2005 Greenhouse Gas Emissions Inventory

CITY OF LA MESA
JEWEL of the HILLS

Prepared by ICLEI – Local Governments for Sustainability

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The San Diego Foundation

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With a dynamic mix of leadership, grantmaking, and civic engagement, The San Diego Foundation makes the San Diego region a better place to live. Founded in 1975, The Foundation addresses evolving issues facing our region by convening community leaders, providing research and expertise on topics important to our citizens, and partnering with nonprofit organizations to meet urgent and changing needs. By working with individuals, families and organizations to carry out their giving plans, The San Diego Foundation utilizes charitable dollars toward the ultimate goal of improving the quality of life in the greater San Diego region, now and for generations to come.

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The San Diego Foundation launched its Climate Initiative in 2006, to raise public awareness about the local implications of climate change and catalyze more comprehensive regional action on global warming. The initiative represents a multi-year effort to bring government, business, the research community, and nonprofits together to tackle one of the greatest challenges of our time.

Over the next few years, The San Diego Foundation will work in partnership with ICLEI to engage local governments and public agencies to develop local climate action plans to reduce emissions and vulnerabilities to climate change in our region, bring more resources to support model programs to promote "green" economic growth and build a more sustainable region, and build public awareness and support for climate action.

ICLEI-Local Governments for Sustainability USA

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ICLEI-Local Governments for Sustainability USA (ICLEI) is a membership association of more than 1,000 local governments worldwide—more than 500 in the United States—committed to advancing climate protection and sustainability. Through technical expertise, direct network engagement, and the innovation and evolution of tools, ICLEI strives to empower local governments to set and achieve their emissions reduction and sustainability goals.

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Executive Summary

The City of La Mesa recognizes that local governments play a leading role in both reducing greenhouse gas emissions and adapting to the potential impacts of climate change. Local governments can dramatically reduce emissions from their government operations through such measures as increasing energy efficiency in facilities and vehicle fleets, utilizing renewable energy sources, enacting sustainable purchasing policies, reducing waste, and supporting alternative modes of transportation for employees. The co-benefits of these measures may include lower energy bills, improved air quality, and more efficient government operations.

The City of La Mesa has begun its efforts to address the causes and effects of climate change with the assistance of the partners in the San Diego Regional Climate Protection Initiative. These partners include the San Diego Foundation; local governments in San Diego County; and ICLEI.

This greenhouse gas emissions inventory is an important first step in La Mesa's climate protection initiative. As advised by ICLEI, it is essential to first quantify emissions to establish:

- A baseline emissions inventory, against which to measure future progress.
- An understanding of the scale of emissions from various sources.

Presented here are estimates of greenhouse gas emissions in 2005 resulting from the City of La Mesa's government operations and from the La Mesa community-at-large. With one exception,[1] all government operations emissions estimates in this report refer to emissions generated from sources over which the City has operational control, exclusive of physical location.[2] This includes all government-operated facilities, streetlights, and other stationary sources; the on-road vehicle fleet and off-road equipment; and waste generated by government operations. The

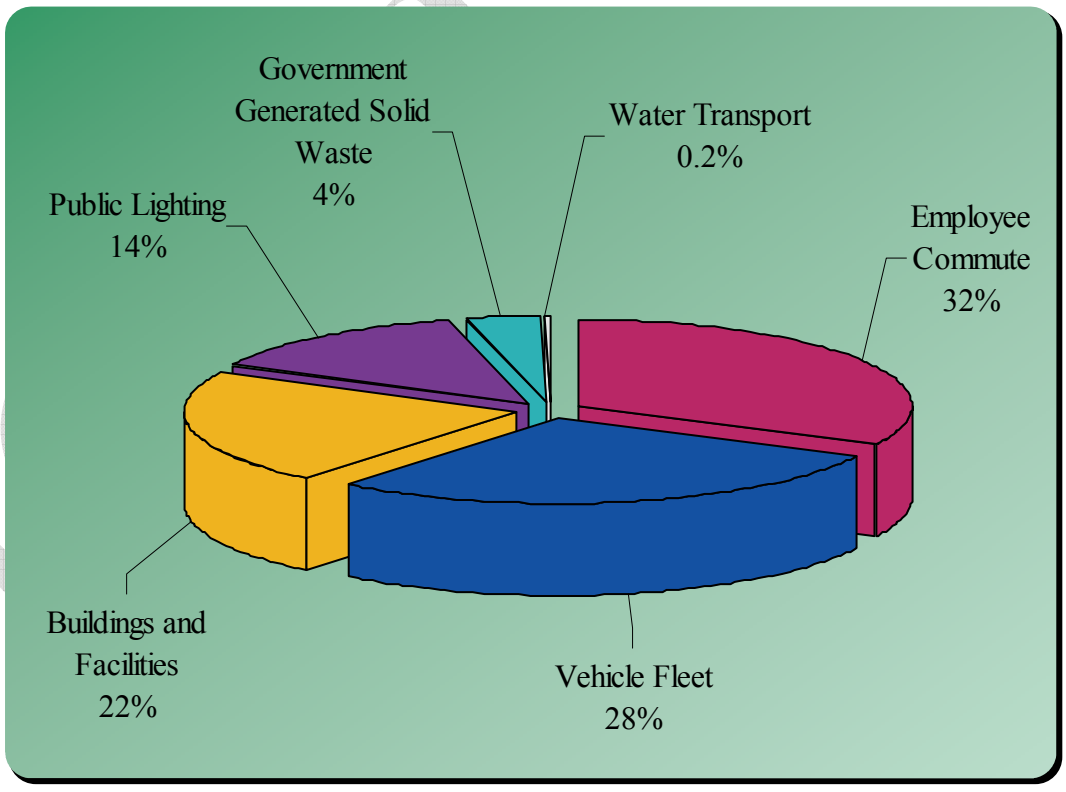
1 The exception is emissions from employee-owned vehicles that are used by employees during commuting.
2 Facilities, vehicles, or other operations wholly or partially owned by, but not operated by the City of La Mesa are not included in this inventory. See Appendix A for more details on the boundaries of the inventory.

inventory also estimates emissions from the community-at-large. Community-scale emissions are reported by five primary sectors: residential, commercial/industrial, transportation, waste, and wastewater.

