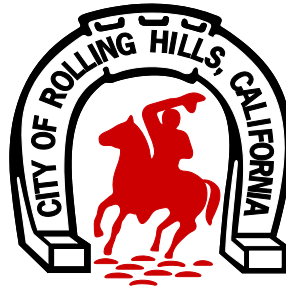

City of Rolling Hills



Municipal Greenhouse Gas Emissions Inventory Report

Prepared by:

South Bay Cities Council of Governments

5033 Rockvalley Road
Rancho Palos Verdes, CA 90275

March 2011

Acknowledgments

The municipal inventory 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. Data was provided by Southern California Edison (SCE), The Southern California Gas Company (SCG) and City staff. Also a special thank you to ICLEI—Local Governments for Sustainability for their guidance and technical advice.

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 Rolling Hills Municipal Emissions Inventory Report

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How to read this report:

The following emissions inventory report includes data for the years 2005 and 2007. It is organized however starting with the year 2005 because it is the baseline year that will be used to set emission goals. The next year discussed is 2007, an interim year that shows progress made since the baseline year. Emissions data located in the Appendix B is organized in the same way to maintain consistency.

I. Executive Summary

A. Project Background

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

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

The increasing interest in climate change has engendered South Bay communities to form active, involved citizen groups that have advocated that their cities begin the process of creating Climate Action Plans.¹ A number of South Bay cities signed the "Cool Cities" pledge.² By committing to reduce global warming emissions cities will be implementing solutions to make themselves more sustainable and energy efficient. In the spring of 2008, the South Bay Cities Council of Governments (SBCCOG) coordinated efforts to respond to AB 32 by assisting South Bay cities with the process of conducting a GHG emissions inventory. In this way, South Bay cities will be in a better position to respond to the challenges and impact legislation related to climate change. Additionally, GHG inventories will be a useful tool to help South Bay cities measure their progress to meet regional reduction goals.

South Bay cities began the process of assessing their GHG emissions by joining ICLEI—Local Governments for Sustainability, an international association of city and county governments that have made a commitment to sustainable development.³ Through ICLEI, South Bay cities gained access to tools and resources such as the Clean Air Climate Protection (CACAP) software, which enables cities to quantify their emissions. By joining ICLEI and adopting a resolution, South Bay cities have committed to ICLEI's Five Milestone Climate Protection Methodology, which includes: conducting a baseline emissions inventory and forecast, adopting an emissions reduction target for the forecast year, developing a local Climate Action Plan, implementing the local Climate Action Plan, and monitoring and verifying results. These milestones are the five steps the City of Rolling Hills has taken to reduce its impact on the environment and promote change within the community.

1 ICLEI-Local Governments for Sustainability, formerly known as the International Council for Local Environmental Initiatives, defines a Climate Action Plan (CAP) as a set of policies and measures designed to meet emissions reduction targets by a designated target year. A CAP should include a timeline, breakdown of actions and estimated benefits of each action compared to the baseline, a description of financing mechanisms, and an assignment of responsibility to departments and staff, and should incorporate public awareness and education efforts.

2 The Cool Cities Pledge was developed to encourage cities to endorse the U.S. Mayors Climate Protection Agreement and create their own greenhouse gas reduction activities.

3 Visit the ICLEI website to learn more about the organization at <http://www.iclei.org/about-iclei/iclei-by-region/california-region>

Another resource utilized to conduct the municipal inventory was the Local Government Operations Protocol (LGOP).⁴ The protocol was developed in partnership by ICLEI, ARB, the California Climate Action Registry (CCAR), and The Climate Registry (TCR) to enable local governments to measure and report emissions in a consistent way. The protocol is a program neutral guide developed for cities to follow internationally recognized GHG accounting and reporting.

B. Purpose of Conducting a GHG Emissions Inventory

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

C. Scope of the GHG Emissions Inventory

To create an inventory, data was gathered for the years 2005 and 2007. The year 2005 was selected as the baseline year and will serve as a reference year to measure future progress and establish short-term and long-term reduction target years. The year 2005 was chosen because it allowed the City to gather the earliest, most accurate and reliable data, which is what is recommended by ICLEI. Additionally, 2005 serves as a baseline year for all South Bay cities to maintain consistency in the subregion. Data was also collected for the year 2007. This year is considered an interim year to monitor energy use changes that may have occurred since the baseline year. It is useful to review data from this year because it shows progress made that will count towards any reduction goal set. There was no data available for the year 1990 to estimate the City's historical GHG emission levels. The year 1990 is significant in that it represents a reference year for several key pieces of climate change legislation such as the United Nations Framework Convention on Climate Change (UNFCCC), the Kyoto Protocol agreement, and the U.S. Mayors' Climate Protection Agreement. It was difficult to find accurate data dating as far back as 1990 and for this reason the emissions for 1990 were unable to be determined, thus the decision was made to use the baseline year 2005 data as the benchmark for setting targets.

