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# City of Hawthorne



## Community Greenhouse Gas Emissions Inventory Report

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## Acknowledgments

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## SBCCOG Climate Protection Initiatives

South Bay cities are unique and independent; however, they all share a common goal of protecting their communities and enhancing the quality of life in the area. One way that South Bay cities address quality of life concerns, and more specifically, climate protection initiatives, is through the collaborative activities of the SBCCOG. A joint powers authority of 16 local governments and the County, the SBCCOG is a forum for cities to collaborate, maximize resources, and find solutions to mutual concerns and interests. The SBCCOG facilitates several environmental projects and programs through the South Bay Environmental Services Center (SBESC) which is a unique resource for SBCCOG cities.

The SBESC delivers a comprehensive message which combines energy efficiency, water conservation, recycling, and other conservation strategies to benefit South Bay residents, public agencies, and businesses through marketing, outreach, and educational workshops. The SBESC achieves this through its alliance with the LA County Metropolitan Transportation Authority, West Basin Municipal Water District, Sanitation Districts of LA County, Southern California Edison, Los Angeles County Energy Program, The Gas Company®, and the Torrance Water Department. It is through this multiple-partner funding that the SBESC offers whole house energy-efficiency workshops, rebates and incentive programs to residents and businesses; assists cities in identifying and implementing energy and water savings projects; and promotes vanpooling and recycling programs.

The SBCCOG strives to support economic development and green jobs through grant-funded opportunities. The SBCCOG is currently involved with Energy Upgrade LA County marketing design and the workforce development program. At its core, the program will increase the number of retrofits and renewable power system installations for residential and commercial buildings in the County. It will also create new jobs related to energy-efficiency auditors and building professionals.

The SBCCOG seeks to find balance and create healthier communities through alternative mobility strategies. SBCCOG has been in the forefront of policy development for communities with aging infrastructure and minimal transit to find novel strategies for sustainable redevelopment and innovative transportation. The SBCCOG seeks to increase mobility in the subregion working with Los Angeles County signal synchronization program and Metro facilitating the completion of highway related transportation projects through Measure R. In addition, the SBCCOG has initiated a demonstration project with neighborhood electric vehicles and is also pursuing other non-traditional mobility projects such as car-sharing for our suburban area. The SBCCOG is committed to climate protection initiatives and seeks to help cities reduce emissions and improve air quality for residents and businesses.

# City of Hawthorne Community Emissions Inventory Report

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## How to read this report:

This report includes data for the years 1990, 2005, and 2007. Data results are organized by scope, source, and sector to provide a foundation for city planning and actions to reduce its greenhouse gas emissions. Activities taking place for the three years inventoried (1990, 2005, and 2007) are shown side-by-side in each table and indicate progress between years. Emissions data located in Appendix B are organized in the same format as in the *Municipal GHG Emissions Inventory Report* to maintain consistency. Since the municipal inventory is a subset of the community inventory, the municipal emission quantities are already included in this inventory. It is important to note that 1990 data are estimated and are not to the same level of accuracy as the subsequent years, but 1990 data has been included to indicate trends in greenhouse gas (GHG) levels since state legislation has set 1990 as the first baseline from which to measure emissions.

# I. Executive Summary

## A. Introduction

Environmental and energy efficiency initiatives currently underway in California originate from the Global Warming Solutions Act of 2006 (AB 32) and the resulting strategic plans set forth in the AB 32 Scoping Plan. The Plan, adopted by the California Air Resources Board in 2008, outlines a variety of strategies (both mandated and voluntary) to reduce emissions in the state to 1990 levels by 2020. Strategies in the Scoping Plan target a range of areas including transportation, waste, energy and water efficiency to meet the goal. A longer-term goal for California is in Executive Order S-3-05, which calls for an 80 percent reduction from 1990 levels by 2050.

Members of the SBCCOG have responded by conducting inventories and creating action plans. Not only is participation by local governments essential to the State meeting its objective, but also member cities of the SBCCOG are supportive of strategies which lead to reduced greenhouse gas (GHG) emission levels and to reducing their carbon footprint. Therefore, they are supportive of the approaches in the Plan which would transition Californians away from the burning of fossil fuels and other human-induced activities that artificially intensify the otherwise naturally occurring Greenhouse Effect.<sup>1</sup>

The City of Hawthorne has been in the forefront, taking actions to promote environmental stewardship at the government operations and community levels. In 2008, the City joined the SBCCOG's initiative to utilize ICLEI-Local Governments for Sustainability's systematic approach to reducing GHG emissions. This 5 milestone approach includes: conducting a municipal and community baseline emissions inventory and forecast, adopting an emissions reduction target for a forecast year, developing a local Climate Action Plan, implementing the local Climate Action Plan, and monitoring and evaluating progress.

Starting with the municipal inventory which can be found at [www.southbaycities.org](http://www.southbaycities.org), Hawthorne identified emission sources of their municipal operations which include government-operated facilities, streetlights, vehicle fleet and equipment, employee commuting, and waste generated by city operated and owned facilities. The assessment created a pathway to identify sources and target areas over which the City has direct operational control. This community emissions inventory is the second part of the inventory process in which the City has documented emission sources from community uses.

To date, the City of Hawthorne has already been actively developing measures and policies to mitigate the effects of climate change. It is through a combination of municipal and community-scale measures that the City will achieve its adopted emissions reduction target. Measures such as increasing energy efficiency in municipal facilities, purchasing fuel-efficient fleet vehicles, developing water conservation ordinances, expanding office recycling, promoting alternative transportation options, and modifying procurement policies will reduce the City's carbon footprint. Additionally, strategies that target sustainable land use and transportation, promote conservation programs, and educate the community can change behavior and influence consumer purchasing decisions leading to a healthier city.

## B. Community Inventory Introduction

Local governments have a broad influence and authority over activities within their jurisdictional boundary. It is through a city's authority over land use planning, permitting, local ordinances, and environmental outreach and education that it can impact a wide range of emission-generating sources to bring about a sustainable community.

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<sup>1</sup> A definition of the Greenhouse Effect can be found in Appendix H.

In general, the purposes of conducting a community inventory are to: 1) identify the sources and quantities of emissions within a local government's jurisdictional boundary including residences and businesses, to help a city understand the impact of their activities; 2) create an emissions baseline against which a city can set emission reduction targets and measure future progress to help a city prioritize and evaluate the effectiveness of local action over time; 3) understand the relative scale of emissions from various sources; and 4) make informed climate mitigation policy decisions.

The municipal and community inventories follow two standards, the Local Government Operations Protocol (LGOP) and the draft International Local Government GHG Emissions Analysis Protocol (IEAP).<sup>2</sup> The LGOP, adopted by the California Air Resources Board (ARB) in 2008, serves as a national standard for quantifying and reporting GHG emissions from local government operations. While the municipal operations inventory follows the approaches set forth in the LGOP, the community inventory follows the standards outlined in the IEAP. The IEAP was developed by ICLEI and serves as a common framework for local governments developing municipal and community inventories, and it is also the foundation for the community protocol which is still being developed. Guidance for the community inventory was also drawn from the experience of ICLEI staff. Inventory data and resources were obtained from utility companies and public agencies including Southern California Edison (SCE), The Southern California Gas Company (SCG), Southern California Association of Governments (SCAG), ARB, and South Coast Air Quality Management District (SCAQMD), the Department of Resources Recycling and Recovery (CalRecycle), and the Los Angeles County Sanitation Districts (LACSD). To provide clarity on what GHG emissions were measured in this inventory, methods for emissions estimates, GHG reference information, and consumption data descriptions, please review Appendices A through F.

### C. Scope of the GHG Emissions Inventory

To maintain consistency with the municipal inventory, data was collected for the years 2005 (baseline year), 2007 (interim year) from which to begin measuring performance against the baseline year, and 1990 to capture historical GHG emission levels and show an overall trend. The year 1990 has been included in this report because it represents a significant reference year for several key pieces of climate change legislation including the AB 32 Scoping Plan, the United Nations Framework Convention on Climate Change (UNFCCC), the Kyoto Protocol agreement, and the U.S. Mayors' Climate Protection Agreement. However, it is not necessary for local governments to attempt to benchmark emissions from 1990 levels where data is not as reliable.

Results are presented in a number of ways to provide a solid foundation from which to develop a plan of action. Results are shown by source, reporting sectors (residential, commercial, industrial, transportation, and waste), and by reporting scopes. The purpose of scopes is to allow for the inclusion of all policy relevant information while preventing double counting. Within the context of a community inventory, this tiered system of accounting for direct and indirect emissions takes on a larger scale. For instance, scope 1 emissions include all transportation, or mobile sources, that take place within the jurisdictional boundary of the community. Scope definitions and details are presented in section two of this report.

Tables and figures in the results section are shown according to their carbon dioxide equivalent unit (CO<sub>2</sub>e) and the percentage they represent relative to the various tables and figures in which they are shown. A CO<sub>2</sub>e number is the universal unit for comparing gases of different global warming potential (GWP). While both the LGOP and IEAP suggest that local governments should assess emissions of all six internationally recognized GHGs regulated under the Kyoto Protocol,<sup>3</sup> this inventory focuses on three of the six internationally-recognized GHGs: carbon dioxide,

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<sup>2</sup> The LGOP was developed in partnership by ICLEI, the California Air Resources Board (ARB), 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.

<sup>3</sup> These gases along with their GWP are outlined in Appendix C, Table C.1.

methane, and nitrous oxide. These three gases comprise a large majority of the GHG emissions at the community level. Quantities of each gas are shown separately and can be found in Appendix B. Additionally, within the results section, single numbers denote the annual emissions (e.g. In 2005, 138,463 metric tons of CO<sub>2</sub>e were produced). Rolling up annual emissions into a single number is commonly practiced by local governments and useful for determining the relative proportions of emissions from various sources (e.g. 70 percent of rolled up emissions came from the transportation sector). Rolling up numbers is also useful for setting targets and planning actions, but it is important to note that when reviewing roll-up numbers they do not represent all emissions, only a summation of inventoried emissions. Also there is no national or international standard for reporting emissions as a single roll-up number.

What has not been included in this inventory are emission sources primarily located outside the local government's influence such as commercial aviation and rail transportation. In addition, emission sources that fall below the significance threshold, also referred to as de minimis emissions have been excluded.<sup>4</sup> These are relatively small sources which represent less than five percent of the total CO<sub>2</sub>e emissions. Sources are also left out of an inventory if there was insufficient data or an accepted standard methodology such as emissions from composting activities and life cycle emissions of energy and materials. Below is a list of the emissions that were not included in the inventory:

- Sulfur Hexafluoride (SF<sub>6</sub>), perfluorocarbons (PFCs), and hydrofluorocarbon (HFCs) emissions
- Emissions of minor off-road sources
- Life cycle emissions of energy and materials
- Composting activities
- Non-combustion industrial process emission sources (e.g. emissions from physical or chemical processing of a material such as cement manufacturing)
- Stationary sources not reported to SCAQMD
- Commercial aviation and Rail

## D. Inventory Methodology

The community inventory is an estimation of emissions based upon a geographic boundary approach. Counted in this inventory is the end-use of energy (electricity, natural gas, and fuels) within the boundary of the local government. The residential and commercial/industrial sectors account for purchased electricity and natural gas consumed in residences and businesses. Aggregated customer data was provided by SCE and SCG. Electricity data was calculated in the Clean Air Climate Protection (CACP) software using utility-specific emission factors for the carbon dioxide and California Grid Average electricity emission factors for the methane and nitrous oxide. Natural gas was also calculated in CACP using default emission factors from the LGOP. The commercial/industrial sector includes fuels burned within the boundary of the community. Some commercial or industrial businesses (e.g. dry cleaner, oil refinery) are required to report fuel usage to the SCAQMD. Fuel data reports obtained from SCAQMD were calculated in CACP software using default emissions factors from the LGOP.

The transportation sector emissions for on-road travel are based upon an origin-destination approach of accounting for vehicle miles traveled (VMT) used by SCAG. VMT is allocated based on the trip production and attraction of land uses. The VMT data allocated by the origin-destination approach is entered into CACP software. SCAG provided VMT data and the regionally-specific data on the mix of vehicle classes (e.g., passenger cars, light trucks) within the Southern California Air Basin (SCAB) for the purpose of breaking down VMT by fuel and vehicle type. Emissions from off-road transportation (e.g. lawn and garden equipment, construction equipment, etc.) were determined using the ARB OffRoad 2007 model. Aviation fuel associated with air travel at the Hawthorne Municipal Airport - Jack Northrop

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<sup>4</sup> De Minimis emissions refer to one or more emission sources, for one or more gases which, when summed, represent less than 5 percent of total CO<sub>2</sub>e emissions. De Minimis sources of emissions are often relatively small, unimportant and difficult to accurately measure and quantify.

Field has also been included in this inventory. Air travel emissions from planes has been included as a scope 3 source. Fuel estimates were based upon a dollars spent method to estimate aviation fuel emissions. Fuel quantities were calculated in CACP software using default emissions factors from the LGOP.

Solid waste sector emissions were captured in two ways: emissions from landfills located within the jurisdiction and community-generated waste. Landfill data was obtained from the ARB's first Order of Decay Model (FOD) and community-generated waste data was collected from the Department of Resources Recycling and Recovery (CalRecycle) and entered into CACP software.<sup>5</sup>

Emissions are determined by using activity data which is the consumption data or the measurement of sources such as fuel, metered annual electricity use, or annual VMT which result in the release of GHG emissions. The accuracy of activity data is important because the more accurate the data, the more precise the emission results. The activity data is then multiplied by an emission factor to determine the equivalent GHG emissions (e.g. Activity Data x Emission Factor = Emissions). An emission factor is a metric that represents the heat and carbon content and/or resource mix of a source. Emission factors are expressed in terms of per unit activity/source (i.e., lbs of CO<sub>2</sub>/kWh). A reduction in emissions happens when fewer emissions are generated per unit of the source or when an emission factor is updated to reflect technology and efficiency improvements. Emission factors come from a variety of sources such as ARB. Although emission factors are verified before they are used there is still a degree of scientific uncertainty associated with these numbers. All the activity data and emission factors used to capture the equivalent emissions have been noted in the Appendix A to be used as reference for future inventories.

Emission results over time will vary based on several influences including: activity data, emission factors, changes in consumption, population growth, and weather. City demographic information on population, households, and jobs for the years inventoried and the forecast year can be found in Appendix C. Demographic information provides insight on the resulting GHG emissions in the years inventoried. On the various GHG emission influences, a local government has the greatest opportunity to reduce its carbon footprint through the promotion of energy conservation and by enacting mitigation policies that encourage sustainable practices. Since the results are an approximation of the GHG emissions in the years inventoried, they should be used as a policy and planning tool rather than a precise measurement of GHGs. Also, the accuracy and certainty of emissions estimates will change as better data and calculation methodologies become available. When conducting future inventories, allowances for better methodologies will have to be taken into account when comparisons are made to the data in this report.

## E. Key Highlights and Findings

- In 2005, the City of Hawthorne generated approximately 423,935 metric tons of CO<sub>2</sub>e. Gasoline represents the largest source of emissions, producing 202,778 metric tons of CO<sub>2</sub>e or 48 percent of the total share of 2005 emissions. The majority of gasoline use is related to passenger vehicles generating tailpipe emissions.
- In 2007, the City of Hawthorne generated approximately 412,510 metric tons of CO<sub>2</sub>e representing a 3 percent decrease from the total emissions in 2005. This decrease can be attributed to lower emissions from electricity, natural gas, and gasoline sources. A decrease in electricity emissions is the result of changes in utility operations. The lower 2007 emission factors used to quantify emissions, represent a greater use of renewable energy, use of cleaner natural gas instead of coal, and a higher degree of efficiency to produce electricity. While sector specific natural gas emissions may have risen, overall emissions decreased due to

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<sup>5</sup> CalRecycle (Officially known as the Department of Resources Recycling and Recovery) is the new department within the California Natural Resources Agency that administers recycling and waste programs formerly managed by the State's Integrated Waste Management Board and Division of Recycling. <http://www.calrecycle.ca.gov> .



less energy consumption. Lower emissions from gasoline sources are the result of less travel activity and increased vehicle fuel economy.

- For both years 2005 and 2007, transportation was the largest sector of emissions (scope 1). In 2005, the transportation sector generated approximately 222,098 metric tons of CO<sub>2e</sub>, or 52 percent of the total 2005 emissions. In 2007, this sector generated approximately 216,546 metric tons of CO<sub>2e</sub> again 52 percent of the total emissions. The majority of transportation sector emissions are the result of gasoline and diesel combustion in vehicles traveling to activity centers within the boundaries of Hawthorne.
- In 2005, the solid waste sector made up 1 percent of the total emissions, approximately 4,846 metric tons of CO<sub>2e</sub>. In 2007, this sector remained at 1 percent of the total emissions, approximately 3,764 metric tons of CO<sub>2e</sub>. The decline of emissions is the result of more disposal tons being diverted from landfills and sent to waste-to-energy facilities.
- While short-term trends show a 3 percent reduction in emissions, long-term general trends in the absence of mitigation efforts suggest an increase in emissions. It is anticipated that Hawthorne's community emissions, under a business-as-usual scenario, will grow 6 percent by 2020 from 412,510 in 2007 to 435,389 metric tons of CO<sub>2e</sub> in 2020.

## F. Future Steps

The City of Hawthorne is on the path to creating a sustainable community through its actions to conserve energy and resources at the municipal operation and community levels. The next step will be to set targets and create a plan of actions to further reduce both the municipal and community-wide carbon footprint. The data results serve to inform the process of designing strategies to impact climate change.

Strategies for municipal and community actions should be compiled into a Climate Action Plan (CAP), which contains policies and measures that outline how the City will meet the goals it has set for itself. A CAP shows an ongoing commitment to address climate change. It is up to each local government to determine how often they choose to re-inventory GHG emissions in order to ensure that their strategies are effectively reducing emissions and continue to monitor progress. The companion document accompanying this report provides next steps to link data results to target setting and the development of strategies to be included in a CAP.

## II. Community Emissions Results

### A. Introduction

This section includes tables and figures that represent the GHG emission levels for the three years inventoried. The data findings are expressed in CO<sub>2</sub>e, a standard unit for comparing gases of different GWP. The results are presented in a number of ways in order to measure progress, understand the relative scale and quantities of emissions, and to pinpoint specific sectors within a jurisdiction for which to plan measures. For these reasons, results are organized by scope, source, sector (including a breakdown of each sector), and per capita. Activities taking place for the three years inventoried are shown side-by-side in each table and figure to compare the changes that have occurred between the years.