Like all emissions inventories, this document must rely on the best available data and calculation methodologies. Emissions estimates are subject to change as better data and calculation methodologies become available in the future. Nevertheless, the findings of this analysis provide a solid basis upon which the City can begin planning and taking action to reduce its greenhouse gas emissions.

This inventory is one of the first inventories to use a new national standard developed and adopted by the California Air Resources Board (CARB) in conjunction with ICLEI, the California Climate Action Registry, and The Climate Registry. This standard, called the Local Government Operations Protocol (LGOP), provides standard accounting principles, boundaries, quantification methods, and procedures for reporting greenhouse gas emissions from local government operations. The LGOP represents a strong step forward in standardizing how inventories are conducted and reported, providing a common national framework for all local governments to establish their emissions baseline.

Figure ES.1 2005 La Mesa Government Operations Emissions by Sector



Government Operations Inventory Results

In 2005, La Mesa's operational greenhouse gas emissions totaled 3,057 metric tons of CO_2e.[3] Of the total emissions accounted for in this inventory, emissions from employee commute were the largest (32 percent as shown in Figure ES.1 and Table ES.1). Emissions from vehicle fleet and building and facilities produced the second and third highest quantity of emissions (29 percent and 22 percent of total emissions, respectively). The remaining emissions reported in this inventory came from public lighting (13 percent), government-generated solid waste (4 percent), and water transport, which consists solely of sprinkler and irrigation controls. (0.2 percent).

Cumulatively, the City of La Mesa spent approximately $902,762 on energy (electricity, natural gas, gasoline, diesel and propane) for government operations[4]. Of this total, 74 percent of these energy expenses ($670,280) resulted from electricity consumption, and 6 percent ($57,916) from natural gas purchases from San Diego Gas and Electric. Fuel purchases (gasoline, diesel, and propane) for the vehicle fleet and mobile equipment totaled $174,566 or 20 percent of total costs included in this inventory. These figures demonstrate the potential for significantly reducing energy costs while also mitigating climate change impacts and helping to stimulate green job development and economic recovery.

Table ES.1 2005 La Mesa Government Operations Emissions by Sector

Sector	Greenhouse Gas Emissions (metric tons CO_2e)
Employee Commute	998
Vehicle Fleet	863
Buildings and Facilities	663
Public Lighting	413
Government Generated Solid Waste	115
Water Transport	5

All units are in metric tons CO_2e

Community Inventory Results

In 2005, the La Mesa community emitted approximately 535,827 metric tons of CO_2e. As shown in Figure ES.2 and Table ES.2 below, the Transportation Sector was by far the largest source of emissions, generating approximately 374,888 metric tons of CO_2e, or 70 percent of total 2005 emissions. Transportation sector emissions are the result of diesel, gasoline and compressed natural gas combustion in vehicles traveling on both local roads, and state highways that pass through the jurisdictional boundaries of La Mesa. Electricity and natural gas consumption within the Commercial / Industrial Sector, the second greatest source of 2005 emissions, generated 75,013 metric tons

3 This number represents a "roll-up" of emissions, and is not intended to represent a complete picture of emissions from La Mesa's operations. This roll-up number should not be used for comparison with other local government roll-up numbers without a detailed analysis of the basis for this total. See section 2.3.2 for definition of and discussion on use of "roll-up" emissions.

4 For buildings and facilities, public lighting and water transport cost data was estimated using more-recent 2007 data as a proxy for 2005 costs.

CO_2e, or 14 percent of the total. Similarly, electricity and natural gas use in La Mesa's Residential Sector produced 69,396 metric tons CO_2e, or 13% percent of total community emissions. The remaining three percent (16,531 metric tons) are the estimated future methane emissions that will result from the decomposition of waste that was generated by the La Mesa community during 2005 and emissions associated with treatment of wastewater generated in La Mesa but processed outside of the community.

Figure ES.2 2005 City of La Mesa Community Emissions by Sector

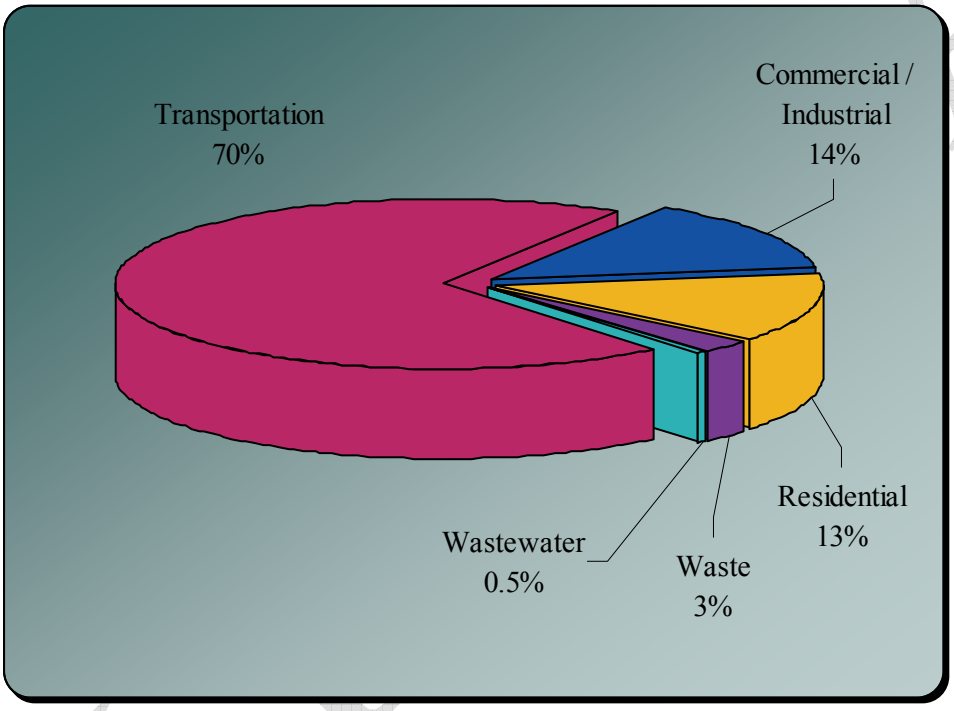


Table ES.2: 2005 Community Emissions Summary by Sector

Sector	Greenhouse Gas Emissions (metric tons CO2e)
Transportation	374,888
Commercial / Industrial	75,013
Residential	69,396
Waste	13,942
Wastewater	2,589
TOTAL	**535,827**

Section One: Introduction

Introduction

Local governments play a fundamental role in addressing the causes and effects of human-induced climate change through their actions at both the community and government operations levels. While local governments cannot solve the problems of climate change by themselves, their policies can dramatically reduce greenhouse gas emissions from a range of sources and can prepare their communities for the potential impacts of climate change.