Following the LGOP guidance for local governments, an operational control approach was used to define the City's organizational boundaries. This means emissions within the municipal inventory are identified based upon what facilities and operations the City owns or controls. The City's operational boundaries are used to establish and organize its emissions by scope. Scope 1 includes direct emissions within the City's control. These are emissions generated by fixed equipment used to produce heat or power from the stationary combustion process and mobile combustion of fuels from city fleet vehicles. Scope 2 includes emissions that are indirect, but the City maintains some control over. Scope 2 emissions are associated with the consumption of purchased electricity. Scope 3 emissions are indirect emissions that are related to activities that the City does not own or operate, such as emissions from contracted services, employee commuting, or waste disposal. Scopes make it possible for a city to separately account for its direct and indirect emissions in a tiered fashion, following LGOP reporting standards.

⁴ The Local Government Operations Protocol can be viewed with this link http://www.climateregistry.org/resources/docs/protocols/industry/local-gov/lgo_protocol_september2008.pdf

Data was gathered from a variety of sources such as consumption data from utility companies to then quantify GHG emissions. Additionally, a waste characterization study by CalRecycle was utilized to breakdown the solid waste composition.⁵ Following ICLEI program-specific requirements, this report is considered to be a Quick Action Report, which entails reporting on three of the six internationally-recognized GHGs regulated under the Kyoto Protocol.⁶ The benefit of this reporting option is that it allows a city to capture the majority of its emissions while familiarizing staff with the process of conducting an inventory so that in the future a more detailed level of reporting can be accomplished. The more comprehensive report entails accounting for all six Kyoto Protocol Gases. When the City conducts a re-inventory, to ensure that it is inline with its emission reduction goals, the City may consider producing a comprehensive report by adding data on the additional gases.

D. Inventory Methodology

ICLEI provided the technical assistance and the software to accomplish the municipal inventory. The CACP 2009 software contains default emission factor from the LGOP to calculate the equivalent GHG emissions. An emission factor is a metric that represents the heat and carbon content and/or resource mix of a source. Emissions factors are multiplied by the data in order to arrive at an equivalent GHG emissions number. Within the report, GHG emissions of different global warming potential are shown as one roll-up number known as a carbon dioxide equivalent unit (CO₂e). Using the carbon dioxide equivalent unit allows the data to be simplified for easy interpretation. However, the most accurate description of emissions requires separate accounting by scope and gas, refer to Appendix B to review sources per item.

The inventory results should be thought of as an approximation of the GHG emissions emitted in the years inventoried. The results should be used as a policy and planning tool rather than a precise measurement of GHG emissions. All the data sources used to capture the equivalent emissions emitted, also referred to as activity data, have been noted in the Appendices A and B. To the extent possible, recommended data and methods in the LGOP were used, but in some cases the suggested alternative methods were necessary to use when recommended data could not be found.

E. Key Highlights and Findings

- In 2005, municipal operations generated approximately 39 metric tons of CO₂e.
- In 2007, municipal operations generated approximately 29 metric tons of CO₂e. The 2007 inventory represents a 24 percent decrease in emissions. This decrease can be attributed to less scope 3 emissions, which is a result of fewer emissions generated from commuting to and from the worksite.
- Emissions resulting from electricity use decreased 3 percent as a result of changes in utility operations. The lower 2007 emission factors used to quantify emissions, represents a greater use of renewable energy, use of cleaner natural gas instead of coal, and a higher degree of efficiency to produce electricity.
- In 2007, natural gas and solid waste emissions remained the same. Natural gas emissions remained the same due to nominal changes in energy consumption. Solid waste emissions remained constant because these emissions are calculated based upon the number of full and part-time employees that worked for the City, which remained unchanged in the years 2005 and 2007.

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>.

