City of Torrance

Community Greenhouse Gas Emissions Inventory Report

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Acknowledgments

The municipal and community inventories would not have been possible if not for the direction and leadership of the South Bay Cities Council of Governments (SBCCOG) and the funding from its member cities Carson, El Segundo, Gardena, Hawthorne, Hermosa Beach, Inglewood, Lawndale, Lomita, Manhattan Beach, Palos Verdes Estates, Rancho Palos Verdes, Redondo Beach, Rolling Hills, Rolling Hills Estates, and Torrance. Also a special thank you to ICLEI—Local Governments for Sustainability for their guidance and technical advice. Producing this document was a collaborative effort. Additionally data and support was provided by a number of agencies including: the California Air Resources Board (ARB), the Department of Resources Recycling and Recovery (CalRecycle), Los Angeles County Sanitation Districts (LACSD), Southern California Edison (SCE), The Southern California Gas Company (SCG), Southern California Association of Governments (SCAG), and the South Coast Air Quality Management District (SCAQMD).

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 Torrance 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.[1]

The City of Torrance 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, Torrance 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 Torrance 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.

[1] 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).[2] 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.

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_2e) and the percentage they represent relative to the various tables and figures in which they are shown. A CO_2e 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,[3] this inventory focuses on three of the six internationally-recognized GHGs: carbon dioxide,

[2] 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.

[3] 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_2e 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.[4] These are relatively small sources which represent less than five percent of the total CO_2e 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 (SF6), 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

C. 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 Torrance Municipal Airport - Zamperini Field

[4] 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 CO2e emissions. De Minimis sources of emissions are often relatively small, unimportant and difficult to accurately measure and quantify.

has also been included in this inventory. Air travel emissions from planes has been included as a scope 3 source. A fuel-use method was utilized to estimate aviation fuel emissions. Additionally, jet fuel reported to SCAQMD was also included. 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.[5]

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_2/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.

D. Key Highlights and Findings

- In 2005, the City of Torrance generated approximately 2,252,557 metric tons of CO_2e. Natural gas represents the largest source of emissions, producing 846,979 metric tons of CO_2e or 38 percent of the total share of 2005 emissions. Typically natural gas is used as a fuel to heat homes and buildings, water heating and cooking, fire boilers, and generate electricity.

- In 2007, the City of Torrance generated approximately 2,151,483 metric tons of CO_2e representing a 4 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 less energy consumption and 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

[5] 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 .

to produce electricity. While sector specific natural gas emissions may have risen, overall emissions decreased due to 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, industrial was the largest sector of emissions (scope 1). However, it should be noted that the industrial and transportation sectors together account for almost 80 percent of the total community emissions. In 2005, the industrial sector generated approximately 1,024,811 metric tons of CO_2e, or 45 percent of the total 2005 emissions. In 2007, this sector generated approximately 949,304 metric tons of CO_2e or 44 percent of the total emissions. The majority of industrial sector emissions are activities associated with industrial processes, products, or utilities.

- In 2005, the transportation sector generated approximately 743,825 metric tons of CO_2e, or 33 percent of the total 2005 emissions. In 2007, the transportation sector generated approximately 726,536 metric tons of CO_2e, a 2 percent decrease from the baseline. The majority of transportation sector emissions are the result of gasoline combustion in vehicles traveling from Torrance to destinations outside of the community.

- In 2005, the solid waste sector including landfill waste-in-place and community-generated waste made up 2 percent of the total emissions, approximately 44,639 metric tons of CO_2e. In 2007, this sector remained at 2 percent of the total emissions, approximately 36,894 metric tons of CO_2e. The decline of emissions is the result of more disposal tons being diverted from landfills.

- While short-term trends show a 4 percent reduction in emissions, long-term general trends in the absence of mitigation efforts suggest an increase in emissions. It is anticipated that Torrance's community emissions, under a business-as-usual scenario, will grow 4 percent by 2020 from 2,151,483 in 2007 to 2,242,479 metric tons of CO_2e in 2020.

E. Future Steps

The City of Torrance 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_2e, 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 Torrance produced the largest amount of emissions, approximately 1,596,124 metric tons of CO_2e, and this was largely due to natural gas and transportation fuels from

vehicles traveling to and from activity centers within the boundaries of Torrance. Purchased electricity (scope 2) represents the second largest share of the total emissions, 609,674 metric tons of CO_2e. Scope 3 emissions from community-generated solid waste and aviation fuels related to the municipal airport produced 46,759 metric tons of CO_2e.

Emissions in 2007 represent an overall decline from the baseline year by approximately 4 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 7 percent between the years. This decrease is partly due to less energy consumption and 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_2e)

Scope	1990	2005	2007
Scope 1 Total	**1,596,713**	**1,596,124**	**1,542,639**
Landfill Waste-in-Place	1,537	1,162	1,162
Natural Gas	769,211	846,979	810,217
Industrial Sector Fuels	7,521	4,158	4,724
Transportation Fuels	818,443	743,825	726,536
Scope 2 Total	**536,039**	**609,674**	**569,790**
Purchased Electricity	536,039	609,674	569,790
Scope 3 Total	**45,429**	**46,759**	**39,054**
Community-Generated Solid Waste	41,243	43,477	35,732
Aviation Fuels	4,186	3,282	3,322

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.

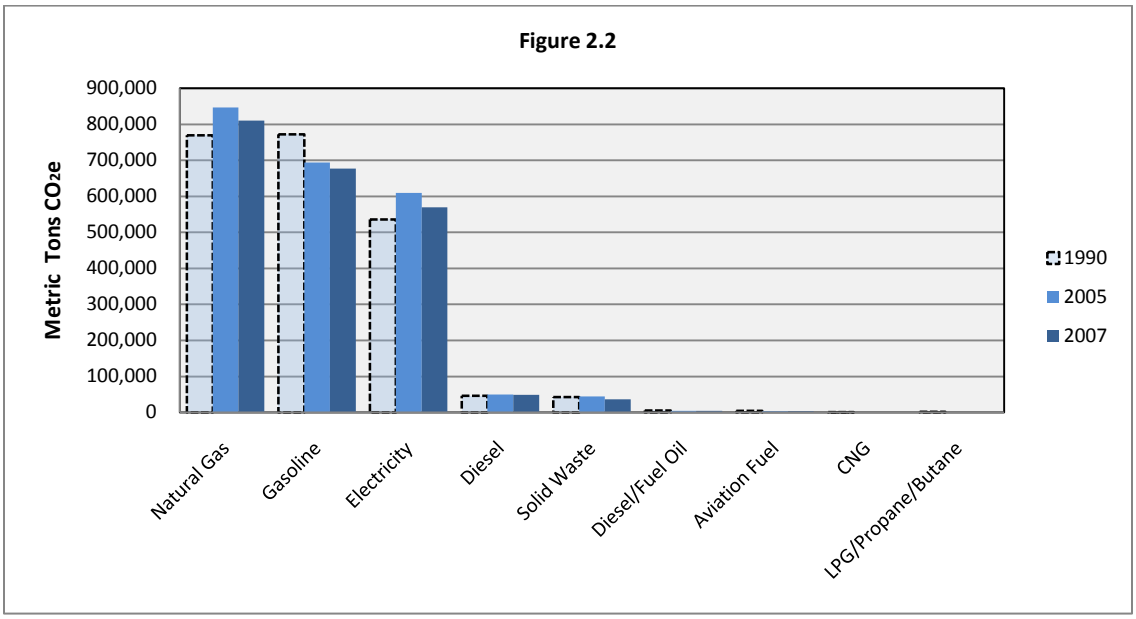
The GHG emissions generated from electricity were estimated based on data obtained from *Electricity Use Reports* prepared by Southern California Edison. Emissions produced from natural gas were estimated based on data provided by the Southern California Gas Company. Emissions for fuel are primarily derived from data provided by

SCAG, with some of the data provided by SCAQMD and ARB's OffRoad2007 model and other ARB reports. Solid waste emissions were estimated based upon data from CalRecycle and ARB's FOD model. Refer to Appendix A for more information.