Within the context of government operations, local governments have control over their emissions-generating activities. They can reduce energy consumption in buildings and facilities, reduce fuel consumption by fleet vehicles and equipment, reduce the amount of government-generated solid waste that is sent to a landfill, and increase the amount of energy that is obtained through alternative energy sources.

Local jurisdictions in California also have broad influence over activities in the community that generate greenhouse gas emissions, such as new construction, the operation of buildings and transportation, and solid waste disposal. That influence may be exercised directly through the jurisdiction's authority over local land use planning and building standards, and indirectly through programs that encourage sustainable behavior among local residents and businesses. The community inventory provides a starting point for addressing how the City can impact emissions within its jurisdictional boundaries.

1.1 Climate Change Background and Potential Impacts

In the phenomenon known as the greenhouse effect, naturally-occurring atmospheric gases help regulate global climate by trapping solar radiation within the Earth's atmosphere. Evidence suggests that modern human activity is artificially intensifying the greenhouse effect, causing global average surface temperatures to rise. This intensification is caused by activities that release carbon dioxide and other greenhouse gases into the atmosphere—most notably the burning of fossil fuels for transportation, electricity, and heating.

Rising temperatures affect local and global climate patterns, and these changes are forecasted to manifest themselves in a number of ways that may impact the San Diego region. In 2008, a vulnerability assessment entitled the *San Diego Regional Focus 2050 Study* (Focus 2050) was prepared by the Scripps Institution of Oceanography, SAIC, and the Environmental and Sustainability Initiative at University of California, San Diego, and was published by the San Diego Foundation. Focus 2050 explored what the San Diego Region may look like in 2050 if current climate trends continue. Scientists at the Scripps Institute of Oceanography used three Intergovernmental Panel on Climate Change (IPCC) climate models and two emissions scenarios to forecast the potential impacts on the region.

The models predicted warming in San Diego County of between 1.5°F and 4.5°F by 2050. Rising temperatures, along with a growing population, will likely create a variety of challenges for the San Diego Region. For example, Focus 2050 determined that heat waves are likely to increase in frequency, magnitude, and duration, thereby increasing energy demand and threatening public health in the process. Extended drought conditions were forecasted to lead to longer fire seasons and an increased likelihood of large wildfires. The study indicated that warmer temperatures also increase the formation of ground-level ozone and may heighten exposure levels to vector born diseases, such as West Nile Virus.

Focus 2050 also examined how climate change will impact water supply and water quality. The study found that shortfalls in water supply will likely occur as warmer temperatures cause significant declines in Colorado River flow and Sierra Nevada snowpack, the region's two main sources of imported water. Additionally, sea level rise along with an increased incidence of extreme high sea level events will lead to coastal erosion and will damage critical habitat, real estate, and infrastructure. These projected impacts will also put additional stress on the region's threatened and vulnerable ecosystems.

To address the climate change threat, many communities in the United States are taking responsibility at the local level. Since many of the major sources of greenhouse gas emissions are directly or indirectly controlled through local policies, local governments have a strong role to play in reducing greenhouse gas emissions within their boundaries. Through proactive measures around sustainable land use patterns, transportation demand management, energy efficiency, green building, and waste diversion, local governments can dramatically reduce emissions in their communities. In addition, local governments are primarily responsible for the provision of emergency services and the mitigation of natural disaster impacts. As the effects of climate change become more common and severe, local government adaptation policies will be fundamental in preserving the welfare of residents and businesses.

1.2 Purpose of Inventory

The objective of this greenhouse gas emissions inventory is to identify the sources and quantities of greenhouse gas emissions resulting in La Mesa in 2005. This inventory is a necessary first step in addressing greenhouse gas emissions, serving two purposes:

- It creates an emissions baseline against which the City can set emissions reductions targets and measure future progress.
- It allows local governments to understand the scale of emissions from various sources.

While La Mesa has already begun to reduce greenhouse gas emissions through its actions (See Section 1.4 for more detail), this inventory represents the first step in a systems approach to reducing the City's emissions. This system, developed by ICLEI is called the Five Milestones for Climate Mitigation. This Five-Milestone process involves the following steps:

Milestone One: Conduct a baseline emissions inventory and forecast

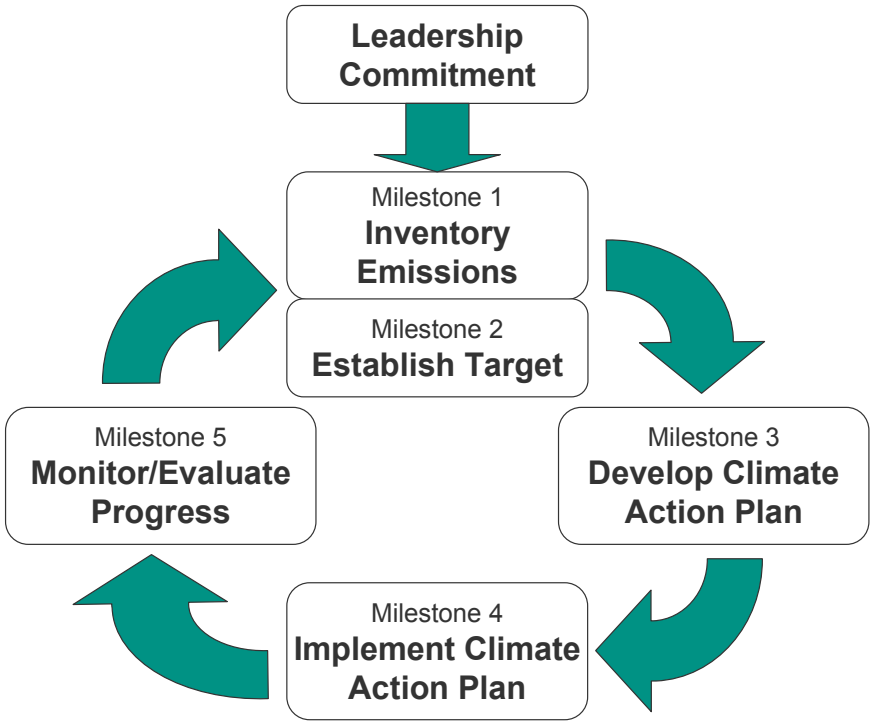
Milestone Two: Adopt an emissions reduction target for the forecast year

