumption of purchased or acquired electricity, heating, cooling, or steam. |
| Scope 3 emissions | All indirect emissions not covered in Scope 2. Examples include upstream |

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