⁶ A Quick Action Report entails reporting only on Carbon dioxide (CO₂); Methane (CH₄); Nitrous oxide (N₂O). The internationally-recognized greenhouse gases regulated under the Kyoto Protocol are: Carbon dioxide (CO₂); Methane (CH₄); Nitrous oxide (N₂O); Hydrofluorocarbons (HFCs); Perfluorocarbons (PFCs); and Sulfur hexafluoride (SF₆), Local Government Operations Protocol, page 11.

- Under a business-as-usual scenario, the City can expect emission levels to remain about the same in the forecast year 2020. Although little to no emission increases are anticipated from municipal operations, it is still vital that the City implement cost-saving, energy efficiency measures to lead by example and promote these practices throughout the community, where the majority of emissions can be found.

F. Future Steps

The next step is to select a reduction target for municipal operations and create a plan of action to curb GHG emissions related to operations. The municipal inventory provides the foundation for setting reduction goals, benchmarking emissions, and targeting focus areas to be included in a Climate Action Plan. Climate action work is important, but before selecting a reduction target the City should review the companion document which provides next steps to link the data results contained in this report to target setting and the development of strategies to be included in a climate action document.

II. Municipal Emissions Inventory Results

A. Introduction

Depicted in this section are Tables and Figures that represent and illustrate an approximation of the GHG emissions levels for the two years of data collected. As mentioned in the executive summary, the data findings are expressed in CO_{2e}, which is an estimated sum or roll-up number for GHGs of different global warming potential, to make it easier to review, plan, and set targets. Based on LGOP reporting standards, GHG emissions are organized according to their scope. Scopes are determined based upon what control approach a local government chooses to define its boundaries. The LGOP recommends an operational approach for local governments wherein a city defines its scopes by what they own and operate. In this way, the City can account for direct and indirect emissions separately.

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

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

Information in Tables 2.1 and 2.2 are organized by scope and source of emissions. The data is shown in metric tons of CO_{2e}. Adjacent to the emission figures is the percentage share of each source followed by energy use, cost (where data was available), and the equivalent one million British thermal units. This information is shown for the purpose of targeting, planning, and then tracking energy and cost-saving measures. Refer to Appendix B to review energy use per item. To learn where specific data was obtained and how it was computed, refer to the Appendix A.

2005

Baseline Year

Results from the 2005 municipal inventory represent the year chosen as a baseline year, which will serve as a foundation for setting short and long-term emissions reduction targets. For this year, there was sufficient data available to conduct an accurate inventory. It is important to keep in mind that scope 3 emissions included in the baseline year are estimates based upon information provided City staff and should be used as policy relevant information that the City may want to consider when developing or evaluating measures or policies.

In 2005, municipal operations produced a total of 39 metric tons of CO_{2e}. This number includes both direct and indirect sources of emissions, as shown in Table 2.1. Looking at the scopes within the table, the smallest portion 5 percent (scope 1) were emissions generated from natural gas use in buildings and facilities. Emissions emitted from electricity use accounted for the largest share of emissions, 57 percent (scope 2). The second largest portion, 38 percent (scope 3), were emissions due to a combination of employee commuting and government-generated solid

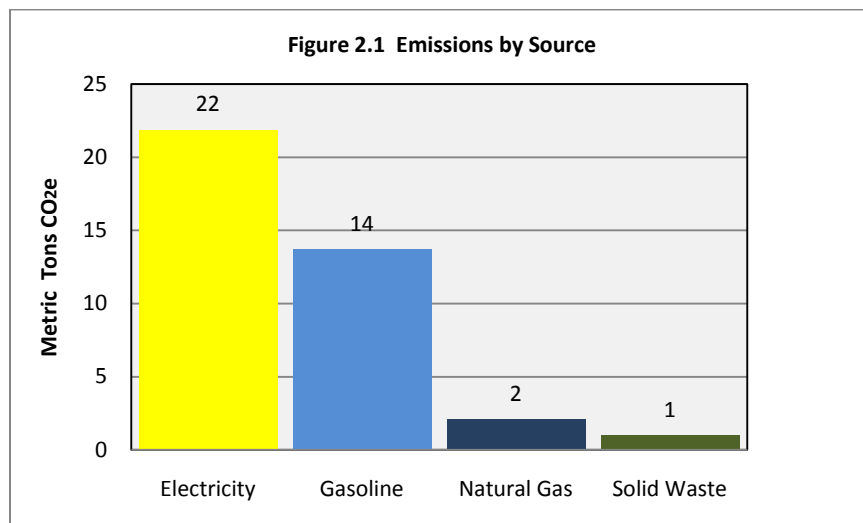
waste. Typical sources of waste in local government operations include paper and food waste from office facilities, construction waste from public works, and plant debris from parks departments.