Milestone Three: Develop a local climate action plan

Milestone Four: Implement the climate action plan

Milestone Five: Monitor progress and report results

Figure 1.1 The Five-Milestone Process



1.3 Climate Change Mitigation Activities in California

Since 2005, the State of California has responded to growing concerns over the effects of climate change by adopting a comprehensive approach to addressing emissions in the public and private sectors. This approach was officially initiated with the passage of the Global Warming Solutions Act of 2006 (AB 32), which requires the state

to reduce its greenhouse gas emissions to 1990 levels by 2020. It also requires the California Air Resources Board (CARB) to develop a policy plan for reaching AB32 emissions reduction goals and to adopt and enforce regulations to implement the plan.

The resulting AB 32 Scoping Plan was adopted by CARB in December 2008. Among many other strategies, it encourages local governments to reduce emissions in their jurisdictions by a degree commensurate with state goals, approximately 15 percent below current levels. In addition, it identifies the following strategies that will impact local governance:

- Develop a California cap-and-trade program
- Expand energy efficiency programs
- Establish and seek to achieve reduction targets for transportation-related GHG emissions
- Expand the use of green building practices
- Increase waste diversion, composting, and commercial recycling toward zero-waste
- Continue water efficiency programs and use cleaner energy sources to move and treat water
- Reduce methane emissions at landfills
- Preserve forests that sequester carbon dioxide

Other measures taken by the state include mandating stronger vehicle emissions standards (AB 1493, 2002), establishing a low-carbon fuel standard (EO # S-01-07, 2007), mandating a climate adaptation plan for the state (S-EO # 13-08, 2008), establishing a Green Collar Job Council, and establishing a renewable energy portfolio standard for power generation or purchase in the state. The state also has made a number of legislative and regulatory changes that have significant implications for local governments:

- SB 97 (2007) requires the Office of Planning and Research to create greenhouse gas planning guidelines for the California Environmental Quality Act (CEQA). In addition, CARB is tasked with creating energy-use and transportation thresholds in CEQA reviews, which may require local governments to account for greenhouse gas emissions when reviewing project applications.
- AB 811 (2007) authorizes all local governments in California to establish special districts that can be used to finance solar or other renewable energy improvements as well as energy efficiency improvements to homes and businesses in their jurisdiction.
- SB 375 (2008) revises the process of regional transportation planning by Metropolitan Planning Organizations (MPOs), which are governed by elected officials from local jurisdictions. The statute calls on CARB to establish regional transportation-related greenhouse gas targets and requires the MPO to develop a regional "Sustainable Communities Strategy" of land use, housing and transportation policies that will move the region towards its GHG target. The statute stipulates that

transportation investments must be consistent with the Sustainable Communities Strategy and provides CEQA streamlining for local development projects that are consistent with the Strategy.

1.4 The City of La Mesa amd Climate Change Mitigation

Centrally located in the rolling hills of San Diego County, La Mesa is known as the "Jewel of the Hills." A near perfect climate, tree-lined streets, walkable neighborhoods, easy access to retail and commercial areas, and a quaint downtown village make La Mesa a highly desirable community in which to live, work and do business.

Table 1.1: La Mesa Profile

Size	Population	Annual Budget	Employees	Climate Zone	Heating and Cooling Degree Days
9 Sq. Miles	55,908	$50,000,000	267	3B	1063 HDD 866CDD

The City provides the core services of planning and permitting of city development, construction and maintenance of city infrastructure and facilities, and other services such as public safety, public lighting and wastewater collection. All of these services require consumption of energy and result in greenhouse gas emissions.

The City of La Mesa has already undertaken several actions that have helped mitigate emissions and reduce energy costs at both an organizational level and throughout the community.

Organizational Actions:

- Florescent lighting has been installed in all city facilities.
- All green and red traffic signals have been retrofitted with LED lights,
- All new purchases of equipment and technology are Energy Star-compliant.
- LEED standards have been incorporated in the new construction of a police station, and a high-albedo “cool roof” has been installed on part of the Community Center.
- Several City vehicles now utilize hybrid technology.
- Recycling containers have been installed in the downtown village as well as at all City parks and facilities
- Most City staff work a 9/80 schedule which allows for one less work day every two weeks and some facilities to remain closed.
- Employees have the ability to telecommute, with approval, using webmail.
- Mandatory recycling is being enforced for all residential and business properties.
- The Environmental Sustainability Commission was formed to address various topics in La Mesa

- The Environmental Awareness Festival is held annually to provide information and workshops to the public

The City recently received Federal assistance through the Energy Efficiency and Conservation Block Grant Program to replace the City's streetlights with broad spectrum lights. This lighting technology uses less energy compared to traditional street lighting and has longer lamp lifetimes.

Community-scale Actions:

- Working with the Empower Partnership between the City of Chula La Mesa and SDG&E, the City of La Mesa provided businesses with the opportunity to exchange kitchen sink spray valves for low flow spray valves. Businesses also exchanged over 500 of their incandescent lamps for free compact fluorescent lamps (CFLs), which use 75 percent less energy than incandescent lamps.
- The Mixed-Use Overlay Zone adopted by the City Council in April 2008 supports compact development and pedestrian oriented neighborhoods.
- City staff worked with developers and the Metropolitan Transit Development Board to develop a major residential project at the Grossmont Trolley station, enabling residents and visitors to utilize public transportation.