Where possible, emission activities have been drilled down for an additional level of analysis. For example, natural gas results are broken out into single and multi-family home classes. Additionally, municipal natural gas and electricity emissions have been identified within the commercial sector for added perspective. The municipal electricity emissions for 2007 and 1990 will vary slightly in this report from the *Municipal Greenhouse Gas Emissions Inventory Report* because the 2007 emission factors have been updated with the latest edition of the LGOP, V1.1, May 2010. Additionally, with the 1990 inventory, the 2005 electricity emission factors were used in place of the 1990 emission factors in order to isolate the effect of consumption (which is influenced by city policy) from the effect of the changing electricity resource mix (which is not influenced by city policy). The 1990 emission factors are significantly higher than the 2005 factors, so this part of the inventory underestimates 1990 emissions.

As with the municipal inventory, 2005 is the baseline year and 2007 (the interim year) measures progress from the baseline. The year 1990 (transparent in color and outlined with a dashed line) gives an indication of consumption trends; however in some cases, backcasting and proxy year data had to be used to approximate historical GHG levels. A jobs by industry dataset was developed by SCAG and used as a metric to disaggregate 1990 electricity consumption data into the commercial and industrial sectors.

### B. Community Emissions by Scope

Similar to the municipal inventory, community-scale emissions are reported according to a three-tiered classification of scopes. Within the context of a community inventory, scope 1 includes all direct emissions sources located within the boundary of the local government. This includes the use of fuels combusted and direct emissions from landfills in the community. Scope 2 emissions are related to indirect sources associated with the consumption of energy that are generated outside the jurisdictional boundary of the community such as purchased electricity, district heating, and steam and cooling consumption. Scope 3 emissions are all other indirect and embodied emissions not covered in Scope 2 that occur as a result of activity within the jurisdiction. The definitions of community scopes are from the IEAP.

As seen in Table 2.1, activities taking place within the boundary have been identified by scope of emissions (all sectors are included). Direct sources that were accounted for in scope 1 include community-wide natural gas use (or the stationary combustion of fuels), where applicable, landfill waste-in-place (emissions from landfills located within the jurisdiction) and transportation (the mobile combustion of fuels). Scope 2 emissions are the result of community-wide consumption of purchased electricity. Scope 3 emissions are associated with the decomposition of solid waste generated within the community.

In 2005, scope 1 activities taking place within the City of Hawthorne produced the largest amount of emissions, approximately 298,999 metric tons of CO<sub>2</sub>e, and this was largely due to natural gas and transportation fuels from

vehicles traveling to and from activity centers within the boundaries of Hawthorne. Purchased electricity (scope 2) represents the second largest share of the total emissions, 116,497 metric tons of CO<sub>2</sub>e. Scope 3 emissions from community-generated solid waste and aviation fuels related to the municipal airport produced 8,439 metric tons of CO<sub>2</sub>e.

Emissions in 2007 represent an overall decline from the baseline year by approximately 3 percent. Generally speaking, influences that contributed to the overall decline in emissions between the years include: variations in consumption, emission factors, changes in the carbon intensity of fuels, population, and weather. Decreases in scope 1 are the result of less emissions from natural gas and transportation sector fuels. The natural gas emissions decreased due to less energy consumption. There are two variables that account for the decline in transportation sector fuels. The first variable is less travel activity, and second, is the increased fuel efficiency of gasoline passenger vehicles. The average mpg, derived from the default settings in the CACP software, went from 18.61 to 18.965 between the two years. This average reflects a 2 percent improvement in fuel efficiency. As for scope 2, overall electricity emissions decreased by 3 percent between the years. This decrease is due to changes in utility operations including a greater use of renewable energy, use of cleaner natural gas instead of coal, and a higher degree of efficiency to produce electricity. The decrease in scope 3 emissions are the result of more disposal tons being diverted from landfills.

**Table 2.1 Emissions by Scope (metric tons CO<sub>2</sub>e)**

| Scope                           | 1990           | 2005           | 2007           |
|---------------------------------|----------------|----------------|----------------|
| <b>Scope 1 Total</b>            | <b>277,759</b> | <b>298,999</b> | <b>291,051</b> |
| Natural Gas                     | 64,768         | 80,391         | 78,826         |
| Industrial Sector Fuels         | 425            | 102            | 74             |
| Transportation Fuels            | 212,567        | 218,506        | 212,151        |
| <b>Scope 2 Total</b>            | <b>160,691</b> | <b>116,497</b> | <b>113,300</b> |
| Purchased Electricity           | 160,691        | 116,497        | 113,300        |
| <b>Scope 3 Total</b>            | <b>7,478</b>   | <b>8,439</b>   | <b>8,160</b>   |
| Community-Generated Solid Waste | 3,934          | 4,846          | 3,764          |
| Aviation Fuels                  | 3,545          | 3,593          | 4,395          |
|                                 |                |                |                |

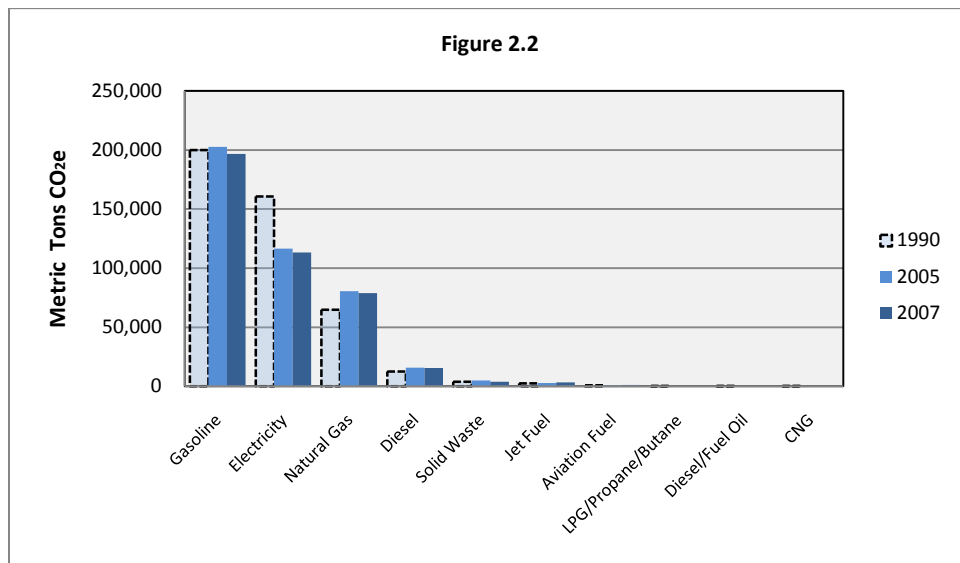
### C. Community Emissions by Source

Summarized in Table 2.2 and Figure 2.2, is a breakdown of inventoried emissions by source, such as electricity and natural gas. Listed next to each source is the percentage share of the total emissions per year. Reviewing emissions by source is another way to identify materials and raw resources that generate emissions to help manage resource use and reduce GHG emissions.

The GHG emissions generated from electricity were estimated based on data obtained from *Electricity Use Reports* prepared by Southern California Edison. Emissions produced from natural gas were estimated based on data provided by the Southern California Gas Company. Emissions for fuel are primarily derived from data provided by SCAG, with some of the data provided by SCAQMD and ARB's OffRoad2007 model and other ARB reports. Refer to Appendix A for more information.

**Table 2.2 Emissions by Source (metric tons CO<sub>2e</sub>)**

| Source             | 1990                 | Share of 1990 Total | 2005           | Share of 2005 Total | 2007           | Share of 2007 Total |
|--------------------|----------------------|---------------------|----------------|---------------------|----------------|---------------------|
| Gasoline           | 200,065              | 45%                 | 202,778        | 48%                 | 196,566        | 48%                 |
| Electricity        | 160,691 <sup>6</sup> | 36%                 | 116,497        | 27%                 | 113,300        | 27%                 |
| Natural Gas        | 64,768               | 15%                 | 80,391         | 19%                 | 78,826         | 19%                 |
| Diesel             | 12,488               | 3%                  | 15,700         | 4%                  | 15,556         | 4%                  |
| Solid Waste        | 3,934                | 1%                  | 4,846          | 1%                  | 3,764          | 1%                  |
| Jet Fuel           | 2,634                | 0.6%                | 2,662          | 0.6%                | 3,241          | 0.8%                |
| Aviation Fuel      | 911                  | 0%                  | 931            | 0%                  | 1,154          | 0%                  |
| LPG/Propane/Butane | 362                  | 0.1%                | 68             | 0.0%                | 71             | 0.0%                |
| Diesel/Fuel Oil    | 62                   | 0.0%                | 35             | 0.0%                | 3              | 0.0%                |
| CNG                | 14                   | 0.0%                | 27             | 0.0%                | 29             | 0.0%                |
| <b>Total</b>       | <b>445,928</b>       | <b>100%</b>         | <b>423,935</b> | <b>100%</b>         | <b>412,510</b> | <b>100%</b>         |



<sup>6</sup> The 2005 electricity emission factors were used in place of the 1990 emission factors in order to indicate consumption changes between the years 1990 and 2005. The 1990 electricity emission factors are significantly higher than the 2005 factors because they represent the entire State of California instead of a specific region, so the number shown here underestimates 1990 electricity emissions.

## D. Community Emissions by Sector

The community inventory consists of five main reporting sectors: Residential, Commercial, Industrial, Transportation, and Waste. Detailed over the next several tables and figures is a breakdown of each sector indicating the relative scale of emissions for comparison and to provide a basis for the City to focus on strategies that will achieve the greatest emission reductions.

The residential sector includes emissions from electricity and natural gas use in homes. Similarly, the commercial and industrial sector emissions are the result of electricity consumption and the on-site combustion of natural gas and fuel use of buildings and facilities. For more information on the types of businesses deemed commercial and industrial refer to Appendices E and F.

The transportation sector emissions are derived from VMT and allocated based on the origin and destination of vehicle trips associated with land uses or activity centers within the City boundary. Also included in the transportation sector are emissions generated from off-road vehicles and equipment (e.g. lawn and garden equipment, construction equipment, industrial equipment, and light commercial equipment) and emissions associated with air travel from the Hawthorne Municipal Airport - Jack Northrop Field.

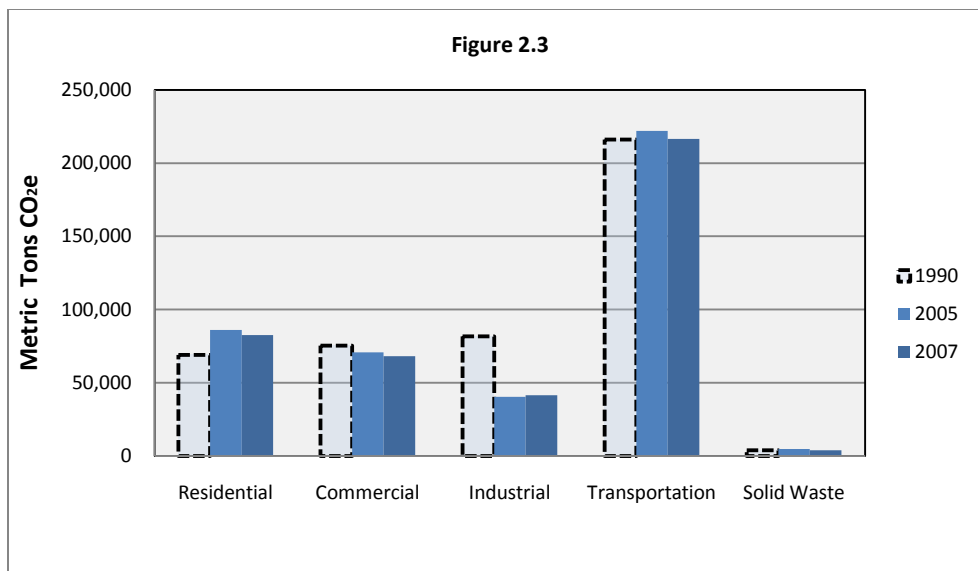
The waste sector includes emissions from community-generated waste and has been broken down by source, according to waste characterization studies by CalRecycle.

### Summary of Emission Sectors

Shown in Table 2.3 and Figure 2.3, is a summary of the emissions from each sector for the years 1990, 2005, and 2007. Evaluating emissions by sector is a useful means to determine where measures and actions may be channeled. Across all years, the transportation sector emissions remain the highest followed by residential sector emissions.

**Table 2.3 Summary of Emissions by Sector (metric tons CO<sub>2</sub>e)**

| Sector         | 1990           | Share of 1990 Total | 2005           | Share of 2005 Total | 2007           | Share of 2007 Total |
|----------------|----------------|---------------------|----------------|---------------------|----------------|---------------------|
| Residential    | 68,896         | 15%                 | 85,949         | 20%                 | 82,644         | 20%                 |
| Commercial     | 75,315         | 17%                 | 70,699         | 17%                 | 68,150         | 17%                 |
| Industrial     | 81,672         | 18%                 | 40,342         | 10%                 | 41,406         | 10%                 |
| Transportation | 216,111        | 48%                 | 222,098        | 52%                 | 216,546        | 52%                 |
| Solid Waste    | 3,934          | 1%                  | 4,846          | 1%                  | 3,764          | 1%                  |
| <b>Total</b>   | <b>445,928</b> | <b>100%</b>         | <b>423,935</b> | <b>100%</b>         | <b>412,510</b> | <b>100%</b>         |



### Residential Emission Sources

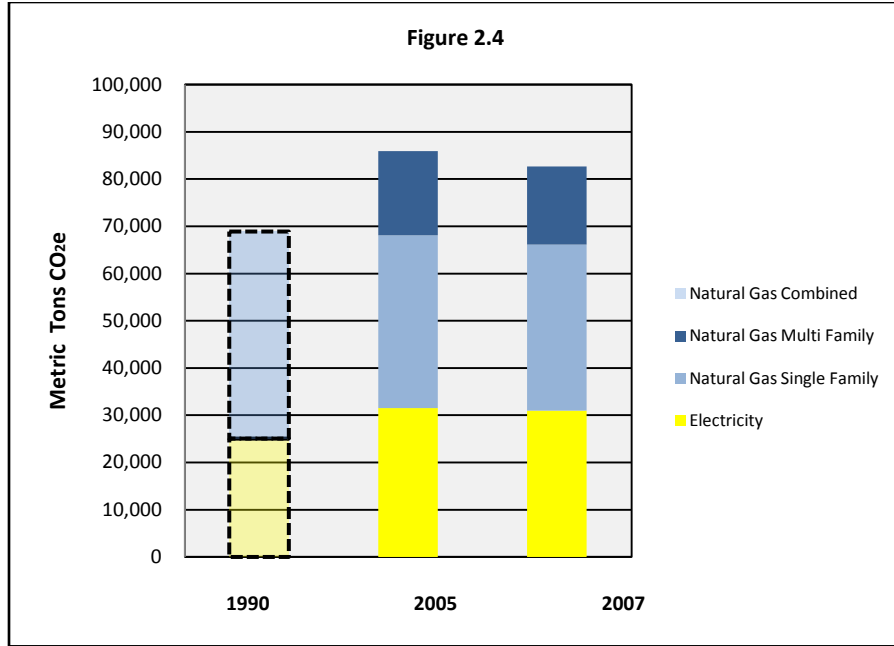
The residential sector represents the second largest quantity of inventoried emissions. Depicted in Table 2.4 and Figure 2.4 are the emissions associated with energy consumption in the residential sector. All residential sector emissions are the result of electricity and natural gas consumption. Electricity in this sector is generally used for lighting, heating, and powering appliances. Natural gas is typically used as a fuel for home heating, water heating, and cooking.

The natural gas emissions are broken out into multi and single family-home classes to provide an additional level of detail in the years 2005 and 2007. In 2005, natural gas emissions associated with multi-family homes totaled 17,825 metric tons of CO<sub>2e</sub> (i.e. 33 percent of the total 54,406 metric tons of CO<sub>2e</sub> emissions associated with natural gas). In this same year, emissions associated with electricity use resulted in a total of 31,542 metric tons of CO<sub>2e</sub>.

In 2007, residential sector natural gas decreased by 5 percent and electricity emissions decreased by 2 percent. A decrease in natural gas emissions is the result of a decline in energy consumption. In the case of electricity, the overall residential sector kWh consumption rose between years by 4 percent; however, changes in the emission factors used to quantify activity data is the primary cause for the decline in emissions.

**Table 2.4 Residential Emission Sources (metric tons CO<sub>2e</sub>)**

| Residential              | 1990          | Share of Source | 2005          | Share of Source | 2007          | Share of Source |
|--------------------------|---------------|-----------------|---------------|-----------------|---------------|-----------------|
| <b>Natural Gas Total</b> | <b>43,835</b> | <b>100%</b>     | <b>54,406</b> | <b>100%</b>     | <b>51,692</b> | <b>100%</b>     |
| Multi Family             | --            | --              | 17,825        | 33%             | 16,522        | 32%             |
| Single Family            | --            | --              | 36,581        | 67%             | 35,170        | 68%             |
| <b>Electricity Total</b> | <b>25,061</b> | <b>100%</b>     | <b>31,542</b> | <b>100%</b>     | <b>30,952</b> | <b>100%</b>     |
| <b>Total</b>             | <b>68,896</b> | --              | <b>85,949</b> | --              | <b>82,644</b> | --              |



**Commercial Emission Sources**

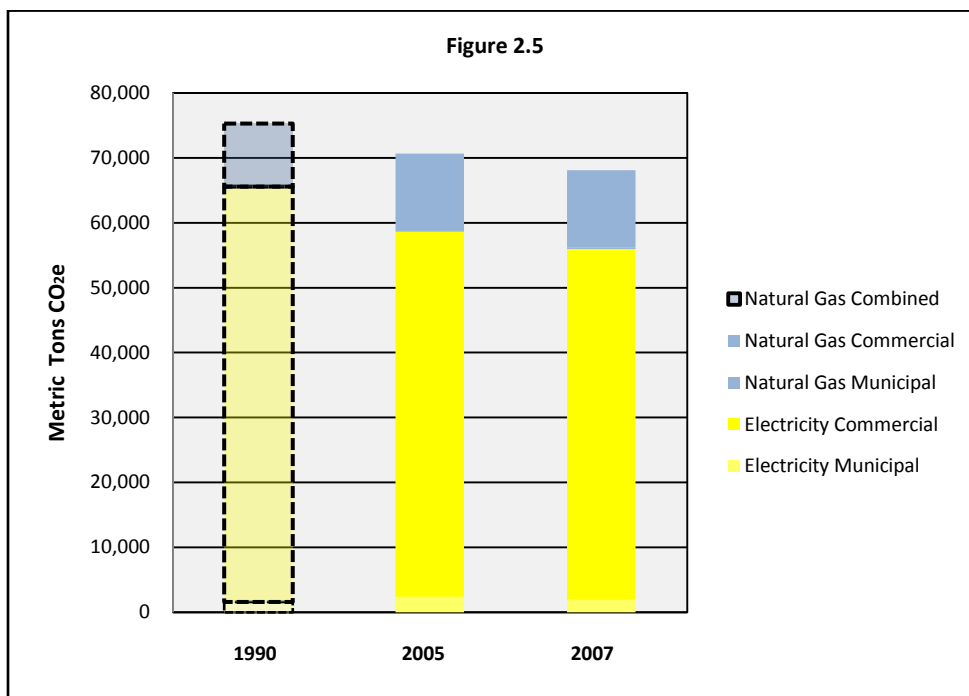
The activity in the commercial sector is the result of electricity and natural gas consumption. Typically, natural gas is used to heat buildings, fire boilers, and generate electricity. Electricity is generally used for lighting, heating, and powering appliances and equipment. The commercial sector emissions include uses related to the operations of businesses and public agencies.