Energy use and cost information has been listed for the purpose of planning and tracking energy measures' cost effectiveness. During 2005, Rolling Hills used 72,040 kWh of electricity and spent approximately \$11,631. In this same year, the City consumed 389 therms of natural gas costing \$557.

Table 2.1 Emissions by Scope (metric tons CO₂e)

Scope and Source 2005	MT CO ₂ e	Share of 2005 Total	Energy Use/ VMT/ tons	Energy Use Cost	Energy Equivalent (MMBtu)
Scope 1					
Natural Gas	2	5%	389 therms	\$557	41
Scope 2					
Purchased Electricity	22	57%	72,040 kWh	\$11,631	259
Scope 3					
Employee Commute	14	35%	26,438 VMT	--	199
Solid Waste	1	3%	1.8 tons	--	--
Total	39	100%		\$12,188	500

Figure 2.2 illustrates emissions by source. 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 largest sources of emissions were from electricity and gasoline. Waste resulted in the lowest source of emissions. It was estimated that 1.8 tons of waste generated by City operated and owned facilities was sent to a landfill. A breakdown of the waste composition can be found in Appendix B, based upon a solid waste characterization study for public administration from the CalRecycle website.



2007

Interim Year

The year 2007 was chosen as an interim year to review any energy use changes that may have occurred since the baseline year. ICLEI recommends cities re-inventory every year or two (or as often as possible) to ensure the City is keeping on track with its target. As with the data in 2005, Table 2.2 is organized by scope, source of emissions, energy use, and cost to capture a broad picture of the data.

In 2007, municipal operations produced a total of 29 metric tons of CO₂e. This number includes both direct and indirect sources of emissions. The year 2007 represents a 24 percent decrease in emissions from the baseline year, which is the result of changes related to scope 3, employee commute emissions.

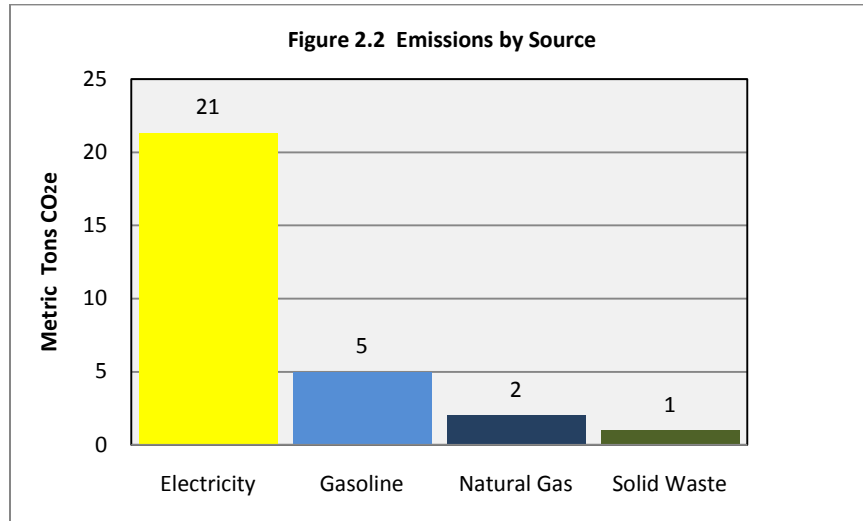
Looking at the scopes within the table, emissions generated from natural gas accounted for 8 percent of the total emissions inventoried in 2007. Emissions from electricity made up 72 percent of the total emissions. Employee commute and government-generated solid waste made up the remaining 19 percent of the total emissions.

In 2007, Rolling Hills used 74,083 kWh of electricity costing approximately \$13,022. In this same year, the City used 436 therms of natural gas at a cost of \$590.

Table 2.2 Emissions by Scope (metric tons CO₂e)

Scope and Source 2007	MT CO ₂ e	Share of 2005 Total	Energy Use/ VMT/ tons	Energy Use Cost	Energy Equivalent (MMBtu)
Scope 1					
Natural Gas	2	8%	436	\$590	46
Scope 2					
Purchased Electricity	21	72%	74,083	\$13,022	267
Scope 3					
Employee Commute	5	16%	8,313 VMT	--	71
Solid Waste	1	3%	1.8 tons	--	--
Total	29	100%		\$13,612	383

Figure 2.2 shows a slight decrease in emissions from electricity and gasoline sources. Emissions from natural gas and solid waste remained the same.