1.5 The San Diego Regional Climate Protection Initiative

The San Diego Regional Climate Protection Initiative is a joint effort between The San Diego Foundation, ICLEI, and 10 local governments in San Diego County. The Initiative was established in 2009 to provide a regional platform for local governments to follow ICLEI's Five-Milestone process (described in Section 1.2).

Through generous support from the San Diego Foundation, ICLEI is working directly with local governments in the San Diego region to quantify greenhouse gas emissions and drive regional activity to reduce emissions and enhance resiliency to a changing climate. In addition to performing greenhouse gas inventories for local jurisdictions, ICLEI is providing ongoing training and technical assistance to participating agencies. The Initiative also includes the initiation and facilitation of a formal regional network of local governments and key stakeholders focused on climate protection initiatives, including both mitigation and adaptation activities. The Network mirrors similar networks across the country that ICLEI supports to engage local governments in information and resource exchange, best practices and lessons learned, as well as collaboration opportunities.

Section Two: Methodology

Methodology

The inventories in this report follow two standards, one for government operations emissions and one for community emissions. As local governments all over the world continue to join the climate protection movement, the need for common conventions and a standardized approach to quantifying greenhouse gas (GHG) emissions is more pressing than ever.

The government operations component of the greenhouse gas emissions inventory follows the standard methodology outlined in the Local Government Operations Protocol (LGOP), which was adopted in 2008 by CARB and serves as the national standard for quantifying and reporting greenhouse emissions from local government operations. By participating in the San Diego Regional Climate Protection Initiative, the City of La Mesa has the opportunity to be one of the first in the nation to follow LGOP when inventorying emissions from government operations.

The community emissions inventory follows the standard outlined in the draft International Local Government GHG Emissions Analysis Protocol (IEAP). ICLEI has been developing this guidance since the inception of its Cities for Climate Protection Campaign in 1993, and has recently formalized version 1 of the IEAP as a means to set a common framework for all local government worldwide. The community inventory also draws on the methodology developed in the *San Diego County Greenhouse Gas Inventory* developed by the Energy Policy Initiatives Center (EPIC) at the University of San Diego in September 2008.

This chapter outlines the basic methodology utilized in the development of this inventory to provide clarity on how the inventory results were reported. Specifically, this section reviews:

- What greenhouse gases were measured in this inventory.
- What general methods were used to estimate emissions.
- How emissions estimates can be reported (the scopes framework, roll-up numbers).
- How emissions estimates were reported in this inventory.

A more detailed account of the methodology used in this inventory can be found in Appendices A and B.

2.1 Greenhouse Gases

According to both the LGOP and the IEAP, local governments should assess emissions of all six internationally recognized greenhouse gases regulated under the Kyoto Protocol. These gases are outlined in Table 2.1, which includes the sources of these gases and their global warming potential (GWP).[5] This report focuses on the four GHGs most relevant to local government policymaking: CO_2, CH_4, N_2O, and hydrofluorocarbons. These gases comprise a large majority of greenhouse gas emissions at the community level, and are the only gases emitted in La Mesa's government operations. The omitted gases, SF_6 and perfluorocarbons, are emitted primarily in private sector manufacturing and electricity transmission, and are the subject of regulation at the state level.

Table 2.1 Greenhouse Gases

Gas	Chemical Formula	Activity	Global Warming Potential (CO_2e)
Carbon Dioxide	CO_2	Combustion	1
Methane	CH_4	Combustion, Anaerobic Decomposition of Organic Waste (Landfills, Wastewater), Fuel Handling	21
Nitrous Oxide	N_2O	Combustion, Wastewater Treatment	310
Hydrofluorocarbons	Various	Leaked Refrigerants, Fire Suppressants	12–11,700
Perfluorocarbons	Various	Aluminum Production, Semiconductor Manufacturing, HVAC Equipment Manufacturing	6,500–9,200
Sulfur Hexafluoride	SF_6	Transmission and Distribution of Power	23,900

2.2 Calculating Emissions

The majority of the emissions recorded in this inventory have been determined using **calculation-based methodologies** to derive emissions using activity data and emission factors. To estimate emissions accordingly, the basic equation below is used:

Activity Data x Emission Factor = Emissions

Activity Data

Activity data refer to the relevant measurement of energy use or other greenhouse gas-generating processes such as fuel consumption by fuel type, metered annual electricity consumption, and annual vehicle miles traveled. Please see the appendices for a detailed listing of the activity data used in composing this inventory.

5 Global warming potential (GWP) is a measure of the amount of warming a greenhouse gas may cause, measured against the amount of warming caused by carbon dioxide.

Emission Factors

Emission factors are used to convert energy usage or other activity data into associated emissions quantities. They are usually expressed in terms of emissions per unit of activity data (e.g. lbs CO_2/kWh). Please see Appendix B for a listing of emissions factors used in this report. Table 2.2 demonstrates an example of common emission calculations that use this formula.

Table 2.2 Basic Emissions Calculations

Activity Data	Emissions Factor	Emissions
Electricity Consumption (kilowatt hours)	CO_2 emitted/kWh	CO_2 emitted
Natural Gas Consumption (therms)	CO_2 emitted/therm	CO_2 emitted
Gasoline/Diesel Consumption (gallons)	CO_2 emitted /gallon	CO_2 emitted
Waste Generated by Government Operations (tons)	CH_4 emitted/ton of waste	CH_4 emitted

2.3 Reporting Emissions

This section defines the two reporting frameworks—scopes and sectors—and discusses how they are used in this inventory. It also discusses the concept of "rolling up" emissions into a single number. The section provides guidance on communicating the results of the inventory and using the inventory to formulate emissions reductions policies.