As seen in Table 2.5 and Figure 2.5, in the baseline year (2005), the combined sources produced a total of 70,699 CO<sub>2e</sub> metric tons of emissions. Approximately 83 percent of the total emissions are related to electricity use and natural gas accounted for 17 percent of emissions.

In 2007, overall sector emissions decreased by 4 percent. Looking at the individual sources, natural gas increased by 1 percent. This rise correlates with an increase in natural gas consumption and the 2 percent increase within the commercial portion of the jobs by industry dataset developed by SCAG, which went from 16,342 in 2005 to 16,712 in 2007. Electricity emissions decreased by 5 percent. In this sector, the overall commercial kWh consumption rose between years by 1 percent but because of changes in the emission factors, which represent improvements in technology and the renewable resource mix used to produce electricity, emissions actually declined in 2007.

**Table 2.5 Commercial Emission Sources (metric tons CO<sub>2e</sub>)**

| Commercial               | 1990          | Share of 1990 Source | 2005          | Share of 2005 Source | 2007          | Share of 2007 Source |
|--------------------------|---------------|----------------------|---------------|----------------------|---------------|----------------------|
| <b>Natural Gas Total</b> | <b>9,715</b>  | <b>100%</b>          | <b>12,061</b> | <b>100%</b>          | <b>12,161</b> | <b>100%</b>          |
| Commercial               | 9,715         | 100%                 | 11,778        | 98%                  | 11,888        | 98%                  |
| Municipal                | --            | --                   | 283           | 2%                   | 273           | 2%                   |
| <b>Electricity Total</b> | <b>65,601</b> | <b>100%</b>          | <b>58,638</b> | <b>100%</b>          | <b>55,989</b> | <b>100%</b>          |
| Commercial               | 64,002        | 98%                  | 56,226        | 96%                  | 54,006        | 96%                  |
| Municipal                | 1,599         | 2%                   | 2,412         | 4%                   | 1,983         | 4%                   |
| <b>Total</b>             | <b>75,315</b> |                      | <b>70,699</b> |                      | <b>68,150</b> |                      |



**Industrial Emission Sources**

The majority of industrial emissions are the result of electricity, natural gas consumption, and the stationary combustion of fuels in the industrial sector. As with the commercial sector, natural gas is used to heat buildings, fire boilers, and generate electricity. Electricity is generally used for lighting, heating, and powering appliances and equipment. Emissions that fall under industrial sector activities are associated with industrial processes, products or utilities. Although the precise electricity ratio between the commercial and industrial sectors was unable to be determined due to a customer confidentiality rule, there was a significant portion of large power use (500kW and over is considered industrial use) not affected by Rule 15/15 therefore industrial sector emissions were able to be identified and estimated.<sup>7</sup> The fuel-use data was provided by SCAQMD. SCAQMD figures related to natural gas have not been included in this inventory because this may result in double counting natural gas data already provided by the utility company.

As seen in Table 2.6 and Figure 2.6, in the baseline year (2005), the combined sources produced a total of 40,342 CO<sub>2</sub>e metric tons of emissions. Approximately 35 percent of the total emissions are related to natural gas use, electricity accounted for 65 percent, and less than 1 percent of emissions was related to the stationary combustion of fuels.

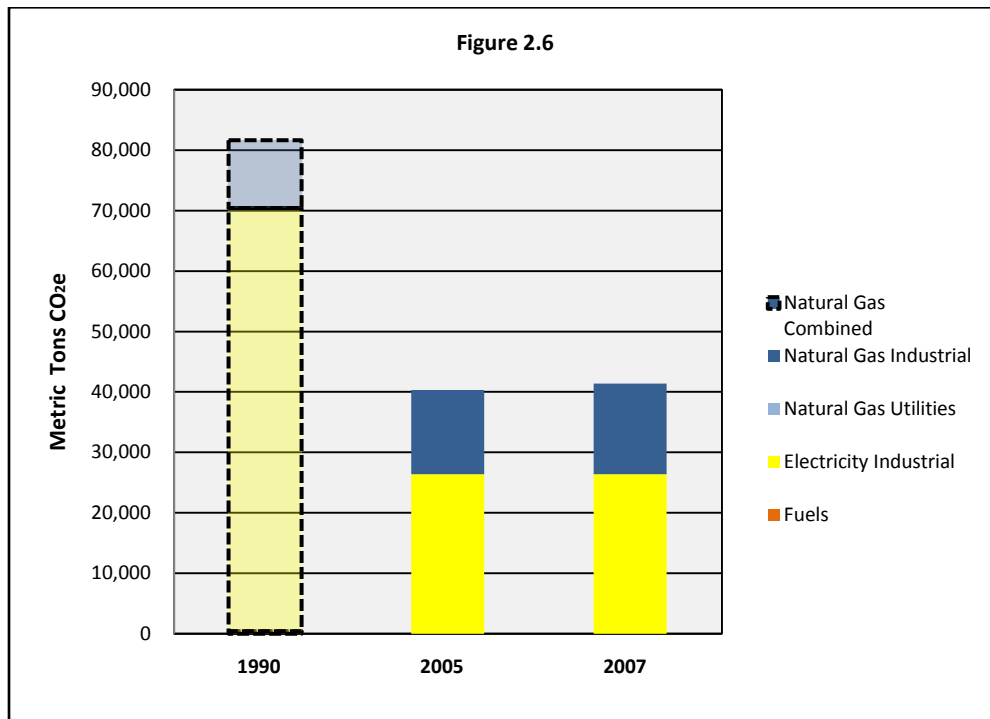
In 2007, overall sector emissions increased by 3 percent. Looking at the individual sources, natural gas increased by 8 percent. This increase correlates with an 8 percent increase in natural gas consumption. Electricity emissions increased by 0.2 percent. While the overall industrial kWh consumption increased by 6 percent. This small increase in electricity emissions is the result of the lower emission factors used to quantify emissions in the year 2007. Overall fuel source emissions decreased due to a decrease in fuel oils consumption.

<sup>7</sup> Refer to Appendix H for a definition of Rule 15/15.



**Table 2.6 Industrial Emission Sources (metric tons CO<sub>2</sub>e)**

| Industrial               | 1990                      | Share of 1990 Source | 2005          | Share of 2005 Source | 2007          | Share of 2007 Source |
|--------------------------|---------------------------|----------------------|---------------|----------------------|---------------|----------------------|
| <b>Natural Gas Total</b> | <b>11,218</b>             | <b>100%</b>          | <b>13,923</b> | <b>100%</b>          | <b>14,973</b> | <b>100%</b>          |
| Industrial               | 11,218                    | 100%                 | 13,922        | 100%                 | 14,972        | 100%                 |
| Utilities                | --                        | --                   | 1             | 0%                   | 2             | 0%                   |
| <b>Electricity Total</b> | <b>70,030<sup>8</sup></b> | <b>100%</b>          | <b>26,317</b> | <b>100%</b>          | <b>26,359</b> | <b>100%</b>          |
| Industrial               | 70,030                    | 100%                 | 26,317        | 100%                 | 26,359        | 100%                 |
| <b>Fuel Total</b>        | <b>425</b>                | <b>100%</b>          | <b>102</b>    | <b>100%</b>          | <b>74</b>     | <b>100%</b>          |
| Diesel/Fuel Oil          | 62                        | 15%                  | 35            | 34%                  | 3             | 4%                   |
| LPG, Propane, Butane     | 362                       | 85%                  | 68            | 66%                  | 71            | 96%                  |
| <b>Total</b>             | <b>81,672</b>             | <b>--</b>            | <b>40,342</b> | <b>--</b>            | <b>41,406</b> | <b>--</b>            |



<sup>8</sup> The results in the year 1990 give an indication of consumption trends. A jobs by industry dataset was developed by SCAG and used as a metric to disaggregate 1990 electricity consumption data. Although the 2005 electricity emission factors were used in place of the 1990 emission factors there were significantly more industrial sector jobs in 1990 than there were in 2005, which went from 9,493 in 1990 to 3,518 in 2005. This is the primary reason electricity emissions look significantly higher in 1990.

## Transportation Emission Sources

The transportation sector represents the largest quantity of inventoried emissions. In order to estimate tailpipe emissions, transportation model outputs were used and VMT was allocated for each city based on the trip production and attraction of land uses. This approach of allocating VMT is known as an Origin/Destination method.

As seen in Table 2.7 and Figure 2.7, emissions generated from vehicle trips are organized based on producing trips that start in the City and end somewhere else; attracting trips, that start outside of the City limits and end in the City; and local vehicle trips that start and end within the community boundary. There are a couple of different methods currently used to capture transportation emissions; however, utilizing the Origin/Destination method allows for pass-through traffic such as freeways to be excluded (which are not typically influenced by city policy), leaving only the policy relevant data which are the vehicle trips that start and/or end in a city's jurisdiction.

In 2005, 103,882 metric tons of CO<sub>2</sub>e were generated from travel activities originating within the City's boundaries and traveling to a destination outside of the community; more emissions, 105,786 metric tons of CO<sub>2</sub>e, were generated by travel that started outside of the City and ended within the City's boundary. The smallest portion of emissions can be attributed to vehicle trips that started and ended within the boundary of the City, 6,358 metric tons of CO<sub>2</sub>e. The majority of on-road travel emissions about 94 percent, are from gasoline powered passenger vehicles while 6 percent are the result of diesel powered vehicles. SCAG provided regionally-specific percentage data on the mix of vehicle classes from the South Coast Air Basin for the purpose of breaking down VMT by fuel and vehicle type. An assumption was made that heavy-duty vehicles used diesel fuel while passenger vehicle used gasoline.

In addition to on-road transportation data, emissions related to off-road transportation are also represented in Table 2.7 and Figure 2.7. Off-road transportation activities make up less than 1 percent of the total emissions. Off-road vehicles and equipment sources include: Lawn and Garden Equipment, Construction Equipment, Industrial Equipment, and Light Commercial Equipment.

Aviation fuel associated with air travel at the Hawthorne Municipal Airport - Jack Northrop Field has also been included in this inventory. The municipal airport is home to private aircraft, charter flights, flight instruction, and Fixed Base Operations (FBO). While emissions associated with the operation of the airport (e.g. the electricity used, the fuel used by vehicles servicing the planes, etc) is included in the *Municipal GHG Emissions Inventory Report*, the air travel emissions associated with planes has been included in the community inventory as a scope 3 source. Fuel estimates were based on a dollars spent method to estimate aviation fuel emissions. In 2005, aviation emissions made up 2 percent of the total emissions in the transportation sector.

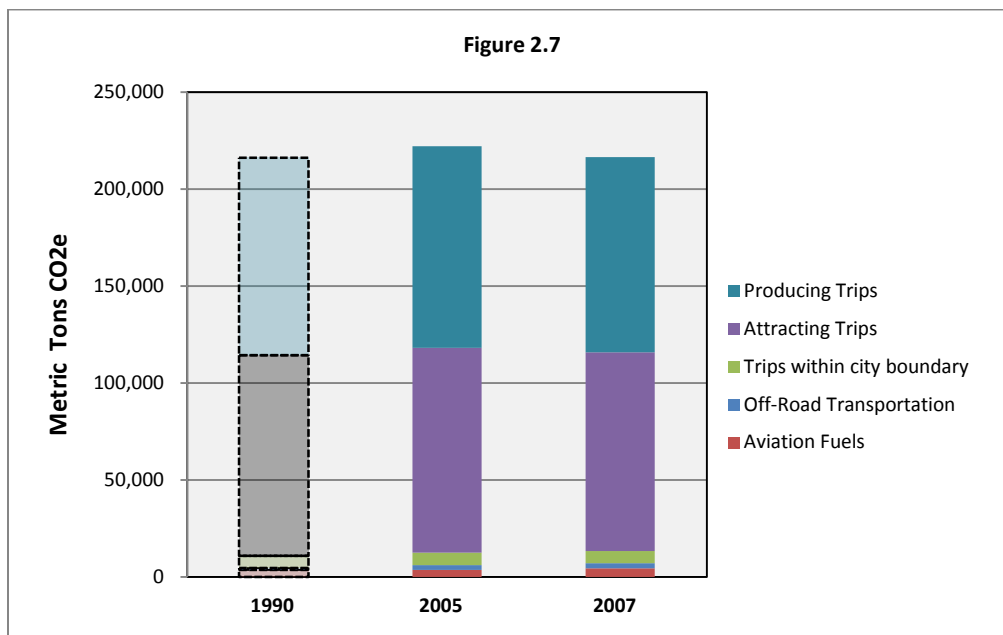
In 2007, the total emissions decreased from the baseline year by 2 percent. Again, more emissions were generated from vehicle trips that started outside of the City and ended within the City's boundary. There were also slightly less emissions generated by vehicle trips which started and ended within the City limits. There are a couple of factors that contributed to the overall decline in emissions from the baseline to the interim year. There was less road travel activity in 2007 which may be the result of higher fuel prices, as people tend to drive less when fuel prices are higher. Another variable that accounts for the decline in emissions is the increased fuel efficiency of gasoline powered passenger vehicles. The average mpg, derived from the default settings in the CACP software, went from 18.61 to 18.965 between the two years. This average reflects a 2 percent improvement in fuel efficiency. Off-road transportation and aviation related emissions increased by 3 and 22 percent respectively.

The VMT for 1990 was estimated based on the annual population growth rate in Hawthorne from 1990 to 2005, which was 1.43 percent. The higher emissions in 1990 caused by gasoline powered passenger vehicles can be rationalized because of the increased passenger vehicle fuel efficiency between 1990 and 2005. In 1990, the average mpg for passenger vehicles was 15.945 and in 2005 the average mpg was 18.61. That is a 16.71 percent improvement in fuel efficiency from 1990 to 2005.

The emission estimates are the result of VMT derived from SCAG's travel demand model. Appendix A includes detailed information on how the VMT was produced by SCAG. Essentially, city boundary limits were used to select Traffic Analysis Zones (TAZ). A TAZ contains information on vehicle trips such as trip length and vehicle trip origins and destinations. VMT is determined per TAZ and is then aggregated. Since there is currently no formal guidance on how much VMT to allocate to a city for attracting and producing trips, an equal 50 percent split in attributing VMT to producing land uses and attracting land uses was applied. In other words, a city is responsible for 50 percent of a trip's emissions when either the origin or destination is within city limits. When both the origin and destination are within city limits, a city is responsible for 100 percent of the local trip VMT since the trip starts and ends within a city's boundary. The off-road sources were obtained from the ARB OffRoad 2007 model. The model was run using default equipment, population, usage, and efficiency data for Los Angeles County and was then scaled to the local government level by population share.

**Table 2.7 Transportation Emissions by Type (metric tons CO<sub>2</sub>e)**

| Source                                  | 1990           | Share of 1990 Source | 2005           | Share of 2005 Source | 2007           | Share of 2007 Source |
|---|----------------|----------------------|----------------|----------------------|----------------|----------------------|
| <b>Origin/Destination Subtotal</b>      | <b>211,560</b> | <b>100%</b>          | <b>216,025</b> | <b>100%</b>          | <b>209,586</b> | <b>100%</b>          |
| Producing Trips                         | 101,735        | 48.1%                | 103,882        | 48.1%                | 100,642        | 48.0%                |
| Attracting Trips                        | 103,599        | 49.0%                | 105,786        | 49.0%                | 102,651        | 49.0%                |
| Trips within City Boundary              | 6,226          | 2.9%                 | 6,358          | 2.9%                 | 6,293          | 3.0%                 |
| <b>Off-Road Transportation Subtotal</b> | <b>1,007</b>   | <b>100%</b>          | <b>2,480</b>   | <b>100%</b>          | <b>2,564</b>   | <b>100%</b>          |
| <b>Aviation Fuels</b>                   | <b>3,545</b>   | <b>100%</b>          | <b>3,593</b>   | <b>100%</b>          | <b>4,395</b>   | <b>100%</b>          |
| <b>Total</b>                            | <b>216,111</b> | <b>--</b>            | <b>222,098</b> | <b>--</b>            | <b>216,546</b> | <b>--</b>            |



### Solid Waste Emission Sources

As waste decomposes in a landfill, methane is released into the atmosphere. Routinely an estimated 75 percent (LGOP recommended percentage) of this methane is captured by landfill gas collection systems while the remaining 25 percent escapes into the atmosphere, contributing to global warming. Emissions from solid waste are captured in two ways. The first, landfill waste-in-place (scope 1) is an estimate of methane emissions in the base year from the decomposition of waste in landfills located within the jurisdictional boundary, regardless of whether the landfill(s) is closed or open. These emissions are estimated based on ARB's FOD. The FOD model incorporates data on waste disposal and facility conditions extending back several decades to calculate methane and carbon dioxide equivalent emissions. There was no data available from ARB for the closed Hawthorne Canyon Landfill facility located in the City of Hawthorne.