B. Emission Trends

Represented in Table 2.3 are the emission percent changes between the years 2005 and 2007. Electricity emissions decreased by 3 percent, though kWh consumption actually rose by 3 percent. The decrease in emissions is the result of lower 2007 emission factors used to calculate emissions. The 2007 emission factors represent changes to utility operations such as a greater use of renewable energy and a higher degree of efficiency to produce electricity. Natural gas emissions remained the same due to nominal changes in energy consumption. Gasoline shows the most significant decline in emissions, 64 percent, as a result of less vehicle miles traveled by commuters to and from the worksite. Solid waste emissions remained the same because these emissions are calculated based upon the number of full and part-time employees that worked for the City in the years 2005 and 2007, which remained the same.

Table 2.3 Emission Trends (metric tons CO₂e)

Emission Trends	2005 MT CO ₂ e	2007 MT CO ₂ e	Percent Change
Electricity	22	21	-3%
Natural Gas	2	2	0%
Gasoline	14	5	-64%
Solid Waste	1	1	0%
Total	39	29	-24%

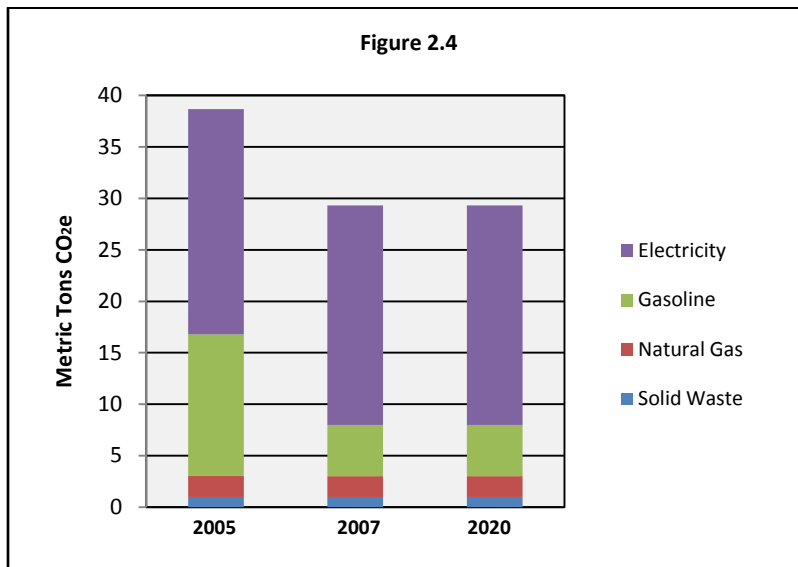
C. Business-As-Usual Growth Forecast by Source

The business-as-usual forecast shown in Table and Figure 2.4 is a prediction of the likely increase in GHG emissions from municipal operations and services. The emissions shown here represent the business-as-usual forecast for the year 2020. The City can expect GHG emissions levels to remain about the same. In this scenario, employee growth was used as the primary indicator for municipal operation emissions growth. Taking into consideration that there is no anticipated employee growth, in all likelihood emissions will remain about the same in the year 2020. Generally speaking, influences that contribute to changes in emissions between the years include: variations in consumption, emission factors, changes in the carbon intensity of fuels, employee growth, and weather. To some degree, over the years there may be small variations in emissions due to the factors listed above.

Although little to no emission increases are anticipated from municipal operations, it is still vital that the City implement cost-saving, energy efficiency measures to lead by example and promote these practices throughout the community, where the majority of emissions can be found.

Table 2.4 Business-As-Usual Emissions Growth Forecast by Source (metric tons CO₂e)

Source	2005	2007	2020	Annual Growth Rate	Percent Change from 2007 to 2020
Electricity	22	21	21	0%	0%
Gasoline	14	5	5	0%	0%
Natural Gas	2	2	2	0%	0%
Solid Waste	1	1	1	0%	0%
Total	39	29	29	--	0%



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.