Table 2.2 Emissions by Source (metric tons CO_2e)

Source	1990	Share of 1990 Total	2005	Share of 2005 Total	2007	Share of 2007 Total
Natural Gas	769,211	35%	846,979	38%	810,217	38%
Gasoline	772,134	35%	694,247	31%	677,285	31%
Electricity	536,039 [6]	25%	609,674	27%	569,790	26%
Diesel	46,284	2%	49,532	2%	49,202	2%
Solid Waste	42,780	2%	44,639	2%	36,895	2%
Diesel/Fuel Oil	5,521	0.3%	4,153	0.2%	4,724	0.2%
Aviation Fuel	4,186	0.2%	3,283	0.1%	3,322	--
CNG	25	0.0%	45	0.0%	48	0.0%
LPG/Propane/Butane (LPG)	2,001	0.1%	5	0.0%	--	0.0%
Total	**2,178,181**	**100%**	**2,252,557**	**100%**	**2,151,483**	**100%**

Figure 2.2



[6] 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 Torrance Municipal Airport - Zamperini Field.

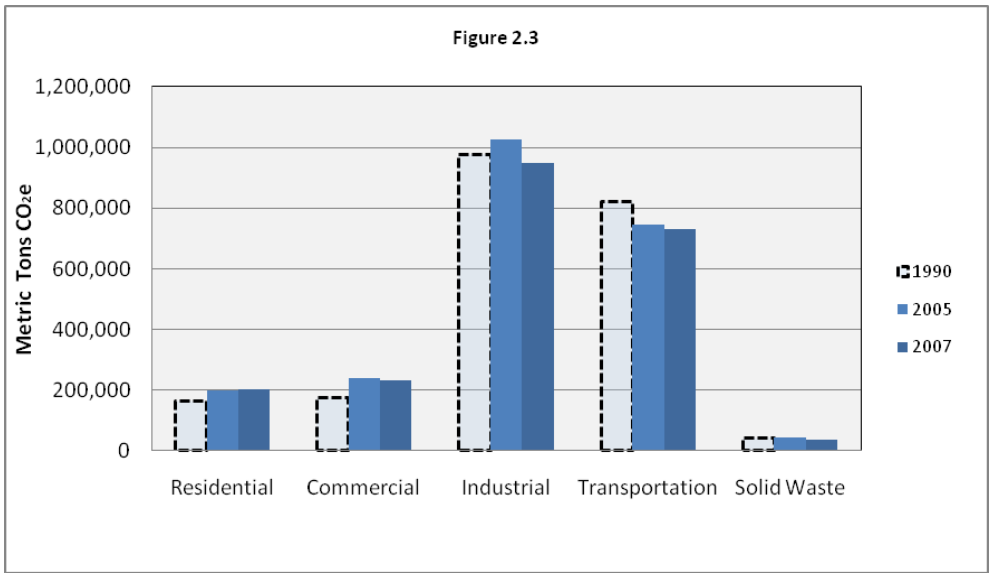
The waste sector includes landfill waste-in-place emissions derived from ARB's FOD model and community-generated waste and has been broken down by source, according to waste characterization studies by CalRecycle.

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 industrial sector emissions remain the highest followed by transportation sector emissions.

Table 2.3 Summary of Emissions by Sector (metric tons CO_2e)

Sector	1990	Share of 1990 Total	2005	Share of 2005 Total	2007	Share of 2007 Total
Residential	164,482	8%	198,200	9%	203,701	9%
Commercial	173,109	8%	237,799	11%	231,726	11%
Industrial	975,181	45%	1,024,811	45%	949,304	44%
Transportation	822,629	38%	747,108	33%	729,857	34%
Solid Waste	42,780	2%	44,639	2%	36,895	2%
Total	**2,178,181**	**100%**	**2,252,557**	**100%**	**2,151,483**	**100%**



Residential Emission Sources

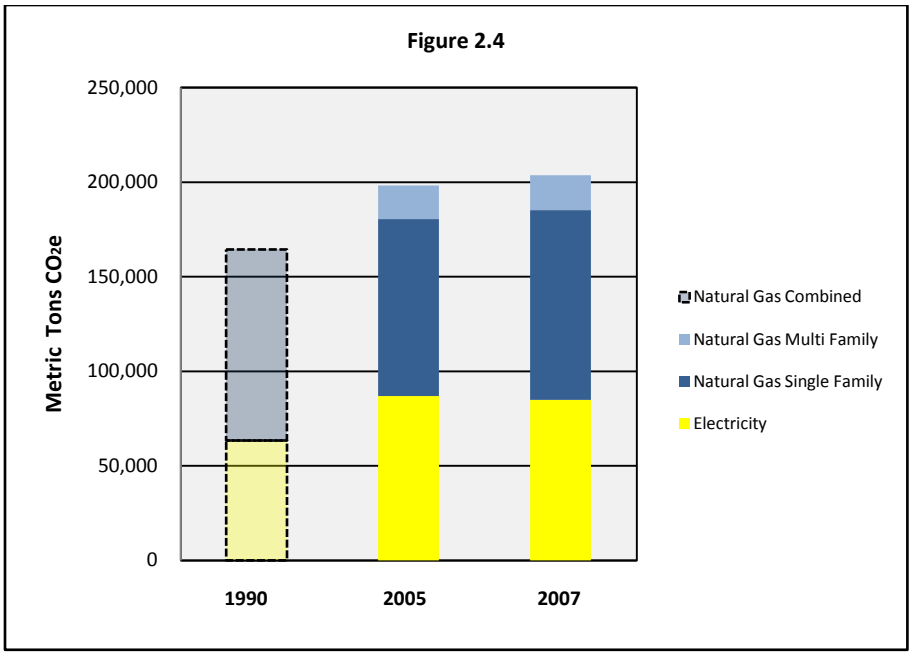
Depicted in Table 2.4 and Figure 2.4 are the emissions associated with energy consumption in the residential sector. All residential sector emissions are the result of electricity and natural gas consumption. Electricity in this sector is generally used for lighting, heating, and powering appliances. 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 17,742 metric tons of CO_2e (i.e. 16 percent of the total 111,287 metric tons of CO_2e emissions associated with natural gas). In this same year, emissions associated with electricity use resulted in a total of 86,913 metric tons of CO_2e.