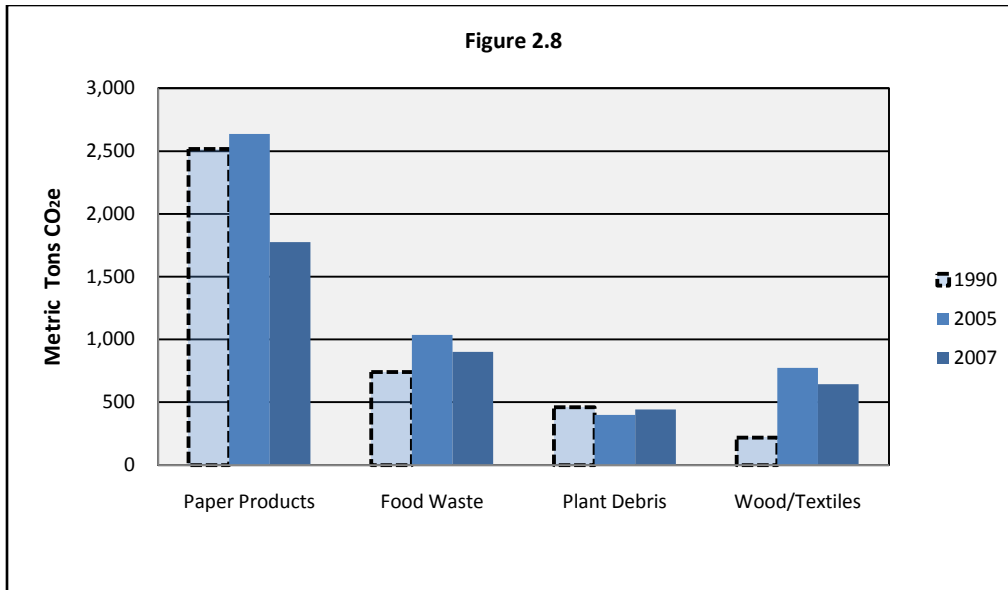
The second way to capture solid waste emissions is from community-generated waste and alternative daily cover (ADC) (scope 3) which accounts for future decomposition of the waste generated in a community in the base year. These emissions are considered scope 3 because the actual emissions occur in the future as they decompose over a long period of time (100 + years). Typically sources of community-generated waste include paper, food waste, textiles, wood, and plant debris. ADC refers to material other than earthen material placed on the surface of the active face of a solid waste landfill at the end of each operating day to control vectors, fires, odors, blowing litter, and scavenging. Data on community-generated waste and ADC was collected from disposal data reported by CalRecycle.

In 2005, the solid waste sector made up 1 percent of the total emissions for Hawthorne. Table 2.8 and Figure 2.8, show a breakdown of community-generated solid waste based upon waste characterization studies by CalRecycle. In the baseline year, paper products are the largest source of emissions followed by food waste. Approximately 2,805 ADC tons and 92,415 disposal tons reportedly went to landfills, while 46 transformation tons was diverted from landfills and sent to waste-to-energy facilities where the solid waste was converted to heat or electricity through the process of incineration, pyrolysis, distillation, or biological conversion.

In 2007, solid waste remained at 1 percent of the total sector emissions. Looking at Table 2.8 paper and food waste continued to be the highest sources of waste in the jurisdiction, though the overall solid waste emissions decreased from 2005 as a result of less disposal tons being sent to landfills. Approximately 1,565 ADC tons and 75,587 disposal tons were sent to landfills. Transformation tons increased with 5,963 tons sent to waste-to-energy facilities.

**Table 2.8 Solid Waste Emission Sources (metric tons CO<sub>2</sub>e)**

| Solid Waste    | 1990         | Share of 1990 Waste | 2005         | Share of 2005 Waste | 2007         | Share of 2007 Waste |
|----------------|--------------|---------------------|--------------|---------------------|--------------|---------------------|
| Paper Products | 2,516        | 64%                 | 2,635        | 54%                 | 1,776        | 47%                 |
| Food Waste     | 740          | 19%                 | 1,037        | 21%                 | 900          | 24%                 |
| Plant Debris   | 460          | 12%                 | 400          | 8%                  | 443          | 12%                 |
| Wood/Textiles  | 217          | 6%                  | 774          | 16%                 | 645          | 17%                 |
| <b>Total</b>   | <b>3,934</b> | <b>100%</b>         | <b>4,846</b> | <b>100%</b>         | <b>3,764</b> | <b>100%</b>         |



### E. Community Per Capita Emissions

Per capita emissions can be a useful metric for a local government to measure progress in reducing GHG emission levels over time. Per capita emissions may be used for short-term target setting (e.g. 4.0 MT CO<sub>2</sub>e per capita by 2015). Per capita information can also be used to compare emissions against regional and/or national averages, or with neighboring South Bay cities.

As detailed in Table 2.9, by dividing the community-wide GHG emissions by the population a result of 4.8 metric ton of CO<sub>2</sub>e per capita is shown in the year 2005. It is important to note that this number is not the same as the carbon footprint of the average individual living in Hawthorne which would include emissions resulting from commercial air travel and other lifecycle emissions.<sup>9</sup>

**Table 2.9 Per Capita Emissions**

| Per Capita   | 1990    | 2005    | 2007    |
|--|---------|---------|---------|
| <b>Population</b>  | 71,349  | 88,245  | 88,583  |
| <b>Community GHG Emissions</b><br>(metric tons CO <sub>2</sub> e)  | 445,928 | 423,935 | 412,510 |
| <b>Per Capita GHG Emissions</b><br>(metric tons CO <sub>2</sub> e) | 6.2     | 4.8     | 4.7     |

<sup>9</sup> A lifecycle emissions would include an assessment identifying and quantifying GHG emissions associated with the energy and materials used at all stages of a product's life including: the gathering of raw materials, growing or fabrication, distribution, use, and the end disposal of a product's life. Identifying and quantifying this type of emission is a difficult and complicated process and currently there is no standardized methodological approach agreed upon to capture these sources.

## F. Community Emissions Forecast

To show the potential for emission growth in the community a business-as-usual (BAU) forecast has been included, see Table 2.10 and Figure 2.10. A BAU forecast reflects the course of activities expected to exist in the future under existing conditions and in the absence of mitigation efforts. The forecast is based on projected trends in population, households, driving habits, and job growth from the interim year 2007 going forward to the year 2020. In the short-term, from 2005 to 2007, a reduction of 3 percent is observed, however long-term general trends suggest an increase in the absence of mitigation efforts. Under a business-as-usual scenario, emissions can be expected to grow by approximately 6 percent from the year 2007 to 2020, or from 412,510 to 435,389 metric tons of CO<sub>2</sub>e. With the exception of transportation emissions, in this scenario the assumption is made that electricity, natural gas, waste, etc. will increase over time in proportion to population, households, and number of jobs. However, this does not factor in changing practices such as the increasing use of renewable energy sources. Transportation emissions are addressed later in this section.

The residential sector forecast is based on a household projection for Hawthorne from SCAG's adopted Regional Growth Forecast (2008). SCAG estimates the number of households to be 28,758 in 2007 and will increase to 30,110 by 2020. Therefore, the average annual compound growth rate (0.4 percent) was applied to the residential sector emissions.

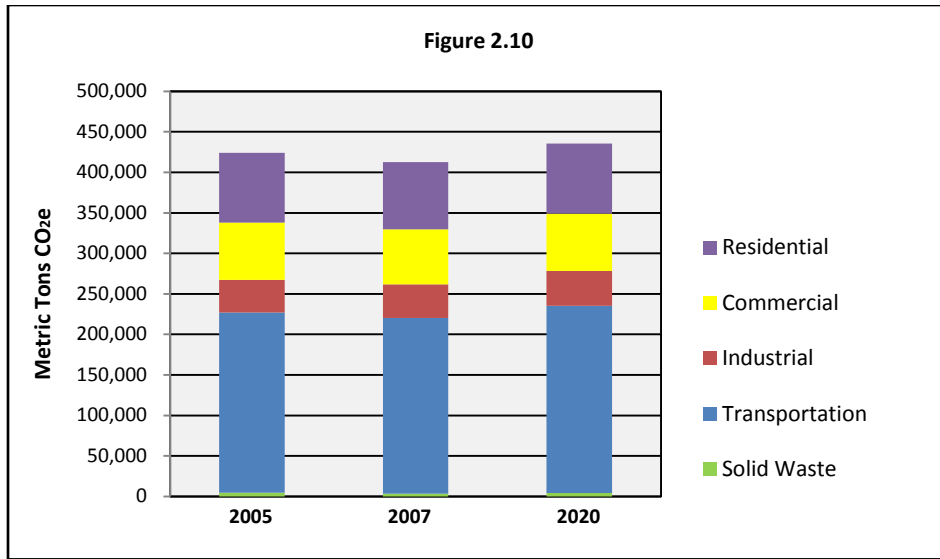
The commercial and industrial sector forecast was also based on SCAG's adopted Regional Growth Forecast (2008), job growth projections. For 2007, SCAG estimates jobs in the City of Hawthorne to be 20,585 and will increase to 21,347 by 2020. The average annual compound growth rate of 0.3 percent was applied to the commercial and industrial sector emissions.

The transportation sector VMT growth projections were also developed by SCAG based on the model results adopted in the Regional Transportation Plan 2008 Amendment 1. SCAG's growth forecast factors in the increasing fuel economy standards. SCAG estimated the total VMT activity in the City of Hawthorne to be 368,857,365 miles in 2007 and will increase to 384,793,997 miles by 2020. The average annual compound growth rate of 0.3 percent was applied to the transportation sector emissions.

For the solid waste sector, population is the primary determinate of growth in emissions. SCAG's adopted Regional Growth Forecast (2008) was used to estimate the average annual compound growth rate (1 percent). SCAG estimates that the population was 88,583 in 2007, and will be 103,236 in 2020.

**Table 2.10 Business-As-Usual Emissions Growth Forecast by Sector (metric tons CO<sub>2</sub>e)**

| Sector         | 2005           | 2007           | 2020           | Annual Growth Rate | Percent Change from 2007 to 2020 |
|----------------|----------------|----------------|----------------|--------------------|----------------------------------|
| Residential    | 85,949         | 82,644         | 86,530         | 0.4%               | 5%                               |
| Commercial     | 70,699         | 68,150         | 70,672         | 0.3%               | 4%                               |
| Industrial     | 40,342         | 41,406         | 42,939         | 0.3%               | 4%                               |
| Transportation | 222,098        | 216,546        | 230,861        | 0.3%               | 7%                               |
| Solid Waste    | 4,846          | 3,764          | 4,387          | 1%                 | 17%                              |
| <b>Total</b>   | <b>423,935</b> | <b>412,510</b> | <b>435,389</b> | <b>--</b>          | <b>6%</b>                        |



## III. Conclusion

### A. Summary

In conclusion, this inventory report identifies the major sources of emissions within Hawthorne's geographic boundary by scope, source, and sector for the purpose of addressing GHG emissions and reducing the community's carbon footprint. In 2005, the City of Hawthorne generated approximately 423,935 metric tons of CO<sub>2</sub>e. The year 2007 represents a 3 percent decrease from the total emissions in 2005. This decrease can be attributed to lower emissions from electricity, natural gas, and gasoline sources. A decrease in electricity emissions is the result of lower 2007 emission factors used to quantify emissions. Less natural gas emissions are the results of less energy consumption. Lower emissions from gasoline sources are the result of less travel activity and increased vehicle fuel economy. In both years, the transportation sector represents the largest source of emissions (scope 1). The majority of transportation sector emissions are the result of gasoline and diesel combustion in vehicles traveling to activity centers within the boundaries of Hawthorne. Community-generated waste also contributed to the decline of emissions from 2005 to 2007. This was a result of more disposal tons being diverted from landfills and sent to waste-to-energy facilities .

Short-term trends show a 3 percent reduction in overall emissions. However, long-term general trends in the absence of mitigation efforts suggest an increase in emissions. It is anticipated that Hawthorne's community emissions, under a business-as-usual scenario, will grow 6 percent by 2020 from 412,510 in 2007 to 435,389 metric tons of CO<sub>2</sub>e in 2020.

### B. Inventory Management

Monitoring reduction targets and conducting routine inventories will help ensure implemented strategies are effective in reducing emissions. The City should determine how often they re-inventory GHG emissions. Annually would be ideal, but every two to three years is an approach taken by many small and medium-sized cities to stay on target with goals. Since a local government has more control over its own emission-generating activities, the City may choose to conduct a municipal inventory on an annual basis.

Establishing internal policies, systems, or procedures will allow staff to easily collect data (per calendar year) in order to efficiently conduct re-inventories. A software program or data template may be used to keep track of records so that time is saved when re-inventorying. For example, the type of information that should be retained for a municipal inventory would include: fuel consumption records on fleet vehicles and maintenance equipment; generators; consumption data on electricity and natural gas use; and data records on fire suppressant equipment or refrigerants recharged into a HVAC system.

The recommended protocol methods should be used because this affects the resulting emission estimates since the more accurate the data, the more precise the emissions results. As emission reporting methods continue to evolve and be refined, the City will want to improve upon their emission estimates utilizing the latest methods to conduct an inventory and adjust previous inventories as needed for comparison purposes.

### C. Next Steps

While several factors play a role in influencing GHG emissions, the City has an opportunity to impact some of those sources such as the consumption of energy within its community through strategic approaches that aim to conserve energy and educate the community. A companion document will provide next steps to link the data results contained in this report to target setting and the development of strategies to be included in a CAP.



## Appendix A—Activity Data/Methodology/Emission Factor Disclosure

Listed below are the data sources also known as activity data. Activity data is the consumption data or the measurement of sources such as fuel, metered annual electricity use, or annual VMT which results in the release of GHG emissions. Data on fuel consumption, electricity use, natural gas, VMT, waste generation, and other sources gathered for this inventory have been included here. The information is grouped by type of emission source. The description details the source of data and the methodology used to obtain and calculate the information as reference for future inventories. Also listed below are the emission factors and sources. Emission factors refer to a unique value used to determine the amount of GHG emitted on a per unit activity basis. These factors are used to convert activity data, like energy and fuel use, into the associated GHG emissions.<sup>10</sup>

Note: It is important to review the information listed below before conducting a routine re-inventory in order to update methodologies and emission factors so that accurate comparisons can be made between inventories.

### A. Purchased Electricity

#### Description:

The GHG emissions generated from electricity were estimated based on *Electricity Use Reports*, Version 5.0, prepared by Southern California Edison. For the years 2005 and 2007, the consumption data was extracted from SCE's Customer Service System based on the Public Authority Codes. Public Authority Codes are used to identify accounts within a municipality for the purpose of calculating state and local taxes. To identify kWh use per sector, SCE aggregated data by rate group. Rate groups are categories used to identify a customer load profile, and a load profile represents the amount or quantity of electricity used by a customer (also see Appendix E for a description of rate group profiles and limits on the customer data provided).

Rule 15/15 was applied to consumption data which requires data to be aggregated and combined with other rate groups if specific criteria is not met. The application of Rule 15/15 is required if customer data is not made up of at least 15 customers and a customer's load is not less than 15 percent of an assigned category. If the 15/15 rule is triggered after customer data has been screened twice, the customer data is then dropped from the information provided. The application of Rule 15/15 was applied to the data. In 2005, the PA-1, PA-2, TOU-PA-5 rate groups were combined into the AG TOU rate group. In 2007, the PA-1, PA-2, TOU-PA-5 rate groups were combined into the AG TOU rate group. The TOU-GS rate group was combined into GS-2 rate group.

A jobs per industry dataset, created by SCAG and based on NAICS and SIC codes, was used as a metric to disaggregate electricity consumption data where rule 15/15 was applied and in the case of 1990 where only the annual sum was known. The dataset was used to indicate the commercial/industrial sector growth rates between years. For 1990, SCE provided the total annual amount of kWh from their Customer Revenue and Consumption Reporting System. The City's population growth rate (1.43 percent) was used to determine the residential consumption and the jobs per industry dataset was used to disaggregate the commercial and industrial sectors.

**Reference:** Larry Sutton, Account Executive, Local Government Metro Region, Southern California Edison, 714-973-5660/PAX52660, Larry.Sutton@sce.com.

<sup>10</sup> A full description of emission factors can be found on page 27 of the Local Government Operations Protocol V1.1. Emission factors are determined by means of direct measurement, laboratory analyses or calculations based on representative heat content and carbon content.

|   |                  |   |                               |
|---|------------------|---|-------------------------------|
| <b>Methodology Name:</b> Known use (Southern California Edison); electricity generated emissions were calculated using utility-specific verified emissions factors provided by the California Climate Action Registry and listed in the LGOP. |                  |   | <b>Emission Factor Source</b> |
| Emission Factor   | CO <sub>2</sub>  | 665.72 lbs/MWh (2005); 630.89 lbs/MWh (2007); 665.72 lbs/MWh (1990) | LGOP V1.1, Table G.6          |
|   | CH <sub>4</sub>  | 0.030 LBS/MWH (2005); 0.029 LBS/MWH (2007); 0.030 LBS/MWH (1990)    | LGOP V1.1, Table G.7          |
|   | N <sub>2</sub> O | 0.011lbs/MWh (2005); 0.010lbs/MWh (2007); 0.011lbs/MWh (1990)       | LGOP V1.1, Table G.7          |

**B. Natural Gas**

|   |  |
|---|--|
| <b>Description:</b><br>The GHG emissions generated from natural gas were estimated based on data provided by the Southern California Gas Company. Legal Jurisdiction codes were used to extract the consumption data. Residential accounts were separated by tariff type, single family and multi-family accounts. For Non-residential data, a combination of NAICS codes and tariff rate types were used to identify commercial, industrial and utility consumption data. For 1990, natural gas estimates were based on the City’s annual population growth rate (1.43 percent). The growth rate was applied to the 2005 natural gas consumption data to arrive at an estimation for 1990. |  |
| <b>Reference:</b> Chauncy Tou, Energy Programs Advisor Customer Programs, Southern California Gas Company, 213-244-2833, ctou@semprautilities.com.  |  |

|  |                  |              |                               |
|--|------------------|--------------|-------------------------------|
| <b>Methodology Name:</b> Known use (Southern California Gas Company); natural gas emissions were calculated using default emissions factors from the LGOP. |                  |              | <b>Emission Factor Source</b> |
| Emission Factor  | CO <sub>2</sub>  | 53.06 kg/MWh | LGOP, v1 Table G.1            |
|  | CH <sub>4</sub>  | 5 g/MMBtu    | LGOP, v1 Table G.3            |
|  | N <sub>2</sub> O | 0.1 g/MMBtu  | LGOP, v1 Table G.3            |

**C. Transportation Fuel Combustion**

|  |  |
|--|--|
| <b>On-Road Mobile Sources:</b><br>SCAG provided average weekday daily VMT figures from its travel demand model. Data for the years 2005 and 2007 were interpolated using SCAG’s year 2003 and 2008 model results. For the year 2003, model results were based on the transportation network in the adopted Regional Transportation Plan (RTP) 2008. Model results for the forecast year 2020 and the year 2008 were based on the network in the adopted RTP 2008 Amendment 1.<br><br>SCAG uses TransCAD, a geographic information system software for transportation and public transport applications. In TransCAD, city boundary limits were used to select Traffic Analysis Zones (TAZ). At the TAZ level information on vehicle trips such as trip length and vehicle trip origins and destinations was analyzed. To arrive at the VMT, origin and destination trips are multiplied by the trip length. VMT is determined per TAZ and is aggregated to become the origin-destination based and intra-city VMT. In cases where a TAZ was split by a city boundary, the ratio was calculated by area.<br><br>Since there is currently no formal guidance on how much VMT to allocate to a city for attracting and producing trips, an equal 50 percent split in attributing VMT to producing land uses and attracting land uses was applied. In other words, a city is responsible for 50 percent of a trip’s emissions when either the origin or destination is within city |  |
|--|--|

limits. When both the origin and destination are within city limits, a city is responsible for 100 percent of the local trip VMT since the trip starts and ends within a city's boundary.