2.3.1 The Scopes Framework

For government operations and community inventories, emissions sources can be categorized by "scope" according to the entity's degree of control over the emissions source and the location of the source. Emissions sources are categorized as direct (Scope 1) or indirect (Scope 2 or Scope 3), in accordance with the World Resources Institute and the World Business Council for Sustainable Development's *Greenhouse Gas Protocol Corporate Standard.* The standard is to report emissions by scope as a primary reporting framework.[6]

Community Scope Definitions

The scopes framework includes three emissions scopes for community emissions:

Scope 1: All direct emissions from sources located within the jurisdictional boundaries of the local government, including fuel combusted in the community and direct emissions from landfills in the community.

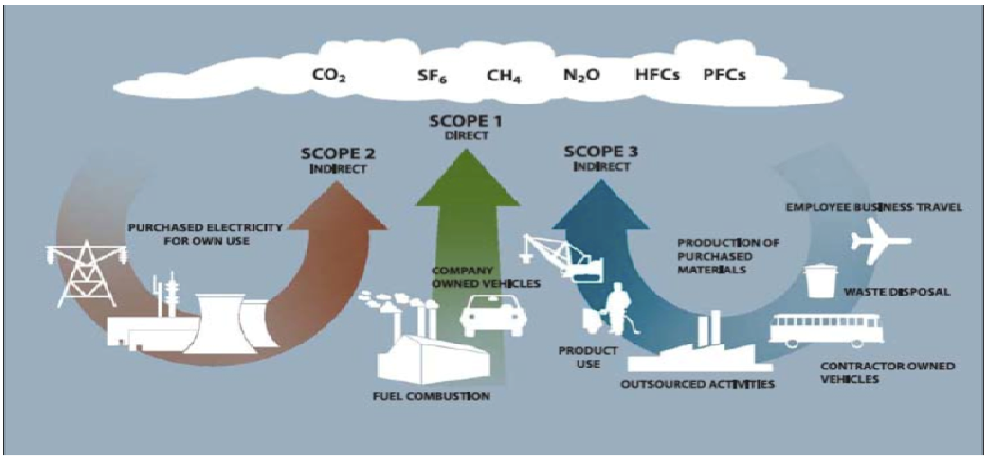
Scope 2: Indirect emissions associated with the consumption of energy that is generated outside the jurisdictional boundaries of the local government.

[6] Another common reporting framework is emissions by sector: See Section 2.3.3-Emisisons Sectors for details

Scope 3: All other indirect or embodied emissions not covered in Scope 2, that occur as a result of activity within the jurisdictional boundaries.

Scope 1 and Scope 2 sources are the most essential components of a community greenhouse gas analysis. This is because these sources are typically the most significant in scale, and are most easily impacted by local policy making. The IEAP also includes, in its *Global Reporting Standard,* the reporting of Scope 3 emissions associated with the future decomposition of solid waste generated in the community in the base year.

Figure 2.1 Emissions Scopes



Source: WRI/WBCSD GHG Protocol Corporate Accounting and Reporting Standard (Revised Edition), Chapter 4.

Government Scope Definitions

Similar to the community framework, the government scopes are divided into three main categories:

Scope 1: Direct emissions from sources within a local government's operations that it owns and/or controls. This includes stationary combustion to produce electricity, steam, heat, and power equipment; mobile combustion of fuels; process emissions from physical or chemical processing; fugitive emissions that result from production, processing, transmission, storage and use of fuels; leaked refrigerants; and other sources.

Scope 2: Indirect emissions associated with the consumption of electricity, steam, heating, or cooling that are purchased from an outside utility.

Scope 3: All other emissions sources that hold policy relevance to the local government that can be measured and reported. This includes all indirect emissions not covered in Scope 2 that occur as a result of activities within the operations of the local government. Scope 3 emission sources include (but are not limited to) tailpipe emissions from employee commutes, employee business travel, and emissions resulting from the decomposition of government-generated solid waste.

2.3.2 Double Counting and Rolling Up Scopes

Many local governments find it useful for public awareness and policymaking to use a single number (a "roll-up" number) to represent emissions in its reports, target setting, and action plan. A roll-up number allows local governments to determine the relative proportions of emissions from various sectors (e.g., 30 percent of rolled up emissions came from the vehicle fleet), which can help policymakers and staff identify priority actions for reducing emissions from their operations.

For these reasons, this report includes roll-up numbers as the basis of the both the government operations and community emissions analyses in this inventory. This roll-up number is composed of direct emissions (Scope 1), all emissions from purchased electricity (Scope 2), and other indirect emissions (Scope 3).

While this report uses a standard roll-up number, these numbers should be used with caution, as they can be problematic for three reasons:

First, a roll-up number does not represent all emissions from La Mesa's operations, only a summation of inventoried emissions using available estimation methods. Reporting a roll-up number can be misleading and encourage citizens, staff, and policymakers to think of this number as the local government's "total" emissions. Therefore, when communicating a roll-up number it is important to represent it only as a sum of inventoried emissions, not as a comprehensive total.

Second, rolling up emissions may not simply involve adding emissions from all sectors, as emissions from different scopes can be double-counted when they are reported as one number. For example, if a local government operates a municipal utility that provides electricity to government facilities, these are emissions from both the power generation and facilities sectors. If these sectors are rolled up into a single number, these emissions are double counted, or reported twice. For these reasons, it is important to be cautious when creating a roll-up number to avoid double counting; the roll-up number used in this report was created specifically to avoid any possible double counting.

Third, it is very difficult to use a roll-up number as a common measure between local governments, which is how the results are sometimes applied. Currently, there is no national or international standard for reporting emissions as a single roll-up number. In addition, local governments provide different services to their citizens, and the scale of the services (and thus the emissions) is highly dependent upon the size of the jurisdiction. For these reasons, comparisons between local government roll-up numbers should not be made without significant analysis of the basis of the roll-up number and the services provided by the local governments being compared.

Furthermore, the results from the government operations component and community component of the inventory should not be rolled-up into one number, as government operations emissions are already accounted for as one source among many in the community inventory.