In 2007, residential sector natural gas increased by 7 percent while electricity emissions decreased by 2 percent. An increase in natural gas emissions is the result of changes in energy consumption which also correlate with the increase in population and the number of households from 2005 to 2007 (refer to Appendix C for demographic information). In the case of electricity, the overall residential sector kWh consumption rose between years by 3 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_2e)

Residential	1990	Share of Source	2005	Share of Source	2007	Share of Source
Natural Gas Total	**101,069**	**100%**	**111,287**	**100%**	**118,903**	**100%**
Multi Family	--	--	17,742	16%	18,492	16%
Single Family	--	--	93,545	84%	100,411	84%
Electricity Total	**63,412**	**100%**	**86,913**	**100%**	**84,798**	**100%**
Total	**164,482**	**--**	**198,200**	**--**	**203,701**	**--**



Commercial Emission Sources

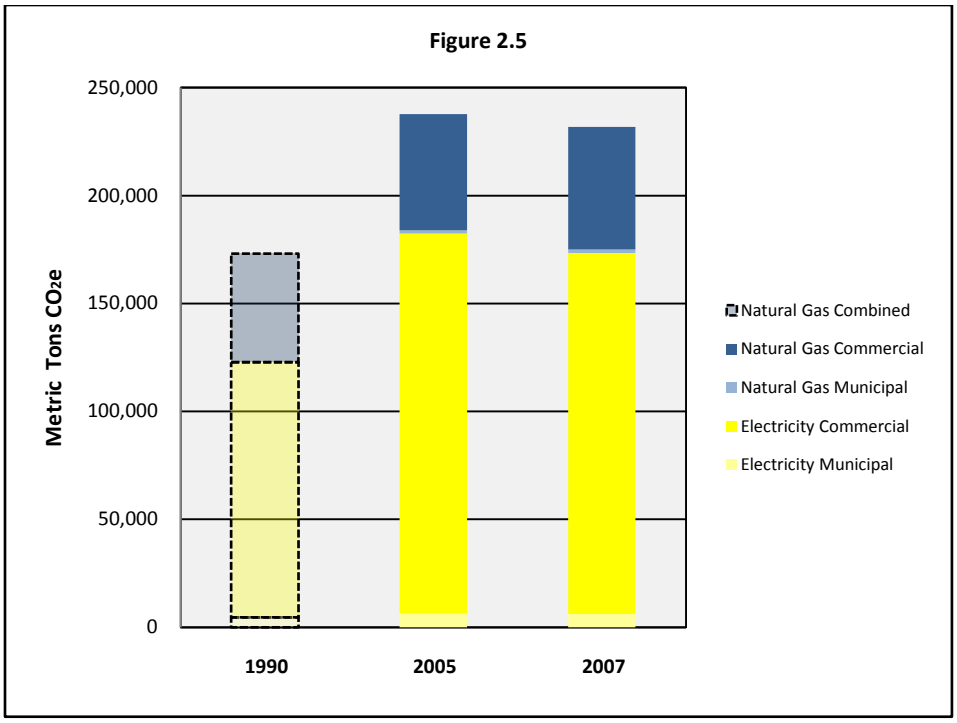
The activity in the commercial sector is the result of electricity and natural gas consumption. Typically, natural gas is used to heat buildings, fire boilers, and generate electricity. Electricity is generally used for lighting, heating, and powering appliances and equipment. The commercial sector emissions 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 237,799 CO_2e metric tons of emissions**.** Approximately 77 percent of the total emissions are related to electricity use and natural gas accounted for 23 percent of emissions.

In 2007, overall sector emissions decreased by 3 percent. Looking at the individual sources, natural gas increased by 5 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 91,228 in 2005 to 93,120 in 2007. End-use electricity emissions decreased by 5 percent. In this sector, the overall commercial kWh consumption rose between years by 0.3 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_2e)

Commercial	1990	Share of 1990 Source	2005	Share of 2005 Source	2007	Share of 2007 Source
Natural Gas Total	**50,326**	**100%**	**55,415**	**100%**	**58,396**	**100%**
Commercial	50,326	100%	53,925	97%	56,748	97%
Municipal	--	--	1,490	3%	1,648	3%
Electricity Total	**122,783**	**100%**	**182,384**	**100%**	**173,330**	**100%**
Commercial	118,162	96%	175,907	96%	167,077	96%
Municipal	4,621	4%	6,477	4%	6,253	4%
Total	**173,109**	**--**	**237,799**	**--**	**231,726**	**--**



Industrial Emission Sources

The industrial sector represents the largest quantity of inventoried emissions, which is due to natural gas consumption. 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. [7] The fuel-use data was provided by SCAQMD. SCAQMD figures related to refinery gas/refinery mixed gas have not been included in this inventory due to questions about the accuracy of the data. Additionally, figures reported to ARB by ExxonMobil Torrance Refinery in 2009 (516 MT CO_2e) could not be utilized as proxy year data either because these figures are not broken down by fuel type and therefore may result in double counting data such as natural gas 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 1,024,811 CO_2e metric tons of emissions. Approximately 66 percent of the total emissions are related to natural gas use, electricity accounted for 33 percent, and the remaining 1 percent of emissions was related to the stationary combustion of fuels.

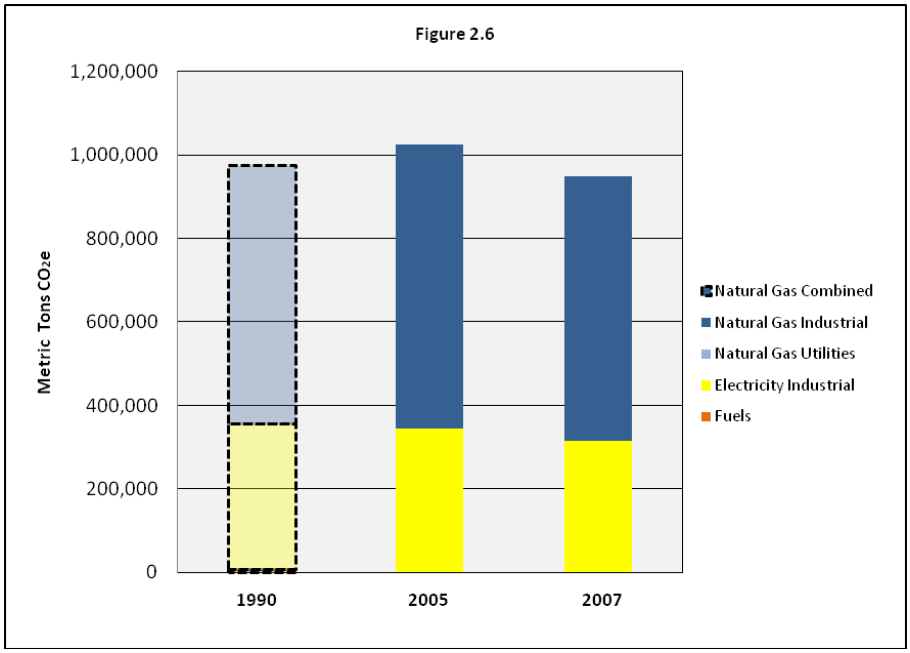
In 2007, overall sector emissions decreased by 7 percent. Looking at the individual sources, natural gas decreased by 7 percent. This decrease correlates with a decrease in natural gas consumption and an 8 percent decrease within the industrial portion of the jobs by industry dataset, which went from 19,099 in 2005 to 17,577 in 2007. End-use

[7] Refer to Appendix H for a definition of Rule 15/15.

electricity emissions decreased by 8 percent. The overall industrial kWh consumption decreased by 3 percent. The change in emissions is both the result of less consumption and the lower emission factors used to quantify emissions in the year 2007. Overall fuel source emissions increased by 14 percent due to an increase in diesel and fuel oils consumption.