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. Buildings & Other Facilities

Scope 1 Stationary Combustion

Description: The GHG emissions generated from natural gas were estimated based on data provided by the Southern California Gas Company. For the year 1990, Southern California Gas no longer possesses official customer records going back to 1990 due to document retention policies, therefore no 1990 municipal data could be included in this inventory.	Recommended Method Known natural gas use
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 ₂ O	0.1 g/MMBtu	LGOP, v1 Table G.3

Scope 2 Purchased Electricity

Description: Consumption data was obtained from Southern California Edison. No records for 1990 were located therefore historical electricity emissions could not be included in this inventory.	Recommended Method Known electricity use
Reference: Larry Sutton, Account Executive, Local Government Metro Region, Southern California Edison, 714-973-5660/PAX52660, Larry.Sutton@sce.com.	

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 ₂ O	0.011lbs/MWh (2005); 0.010lbs/MWh (2007); 0.011lbs/MWh (1990)	LGOP V1.1, Table G.7

B. Employee Commute

<p>Description: Employee commute distance, mode, and frequency for the years 2007 and 2005 were obtained from City staff. Utilizing employee benefits information, 27 days were deducted from the possible number of working days in a year. It was assumed that these absences were due to vacation, sick, personal, and holiday.</p>
<p>Reference: Information provided by Ewa Nikodem, Administrative Assistant, City of Rolling Hills 2 Portuguese Bend Road, Rolling Hills, CA 90274, 310-377-1521 Fax: 310-377-7288</p>

Methodology Name: Vehicle miles traveled; fuel emissions were calculated 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 ₂ O	Varies by model year	LGOP, v1 Table G.10; Table G.12 for other equipment

E. Solid Waste

<p>Description: The 2005 and 2007 solid waste estimates were based on the number of full-time employees which was 4 and 1 part-time employee. The waste estimates were calculated by multiplying the number of full-time personnel by the waste rate of 0.4. For the part-time employee, 0.5 was multiplied by the waste rate to determine the tons of waste per year. The waste rate was derived from the CalRecycle website, CalRecycle disposal (1999 database) rate for Public Administration per employee = 0.4 http://www.calrecycle.ca.gov/WasteChar/wcabscrn.asp</p>

<p>Methodology Name: Municipal solid waste estimates were based upon number of full and part time employees. Methane Recovery—75 percent (LGOP recommended percentage) Solid Waste Characterization for public administration http://www.calrecycle.ca.gov/wastechar/BizGrpCp.asp</p>
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Appendix B—Emissions Data

The municipal inventory report was based on data collected from electricity, natural gas consumption, and other sources listed in the tables below as reference. Information is organized to be consistent with the order of the report, e.g., baseline year then interim year. Emissions sources are organized according to source, equivalent metric tons of carbon dioxide emissions, energy equivalent in MMBtu, energy use, and cost where known.⁷

Source of Emissions 2005	CO2	N2O	CH4	Equiv CO2 (tonnes)	Equiv Energy (MMBtu)	Energy/Fuel/VMT/tons	Unit
Buildings and Facilities							
Electricity	22	0.0004	0.0009	22	259	72,040	kWh
Natural Gas	2	0.0000	0.0002	2	41	389	therms
Employee Commute							
Gasoline	13	0.0010	0.0008	14	199	26,438	VMT
Solid Waste							
Solid Waste	0.0000	0.0000	0.0242	1	--	1.8	tons
Solid Waste							
Source Breakdown: Paper Products			0.0182	0.3821			
Food Waste			0.0026	0.0538			
Plant Debris			0.0025	0.0529			
Wood or Textile			0.0009	0.0184			

Source of Emissions 2007	CO2	N2O	CH4	Equiv CO2 (tonnes)	Equiv Energy (MMBtu)	Energy/Fuel/VMT/tons	Unit
Buildings and Facilities							
Electricity	21	0.0003	0.0010	21	267	74,083	kWh
Natural Gas	2	0.0000	0.0002	2	46	436	therms
Employee Commute							
Gasoline	5	0.0003	0.0003	5	71	8,313	VMT
Solid Waste							
Solid Waste	0.0000	0.0000	0.0242	1	--	1.8	tons
Solid Waste							
Source Breakdown: Paper Products			0.0182	0.3821			
Food Waste			0.0026	0.0538			
Plant Debris			0.0025	0.0529			
Wood or Textile			0.0009	0.0184			

⁷ Source of data CACP software output.

Appendix C—Climate Change Action

For reference, listed below are some of the key climate change policies that have been adopted at an international level as well as at State and Regional levels.⁸

AB 811, 2008—Gives counties and local governments authority to create benefit assessment districts which allow property owners to finance energy efficiency upgrades, such as solar panels, efficient air conditioning and ventilation systems, and tankless water heating equipment. Owners may enter a loan contract with a local government and pay it back through their property-tax bill. This legislation will help to reduce GHG emissions and stimulate energy efficiency upgrades.