2.3.3 Emissions Sectors

In addition to categorizing emissions by scope, ICLEI recommends that local governments examine their emissions in the context of the sector that is responsible for those emissions. Many local governments will find a sector-based analysis more directly relevant to policy making and project management, as it assists in formulating sector-specific reduction measures and climate action plan components. The government operations inventory uses LGOP sectors as a primary reporting framework, including the following sectors:

- Buildings and other facilities
- Streetlights, traffic signals, and other public lighting
- Water delivery facilities
- Vehicle fleet and mobile equipment
- Government-generated solid waste
- Emissions from employee commutes

The community inventory reports emissions by the following sectors:

- Residential. This sector includes Scope 1 natural gas combustion and Scope 2 electricity consumption.
- Commercial/Industrial. This sector includes Scope 1 fuel combustion and Scope 2 electricity consumption.
- Transportation. The transportation sector includes exclusively Scope 1 transportation fuel combustion.
- Solid Waste. The sector includes Scope 1 emissions from landfills located in the jurisdiction and Scope 3 emissions from future decomposition of solid waste generated in the community in the base year.
- Wastewater. This is a Scope 3 sector that is an estimate of the emissions created by the processing of wastewater that is generated in La Mesa.

Section Three: Government Operations Inventory Results

Government Operations Inventory Results

This chapter provides a detailed description of the City of La Mesa's greenhouse gas emissions from government operations in 2005, rolling up and comparing emissions across sectors and sources as appropriate. This chapter also provides details on emissions from each sector, including a breakdown of emissions types and, where possible, an analysis of emissions by department. This information identifies more specific sources of emissions (such as a particular building) that can help staff and policymakers in La Mesa to best target emissions reduction activities in the future.

For a report of emissions by scope, and a detailed description of the methodology and emission factors used in calculating the emissions from La Mesa's operations, please see Appendix B: LGOP Standard Report.

In 2005, the City of La Mesa's greenhouse gas emissions from government operations totaled 3,057 metric tons of CO_2e.[7] In this report, this number is the basis for comparing emissions across sectors and sources (fuel types), and is the aggregate of all emissions estimates used in this inventory.

3.1 Summary by Sector

Reporting emissions by sector provides a useful way to understand the sources of La Mesa's emissions. By better understanding the relative scale of emissions from each of the sectors, the City can more effectively focus emissions reductions strategies to achieve the greatest emissions reductions.[8]

7 This number represents a roll-up of emissions, and is not intended to represent a complete picture of emissions from the city's operations. This roll-up number should not be used for comparison with other local government roll-up numbers without a detailed analysis of the basis for this total. See section 2.3.2 for more detail.

8 The sectors with the largest scale of emissions do not necessarily represent the best opportunity for emissions reductions. Cost, administration, and other concerns may affect La Mesa's ability to reduce emissions from any one sector.

Figure 3.1 2005 La Mesa Government Operations Emissions by Sector

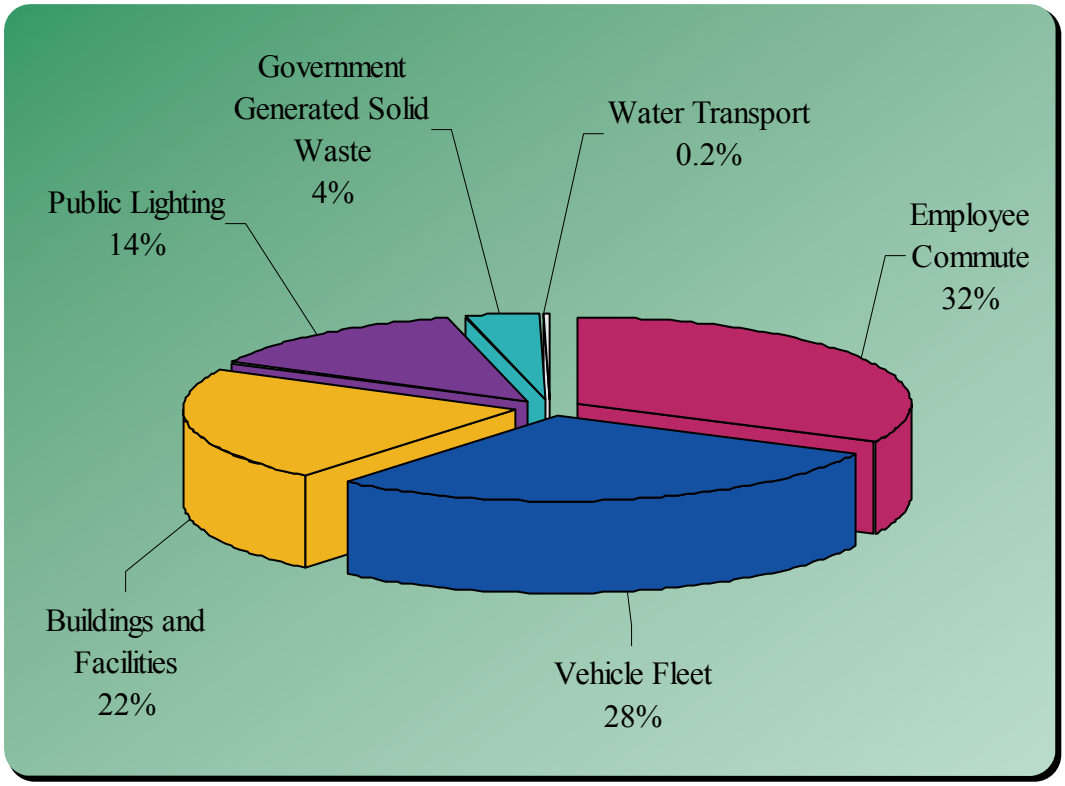


Table 3.1 2005 La Mesa Government Operations Emissions by Sector

Activity	Greenhouse Gas Emissions (metric tons of CO_2e)
Employee Commute	998
Vehicle Fleet	863
Buildings and Facilities	663
Public Lighting	413
Government Generated Solid Waste	115
Water Transport	5

As shown in Figure 3.1, employee commute was the largest emitter (998 metric tons CO_2e) in 2005. Emissions from the vehicle fleet produced the second highest quantity of emissions, resulting in 863 metric tons of CO_2e, while the building and facilities were the third largest contributor (663 metric tons CO_2e). La Mesa's public lighting produced 413 metric tons of CO_2e of total emissions with the remainder coming from government generated waste (115 metric tons of CO_2e) and water transport (5 metric tons of CO_2e).