Table 2.6 Industrial Emission Sources (metric tons CO_2e)

Industrial	1990	Share of 1990 Source	2005	Share of 2005 Source	2007	Share of 2007 Source
Natural Gas Total	**617,816**	**100%**	**680,277**	**100%**	**632,917**	**100%**
Industrial	617,816	100%	680,096	100%	632,732	100%
Utilities	--	--	181	0%	185	0%
Electricity Total	**349,844**	**100%**	**340,376**	**100%**	**311,662**	**100%**
Industrial	349,844	100%	340,376	100%	311,662	100%
Fuel Total	**7,522**	**100%**	**4,158**	**100%**	**4,724**	**100%**
Diesel/Fuel Oil	5,521	73%	4,153	100%	4,724	100%
LPG, Propane, Butane	2,001	27%	5	0%	--	
Total	**975,181**	**--**	**1,024,811**	**--**	**949,304**	**--**



Transportation Emission Sources

The transportation sector represents the second 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, the majority of emissions, 342,708 metric tons of CO_2e were generated from travel activities originating within the City's boundaries and traveling to a destination outside of the community; less emissions, 339,421 metric tons of CO_2e, 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, 57,579 metric tons of CO_2e. The majority of on-road travel emissions about 93 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 about 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 Torrance Municipal Airport - Zamperini Field - has also been included in this inventory. The municipal airport is home to private aircraft, charter flights, flight instruction, and several 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. A fuel-use method has been utilized to estimate aviation fuel emissions. Additionally, jet fuel reported to SCAQMD has also been included in this section of the inventory. In 2005, aviation emissions made up less than 1 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 originating within the City's boundaries and traveling to a destination outside of the community. 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 4 and 1 percent respectively.

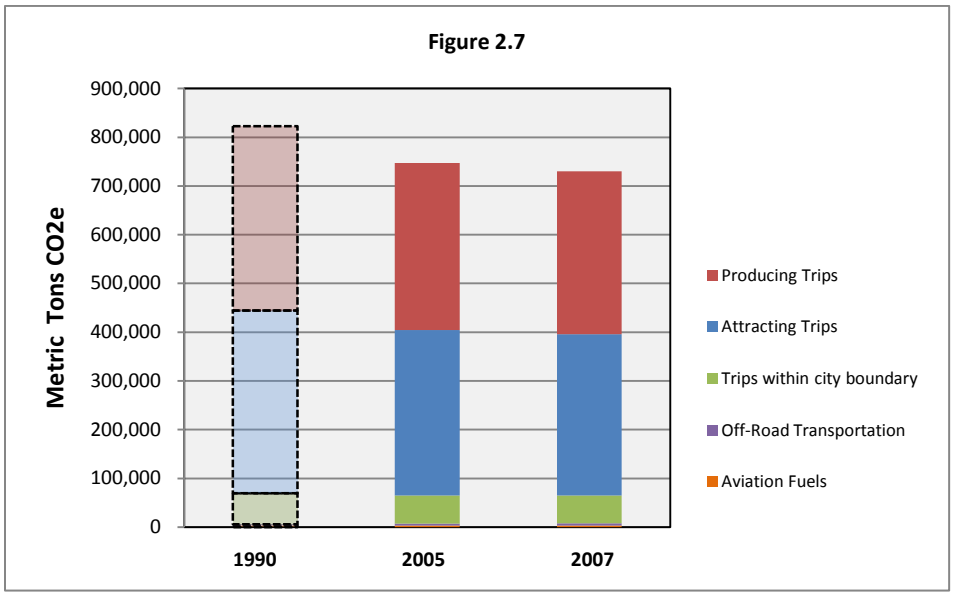
The VMT for 1990 was estimated based on the annual population growth rate in Torrance from 1990 to 2005, which was 0.64 percent. The higher emissions in 1990 caused by gasoline powered passenger vehicles can be rationalized because of the increased passenger vehicle fuel efficiency between 1990 and 2005. 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_2e)

Source	1990	Share of 1990 Source	2005	Share of 2005 Source	2007	Share of 2007 Source
Origin/Destination Subtotal	**816,565**	**100%**	**739,708**	**100%**	**722,258**	**100%**
Producing Trips	378,316	46.3%	342,708	46.3%	333,960	46.2%
Attracting Trips	374,688	45.9%	339,421	45.9%	331,077	45.8%
Trips within City Boundary	63,562	7.8%	57,579	7.8%	57,221	7.9%
Off-Road Transportation Subtotal	**1,878**	**100%**	**4,118**	**100%**	**4,277**	**100%**
Aviation Fuels	**4,186**	**100%**	**3,282**	**100%**	**3,322**	**100%**
Total	**822,629**	**--**	**747,107**	**--**	**729,857**	**--**



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. Table 2.8 shows the landfill emissions from the Torrance Municipal Dump.

Table 2.8 Landfill Waste-in-Place Emissions (metric tons CO_2e)

Landfill Waste-in-Place	1990	2005	2007 [8]
Torrance Municipal Dump	1,537	1,162	1,162

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 recorded and reported by Los Angeles Regional Agency (LARA) to CalRecycle.[9]

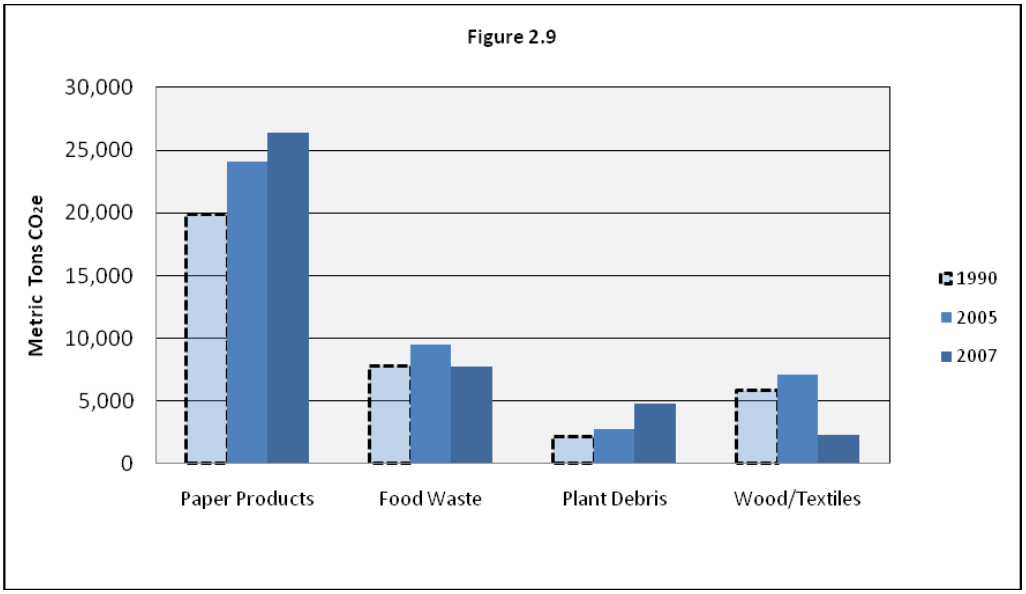
In 2005, the solid waste sector including landfill waste-in-place and community-generated waste made up 2 percent of the total emissions for Torrance. Table 2.9 and Figure 2.9, show a breakdown of community-generated solid waste based upon waste characterization studies by CalRecycle. In the baseline year, paper products are the largest source of emissions followed by food waste. Approximately 1,497 ADC tons and 236,865 disposal tons reportedly went to landfills, while 19,941 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 2 percent of the total sector emissions. Looking at Table 2.9 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 698 ADC tons and 195,127 disposal tons were sent to landfills. Transformation tons decrease with 11,338 tons sent to waste-to-energy facilities.

[8] The FOD Landfill Model (November 27, 2007) captures data through the year 2005; therefore, 2005 data was used as proxy year data for 2007.
[9] LARA is a regional agency that assists its members cities in meeting and exceeding the 50 percent waste diversion mandates of State Assembly Bill 939.