SB 375 Steinberg, 2008—Advances the State's efforts to achieve the global warming goals consistent with AB 32. It aligns three critical policy areas of importance to local government: (1) regional long-range transportation plans and investments; (2) regional allocation of the obligation for cities and counties to zone for housing; and (3) a process to achieve greenhouse gas emissions reductions targets for the transportation sector.

SB 97 Dutton, 2007—States that GHGs and their effects are subject to the California Environmental Quality Act (CEQA). CEQA requires that agencies identify a given project's potentially significant effects on the environment and mitigate those significant effects whenever feasible. Public agencies such as local governments are therefore obligated to determine whether a given project's climate change-related impacts are significant and to mitigate any significant effects. ARB is responsible for recommending where the threshold of "significance" lies.

SB 107 Simitian, 2006—Requires investor-owned utilities (IOUs) to increase the share of renewable energy sources (e.g., wind, solar, geothermal) in their electricity mix to 20 percent by 2010. Known as the Renewables Portfolio Standard (RPS), the law is intended to decrease California's reliance on fossil fuel and reduce GHG emissions from the electricity sector. As of 2008, about 12 percent of California's electricity demand is met with renewable resources. Governor Schwarzenegger has since called for 33 percent of California's electricity to be provided by renewable sources by 2020.

AB 32 Nunez & Pavley, 2006—Institutes a mandatory limit on greenhouse gas emissions -- reducing emissions in California to 1990 levels by the year 2020 below forecasted levels. The bill also directs the California Air Resources Board (ARB) to establish a mandatory reporting system to track and monitor emission levels and requires ARB to develop various compliance options and enforcement mechanisms.

U.S. Mayors' Climate Protection Agreement, 2005—Creates a commitment to strive to meet or beat, by 2012, the Kyoto Protocol target of a seven percent reduction in greenhouse gas emissions below 1990 levels. The agreement was initiated by Seattle Mayor Greg Nickels.

AB 1493 Pavley, 2002—Requires the State Air Resources Board to develop and adopt regulations that achieve the maximum feasible reduction of greenhouse gases from vehicles primarily used for non-commercial transportation by January 2005.

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

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

⁸ The California Air Resources Board website was a source of information for the legislation listed above. To find more information on the legislation visit the website at <http://www.arb.ca.gov/cc/cc.htm>. For more information on the U.S. Mayors' Climate Protection Agreement visit their website at <http://usmayors.org/climateprotection/agreement.htm>. To learn more about AB 811 visit the Los Angeles County website at <http://portal.lacounty.gov/wps/portal/lac/home>.