The VMT totals were multiplied by a 0.95 conversion factor (347/365) 5-day average daily VMT to 7-day average daily. The VMT conversion factor was provided by SCAG. Data was then multiplied by 365, to get annual VMT. For 1990, VMT estimates were based on the City's annual population growth rate (1.43 percent). This growth rate was applied to the 2005 VMT data to arrive at an estimate for 1990.

SCAG provided regionally-specific percentage data on the mix of vehicle classes (e.g., passenger cars, light trucks) from the Southern California Air Basin (SCAB) in the years 2005, 2007, and 2020 for the purpose of breaking down VMT by fuel and vehicle type. An assumption was made that heavy-duty vehicles used diesel fuel while passenger vehicle used gasoline. The 2005 vehicle class percentages were used for the 1990 inventory where data was not available.

**Off-Road Mobile Sources:**

The Off-road emissions were obtained from the ARB OFFROAD2007 model. The model was run using default equipment population, usage, and efficiency data for Los Angeles County. Emissions outputs were scaled to the local Jurisdiction level by population share. Results were converted from short tons per day to metric tons per year. Methane and nitrous oxide emissions were converted to carbon dioxide equivalent units based on the Global Warming Potential factors from LGOP. The Model can be found at: [www.arb.ca.gov/msei/offroad/offroad.htm](http://www.arb.ca.gov/msei/offroad/offroad.htm)

**Aviation Fuel:**

Aviation fuel dollars spent was obtained from the Director of Property Management. Fuel estimates per fuel type were based on dollars spent method. Fuel quantities were calculated in CACP software using default emissions factors from the LGOP.

**Reference:** Hao Cheng, Transportation Modeler II, Transportation Modeling, AQ & Conformity Southern California Association of Governments, 818 W. Seventh Street, 12th Floor Los Angeles, CA 90017 (Tel) 213-236-1977 .

**Aviation Fuel Reference:** Anne Price, CPM®, Director of Property Management, Kearny Real Estate Company, 3231 Jack Northrop Avenue, Hawthorne, California 90250 T: 310-675-6129 | F: 310-675-6128 [aprice@kearny.com](mailto:aprice@kearny.com) | [www.kearny.com](http://www.kearny.com)

| <b>Methodology Name:</b> VMT, Origin-Destination method (SCAG); fuel emissions were calculated with VMT using default emissions factors from the LGOP. |     |                      | <b>Emission Factor Source</b>                       |
|--|-----|----------------------|---|
| Gasoline Emission Factor   | CO2 | 8.81 kg/gallon       | LGOP, v1 Table G.9                                  |
|  | CH4 | Varies by model year | LGOP, v1 Table G.10; Table G.12 for other equipment |
|  | N2O | Varies by model year | LGOP, v1 Table G.10; Table G.12 for other equipment |
| Diesel Emission Factor   | CO2 | 10.15 kg/gallon      | LGOP, v1 Table G.9                                  |
|  | CH4 | Varies by model year | LGOP, v1 Table G.10; Table G.12 for other equipment |
|  | N2O | Varies by model year | LGOP, v1 Table G.10; Table G.12 for other equipment |
| CNG Emission Factor  | CO2 | 53.057 kg/MMBtu      | LGOP, v1 Table G.9                                  |
|  | CH4 | Varies by model year | LGOP, v1 Table G.10; Table G.12 for other equipment |

|                               |                  |                      |   |
|-------------------------------|------------------|----------------------|---|
|                               | N <sub>2</sub> O | Varies by model year | LGOP, v1 Table G.10; Table G.12 for other equipment |
| Jet Fuel Emission Factor      | CO <sub>2</sub>  | 9.57 KG/GALLON       | LGOP, v1 Table G.9                                  |
|                               | CH <sub>4</sub>  | 0.27G/GALLON         | LGOP, v1 Table G.12                                 |
|                               | N <sub>2</sub> O | 0.31G/GALLON         | LGOP, v1 Table G.12                                 |
| Aviation Fuel Emission Factor | CO <sub>2</sub>  | 8.32 KG/GALLON       | LGOP, v1 Table G.9                                  |
|                               | CH <sub>4</sub>  | 7.04G/GALLON         | LGOP, v1 Table G.12                                 |
|                               | N <sub>2</sub> O | 0.11G/GALLON         | LGOP, v1 Table G.12                                 |

### D. Industrial Source Fuel Combustion

|   |
|---|
| <p><b>Description:</b><br/>                 South Coast Air Quality Management District provided reports on fuel usage by fiscal year, per fuel type reported to the agency within the local jurisdiction. For the year 1990, proxy year data from the fiscal years 1992 and 1993 was utilized to estimate 1990 GHG emissions.</p> <p>Note: SCAQMD natural gas and gasoline figures were excluded because this would result in double counting data already provided by the utility company and SCAG.</p> <p><b>Reference:</b> Lisa Ramos, public records unit, SCAQMD, 909.396.3211, lramos1@aqmd.gov. &amp; Ali Ghasemi, Program Supervisor, Annual Emissions Reporting Program, Office of Planning, Rule Development and Area Sources, SCAQMD, 909-396-2451, aghasemi@aqmd.gov. Control number: 61997 Annual emissions reports .</p> |
|---|

|   |                  |                |                               |
|---|------------------|----------------|-------------------------------|
| <p><b>Methodology Name:</b> Fuel-use based method. Fuels consumed were calculated using default emissions factors from the LGOP.<br/>                 Fuel Oil EF was used to calculate: Diesel/Distillate Oil<br/>                 Stationary LPG EF was used to calculate: LPG, Propane, Butane</p> |                  |                | <b>Emission Factor Source</b> |
| Diesel/Distillate Oil- Fuel Oil 1,2,4 Emission Factor   | CO <sub>2</sub>  | 73.15 KG/MMBTU | LGOP, v1 Table G.1            |
|   | CH <sub>4</sub>  | 11.000 G/MMBTU | LGOP, v1 Table G.3            |
|   | N <sub>2</sub> O | 0.600 G/MMBTU  | LGOP, v1 Table G.3            |
| LPG, Propane, Butane- Stationary LPG Emission Factor  | CO <sub>2</sub>  | 63.16 KG/MMBTU | LGOP, v1 Table G.1            |
|   | CH <sub>4</sub>  | 3.000 G/MMBTU  | LGOP, v1 Table G.3            |
|   | N <sub>2</sub> O | 0.600 G/MMBTU  | LGOP, v1 Table G.3            |

E. Solid Waste

|   |
|---|
| <p><b>Waste-in-place:</b><br/>                 ARB’s First Order Decay Model (FOD) was obtained from ICLEI to estimate methane emissions from waste disposal facilities. FOD model is based on the Intergovernmental Panel on Climate Change (IPCC) Mathematically exact FOD Model. The FOD incorporates data on waste disposal and facility conditions extending back several decades to calculate methane and carbon dioxide equivalent emissions. There was no data available from ARB for the closed Hawthorne Canyon Landfill facility located in the City of Hawthorne.</p> <p><b>Community-Generated Solid Waste:</b><br/>                 Community-generated solid waste emissions were calculated in CACP using waste disposal data obtained from CalRecycle’s Disposal Reporting System. Data includes records on disposal tons, alternative daily cover (ADC) and transformation tons by local Jurisdiction. Disposal tons and ADC for 1990 were based on proxy year data from 1995.</p> <p>The waste characterization for community-generated solid waste was estimated for 2007 using waste composition percents from the CalRecycle 2008 Statewide Waste Characterization Study, for 2008. Waste composition percents for the 2005 inventory are from the CalRecycle 2004 Statewide Waste Characterization Study and reflect the year 2004. And for 1990, waste composition percents are from the CalRecycle 1999 Statewide Waste Characterization Study and reflect the year 2003.</p> <p><b>Reference:</b> Okla Hensley, CalRecycle 916-341-6242, Okla.Hensley@calrecycle.ca.gov</p> |
|---|

|   |  |
|---|--|
| <p><b>Community-Generated Solid Waste Methodology Name:</b> Known data from disposal tons, ADC, and transformation tons reported to CalRecycle in the years 2005 and 2007 was used. For the year 1990, proxy year data from CalRecycle’s Disposal Reporting System (DRS) 1995 was utilized. Visit the website listed below for detailed reports. <a href="http://www.calrecycle.ca.gov/LGCentral/Reports/DRS/Origin/WFOrgin.aspx">http://www.calrecycle.ca.gov/LGCentral/Reports/DRS/Origin/WFOrgin.aspx</a>. Methane Recovery—75 percent (LGOP recommended percentage)</p> |  |
| <p>Community-Generated Solid Waste, Waste Composition Notes</p>   | <p>2007---Waste composition percents are from the CalRecycle 2008 Statewide Waste Characterization Study, for 2008. The 2008 report contains more detailed descriptions of each waste class and subclass than are needed for CACP input. To Download the report:<br/> <a href="http://www.calrecycle.ca.gov/Publications/default.asp?pubid=1346">http://www.calrecycle.ca.gov/Publications/default.asp?pubid=1346</a></p>            |
|   | <p>2005---Waste composition percents are from the CalRecycle 2004 Statewide Waste Characterization Study, for 2004. The 2004 report contains more detailed descriptions of each waste class and subclass listed here; see Appendix B in the report. To Download the report:<br/> <a href="http://www.calrecycle.ca.gov/Publications/LocalAsst/34004005.pdf">http://www.calrecycle.ca.gov/Publications/LocalAsst/34004005.pdf</a></p> |
|   | <p>1990--Waste composition percents are from the CalRecycle 1999 Statewide Waste Characterization Study, and reflect the year 2003. The 1999 report contains more detailed descriptions of each waste class and subclass than are needed for CACP input. To Download the report:<br/> <a href="http://www.calrecycle.ca.gov/WasteChar/WasteStudies.htm#1999">http://www.calrecycle.ca.gov/WasteChar/WasteStudies.htm#1999</a></p>    |

## Appendix B—Emissions Data

The community inventory was based on data collected from electricity, natural gas, fuels, solid waste and other sources listed in the tables below as reference. Information is organized to be consistent with the order of the municipal report (e.g. baseline year, interim year, and historical year). Emissions sources are organized according to source, metric tons of carbon dioxide, nitrous oxide, methane, and the equivalent metric tons of carbon dioxide emissions, energy equivalent in MMBtu, and the energy/fuel use.<sup>11</sup>

| Source of Emissions 2005                        | CO2     | N2O    | CH4    | Equiv CO2 (tonnes) | Equiv Energy (MMBtu) | Energy/Fuel Use | Unit   |
|---|---------|--------|--------|--------------------|----------------------|-----------------|--------|
| <b>Residential</b>                              |         |        |        |                    |                      |                 |        |
| Electricity                                     | 31,353  | 0.5181 | 1.3658 | 31,542             | 373,787              | 103,829,746     | kWh    |
| Natural Gas Multi Family                        | 17,780  | 0.0335 | 1.6754 | 17,825             | 353,453              | 3,350,898       | therms |
| Natural Gas Single Family                       | 36,487  | 0.0688 | 3.4383 | 36,581             | 725,349              | 52,696          | therms |
| <b>Commercial</b>                               |         |        |        |                    |                      |                 |        |
| Electricity commercial                          | 55,889  | 0.9235 | 2.4346 | 56,226             | 666,297              | 185,082,483     | kWh    |
| Electricity municipal                           | 2,412   | 0.0000 | 0.0000 | 2,412              | 27,084               | 7,937,649       | kWh    |
| Natural Gas commercial                          | 11,747  | 0.0221 | 1.1070 | 11,778             | 233,531              | 2,213,984       | therms |
| Natural Gas municipal                           | 283     | 0.0000 | 0.0000 | 283                | 5,313                | 52,696          | therms |
| <b>Industrial</b>                               |         |        |        |                    |                      |                 |        |
| Electricity                                     | 26,159  | 0.4322 | 1.1395 | 26,317             | 311,868              | 86,629,939      | kWh    |
| Natural Gas industrial                          | 13,908  | 0.0262 | 0.2621 | 13,922             | 276,480              | 2,621,165       | therms |
| Natural Gas utilities                           | 1       | 0.0000 | 0.0000 | 1                  | 25                   | 234             | therms |
| Diesel/Distillate Oil                           | 35      | 0.0003 | 0.0052 | 35                 | 498                  | 3,405           | gals   |
| LPG, Propane, Butane                            | 67      | 0.0006 | 0.0032 | 71                 | 1,127                | 11,660          | gals   |
| <b>Transportation-Origin/Destination Method</b> |         |        |        |                    |                      |                 |        |
| Producing                                       | 101,564 | 7.0985 | 5.6087 | 103,882            | 1,508,467            | 180,114,789     | VMT    |
| Attracting                                      | 103,425 | 7.2286 | 5.7115 | 105,786            | 1,536,113            | 183,415,848     | VMT    |
| Within City Limits                              | 6,216   | 0.4344 | 0.3433 | 6,358              | 92,318               | 11,023,566      | VMT    |
| <b>Aviation Fuels:</b>                          |         |        |        |                    |                      |                 |        |
| Aviation fuel                                   | 911     | 0.0120 | 0.7709 | 931                | 14,348               | 135,751.82      | gals   |
| Jet Fuel  | 2,634   | 0.0853 | 0.0743 | 2,662              | 36,059               | 335,099.70      | gals   |
| <b>OFFRoad Transportation:</b>                  |         |        |        | <b>Total</b>       | <b>2,480.21 CO2e</b> |                 |        |
| Lawn and Garden Equipment                       |         |        |        | 28.61 CO2e         |                      |                 |        |
| Construction Equipment                          |         |        |        | 2,329.62 CO2e      |                      |                 |        |
| Industrial Equipment                            |         |        |        | 73.20 CO2e         |                      |                 |        |
| Light Commercial Equipment                      |         |        |        | 48.78 CO2e         |                      |                 |        |
| <b>Solid Waste</b>                              |         |        |        |                    |                      |                 |        |

<sup>11</sup> Source of data CACP software output.