Table 2.9 Solid Waste Emission Sources (metric tons CO_2e)

Solid Waste	1990	Share of 1990 Waste	2005	Share of 2005 Waste	2007	Share of 2007 Waste
Paper Products	26,396	64%	24,122	55%	19,872	56%
Food Waste	7,767	19%	9,493	22%	7,820	22%
Plant Debris	4,804	12%	2,775	6%	2,203	6%
Wood/Textiles	2,276	6%	7,087	16%	5,838	16%
Total	**41,243**	**100%**	**43,477**	**100%**	**35,733**	**100%**



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. 6.5 MT CO_2e 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 2.10, by dividing the community-wide GHG emissions by the population a result of 15 metric ton of CO_2e 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 Torrance which would include emissions resulting from commercial air travel and other lifecycle emissions.[10]

[10] 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.

Table 2.10 Per Capita Emissions

Per Capita	1990	2005	2007
Population	133,107	146,504	147,730
Community GHG Emissions (metric tons CO_2e)	2,178,181	2,252,557	2,151,483
Per Capita GHG Emissions (metric tons CO_2e)	16	15	15

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 2.11 and Figure 2.11. 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 4 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 4 percent from the year 2007 to 2020, or from 2,151,483 to 2,242,479 metric tons of CO_2e. 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 Torrance from SCAG's adopted Regional Growth Forecast (2008). SCAG estimates the number of households to be 55,945 in 2007 and will increase to 58,170 by 2020. Therefore, the average annual compound growth rate (0.30 percent) was applied to the residential sector emissions.

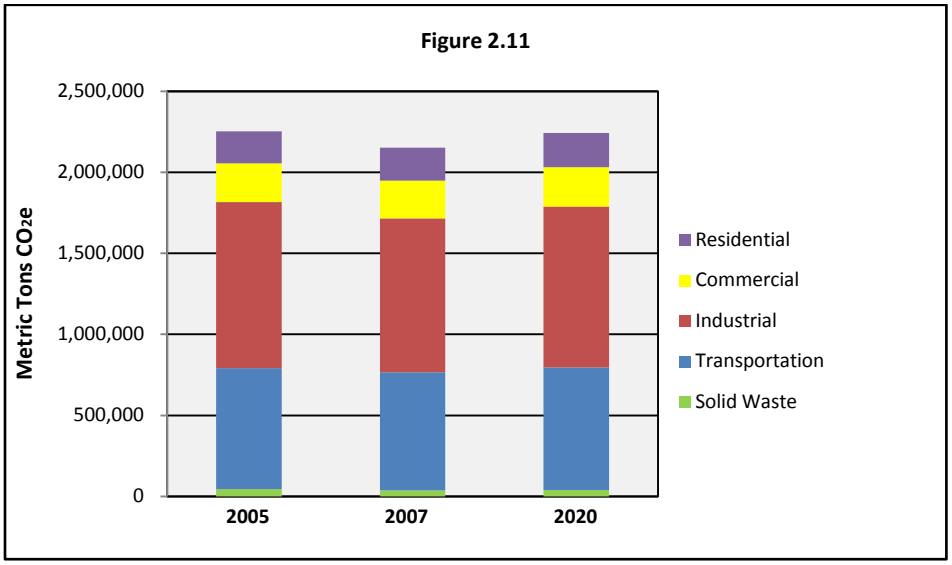
The commercial and industrial sector forecast was also based on SCAG's adopted Regional Growth Forecast (2008), job growth projections. For 2007, SCAG estimates jobs in the City of Torrance to be 105,517 and will increase to 110,252 by 2020. The average annual compound growth rate of 0.34 percent was 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 Torrance to be 1,271,121,860 miles in 2007 and will increase to 1,311,188,115 miles by 2020. The average annual compound growth rate of 0.24 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 (0.39 percent). SCAG estimates that the population was 147,730 in 2007, and will be 155,464 in 2020.

Table 2.11 Business-As-Usual Emissions Growth Forecast by Sector (metric tons CO2e)

Sector	2005	2007	2020	Annual Growth Rate	Percent Change from 2007 to 2020
Residential	198,200	203,701	211,802	0.30%	4%
Commercial	237,799	231,726	242,125	0.34%	4%
Industrial	1,024,811	949,304	991,903	0.34%	4%
Transportation	747,108	729,857	757,822	0.24%	4%
Solid Waste	44,639	36,895	38,827	0.39%	5%
Total	**2,252,557**	**2,151,483**	**2,242,479**	**--**	**4%**



III. Conclusion

A. Summary

In conclusion, this inventory report identifies the major sources of emissions within Torrance'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 Torrance generated approximately 2,252,557 metric tons of CO_2e. The year 2007 represents a 4 percent decrease from the total emissions in 2005. This decrease can be attributed to lower emissions from electricity, natural gas, and gasoline sources. In both years, the industrial sector represents the largest source of emissions (scope 1). However, it should be noted that the industrial and transportation sectors together account for almost 80 percent of the total community emissions. The majority of industrial sector emissions are the result of natural gas consumption. The majority of the transportation emissions are the result of gasoline consumption. 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.

Short-term trends show a 4 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 Torrance's community emissions, under a business-as-usual scenario, will grow 4 percent by 2020 from 2,151,483 in 2007 to 2,242,479 metric tons of CO_2e 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.[11]

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 Ruleule15/15 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. The PA-1, PA-2, and TOU-PA-5 rate groups were combined into the Ag TOU rate group in 2005 and 2007.

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 (0.64 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.

[11] 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.

Methodology Name: 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.			**Emission Factor Source**
Emission Factor	CO_2	665.72 lbs/MWh (2005); 630.89 lbs/MWh (2007); 665.72 lbs/MWh (1990)	LGOP V1.1, Table G.6
	CH_4	0.030 LBS/MWH (2005); 0.029 LBS/MWH (2007); 0.030 LBS/MWH (1990)	LGOP V1.1, Table G.7
	N_2O	0.011lbs/MWh (2005); 0.010lbs/MWh (2007); 0.011lbs/MWh (1990)	LGOP V1.1, Table G.7

B. Natural Gas

Description:

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 (0.64 percent). The growth rate was applied to the 2005 natural gas consumption data to arrive at an estimation for 1990.

Reference: Chauncy Tou, Energy Programs Advisor Customer Programs, Southern California Gas Company, 213-244-2833, ctou@semprautilities.com.

Methodology Name: Known use (Southern California Gas Company); natural gas emissions were calculated using default emissions factors from the LGOP.			**Emission Factor Source**
Emission Factor	CO_2	53.06 kg/MWh	LGOP, v1 Table G.1
	CH_4	5 g/MMBtu	LGOP, v1 Table G.3
	N_2O	0.1 g/MMBtu	LGOP, v1 Table G.3

C. Transportation Fuel Combustion

On-Road Mobile Sources:

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.

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.

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 (0.64 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

Aviation Fuel:
Aviation fuel data was obtained from City Staff. Using a fuel-use based method, fuel quantities were calculated in CACP software using default emissions factors from the LGOP. Fiscal year data rather than calendar year data was used for quantify these emissions. The year 2005 was based upon fiscal year fuel data from 2005 and 2006 and 2007 was based upon fiscal year 20007 and 2008. For the 1990 inventory, proxy year data was used including fiscal years 1994 and 1995.