Appendix D—Abbreviations and Acronyms

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

Appendix E—Glossary of Terms⁹

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

⁹ 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 (CO ₂)	The most common of the six primary GHGs, consisting of a single carbon atom and two oxygen atoms, and providing the reference point for the GWP of other gases. (Thus, the GWP of CO ₂ is equal to 1.)
Carbon Intensity	The amount of carbon emitted per unit of energy or fuels consumed.
CO ₂ equivalent (CO ₂ e)	The universal unit for comparing emissions of different GHGs expressed in terms of the GWP of one unit of carbon dioxide.
Community Scope Definitions	Scope 1 emissions – All direct emissions sources located within the boundary of the local government. 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 (NO _x), volatile organic compounds (VOCs), carbon monoxide (CO), sulfur oxides (SO _x), and particulate matter smaller than ten microns in diameter (PM-10). The CACP software provides estimated emissions of CAPs as well as GHGs for emissions analyses and reduction benefits of measures.
Direct emissions	Emissions from sources within the reporting entity's organizational boundaries that are owned or controlled by the reporting entity, including stationary combustion emissions, mobile combustion emissions, process emissions, and fugitive emissions. All direct emissions are Scope 1 emissions, with the exception of biogenic CO ₂ emissions from biomass combustion
De Minimis	De Minimis emissions may be excluded from measurement and reporting. De Minimis emissions refer to one or more emission sources, for one or more gases which, when summed, represent less than 5 percent of total CO ₂ e emissions. De Minimis sources of emissions are often relatively small, unimportant and difficult to accurately measure and quantify.
Double counting	Two or more reporting entities taking ownership of the same emissions or reductions.
Emission factor	A unique value for determining an amount of a GHG emitted on a per unit activity basis (for example, metric tons of CO ₂ emitted per million Btus of coal combusted, or metric tons of CO ₂ 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 CH ₄ emissions from organic waste or wastewater undergoing biological decomposition. This method assumes that the degradable organic component (degradable organic carbon, DOC) in waste decays slowly throughout a few decades, during which CH ₄ and CO ₂ are formed. If conditions are constant, the rate of CH ₄ production depends solely on the amount of carbon remaining in the waste.
Forecast Year	Any future year in which predictions are made about emission levels based on growth multipliers applied to the base year.
Fossil fuel	A fuel, such as coal, oil, and natural gas, produced by the decomposition of ancient (fossilized) plants and animals.
Fugitive Emissions	Emissions that are not physically controlled but result from the intentional or unintentional release of GHGs. They commonly arise from the production, processing, transmission, storage and use of fuels or other substances, often through joints, seals, packing, gaskets, etc. Examples include HFCs from refrigeration leaks, SF ₆ from electrical power distributors, and CH ₄ 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 (CO ₂) over a given period of time.
Greenhouse Effect	The effect of heat retention in the lower atmosphere as a result of absorption and re-radiation by clouds and various greenhouse gases of long-wave terrestrial radiation. Incoming, short-wave radiation, including visible light and heat, is absorbed by materials which then behave as black bodies re-radiating at longer wavelengths. Certain substances (e.g. carbon dioxide) absorb long-wave radiation, are heated by it, and then begin to radiate it, still as long-wave radiation, in all directions, some of it downwards. Despite its name, the actual heating in a real greenhouse is caused mainly by the physical obstruction of the glass, which prevents warm air from leaving and cooler air from entering.
Greenhouse gases (GHGs)	For the purposes of this Protocol, GHGs are the six gases identified in the Kyoto Protocol: carbon dioxide (CO ₂), nitrous oxide (N ₂ O), methane (CH ₄), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF ₆).
Greenhouse gas credit	GHG offsets can be converted into GHG credits when used to meet an externally imposed target. A GHG credit is a convertible and transferable instrument usually bestowed by a GHG program.
Greenhouse gas offset	Offsets are discrete GHG reductions used to compensate for (i.e., offset) GHG emissions elsewhere, for example to meet a voluntary or mandatory GHG target or cap. Offsets are calculated relative to a baseline that represents a hypothetical scenario for what emissions would have been in the absence of the mitigation project that generates the offsets.
Greenhouse gas sink	Any physical unit or process that stores GHGs; usually refers to forests and underground/deep sea reservoirs of CO ₂ .
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 (CH ₄)	One of the six primary GHGs, consisting of a single carbon atom and four hydrogen atoms, possessing a GWP of 21, and produced through the anaerobic decomposition of waste in landfills, animal digestion, decomposition of animal wastes, production and distribution of natural gas and petroleum, coal production, and incomplete fossil fuel combustion.
Metric ton (MT, tonne)	Common international measurement for the quantity of GHG emissions, equivalent to about 2,204.6 pounds or 1.1 short tons.
Mobile combustion	Emissions from the combustion of fuels in transportation sources (e.g., cars, trucks, buses, trains, airplanes, and marine vessels) and emissions from non-road equipment such as equipment used in construction, agriculture, and forestry. A piece of equipment that cannot move under its own power but that is transported from site to site (e.g., an emergency generator) is a stationary, not a mobile, combustion source.
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 (N ₂ O)	One of the six primary GHGs, consisting of two nitrogen atoms and a single

	oxygen atom, possessing a GWP of 310, and typically generated as a result of soil cultivation practices, particularly the use of commercial and organic fertilizers, fossil fuel combustion, nitric acid production, and biomass burning.
Operational boundaries	The boundaries that determine the direct and indirect emissions associated with operations within the entity's organizational boundaries.
Operational control	Full authority to introduce and implement operating policies at an operation.
Organizational boundaries	The boundaries that determine the operations owned or controlled by the reporting entity, depending on the consolidation approach taken.
Perfluorocarbons (PFCs)	One of the six primary GHGs, consisting of a group of man-made chemicals composed of one or two carbon atoms and four to six fluorine atoms, containing no chlorine. Originally introduced as alternatives to ozone depleting substances, PFCs have few commercial uses and are typically emitted as by-products of industrial and manufacturing processes. PFCs have very high GWPs and live a long time in the atmosphere.
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.