|  |     |                         |        |      |
|--|-----|-------------------------|--------|------|
| Paper Products                               | 125 | 2,635 CO <sub>2</sub> e |        |      |
| Food Waste                                   | 49  | 1,037 CO <sub>2</sub> e |        |      |
| Plant Debris                                 | 13  | 278 CO <sub>2</sub> e   |        |      |
| Wood or Textile                              | 37  | 774 CO <sub>2</sub> e   |        |      |
| Alternative Daily Cover (plant debris)       | 6   | 122 CO <sub>2</sub> e   | 2,805  | tons |
| <b>Community-generated solid waste Total</b> | 231 | 4,846 CO <sub>2</sub> e | 92,415 | tons |
| Transformation tons (informational item)     |     |                         | 46     | tons |

| Source of Emissions 2007                        | CO <sub>2</sub> | N <sub>2</sub> O | CH <sub>4</sub> | Equiv CO <sub>2</sub> (tonnes) | Equiv Energy (MMBtu)            | Energy/Fuel Use | Unit   |
|---|-----------------|------------------|-----------------|--------------------------------|---------------------------------|-----------------|--------|
| <b>Residential</b>                              |                 |                  |                 |                                |                                 |                 |        |
| Electricity                                     | 30,771          | 0.4877           | 1.4145          | 30,952                         | 387,107                         | 107,529,768     | kWh    |
| Natural Gas Multi Family                        | 16,479          | 0.0311           | 1.5529          | 16,522                         | 327,600                         | 3,105,798       | therms |
| Natural Gas Single Family                       | 35,080          | 0.0661           | 3.3057          | 35,170                         | 697,377                         | 6,611,466       | therms |
| <b>Commercial</b>                               |                 |                  |                 |                                |                                 |                 |        |
| Electricity commercial                          | 53,690          | 0.8510           | 2.4680          | 54,006                         | 675,423                         | 187,617,451     | kWh    |
| Electricity municipal                           | 1,971           | 0.0312           | 0.0906          | 1,983                          | 24,801                          | 6,889,242       | kWh    |
| Natural Gas commercial                          | 11,858          | 0.0223           | 1.1174          | 11,888                         | 235,720                         | 2,234,737       | therms |
| Natural Gas municipal                           | 273             | 0.0000           | 0.0000          | 273                            | 0                               | 51,307          | therms |
| <b>Industrial</b>                               |                 |                  |                 |                                |                                 |                 |        |
| Electricity                                     | 26,205          | 0.4154           | 1.2045          | 26,359                         | 329,657                         | 91,571,321      | kWh    |
| Natural Gas industrial                          | 14,957          | 0.0282           | 0.2819          | 14,972                         | 297,340                         | 2,818,925       | therms |
| Natural Gas utilities                           | 2               | 0.0000           | 0.0000          | 2                              | 31                              | 296             | therms |
| Diesel/Distillate Oil                           | 3               | 0.0000           | 0.0005          | 3                              | 44                              | 300             | gals   |
| LPG, Propane, Butane                            | 59              | 0.0006           | 0.0028          | 60                             | 991                             | 12,250          | gals   |
| <b>Transportation-Origin/Destination Method</b> |                 |                  |                 |                                |                                 |                 |        |
| Producing                                       | 98,648          | 6.0858           | 5.0901          | 100,642                        | 1,465,136                       | 177,122,656     | VMT    |
| Attracting                                      | 100,618         | 6.2073           | 5.1917          | 102,651                        | 1,494,386                       | 180,658,221     | VMT    |
| Within City Limits                              | 6,169           | 0.3806           | 0.3183          | 6,293                          | 91,620                          | 11,076,488      | VMT    |
| <b>Aviation Fuels:</b>                          |                 |                  |                 |                                |                                 |                 |        |
| Aviation fuel                                   | 1,129           | 0.0149           | 0.9557          | 1,154                          | 17,788                          | 109,503.25      | gals   |
| Jet Fuel  | 3,207           | 0.1039           | 0.0905          | 3,241                          | 43,909                          | 275,195.45      | gals   |
| <b>OFFRoad Transportation:</b>                  |                 |                  |                 | <b>Total</b>                   | <b>2,564.43 CO<sub>2</sub>e</b> |                 |        |
| Lawn and Garden Equipment                       |                 |                  |                 | 29.93 CO <sub>2</sub> e        |                                 |                 |        |
| Construction Equipment                          |                 |                  |                 | 2,406.38 CO <sub>2</sub> e     |                                 |                 |        |
| Industrial Equipment                            |                 |                  |                 | 76.87 CO <sub>2</sub> e        |                                 |                 |        |
| Light Commercial Equipment                      |                 |                  |                 | 51.24 CO <sub>2</sub> e        |                                 |                 |        |

| Solid Waste                                  |     |                         |        |      |
|--|-----|-------------------------|--------|------|
| Paper Products                               | 85  | 1,776 CO <sub>2</sub> e |        |      |
| Food Waste                                   | 43  | 900 CO <sub>2</sub> e   |        |      |
| Plant Debris                                 | 18  | 375 CO <sub>2</sub> e   |        |      |
| Wood or Textile                              | 31  | 645 CO <sub>2</sub> e   |        |      |
| Alternative Daily Cover (plant debris)       | 3   | 68 CO <sub>2</sub> e    | 1,565  | tons |
| <b>Community-generated solid waste Total</b> | 179 | 3,764 CO <sub>2</sub> e | 75,587 | tons |
| Transformation tons (informational item)     |     |                         | 5,963  | tons |

| Source of Emissions 1990                        | CO <sub>2</sub> | N <sub>2</sub> O | CH <sub>4</sub> | Equiv CO <sub>2</sub> (tonnes)  | Equiv Energy (MMBtu) | Energy/Fuel Use | Unit   |
|---|-----------------|------------------|-----------------|---------------------------------|----------------------|-----------------|--------|
| <b>Residential</b>                              |                 |                  |                 |                                 |                      |                 |        |
| Electricity                                     | 24,910          | 0.4116           | 1.0851          | 25,061                          | 296,978              | 82,493,887      | kWh    |
| Natural Gas                                     | 43,723          | 0.0824           | 4.1201          | 43,835                          | 869,186              | 8,240,293       | therms |
| <b>Commercial</b>                               |                 |                  |                 |                                 |                      |                 |        |
| Electricity commercial                          | 63,618          | 1.0512           | 2.7713          | 64,002                          | 758,442              | 210,678,327     | kWh    |
| Electricity municipal                           | 1,589           | 0.0263           | 0.0692          | 1,599                           | 18,947               | 5,263,094       | kWh    |
| Natural Gas commercial                          | 9,690           | 0.0183           | 0.9131          | 9,715                           | 192,633              | 1,826,256       | therms |
| <b>Industrial</b>                               |                 |                  |                 |                                 |                      |                 |        |
| Electricity                                     | 69,610          | 1.1502           | 3.0323          | 70,030                          | 829,879              | 230,521,904     | kWh    |
| Natural Gas industrial                          | 11,207          | 0.0211           | 0.2112          | 11,218                          | 222,779              | 2,112,051       | therms |
| Diesel/Distillate Oil                           | 62              | 0.0005           | 0.0093          | 62                              | 895                  | 6,116           | gals   |
| LPG, Propane, Butane                            | 361             | 0.0034           | 0.0171          | 362                             | 6,024                | 62,323          | gals   |
| <b>Transportation-Origin/Destination Method</b> |                 |                  |                 |                                 |                      |                 |        |
| Producing                                       | 98,563          | 9.7080           | 7.7388          | 101,735                         | 1,464,200            | 145,117,812     | VMT    |
| Attracting                                      | 100,369         | 9.8859           | 7.8807          | 103,599                         | 1,491,039            | 147,777,463     | VMT    |
| Within City Limits                              | 6,032           | 0.5941           | 0.4736          | 6,226                           | 89,607               | 8,881,646       | VMT    |
| Aviation Fuels:                                 |                 |                  |                 |                                 |                      |                 |        |
| Aviation fuel                                   | 911             | 0.0120           | 0.7709          | 911                             | 14,348               | 109,503.25      | gals   |
| Jet Fuel  | 2,634           | 0.0853           | 0.0743          | 2,634                           | 36,059               | 275,195.45      | gals   |
| <b>OFFRoad Transportation: Total</b>            |                 |                  |                 | <b>2,480.21 CO<sub>2</sub>e</b> |                      |                 |        |
| Lawn and Garden Equipment                       |                 |                  |                 | 28.61 CO <sub>2</sub> e         |                      |                 |        |
| Construction Equipment                          |                 |                  |                 | 2,329.62 CO <sub>2</sub> e      |                      |                 |        |
| Industrial Equipment                            |                 |                  |                 | 73.20 CO <sub>2</sub> e         |                      |                 |        |
| Light Commercial Equipment                      |                 |                  |                 | 48.78 CO <sub>2</sub> e         |                      |                 |        |
| <b>Solid Waste</b>                              |                 |                  |                 |                                 |                      |                 |        |
| Paper Products                                  | 120             |                  |                 | 2,516 CO <sub>2</sub> e         |                      |                 |        |



|  |      |                         |        |      |
|--|------|-------------------------|--------|------|
| Food Waste                                   | 35   | 740 CO <sub>2</sub> e   |        |      |
| Plant Debris                                 | 22   | 457 CO <sub>2</sub> e   |        |      |
| Wood or Textile                              | 10   | 217 CO <sub>2</sub> e   |        |      |
| Alternative Daily Cover (plant debris)       | 0.16 | 3 CO <sub>2</sub> e     | 75     | tons |
| <b>Community-generated solid waste Total</b> | 187  | 3,934 CO <sub>2</sub> e | 61,358 | tons |
| Transformation tons (informational item)     |      |                         | 86     | tons |

## Appendix C—City Demographics and HDD/CDD Information

Listed in Table C.1 is the City and LA County demographics data including: population, number of households, and number of jobs, and the local percentage share of the County for the years inventoried. Listed in Table C.2 is the historical data on the annual heating and cooling degree days for the South Coast Drainage Division of California.<sup>12</sup>

**Table C.1 Summary of City Demographics**

| City Profile   | Local Jurisdiction | LA County  | Local share of County |
|--|--------------------|------------|-----------------------|
| <b>Population</b>  |                    |            |                       |
| 1990   | 71,349             | 8,863,164  | 0.81%                 |
| 2005   | 88,245             | 10,206,001 | 0.86%                 |
| 2007   | 88,583             | 10,243,764 | 0.86%                 |
| 2020   | 103,236            | 11,329,829 | 0.91%                 |
| <b>Number of Households</b>  |                    |            |                       |
| 1990   | 27,137             | 2,989,552  | 0.91%                 |
| 2005   | 28,630             | 3,212,434  | 0.89%                 |
| 2007   | 28,758             | 3,239,605  | 0.89%                 |
| 2020   | 30,110             | 3,666,631  | 0.82%                 |
| <b>Number of Jobs</b>  |                    |            |                       |
| 1990   | 45,386             | 4,615,644  | 0.98%                 |
| *2005  | 20,496             | 4,397,025  | 0.47%                 |
| **2007   | 20,585             | 4,440,560  | 0.46%                 |
| 2020   | 21,347             | 4,754,731  | 0.45%                 |
| Sources: 1990 data is from the U.S. Census Bureau for population and households and SCAG for the employment<br>2005 and 2007 data is from SCAG's Local Jurisdiction Profile data (May 2009)<br>2020 data is from SCAG's adopted Regional Growth Forecast (2008)<br>*2005 number of jobs figure is from SCAG's adopted Regional Growth Forecast (2008)<br>**2007 number of jobs figure was interpolated based upon known values in 2005 and 2008<br>LA County number of jobs figure was interpolated based upon known values in 2005 and 2003 from SCAG's adopted Regional Growth Forecast (2008) |                    |            |                       |

Heating Degree Days (HDD) and Cooling Degree Days (CDD) are designed to reflect the demand for energy needed to heat and cool a home or business in a particular location over a certain period (e.g. year). HDD/CDD are defined relative to an average base temperature observed at a particular location. The more HDD/CDD days will result in higher energy use to maintain thermal comfort in buildings, and as a result, higher emissions. In 2005 there were 2,101 HDD and 771 CDD and in 2007 the total number of HDD/CDD increased.

**Table C.2 Summary of Heating and Cooling Degree Days (HDD/CDD)**

| California, South Coast Division | Heating / Cooling Degree Days |
|----------------------------------|-------------------------------|
| 1990                             | 2040 / 1072                   |
| 2005                             | 2101 / 771                    |
| 2007                             | 2048 / 937                    |

<sup>12</sup> The data in Table C.2 was retrieved from the National Oceanic and Atmosphere Administration website <http://www7.ncdc.noaa.gov/CDO/CDODivisionalSelect.jsp>.

## Appendix D—GHG Reference Information

Listed in Table D.1 are the six internationally recognized GHGs regulated under the Kyoto Protocol. Next to each gas is a brief summary of the activity which may cause the gas to be emitted into the atmosphere and its global warming potential (GWP). Each GHG has a different global warming potential based on its ability to trap heat in the atmosphere relative to that of carbon dioxide. The CO<sub>2</sub> equivalent number is the universal unit for comparing gases of different global warming potential. For example, the GWP of methane is 21 because one metric ton of methane has 21 times more ability to trap heat in the atmosphere than one metric ton of carbon dioxide.<sup>13</sup> Emission factors are usually expressed in terms of emissions per unit of activity, and are used to convert activity data into the associated emissions quantities. Table D.2 shows the emissions per unit of activity. Table D.3 shows the standard conversion factors.

**Table D.1 Summary of Greenhouse Gases**

| Common Name              | Formula          | Activity  | GWP (CO <sub>2</sub> e) |
|--------------------------|------------------|---|-------------------------|
| Carbon dioxide           | CO <sub>2</sub>  | Combustion  | 1                       |
| Methane                  | CH <sub>4</sub>  | Combustion, Anaerobic Decomposition of Organic Waste (Landfills, Wastewater), Fuel Handling | 21                      |
| Nitrous Oxide            | N <sub>2</sub> O | Combustion, Wastewater Treatment  | 310                     |
| Hydrofluorocarbons (HFC) | Various          | Leaked Refrigerants, Fire Suppressants  | 12-11,700               |
| Perfluorocarbons (PFC)   | Various          | Aluminum Production, Semiconductor Manufacturing, HVAC equipment,                           | 6,500-9,200             |
| Sulfur Hexafluoride      | SF <sub>6</sub>  | Transmission and Distribution of Power  | 23,900                  |

Source: Local Government Operations Protocol, Version 1.0, Appendix E.

**Table D.2 Emissions Per Unit of Activity**

| Energy/Fuel Unit       | Carbon Dioxide CO <sub>2</sub> |                 |                    |
|------------------------|--------------------------------|-----------------|--------------------|
|                        | Pounds (lb)                    | Short Ton (ton) | Metric Ton (tonne) |
| 1 kWh =                | 0.67                           | 0.00033         | 0.00030            |
| 1 therm =              | 12                             | 0.00585         | 0.00531            |
| 1 gallon of gasoline = | 19                             | 0.00971         | 0.00881            |

Emission factors used for conversion: kWh 665.72 (lbs CO<sub>2</sub>/MWh); therm 0.0546 (kg CO<sub>2</sub>/SCF); gasoline 8.81 (kg CO<sub>2</sub>/gallon).

<sup>13</sup> Refer to the LGOP, Appendix E, for detailed information on Global Warming Potentials.

**Table D.3 Standard Conversion Factors**

| <b>Mass</b>  |   |  |   |
|--|---|--|---|
| 1 pound (lb) =   | 453.6 grams (g)                               | 0.4536 kilograms (kg)                  | 0.0004536 metric tons (tonnes)          |
| 1 kilogram (kg) =  | 1,000 grams (g)                               | 2.2046 pounds (lb)                     | 0.001 metric tons (tonnes)              |
| 1 short ton (ton) =  | 2,000 pounds (lb)                             | 907.18 kilograms (kg)                  | 0.9072 metric tons (tonnes)             |
| 1 metric ton (tonne) =   | 2,204.62 pounds (lb)                          | 1,000 kilograms (kg)                   | 1.1023 short tons (tons)                |
| <b>Volume</b>  |   |  |   |
| 1 cubic foot (ft <sup>3</sup> ) =                                      | 7.4805 US gallons (gal)                       | 0.1781 barrels (bbl)                   |   |
| 1 cubic foot (ft <sup>3</sup> ) =                                      | 28.32 liters (L)                              | 0.02832 cubic meters (m <sup>3</sup> ) |   |
| 1 US gallon (gal) =  | 0.0238 barrels (bbl)                          | 3.785 liters (L)                       | 0.003785 cubic meters (m <sup>3</sup> ) |
| 1 barrel (bbl) =   | 42 US gallons (gal)                           | 158.99 liters (L)                      | 0.1589 cubic meters (m <sup>3</sup> )   |
| 1 liter (L) =  | 0.001 cubic meters (m <sup>3</sup> )          | 0.2642 US gallons (gal)                | 0.0063 barrels (bbl)                    |
| 1 cubic meter (m <sup>3</sup> ) =                                      | 6.2897 barrels (bbl)                          | 264.17 US gallons (gal)                | 1,000 liters (L)                        |
| <b>Energy</b>  |   |  |   |
| 1 kilowatt hour (kWh) =  | 3,412 Btu (Btu)                               | 3,600 kilojoules (KJ)                  |   |
| 1 megajoule (MJ) =   | 0.001 gigajoules (GJ)                         |  |   |
| 1 gigajoule (GJ) =   | 0.9478 million Btu (MMBtu)                    | 277.8 kilowatt hours (kWh)             |   |
| 1 British thermal unit (Btu) =   | 1,055 joules (J)                              | 1.055 kilojoules (KJ)                  |   |
| 1 million Btu (MMBtu) =  | 1.055 gigajoules (GJ)                         | 293 kilowatt hours (kWh)               |   |
| 1 therm =  | 100,000 Btu                                   | 0.1055 gigajoules (GJ)                 | 29.3 kilowatt hours (kWh)               |
| <b>Other</b>   |   |  |   |
| kilo =   | 1,000   |  |   |
| mega =   | 1,000,000                                     |  |   |
| giga =   | 1,000,000,000                                 |  |   |
| tera =   | 1,000,000,000,000                             |  |   |
| peta =   | 1,000,000,000,000,000                         |  |   |
| 1 mile =   | 1.609 kilometers                              |  |   |
| 1 metric ton carbon (C) =  | <sup>44</sup> /12 metric tons CO <sub>2</sub> |  |   |
| Source: Local Government Operations Protocol, Version 1.0, Appendix F. |   |  |   |

## Appendix E—Electricity Consumption Data Description

Below is a rate group matrix and a brief profile of the rate groups that were used by Southern California Edison to extract the consumption data. The data was then organized into the following sectors: residential, commercial, and industrial. In some cases, to protect customer confidentiality Rule 15/15 (implemented by the PUC) requires that data be aggregated and combined with other rate groups if specific criteria is not met. The rule requires that customer data be made up of at least 15 customers and that a customer’s load be less than 15 percent of an assigned category. If the 15/15 rule is triggered after customer data has been screened twice, the customer data is then dropped from the information provided.

**Table E.1 Electricity Rate Groups**

| Sector               | Rate Group        | Description  | Rate Schedule  |
|----------------------|-------------------|--|--|
| <b>Residential</b>   | Domestic          | Domestic Single/Multiple, Master-Metered   | D, D-CARE, DE, DS, TOU-D-1, TOU-D-2, TOU-EV-1, TOU-EV-2, DM, DMS-1, DMS-2, DMS-3.                                  |
|                      | GS-1              | General Service, Non-demand Metered, Small Commercial                                      | GS-1, TOU-GS-1, TOU-EV-3.  |
| <b>Commercial</b>    | TC-1              | Traffic Control Services   | TC-1   |
|                      | GS-2              | General Service, Demand Metered, Medium Commercial/Industrial                              | GS-2, GS-2-RTP, RTP-2-GS, RTP-3-GS, TOU-EV-4.  |
|                      | TOU-GS            | General Service, Time-of-Use, Medium Commercial/Industrial                                 | TOU-GS-2, TOU-GS-2-SOP, TOU-GS-3.  |
|                      | PA-1              | Small Agriculture & Pumping  | PA-1   |
|                      | PA-2              | Agriculture & Pumping, Demand Metered  | PA-2   |
|                      | TOU-PA-5          | Agriculture & Pumping, Time-of-Use   | TOU-PA-5.  |
|                      | Ag-TOU            | Agriculture & Pumping, Time-of-Use   | PA-RTP, TOU-PA, TOU-PA-3, TOU-PA-4, TOU-PA-6, TOU-PA-7, TOU-PA-SOP, TOU-PA-SOP-I.                                  |
|                      | St-Ltng           | Street and Area Lighting   | AL-1, DWL, LS-1, LS-2, LS-3, OL-1, AL-2.   |
|                      | <b>Industrial</b> | Large Power TOU8-SEC   | General Service, Time-of-Use, Large Power(>500 kW), Secondary Voltage (Below 2 kv)                                 |
| Large Power TOU8-PRI |                   | General Service, Time-of-Use, Large Power(>500 kW), Primary Voltage (2 kv - 50 kv)         | TOU-8-P, I-6-P, RTP-2-P, RTP-2-I-P, RTP-3-P, TOU-8-CR-1-P, TOU-8-RTP-P, TOU-8-SOP-P, TOU-SOP-I-P, TOU-8-SOP-RTP-P. |
| Large Power TOU8-SUB |                   | General Service, Time-of-Use, Large Power(>500 kW), Sub-Transmission Voltage (Above 50 kv) | TOU-8-T, I-6-T, RTP-2-T, RTP-2-I-T, RTP-3-T, TOU-8-CR-1-T, TOU-8-RTP-T, TOU-8-SOP-T, TOU-SOP-I-T, TOU-8-SOP-RTP-T. |

## Appendix F— Natural Gas Consumption Data Description

Below is a list of the business types within the North American Industrial Classification System (NAICS)<sup>14</sup> that the Southern California Gas Company utilized to extract and organize customer consumption data identified as non-residential for the commercial and industrial inventory sectors. This list summarizes the business types that fall under either commercial or industrial use.<sup>15</sup> This list is not intended to be exhaustive, but to provide an overview of what is considered commercial, industrial, or utility use (utility is a subset of the industrial sector).