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: City of Torrance, Torrance Municipal Airport - Zamperini Field, Cheryl Williams, General Services Department, 310.784.7911, CWilliams@torranceCa.Gov; Shant Megerdichian, Facilities Operations Manager, General Services Department, 310.784.7908, smegerdichian@TorranceCA.gov

Methodology Name: VMT, Origin-Destination method (SCAG); fuel emissions were calculated with VMT using default emissions factors from the LGOP.			**Emission Factor Source**
Gasoline Emission Factor	CO_2	8.81 kg/gallon	LGOP, v1 Table G.9
	CH_4	Varies by model year	LGOP, v1 Table G.10; Table G.12 for other equipment
	N_2O	Varies by model year	LGOP, v1 Table G.10; Table G.12 for other equipment
Diesel Emission Factor	CO_2	10.15 kg/gallon	LGOP, v1 Table G.9
	CH_4	Varies by model year	LGOP, v1 Table G.10; Table G.12 for other equipment
	N_2O	Varies by model year	LGOP, v1 Table G.10; Table G.12 for other equipment
CNG Emission Factor	CO_2	53.057 kg/MMBtu	LGOP, v1 Table G.9

	CH_4	Varies by model year	LGOP, v1 Table G.10; Table G.12 for other equipment
	N_2O	Varies by model year	LGOP, v1 Table G.10; Table G.12 for other equipment
Jet Fuel Emission Factor	CO_2	9.57 KG/GALLON	LGOP, v1 Table G.9
	CH_4	0.27G/GALLON	LGOP, v1 Table G.12
	N_2O	0.31G/GALLON	LGOP, v1 Table G.12
Aviation Fuel Emission Factor	CO_2	8.32 KG/GALLON	LGOP, v1 Table G.9
	CH_4	7.04G/GALLON	LGOP, v1 Table G.12
	N_2O	0.11G/GALLON	LGOP, v1 Table G.12

D. Commercial/Industrial Source Fuel Combustion

Description:

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.

Note:
SCAQMD figures related to refinery gas/refinery mixed gas have not been included in this inventory due to questions about the accuracy of the data. Additionally, figures reported to ARB by ExxonMobil Torrance Refinery in 2009 (516 MT CO_2e) could not be utilized as proxy year data either because these figures are not broken down by fuel type and therefore may result in double counting data such as natural gas already provided by the utility company.

Additionally, SCAQMD natural gas and gasoline figures were excluded because this would result in double counting data already provided by the utility company and SCAG.

Reference: Lisa Ramos, public records unit, SCAQMD, 909.396.3211, lramos1@aqmd.gov. & 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 .

Methodology Name: Fuel-use based method. Fuels consumed were calculated using default emissions factors from the LGOP. Fuel Oil EF was used to calculate: Residual Fuel Oil, Distillate (0.05% or 0.5% S). Stationary LPG EF was used to calculate: LPG, Propane, Butane. Still Gas EF was used to calculate: Refinery Gas/Refinery Mixed Gas.			**Emission Factor Source**
Diesel/Distillate Oil- Fuel Oil 1,2,4 Emission Factor	CO_2	73.15 KG/MMBTU	LGOP, v1 Table G.1
	CH_4	11.000 G/MMBTU	LGOP, v1 Table G.3
	N_2O	0.600 G/MMBTU	LGOP, v1 Table G.3
LPG, Propane, Butane- Stationary LPG Emission Factor	CO_2	63.16 KG/MMBTU	LGOP, v1 Table G.1
	CH_4	3.000 G/MMBTU	LGOP, v1 Table G.3
	N_2O	0.600 G/MMBTU	LGOP, v1 Table G.3

E. Solid Waste

Waste-in-place:
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. The landfill waste-in-place emissions derived from the FOD model and reported in this inventory are for the Torrance Municipal Dump which closed in the year 1966. The FOD Landfill Model (November 27, 2007) captures data through the year 2005; therefore, 2005 data was used as proxy year data for 2007.

Community-Generated Solid Waste:
Community-generated solid waste emissions were calculated in CACP using waste disposal data obtained from the Los Angeles Regional Agency (LARA) which is then reported to CalRecycle. 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.

LARA is a consortium of member cities in Los Angeles County. In 2004, the California Integrated Waste Management Board (CIWMB) approved the formation of LARA as a regional agency whose mission is to assist members in meeting and exceeding the 50 percent waste diversion mandates of State Assembly Bill 939. www.laregionalagency.com

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.

Reference: Okla Hensley, CalRecycle 916-341-6242, Okla.Hensley@calrecycle.ca.gov

Waste-in-Place Methodology Name: First Order Decay Model (CARB); proxy year data from 2005 was used for the year 2007. Landfill Methane Emissions Methodology Based on IPCC's Mathematically Exact First-Order Decay Model http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/5_Volume5/V5_3_Ch3_SWDS.pdf; see section 3A1.6.3

Community-Generated Solid Waste Methodology Name: 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. There was no ADC data reported in 1995 therefore 1996 ADC proxy year data was used in its place. Visit the website listed below for detailed reports.
http://www.calrecycle.ca.gov/LGCentral/Reports/DRS/Origin/WFOrgin.aspx.
Methane Recovery—75 percent (LGOP recommended percentage)

Community-Generated Solid Waste, Waste Composition Notes	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: http://www.calrecycle.ca.gov/Publications/default.asp?pubid=1346
	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: http://www.calrecycle.ca.gov/Publications/LocalAsst/34004005.pdf

	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: http://www.calrecycle.ca.gov/WasteChar/WasteStudies.htm#1999

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.[12]

Source of Emissions 2005	CO2	N2O	CH4	Equiv CO_2 (tonnes)	Equiv Energy (MMBtu)	Energy/Fuel Use	Unit
Residential							
Electricity	86,392	1.43	3.76	86,913	1,029,955	286,098,688	kWh
Natural Gas Multi Family	17,697	0.03	1.67	17,742	351,799	3,335,218	therms
Natural Gas Single Family	93,306	0.18	8.79	93,545	1,854,868	279,738	therms
Commercial							
Electricity commercial	174,851	2.89	7.62	175,907	2,084,556	579,043,198	kWh
Electricity municipal	6,436	106	280	6,477	72,237	21,314,982	kWh
Natural Gas commercial	53,788	0.10	5.07	53,925	1,069,262	10,137,109	therms
Natural Gas municipal	1,484	3	140	1,490	27,972	279,738	therms
Industrial							
Electricity	338,334	5.59	14.74	340,376	4,033,580	1,120,438,937	kWh
Natural Gas industrial	679,430	1.28	12.80	680,096	13,506,647	128,049,367	therms
Natural Gas utilities	181	0.00	0.00	181	3,594	34,074	therms
Stationary Combustion:							
Diesel/Distillate Oil	4,130	0.03	0.62	4,153	59,546	407,085	gals
LPG, Propane, Butane	5	0.00	0.00	5	81	835	gals
Transportation-Origin/Destination Method							
Producing	335,059	23.42	18.50	342,708	4,976,447	594,198,001	VMT
Attracting	331,846	23.19	18.33	339,421	4,928,718	588,499,485	VMT
Within City Limits	56,294	3.93	3.11	57,579	836,108	99,833,649	VMT
Aviation Fuels:							
Aviation fuel	3,194	0.04	2.70	3,264	50,300	383,874	gals
Jet Fuel (SCAQMD report)	18	0.00	0.00	19	253	1,930	gals
OFFRoad Transportation:			**Total**	CO_2e			
Lawn and Garden Equipment				47.50 CO_2e			
Construction Equipment				3,867.62 CO_2e			
Industrial Equipment				121.52 CO_2e			
Light Commercial Equipment				80.99 CO_2e			

[12] Source of data CACP software output.

Solid Waste				
Landfill Waste-in-Place: Torrance Municipal Dump		1,162 CO_2e		
Paper Products	1,148.68	24,122 CO_2e		
Food Waste	452.04	9,493 CO_2e		
Plant Debris	121.06	2,542 CO_2e		
Wood or Textile	337.48	7,087 CO_2e		
Alternative Daily Cover (plant debris)	11	233 CO_2e	1,497	tons
Community-generated solid waste Total	2,070	43,477 CO_2e	236,865	tons
Transformation tons (informational item)			19,941	tons

Source of Emissions 2007	**CO2**	**N2O**	**CH4**	**Equiv CO_2 (tonnes)**	**Equiv Energy (MMBtu)**	**Energy/Fuel Use**	**Unit**
Residential							
Electricity	84,302	1.34	3.88	84,798	1,060,530	294,591,718	kWh
Natural Gas Multi Family	18,445	0.03	1.74	18,492	366,679	3,476,288	therms
Natural Gas Single Family	100,154	0.19	9.44	100,411	1,991,003	18,875,648	therms
Commercial							
Electricity commercial	166,100	2.63	7.64	167,077	2,089,553	580,431,444	kWh
Electricity municipal	6,216	0.10	0.29	6,253	78,204	21,723,279	kWh
Natural Gas commercial	56,602	0.11	5.33	56,748	1,125,222	10,667,637	therms
Natural Gas municipal	1,646	3	155	1,648	31,024	310,236	therms
Industrial							
Electricity	309,841	4.91	14.24	311,662	3,897,819	1,082,727,589	kWh
Natural Gas industrial	632,113	1.19	11.91	632,733	12,566,023	119,131,804	therms
Natural Gas utilities	185	0.00	0.00	185	3,678	34,867	therms
Stationary Combustion:							
Diesel/Distillate Oil	4,698	0.04	0.71	4,724	67,739	463,095	gals
Transportation-Origin/Destination Method							
Producing	327,345	20.19	16.89	333,960	4,861,771	587,745,796	VMT
Attracting	324,519	20.02	16.74	331,077	4,819,791	582,670,466	VMT
Within City Limits	56,088	3.46	2.89	57,221	833,022	100,705,598	VMT
Aviation Fuels:							
Aviation fuel	3,243	0.04	2.74	3,314	51,072	389,765	gals
Jet Fuel (SCAQMD report)	9	0.00	0.00	9	118	900	gals
OFFRoad Transportation:			**Total**	CO_2e			
Lawn and Garden Equipment				49.92 CO_2e			

Construction Equipment		4,013.13 CO_2e		
Industrial Equipment		128.20 CO_2e		
Light Commercial Equipment		85.45 CO_2e		
Solid Waste				
Landfill Waste-in-Place: Torrance Municipal Dump		1,162 CO_2e		
Paper Products	946.27	19,872 CO_2e		
Food Waste	372.39	7,820 CO_2e		
Plant Debris	99.73	2,094 CO_2e		
Wood or Textile	278.01	5,838 CO_2e		
Alternative Daily Cover (plant debris)	5.17	109 CO_2e	698	tons
Community-generated solid waste Total	1,701.57	35,733 CO_2e	195,127	tons
Transformation tons (informational item)			11,338	tons

Source of Emissions 1990	**CO2**	**N2O**	**CH4**	**Equiv CO_2 (tonnes)**	**Equiv Energy (MMBtu)**	**Energy/Fuel Use**	**Unit**
Residential							
Electricity	63,032	1.04	2.75	63,412	751,458	208,738,333	kWh
Natural Gas	100,811	0.19	9.50	101,069	2,004,059	18,999,420	therms
Commercial							
Electricity commercial	117,453	1.94	5.12	118,162	1,400,261	388,961,450	kWh
Electricity municipal	4,593	0.08	0.20	4,621	54,761	15,211,322	kWh
Natural Gas commercial	50,197	0.09	4.73	50,326	997,884	9,460,412	therms
Industrial							
Electricity	347,744	5.75	15.15	349,844	4,145,769	1,151,602,543	kWh
Natural Gas industrial	617,211	1.16	11.63	617,816	12,269,782	116,323,304	therms
Stationary Combustion:							
LPG, Propane, Butane	1,993	0.02	0.09	2,001	33,279	344,305	gals
Distillate (0.05% OR 0.5% S)	10	0.00	0.00	10	149	1,020	gals
Fuel Oil (0.1% S)	69	0.00	0.00	69	995	6,800	gals
Diesel Oil	5,410	0.04	0.81	5,441	78,016	533,349	gals
Transportation-Origin/Destination Method							
Producing	366,520	36.10	28.78	378,316	5,444,853	587,745,796	VMT
Attracting	363,005	35.75	28.50	374,688	5,392,639	582,670,466	VMT
Within City Limits	61,580	6.07	4.84	63,562	914,811	100,705,598	VMT
Aviation Fuels:							
Aviation fuel	4,097	0.05	3.47	4,186	64,522	492,416	gals
OFFRoad Transportation:			**Total**	CO_2e			

Lawn and Garden Equipment		30.94 CO_2e		
Construction Equipment		1,731.12 CO_2e		
Industrial Equipment		69.28 CO_2e		
Light Commercial Equipment		46.62 CO_2e		
Solid Waste				
Landfill Waste-in-Place: Torrance Municipal Dump		1,537 CO2e		
Paper Products	1,256.93	26,396 CO_2e		
Food Waste	369.87	7,767 CO_2e		
Plant Debris	228.28	4,794 CO_2e		
Wood or Textile	108.37	2,276 CO_2e		
Alternative Daily Cover (plant debris)	0.48	10 CO_2e	65	tons
Community-generated solid waste Total	1,963.94	41,243 CO_2e	180,230	tons
Transformation tons (informational item from 1995)			4,873	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.[13]

Table C.1 Summary of City Demographics

City Profile	Local Jurisdiction	LA County	Local share of County
Population			
1990	133,107	8,863,164	1.50%
2005	146,504	10,206,001	1.44%
2007	147,730	10,243,764	1.44%
2020	155,464	11,329,829	1.37%
Number of Households			
1990	52,615	2,989,552	1.76%
2005	55,507	3,212,434	1.73%
2007	55,945	3,239,605	1.73%
2020	58,170	3,666,631	1.59%
Number of Jobs			
1990	107,289	4,615,644	2.32%
*2005	104,992	4,397,025	2.39%
**2007	105,517	4,440,560	2.38%
2020	110,252	4,754,731	2.32%

Sources: 1990 data is from the U.S. Census Bureau for population and households and SCAG for the employment
2005 and 2007 data is from SCAG's Local Jurisdiction Profile data (May 2009)
2020 data is from SCAG's adopted Regional Growth Forecast (2008)
*2005 number of jobs figure is from SCAG's adopted Regional Growth Forecast (2008)
**2007 number of jobs figure was interpolated based upon known values in 2005 and 2008
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

[13] 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_2 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.[14] 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_2e)
Carbon dioxide	CO2	Combustion	1
Methane	CH4	Combustion, Anaerobic Decomposition of Organic Waste (Landfills, Wastewater), Fuel Handling	21
Nitrous Oxide	N2O	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	SF6	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_2		
	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 CO2/MWh); therm 0.0546 (kg CO2/SCF); gasoline 8.81(kg CO2/gallon).			

[14] Refer to the LGOP, Appendix E, for detailed information on Global Warming Potentials.