**Table F.1 NAICS Description**

| NAICS Description—Commercial  |   |   |
|---|---|---|
| Accounting Tax Preparation<br>Bookkeeping and Payroll Services                                | Credit Card Issuing   | Mobile Food Services  |
| Administration/ Legal / Accounting  | Crop and Grain Farming  | Motion Picture making and distribution and theatres                   |
| Advertising and Related Services  | Dairy Cattle and Milk Production                              | Motor Vehicle and Parts Dealers and Renters                           |
| Agencies Brokerages Claim<br>Adjusting Underwriting and Other<br>Insurance Related Activities | Death Care Services   | Museums   |
| Agents and Managers for Artists<br>Athletes Entertainers and Other<br>Public                  | Deep Sea Coastal Transportation                               | Office Equipment and Supply   |
| Agricultural Merchant Wholesalers   | Department Stores   | Packing and Crating   |
| Air Traffic Control / Airport Ops   | Direct Selling Establishments                                 | Parking Lots and Garages  |
| Air Transportation  | Directory and Mailing List Publishers                         | Parole Offices and Probation Offices                                  |
| Ambulance Services  | Document Preparation Services                                 | Pension Funds   |
| American Indian and Alaska<br>Native Tribal Governments                                       | Drafting and Graphic Design Services                          | Performing Arts Spectator Sports and Related Industries               |
| Amusement and Theme Parks,<br>Arcades   | Drugs and Druggists' Sundries Merchant<br>Wholesalers         | Pet and Pet Supplies Stores   |
| Animal Production   | Egg Production  | Pharmacies and Drug Stores  |
| Apparel Stores  | Electronic and Precision Equipment Repair<br>and Maintenance  | Photography   |
| Appliance Repair and<br>Maintenance   | Electronic Shopping   | Pipeline Transportation   |
| Apprenticeship Training   | Electronics and Appliance Stores                              | Plastics Materials and Basic Forms and<br>Shapes Merchant Wholesalers |
| Aquaculture   | Employee Leasing Services and Placement<br>Services           | Political Organizations   |
| Architectural Engineering and<br>Related Services   | Engineering Consulting Services                               | Port and Harbor Operations  |
| Armored Car Services  | Environment Conservation and Wildlife<br>Organizations        | Postal Service  |
| Art Dealers   | Executive Legislative and Other General<br>Government Support | Power and Communication Line Construction                             |
| Arts Entertainment and Recreation   | Exterminating and Pest Control Services                       | Professional Organizations  |
| Automobile Driving Schools  | Facilities Support Services                                   | Professional Scientific and Technical<br>Services                     |
| Automotive Repair and<br>Maintenance  | Family Planning Centers                                       | Promoters of Performing Arts Sports and<br>Similar Events             |
| Baked Goods Stores  | Farm Product Merchants Wholesalers                            | Property Management   |
| Banking and Lending and Credit  | Fine Arts Schools   | Public Relations Agencies   |

<sup>14</sup> See Appendix H for a definition of the North American Industrial Classification System.

<sup>15</sup> For a complete list of NAICS business types and codes as they relate to natural gas refer to the City's data packet, natural gas reference worksheet or visit NAICS for a complete list at <http://www.census.gov/eos/www/naics/>.

|  |   |   |
|--|---|---|
| Unions   |   |   |
| Barber and Beauty Shops  | Fishing Hunting and Trapping                                | Public Safety Fire Protection Emergency and Other Relief Services |
| Bed-and-Breakfast Inns   | Fitness Diet and Weight Reducing Centers                    | Publishers  |
| Beer Wine and Distilled Alcoholic Beverage Merchant Wholesalers    | Floriculture Production                                     | Radio and Television Broadcasting                                 |
| Blood and Organ Banks  | Florists  | Rail Systems  |
| Boat Dealers   | Food Markets and Stores / Merchants and wholesalers         | Real Estate Appraisers Agents and Brokers                         |
| Book Periodical and Newspaper and Recording Merchant Wholesalers   | Food Service Contractors                                    | Recreational and Vacation Camps (except Campgrounds)              |
| Bowling Centers  | Food Services and Drinking Places                           | Recyclable Material Merchant Wholesalers                          |
| Building Construction  | Footwear and Leather Goods Repair                           | Regulation - Admin, Licensing, Public                             |
| Building Equipment Contractors                                     | Forestry and Logging / Lumber                               | Rehabilitation Services   |
| Building Finishing Contractors                                     | Forestry Fishing and Hunting                                | Religious Organizations   |
| Building Inspection Services                                       | Fuel Retailers and Dealers                                  | Repossession Services   |
| Business and Secretarial Schools                                   | Funds Trusts and Other Financial Vehicles                   | Research and Development  |
| Business Associations  | Gasoline Stations with Convenience Stores                   | Restaurants and Cafeterias  |
| Business Professional Labor Political and Similar Organizations    | General Freight Trucking                                    | Reupholstery and Furniture Repair                                 |
| Business Service Centers   | Golf Courses and Country Clubs                              | Satellite Telecommunications                                      |
| Business to Business Electronic Markets                            | Grants  | Scenic and Sightseeing Transportation                             |
| Cable and Other Program Distribution                               | Hazardous Waste Collection Treatment and Disposal           | Schools and Trade Schools   |
| Campgrounds and Parks  | Historical Sites  | Securities and Commodity Exchanges                                |
| Car Washes   | Hobby Toy and Game Stores                                   | Security Systems and Services                                     |
| Carpet and Upholstery Cleaning Services                            | Home Furnishings Stores                                     | Septic Tank and Related Services                                  |
| Casino Hotels  | Home Health Care Services                                   | Skiing Facilities   |
| Caterers   | Home Health Equipment Rental                                | Sound Recording Industries  |
| Cellular and Other Wireless Telecommunications                     | Home Improvement /Hardware Stores Merchants and Wholesalers | Specialty Food Stores   |
| Chemical and Allied Products Merchant Wholesalers                  | Hospitals Psychiatric Surgical and Emergency Centers        | Spectator Sports  |
| Child and Youth Services   | Human Resources and Executive Search Consulting Services    | Sporting and Recreational Goods and Supplies Merchant Wholesalers |
| Civic and Social Organizations                                     | Human Rights Organizations                                  | Sports and Recreation Instruction                                 |
| Coal and Other Mineral and Ore Merchant Wholesalers                | Information Svcs  | Sports Teams and Clubs  |
| Coastal Lakes Transportation                                       | International Affairs                                       | Street and Road Construction                                      |
| Collection Agencies  | Investigation and Security Services                         | Taxi and Limousine Service  |
| Colleges Universities and Professional Schools                     | Investment Advice   | Telemarketing Bureaus   |
| Commercial and Institutional Building Construction                 | Investment Banking and Securities Dealing                   | Telephone Answering Services                                      |
| Commodity Contracts Brokerage                                      | Jewelry Luggage and Leather Goods Stores                    | Telephone Call Centers  |
| Communication Equipment Repair and Maintenance                     | Kidney Dialysis Centers                                     | Tobacco Stores  |
| Community Food and Housing and Emergency and Other Relief Services | Labor Unions and Similar Labor Organizations                | Towing  |
| Computer and Office Machine Repair and Maintenance                 | Labs and Diagnostic Centers                                 | Transit and Ground Passenger Transportation                       |

|   |  |   |
|---|--|---|
| Computer Facilities and Information Management Services | Landfill   | Travel Arrangement and Reservation Services |
| Construction Services                                   | Laundries and Drycleaners  | Travel Arrangement and Reservation Services |
| Construction Supplies Wholesale / Retail                | Legal Services   | Traveler Accommodations                     |
| Consumer Electronics Repair and Maintenance             | Legislative Bodies   | Vending Machine Operators                   |
| Consumer Goods Rental                                   | Libraries and Archives   | Veterinary Services                         |
| Continuing Care Retirement Communities                  | Linen and Uniform Supply   | Video Tape and Disc Rental                  |
| Convenience Stores                                      | Locksmiths   | Warehousing and Storage                     |
| Convention and Trade Show Organizers                    | Machinery and Equipment Wholesale and retail                           | Waste Combustors and Incinerators           |
| Cosmetics Beauty Supplies and Perfume Stores            | Mail-Order Houses  | Waste Management Services                   |
| Couriers  | Management Consulting Services   | Water Transportation                        |
| Court Reporting and Stenotype Services                  | Marinas  | Web Search Portals                          |
| Courts, Correctional Institutions                       | Medical Dental and Hospital Equipment and Supplies Merchant Wholesaler | Wholesale / Retail Photographic Services    |
| Credit Brokers  | Medical Professionals / Physicians Nurses Therapists                   | Zoos and Botanical Gardens                  |

| NAICS Description—Industrial  |  |  |
|---|--|--|
| Abrasive Product Manufacturing  | Envelope Manufacturing                                 | Oil and Gas Extraction   |
| Adhesive Manufacturing  | Ethyl Alcohol Manufacturing                            | Oil and Gas Field Machinery and Equipment Manufacturing            |
| Aerospace Product and Parts Manufacturing                                     | Explosives Manufacturing                               | Ophthalmic Goods Manufacturing                                     |
| Agricultural Implement Manufacturing  | Fan and Blower Manufacturing                           | Overhead Traveling Crane Hoist and Monorail System Manufacturing   |
| Agriculture Construction and Mining Machinery Manufacturing                   | Farm Machinery and Equipment Manufacturing             | Packaging Machinery Manufacturing                                  |
| Air Purification Equipment Manufacturing                                      | Fastener Button Needle and Pin Manufacturing           | Paint and Coating Manufacturing                                    |
| Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial | Fiber Can Tube Drum and Similar Products Manufacturing | Paint Coating and Adhesive Manufacturing                           |
| Aircraft Engine and Engine Parts Manufacturing                                | Fiber Optic Cable Manufacturing                        | Paper Industry Machinery Manufacturing                             |
| Aircraft Manufacturing  | Floor Covering Manufacturing                           | Paper Paperboard Paper Products                                    |
| Alkalies and Chlorine Manufacturing   | Fluid Power Cylinder and Actuator Manufacturing        | Pesticide Fertilizer and Other Agricultural Chemical Manufacturing |
| Alumina and Aluminum Production and Processing                                | Food Container Manufacturing                           | Petroleum and Coal Products Manufacturing                          |
| Aluminum Production   | Food Manufacturing                                     | Petroleum Refineries   |
| Analytical Laboratory Instrument Manufacturing                                | Food Product Machinery Manufacturing                   | Pharmaceutical Preparation Manufacturing                           |
| Animal (except Poultry) Slaughtering  | Footwear Manufacturing                                 | Phosphatic Fertilizer Manufacturing                                |
| Animal Food Manufacturing   | Foundries  | Photographic and Photocopying Equipment Manufacturing              |
| Animal Slaughtering and Processing  | Fur and Leather Apparel Manufacturing                  | Photographic Film Paper Plate and Chemical Manufacturing           |
| Apparel Accessories and Apparel Manufacturing                                 | Furnace and Oven Manufacturing                         | Pipe and Pipe Fitting Manufacturing                                |
| Appliance Manufacturing   | Furniture and Related Product                          | Pipe and Tube Manufacturing from                                   |



|  |  |   |
|--|--|---|
|  | Manufacturing  | Purchased Steel   |
| Architectural and Structural Metals Manufacturing                        | Gas Liquid Extraction  | Plastics and Rubber Industry Machinery Manufacturing                    |
| Architectural Woodwork and Millwork Manufacturing                        | Gas Manufacturing  | Plumbing Fixture Fitting and Trim Manufacturing                         |
| Arms and Ammunition Manufacturing  | Gasket Packing and Sealing Device Manufacturing                        | Porcelain Electrical Supply Manufacturing                               |
| Artificial and Synthetic Fibers and Filaments Manufacturing              | Glass and Glass Product Manufacturing                                  | Powder Metallurgy Part Manufacturing                                    |
| Asphalt Shingle and Coating Materials Manufacturing                      | Grain and Oilseed Milling  | Power Boiler and Heat Exchanger Manufacturing                           |
| Audio and Video Equipment Manufacturing                                  | Ground or Treated Mineral and Earth Manufacturing                      | Power Distribution and Specialty Transformer Manufacturing              |
| Automatic Environmental Control Manufacturing for Residential Commercial | Guided Missile and Space Vehicle Propulsion Unit and Propulsion Unit P | Precision Turned Product Manufacturing                                  |
| Automatic Vending Machine Manufacturing                                  | Gum and Wood Chemical Manufacturing                                    | Prerecorded Compact Disc (except Software) Tape and Record Reproducing  |
| Automobile Manufacturing   | Gypsum Product Manufacturing   | Printing and Related Support Activities                                 |
| Bare Printed Circuit Board Manufacturing                                 | Hand and Edge Tool Manufacturing                                       | Printing Ink Manufacturing  |
| Basic Chemical Manufacturing   | Handbag and Purse Manufacturing  | Printing Machinery and Equipment Manufacturing                          |
| Battery Manufacturing  | Hardware Manufacturing   | Pump Compressor and Pumping Equipment Manufacturing                     |
| Beverage and Tobacco Product Manufacturing                               | Heating Equipment (except Warm Air Furnaces) Manufacturing             | Radio and Television Broadcasting and Wireless Communications Equipment |
| Biological Product Manufacturing   | Heavy Duty Truck Manufacturing   | Railroad Rolling Stock Manufacturing                                    |
| Blankbook Looseleaf Binders and Devices Manufacturing                    | Hoses and Belting Manufacturing  | Reconstituted Wood Product Manufacturing                                |
| Boiler Tank and Shipping Container Manufacturing                         | Hosiery Mills  | Relay and Industrial Control Manufacturing                              |
| Bolt Nut Screw Rivet and Washer Manufacturing                            | Household Laundry Equipment Manufacturing                              | Resin Synthetic Rubber and Artificial and Synthetic Fibers and Filamen  |
| Breweries and Distilleries   | Ice Manufacturing  | Rolling - Metal Rolling Drawing and Extr                                |
| Brick and Structural Clay Tile Manufacturing                             | Industrial Pattern Manufacturing                                       | Rolling Mill Machinery and Equipment Manufacturing                      |
| Broom Brush and Mop Manufacturing  | Inorganic Dye and Pigment Manufacturing                                | Rope Cordage and Twine Mills  |
| Burial Casket Manufacturing  | Irradiation Apparatus Manufacturing                                    | Sawmill and Woodworking Machinery Manufacturing                         |
| Canning  | Jewelers' Material and Lapidary Work Manufacturing                     | Scale and Balance (except Laboratory) Manufacturing                     |
| Canvas and Related Product Mills   | Jewelry and Silverware Manufacturing                                   | Ship and Boat Building and Repairing                                    |
| Carbon and Graphite Product Manufacturing                                | Kitchen Utensil Pot and Pan Manufacturing                              | Showcase Partition Shelving and Locker Manufacturing                    |
| Carbon Black Manufacturing   | Laboratory Apparatus and Furniture Manufacturing                       | Sign Manufacturing  |
| Carbon Paper and Inked Ribbon Manufacturing                              | Lighting Fixture Manufacturing   | Smelting Refining and Alloying  |
| Cellulosic Organic Fiber Manufacturing                                   | Lime and Gypsum Product Manufacturing                                  | Soap and Other Detergent Manufacturing                                  |
| Cement and Concrete Product Manufacturing                                | Luggage Manufacturing  | Software Reproducing  |
| Ceramic Wall and Floor Tile Manufacturing                                | Machine Tool (Metal Cutting Types) Manufacturing                       | Speed Changer Industrial High-Speed Drive and Gear Manufacturing        |
| Chemical Manufacturing   | Manufacturing and Reproducing Magnetic and Optical Media               | Sporting and Athletic Goods Manufacturing                               |
| Clay Building Material and Refractories                                  | Marking Device Manufacturing   | Spring and Wire Product Manufacturing                                   |