Table D.3 Standard Conversion Factors

Mass			
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)
Volume			
1 cubic foot (ft^3) =	7.4805 US gallons (gal)	0.1781 barrels (bbl)	
1 cubic foot (ft^3) =	28.32 liters (L)	0.02832 cubic meters (m^3)	
1 US gallon (gal) =	0.0238 barrels (bbl)	3.785 liters (L)	0.003785 cubic meters (m^3)
1 barrel (bbl) =	42 US gallons (gal)	158.99 liters (L)	0.1589 cubic meters (m^3)
1 liter (L) =	0.001 cubic meters (m^3)	0.2642 US gallons (gal)	0.0063 barrels (bbl)
1 cubic meter (m^3) =	6.2897 barrels (bbl)	264.17 US gallons (gal)	1,000 liters (L)
Energy			
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)
Other			
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) =	$^{44}/_{12}$ metric tons CO_2		
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
Residential	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.
Commercial	GS-1	General Service, Non-demand Metered, Small Commercial	GS-1, TOU-GS-1, TOU-EV-3.
	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.
Industrial	Large Power TOU8-SEC	General Service, Time-of-Use, Large Power(>500 kW), Secondary Voltage (Below 2 kv)	TOU-8-S, I-6-S, RTP-2-S, RTP-2-I-S, RTP-3-S, TOU-8-CR-1-S, TOU-8-RTP-S, TOU-8-SOP-S, TOU-SOP-I-S, TOU-8-SOP-RTP-S.
	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)[15] 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.[16] 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 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 Adjusting Underwriting and Other Insurance Related Activities	Death Care Services	Museums
Agents and Managers for Artists Athletes Entertainers and Other 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 Native Tribal Governments	Drafting and Graphic Design Services	Performing Arts Spectator Sports and Related Industries
Amusement and Theme Parks, Arcades	Drugs and Druggists' Sundries Merchant Wholesalers	Pet and Pet Supplies Stores
Animal Production	Egg Production	Pharmacies and Drug Stores
Apparel Stores	Electronic and Precision Equipment Repair and Maintenance	Photography
Appliance Repair and Maintenance	Electronic Shopping	Pipeline Transportation
Apprenticeship Training	Electronics and Appliance Stores	Plastics Materials and Basic Forms and Shapes Merchant Wholesalers
Aquaculture	Employee Leasing Services and Placement Services	Political Organizations
Architectural Engineering and Related Services	Engineering Consulting Services	Port and Harbor Operations
Armored Car Services	Environment Conservation and Wildlife Organizations	Postal Service
Art Dealers	Executive Legislative and Other General 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 Services
Automotive Repair and Maintenance	Family Planning Centers	Promoters of Performing Arts Sports and Similar Events
Baked Goods Stores	Farm Product Merchants Wholesalers	Property Management
Banking and Lending and Credit	Fine Arts Schools	Public Relations Agencies

[15] See Appendix H for a definition of the North American Industrial Classification System.
[16] 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 Svs	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

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		

NAICS Description—Utilities (subset of Industrial)		
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
CH4	Methane
CFC	chlorofluorocarbon
CO	Carbon monoxide
CO2	Carbon dioxide
CO2e	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
NOx	Oxides of nitrogen
mt	metric ton(s)
N2O	Nitrous oxide
PFC	Perfluorocarbon
PM10	particulate matter smaller than ten microns in diameter
SF6	Sulfur hexafluoride
SOx	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[17]

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 tropsch, bio oil, and all other liquid biofuels which are added to, blended with, or used straight as transportation diesel fuel.
Biogenic emissions from combustion	CO2 emissions produced from combusting a variety of biofuels and biomass, such as biodiesel, ethanol, wood, wood waste and landfill gas.

[17] 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.

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 (CO2)	The most common of the six primary GHGs, consisting of a single carbon atom and two oxygen atoms, and providing the reference point for the GWP of other gases. (Thus, the GWP of CO2 is equal to 1.)
Carbon Intensity	The amount of carbon emitted per unit of energy or fuels consumed.
CO2 equivalent (CO2e)	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. 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. 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 (NOx), volatile organic compounds (VOCs), carbon monoxide (CO), sulfur oxides (SOx), and particulate matter smaller than ten microns in diameter (PM-10). The CACP software provides estimated emissions of CAPs as well as GHGs for emissions analyses and reduction benefits of measures.
Direct emissions	Emissions from sources within the reporting entity's organizational boundaries that are owned or controlled by the reporting entity, including stationary combustion emissions, mobile combustion emissions, process emissions, and fugitive emissions. All direct emissions are Scope 1 emissions, with the exception of biogenic CO2 emissions from biomass combustion
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 CO2e 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 CO2 emitted per million Btus of coal combusted, or metric tons of CO2 emitted per kWh of electricity consumed
Facility	Any property, plant, building, structure, stationary source, stationary equipment or grouping of stationary equipment or stationary sources located on one or more contiguous or adjacent properties, in actual physical contact or

	separated solely by a public roadway or other public right-of way, and under common operational or financial control, that emits or may emit any greenhouse gas.
First Order Decay (FOD) model	A methodology for estimating CH4 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 CH4 and CO2 are formed. If conditions are constant, the rate of CH4 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, SF6 from electrical power distributors, and CH4 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. Scope 2 emissions – Indirect emission sources limited to electricity, district heating, steam and cooling consumption. 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 (CO2) 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 (CO2), nitrous oxide (N2O), methane (CH4), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF6).
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 CO2.
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

	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 (www.ipcc.ch).
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 (CH4)	One of the six primary GHGs, consisting of a single carbon atom and four hydrogen atoms, possessing a GWP of 21, and produced through the anaerobic decomposition of waste in landfills, animal digestion, decomposition of animal wastes, production and distribution of natural gas and petroleum, coal production, and incomplete fossil fuel combustion.
Metric ton (MT, tonne)	Common international measurement for the quantity of GHG emissions, equivalent to about 2,204.6 pounds or 1.1 short tons.
Mobile combustion	Emissions from the combustion of fuels in transportation sources (e.g., cars, trucks, buses, trains, airplanes, and marine vessels) and emissions from non-road equipment such as equipment used in construction, agriculture, and forestry. A piece of equipment that cannot move under its own power but that is transported from site to site (e.g., an emergency generator) is a stationary, not a mobile, combustion source.
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.

Nitrous oxide (N2O)	One of the six primary GHGs, consisting of two nitrogen atoms and a single oxygen atom, possessing a GWP of 310, and typically generated as a result of soil cultivation practices, particularly the use of commercial and organic fertilizers, fossil fuel combustion, nitric acid production, and biomass burning.
Operational boundaries	The boundaries that determine the direct and indirect emissions associated with operations within the entity's organizational boundaries.
Operational control	Full authority to introduce and implement operating policies at an operation.
Organizational boundaries	The boundaries that determine the operations owned or controlled by the reporting entity, depending on the consolidation approach taken.
Perfluorocarbons (PFCs)	One of the six primary GHGs, consisting of a group of man-made chemicals composed of one or two carbon atoms and four to six fluorine atoms, containing no chlorine. Originally introduced as alternatives to ozone depleting substances, PFCs have few commercial uses and are typically emitted as by-products of industrial and manufacturing processes. PFCs have very high GWPs and live a long time in the atmosphere.
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 (SF6)	One of the six primary GHGs, consisting of a single sulfur atom and six fluoride atoms, possessing a very high GWP of 23,900, and primarily used in electrical transmission and distribution systems.
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: http://www.calrecycle.ca.gov/lgcentral/basics/transform.htm
Therm	A measure of one hundred thousand (10^5) 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.