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| Manufacturing  |  |   |
| Coated and Laminated Packaging Paper and Plastics Film Manufacturing | Material Handling Equipment Manufacturing                                    | Stamping - Metal Stamping   |
| Commercial and Service Industry Machinery Manufacturing              | Mattress Manufacturing   | Stationery Product Manufacturing  |
| Communications Equipment Manufacturing                               | Measuring and Dispensing Pump Manufacturing                                  | Steel Product Manufacturing   |
| Computer and Electronic Product Manufacturing                        | Medical Equipment and Supplies Manufacturing                                 | Surface Active Agent Manufacturing  |
| Concrete Manufacturing   | Metal Container Manufacturing  | Surface-Coated Paperboard Manufacturing                                     |
| Concrete Pipe Brick and Block Manufacturing                          | Metal Product Manufacturing  | Surgical and Medical Instrument Manufacturing                               |
| Construction Machinery Manufacturing                                 | Metal Production and Processing  | Telephone Apparatus Manufacturing   |
| Container and Pallet Manufacturing                                   | Metalworking Machinery Manufacturing   | Textile Machinery Manufacturing   |
| Conveyor and Conveying Equipment Manufacturing                       | Mills - Iron and Steel Mills   | Tobacco Manufacturing   |
| Crown and Closure Manufacturing                                      | Mills - Pulp Mills   | Totalizing Fluid Meter and Counting Device Manufacturing                    |
| Cut Stock Resawing Lumber and Planning                               | Mills - Textile and Fabric Finishing Mills                                   | Toy and Game Manufacturing  |
| Cut Stone and Stone Product Manufacturing                            | Mills Paper and Paperboard Mills   | Travel Trailer and Camper Manufacturing                                     |
| Cutlery and Flatware and Handtool Manufacturing                      | Mineral Product Manufacturing  | Truck Tractor Trailer and Stacker Machinery Manufacturing                   |
| Cutting Tool and Machine Tool Accessory Manufacturing                | Mineral Wool Manufacturing   | Turbine and Turbine Generator Set Units Manufacturing                       |
| Cyclic Crude and Intermediate Manufacturing                          | Mining - Coal and Lignite Mining   | Turned Product and Screw Nut and Bolt Manufacturing                         |
| Dental Equipment and Supplies Manufacturing                          | Mining - Mineral Mining and Quarrying  | Uncoated Paper and Multiwall Bag Manufacturing                              |
| Die and Tool Die Set Jig and Fixture Manufacturing                   | Mining Construction Sand and Gravel  | Valve and Hose Fitting Manufacturing  |
| Drilling Oil and Gas Wells   | Mining Machinery and Equipment Manufacturing                                 | Vehicular Lighting Equipment Manufacturing                                  |
| Dye and Pigment Manufacturing  | Mining Metal   | Veneer and Plywood Manufacturing  |
| Electric Housewares and Household Fan Manufacturing                  | Mining Ore Mining  | Ventilation Heating Air-Conditioning and Commercial Refrigeration Equipment |
| Electric Lighting Equipment Manufacturing                            | Mold Manufacturing   | Vitreous China Fine Earthenware and Other Pottery Product Manufacturing     |
| Electrical Equipment Appliance and Component Manufacturing           | Motor and Generator Manufacturing  | Watch Clock and Part Manufacturing  |
| Electrometallurgical Ferroalloy Product Manufacturing                | Motor Vehicle Parts Manufacturing  | Welding and Soldering Equipment Manufacturing                               |
| Electron Tube Manufacturing  | Musical Instrument Manufacturing   | Window and Door Manufacturing   |
| Electroplating Plating Polishing Anodizing and Coloring              | Navigational Measuring Electro medical and Control Instruments Manufacturing | Wineries  |
| Elevator and Moving Stairway Manufacturing                           | Noncellulosic Organic Fiber Manufacturing                                    | Wire Drawing  |
| Enameled Iron and Metal Sanitary Ware Manufacturing                  | Office Machinery Manufacturing   | Wiring Device Manufacturing   |
| Engine and Engine Parts Manufacturing                                | Office Supplies (except Paper) Manufacturing                                 | Wood Product Manufacturing  |
| Engineered Wood Member Manufacturing                                 |  |   |

| <b>NAICS Description—Utilities (subset of Industrial)</b> |                                       |                                     |
|---|---------------------------------------|-------------------------------------|
| Electric Bulk Power Transmission and Control              | Fossil Fuel Electric Power Generation | Other Electric Power Generation     |
| Electric Power Distribution                               | Hydroelectric Power Generation        | Sewage Treatment Facilities         |
| Electric Power Generation                                 | Natural Gas Distribution              | Steam and Air-Conditioning Supply   |
| Electric Power Generation Transmission and Distribution   | Natural Gas Distribution              | Utilities                           |
| Electric Power Transmission Control and Distribution      | Nuclear Electric Power Generation     | Water Sewage and Other Systems      |
|   |                                       | Water Supply and Irrigation Systems |

## Appendix G—Abbreviations and Acronyms

|                   |   |
|-------------------|---|
| AB 32             | Assembly Bill 32, California State                      |
| ARB               | California Air Resources Board                          |
| Btu               | British thermal unit                                    |
| CH <sub>4</sub>   | Methane   |
| CFC               | chlorofluorocarbon                                      |
| CO                | Carbon monoxide   |
| CO <sub>2</sub>   | Carbon dioxide  |
| CO <sub>2</sub> e | Carbon dioxide equivalent                               |
| FE                | Fuel Economy  |
| FOD               | first-order decay                                       |
| GHG               | Greenhouse gas  |
| HFC               | Hydrofluorocarbon                                       |
| kWh               | kilowatt-hour(s)  |
| mpg               | miles per gallon  |
| MMBtu             | 1 million British thermal unit                          |
| NO <sub>x</sub>   | Oxides of nitrogen                                      |
| mt                | metric ton(s)   |
| N <sub>2</sub> O  | Nitrous oxide   |
| PFC               | Perfluorocarbon   |
| PM <sub>10</sub>  | particulate matter smaller than ten microns in diameter |
| SF <sub>6</sub>   | Sulfur hexafluoride                                     |
| SO <sub>x</sub>   | Sulfur oxides   |
| UNFCCC            | United Nations Framework Convention on Climate Change   |
| WBCSD             | World Business Council for Sustainable Development      |
| VOC               | Volatile organic compounds                              |

## Appendix H—Glossary of Terms<sup>16</sup>

|                                    |   |
|------------------------------------|---|
| 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.  |
| Annual                             | A frequency of once a year; unless otherwise noted, annual events such as reporting requirements will be based on the calendar year.  |
| Anthropogenic emissions            | GHG emissions that are a direct result of human activities or are the result of natural processes that have been affected by human activities.  |
| Base year                          | A specific year against which an entity's emissions are tracked over time.  |
| Base year emissions                | GHG emissions in the base year.   |
| Biofuel                            | Fuel made from biomass, including wood and wood waste, sulphite lyes (black liquor), vegetal waste (straw, hay, grass, leaves, roots, bark, crops), animal materials/waste (fish and food meal, manure, sewage sludge, fat, oil and tallow), turpentine, charcoal, landfill gas, sludge gas, and other biogas, bioethanol, biomethanol, bioETBE, bioMTBE, biodiesel, biodimethylether, fischer tropesch, bio oil, and all other liquid biofuels which are added to, blended with, or used straight as transportation diesel fuel. |
| Biogenic emissions from combustion | CO <sub>2</sub> emissions produced from combusting a variety of biofuels and biomass, such as biodiesel, ethanol, wood, wood waste and landfill gas.  |

<sup>16</sup> Abbreviations, Acronyms, and Definition are from a variety of sources including: the Local Government Operations Protocol, Version 1.1, ICLEI's Cities for Climate Protection Milestone Guide, and the International Local Government GHG Emissions Analysis Protocol, Oct 2009.

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| Biomass  | Non-fossilized organic material originating from plants, animals, and micro-organisms, including products, byproducts, residues and waste from agriculture, forestry and related industries as well as the non-fossilized and biodegradable organic fractions of industrial and municipal wastes, including gases and liquids recovered from the decomposition of non-fossilized and biodegradable organic material.   |
| 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.  |
| British thermal unit (Btu)                     | The quantity of heat required to raise the temperature of one pound of water by one degree Fahrenheit at about 39.2 degrees Fahrenheit.  |
| Calendar year                                  | The time period from January 1 through December 31.  |
| Carbon dioxide (CO <sub>2</sub> )              | The most common of the six primary GHGs, consisting of a single carbon atom and two oxygen atoms, and providing the reference point for the GWP of other gases. (Thus, the GWP of CO <sub>2</sub> is equal to 1.)  |
| Carbon Intensity                               | The amount of carbon emitted per unit of energy or fuels consumed.   |
| CO <sub>2</sub> equivalent (CO <sub>2</sub> e) | The universal unit for comparing emissions of different GHGs expressed in terms of the GWP of one unit of carbon dioxide.  |
| Community Scope Definitions                    | Scope 1 emissions – All direct emissions sources located within the boundary of the local government.<br>Scope 2 emissions – Indirect emissions that result as a consequence of activity within the jurisdiction's boundary limited to electricity, district heating, steam and cooling consumption.<br>Scope 3 emissions – All other indirect and embodied emissions that occur as a result of activity within the boundary.  |
| Continuous emissions monitoring system (CEMS)  | The total equipment required to obtain a continuous measurement of a gas concentration or emission rate from combustion or industrial processes.   |
| 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 (NO <sub>x</sub> ), volatile organic compounds (VOCs), carbon monoxide (CO), sulfur oxides (SO <sub>x</sub> ), 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 CO <sub>2</sub> emissions from biomass combustion   |
| De Minimis                                     | De Minimis emissions may be excluded from measurement and reporting. De Minimis emissions refer to one or more emission sources, for one or more gases which, when summed, represent less than 5 percent of total CO <sub>2</sub> e emissions. De Minimis sources of emissions are often relatively small, unimportant and difficult to accurately measure and quantify.   |
| Double counting                                | Two or more reporting entities taking ownership of the same emissions or reductions.   |
| Emission factor                                | A unique value for determining an amount of a GHG emitted on a per unit activity basis (for example, metric tons of CO <sub>2</sub> emitted per million Btus of coal combusted, or metric tons of CO <sub>2</sub> 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  |

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|                                | 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.  |
| First Order Decay (FOD) model  | A methodology for estimating CH <sub>4</sub> emissions from organic waste or wastewater undergoing biological decomposition. This method assumes that the degradable organic component (degradable organic carbon, DOC) in waste decays slowly throughout a few decades, during which CH <sub>4</sub> and CO <sub>2</sub> are formed. If conditions are constant, the rate of CH <sub>4</sub> production depends solely on the amount of carbon remaining in the waste.   |
| Forecast Year                  | Any future year in which predictions are made about emission levels based on growth multipliers applied to the base year.   |
| Fossil fuel                    | A fuel, such as coal, oil, and natural gas, produced by the decomposition of ancient (fossilized) plants and animals.   |
| Fugitive Emissions             | Emissions that are not physically controlled but result from the intentional or unintentional release of GHGs. They commonly arise from the production, processing, transmission, storage and use of fuels or other substances, often through joints, seals, packing, gaskets, etc. Examples include HFCs from refrigeration leaks, SF <sub>6</sub> from electrical power distributors, and CH <sub>4</sub> from solid waste landfills.   |
| Geopolitical Boundary          | The physical area or region over which a local government has jurisdictional authority.   |
| Government Scope Definitions   | Scope 1 emissions – Direct emission sources owned or operated by the local government.<br>Scope 2 emissions – Indirect emission sources limited to electricity, district heating, steam and cooling consumption.<br>Scope 3 emissions – All other indirect and embodied emissions over which the local government exerts significant control or influence.  |
| 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 (CO <sub>2</sub> ) over a given period of time.  |
| Greenhouse Effect              | The effect of heat retention in the lower atmosphere as a result of absorption and re-radiation by clouds and various greenhouse gases of long-wave terrestrial radiation. Incoming, short-wave radiation, including visible light and heat, is absorbed by materials which then behave as black bodies re-radiating at longer wavelengths. Certain substances (e.g. carbon dioxide) absorb long-wave radiation, are heated by it, and then begin to radiate it, still as long-wave radiation, in all directions, some of it downwards. Despite its name, the actual heating in a real greenhouse is caused mainly by the physical obstruction of the glass, which prevents warm air from leaving and cooler air from entering. |
| Greenhouse gases (GHGs)        | For the purposes of this Protocol, GHGs are the six gases identified in the Kyoto Protocol: carbon dioxide (CO <sub>2</sub> ), nitrous oxide (N <sub>2</sub> O), methane (CH <sub>4</sub> ), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF <sub>6</sub> ).  |
| Greenhouse gas credit          | GHG offsets can be converted into GHG credits when used to meet an externally imposed target. A GHG credit is a convertible and transferable instrument usually bestowed by a GHG program.  |
| Greenhouse gas offset          | Offsets are discrete GHG reductions used to compensate for (i.e., offset) GHG emissions elsewhere, for example to meet a voluntary or mandatory GHG target or cap. Offsets are calculated relative to a baseline that represents a hypothetical scenario for what emissions would have been in the absence of the mitigation project that generates the offsets.  |
| Greenhouse gas sink            | Any physical unit or process that stores GHGs; usually refers to forests and underground/deep sea reservoirs of CO <sub>2</sub> .   |
| Greenhouse gas source          | Any physical unit or process which releases GHG into the atmosphere.  |
| Green power                    | A generic term for renewable energy sources and specific clean energy   |

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|  | technologies that emit fewer GHG emissions relative to other sources of energy that supply the electric grid. Includes solar photovoltaic panels, solar thermal energy, geothermal energy, landfill gas, low-impact hydropower, and wind turbines.  |
| Hydrofluorocarbons (HFCs)                        | One of the six primary GHGs, a group of manmade chemicals with various commercial uses (e.g., refrigerants) composed of one or two carbon atoms and varying numbers of hydrogen and fluorine atoms. Most HFCs are highly potent GHGs with 100-year GWPs in the thousands.   |
| 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.   |
| Informational Items                              | Biogenic emissions and other indicators which may be relevant to a complete understanding of an organization's energy use and climate impact, but which are not conventionally included in greenhouse gas accounting.   |
| Intergovernmental Panel on Climate Change (IPCC) | International body of climate change scientists. The role of the IPCC is to assess the scientific, technical and socio-economic information relevant to the understanding of the risk of human-induced climate change ( <a href="http://www.ipcc.ch">www.ipcc.ch</a> ).   |
| Interim Year                                     | Any year for which an emissions inventory is completed that falls between the base year and the target year. Completing an emissions inventory for an interim year is useful in determining a jurisdiction's progress towards meeting their emission reduction goals.   |
| Inventory  | A comprehensive, quantified list of an organization's GHG emissions and sources.  |
| Joule  | A measure of energy, representing the energy needed to push with a force of one Newton for one meter.   |
| Kilowatt hour (KWh)                              | The electrical energy unit of measure equal to one thousand watts of power supplied to, or taken from, an electric circuit steadily for one hour. (A Watt is the unit of electrical power equal to one ampere under a pressure of one volt, or 1/746 horsepower.)   |
| Kyoto Protocol                                   | A protocol to the United Nations Framework Convention on Climate Change (UNFCCC). Ratified in 2005, it requires countries listed in its Annex B (developed nations) to meet reduction targets of GHG emissions relative to their 1990 levels during the period of 2008–12.  |
| Life Cycle Analysis                              | Assessment of the sum of a product's effects (e.g. GHG emissions) at each step in its life cycle, including resource extraction, production, use and waste disposal.  |
| Local Action Plan                                | includes the Emissions Analysis, Emissions Reduction Target, Emissions Reduction Strategy, and Emissions Reduction Implementation Strategy.   |
| Measures   | Measures are actions taken to reduce greenhouse gas emissions.  |
| Methane (CH <sub>4</sub> )                       | 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. |
| Natural gas                                      | A naturally occurring mixture of hydrocarbons (e.g., methane, ethane, or propane) produced in geological formations beneath the earth's surface that maintains a gaseous state at standard atmospheric temperature and pressure under ordinary conditions.  |

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| Nitrous oxide (N <sub>2</sub> O)                               | One of the six primary GHGs, consisting of two nitrogen atoms and a single oxygen atom, possessing a GWP of 310, and typically generated as a result of soil cultivation practices, particularly the use of commercial and organic fertilizers, fossil fuel combustion, nitric acid production, and biomass burning.  |
| Operational boundaries   | The boundaries that determine the direct and indirect emissions associated with operations within the entity's organizational boundaries.   |
| Operational control  | Full authority to introduce and implement operating policies at an operation.   |
| Organizational boundaries                                      | The boundaries that determine the operations owned or controlled by the reporting entity, depending on the consolidation approach taken.  |
| Perfluorocarbons (PFCs)  | One of the six primary GHGs, consisting of a group of man-made chemicals composed of one or two carbon atoms and four to six fluorine atoms, containing no chlorine. Originally introduced as alternatives to ozone depleting substances, PFCs have few commercial uses and are typically emitted as by-products of industrial and manufacturing processes. PFCs have very high GWPs and live a long time in the atmosphere.                |
| Process emissions  | Emissions from physical or chemical processing rather than from fuel combustion. Examples include emissions from manufacturing cement, aluminum, adipic acid, ammonia, etc.   |
| Residual fuel oil  | A general classification for the heavier oils, known as No. 5 and No. 6 fuel oils, that remain after the distillate fuel oils and lighter hydrocarbons are distilled away in refinery operations.   |
| Short ton (ton)  | Common measurement for a ton in the U.S. and equivalent to 2,000 pounds or about 0.907 metric tons.   |
| 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.   |
| Sectors  | Within each module of an emissions analysis, records are organized into sectors that contain similar activities or emission sources.  |
| Still gas  | Gas generated at a petroleum refinery or any gas generated by a refinery process unit, and that is combusted separately or in any combination with any type of gas or used as a chemical feedstock.   |
| Sulfur hexafluoride (SF <sub>6</sub> )                         | 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.   |
| Transformation   | Transformation means the incineration, pyrolysis, distillation, or biological conversion (other than composting) of solid waste to produce heat or electricity. Transformation does not include composting, gasification, or biomass conversion. according to CalRecycle website:<br><a href="http://www.calrecycle.ca.gov/lgcentral/basics/transform.htm">http://www.calrecycle.ca.gov/lgcentral/basics/transform.htm</a>                  |
| Therm  | A measure of one hundred thousand (10 <sup>5</sup> ) Btu.   |
| United Nations Framework Convention on Climate Change (UNFCCC) | Signed in 1992 at the Rio Earth Summit, the UNFCCC is a milestone Convention on Climate Change treaty that provides an overall framework for international efforts to mitigate climate change. The Kyoto Protocol is a protocol to the UNFCCC.  |
| Verification   | An independent assessment of the reliability (considering completeness and accuracy) of a GHG inventory. For the purposes of this Protocol, the method used to ensure that a given participant's GHG emissions inventory has met a minimum quality standard and complied with an appropriate set of California Registry- or California Air Resource Board-approved procedures and protocols for submitting emissions inventory information. |
| 15/15 Rule   | Implemented by the PUC, requires that data be aggregated and combined with other rate groups if specific criteria is not met. The rule requires that customer data be made up of at least 15 customers and that a customer's load be less than 15 percent of an assigned category. If the 15/15 rule is triggered after customer data has been screened twice, the customer data is then dropped from the information provided.             |