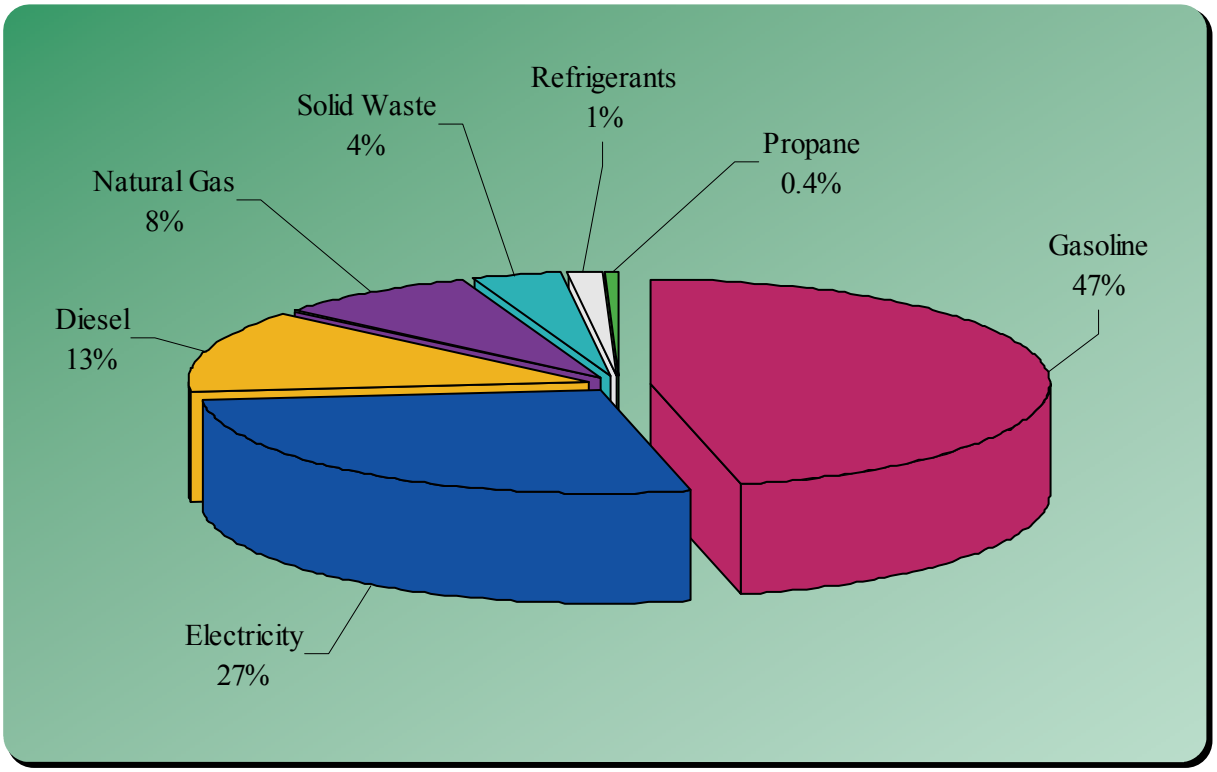
3.2 Summary by Source

When considering how to reduce emissions, it is helpful to look not only at which sectors are generating emissions, but also at the specific raw resources and materials (gasoline, diesel, electricity, natural gas, solid waste, etc.) whose use and generation directly result in the release of greenhouse gases. This analysis can help target resource management in a way that will successfully reduce greenhouse gas emissions. Table 3.2 and Figure 3.2 provide a summary of La Mesa's government operations 2005 greenhouse gas emissions by fuel type or material.

Table 3.2 2005 La Mesa Government Operations Emissions by Source

Fuel/Source	Greenhouse Gas Emissions (metric tons CO_2e)
Gasoline	1,416
Electricity	824
Diesel	388
Natural Gas	256
Solid Waste	115
Refrigerants	44
Propane	13

Figure 3.2 2005 La Mesa Government Operations Emissions by Source



3.3 Summary of Energy-Related Costs

In addition to tracking energy consumption and generating estimates on emissions per sector, ICLEI has calculated the basic energy costs of various government operations. La Mesa spent approximately $902,762 on energy (e.g., electricity, natural gas, gasoline, diesel, propane) for its operations[9]. Eighty-one percent of these energy expenses ($728,196) are the result of electricity and natural gas purchases from San Diego Gas and Electric. The City also spent approximately $174,566 on gasoline and diesel for the municipal fleet (19 percent of total costs). Beyond reducing harmful greenhouse gases, any future reductions in energy use will have the potential to reduce these costs, enabling the City to reallocate limited funds toward other municipal services or create a revolving energy loan fund to support future climate protection activities.

Table 3.3 La Mesa Energy Costs by Sector

Activity	Costs ($)
Buildings and Facilities	$389,057
Public Lighting	$337,018
Vehicle Fleet	$174,566
Water / Sewage	$2,121
TOTAL	**$902,762**

3.4 Detailed Sector Analyses

3.4.1 Buildings and Other Facilities

Through their use of energy for heating, cooling, lighting, and other purposes, buildings and other facilities operated by local governments constitute a significant portion of their greenhouse gas emissions. The City of La Mesa operates 25 facilities, including a city hall complex, public works yard, three fire stations, one police station, a community center, adult enrichment center, recreation center with a pool, and 14 parks of various sizes. The majority of greenhouse gas emissions are attributed to facilities' consumption of electricity and fuels such as natural gas and diesel (for back up generators). In addition, fire suppression, air conditioning, and refrigeration equipment in buildings can emit hydrofluorocarbons (HFCs) and other greenhouse gases when these systems leak refrigerants or fire suppressants.

In 2005, the operation of La Mesa's facilities produced approximately 663 metric tons of CO_2e from the above sources. Table 3.4 and Figure 3.3 depict 2005 emissions per facility or department. Of total facility emissions, 61 percent came from the consumption of electricity, 39 percent came from the combustion of natural gas, and less

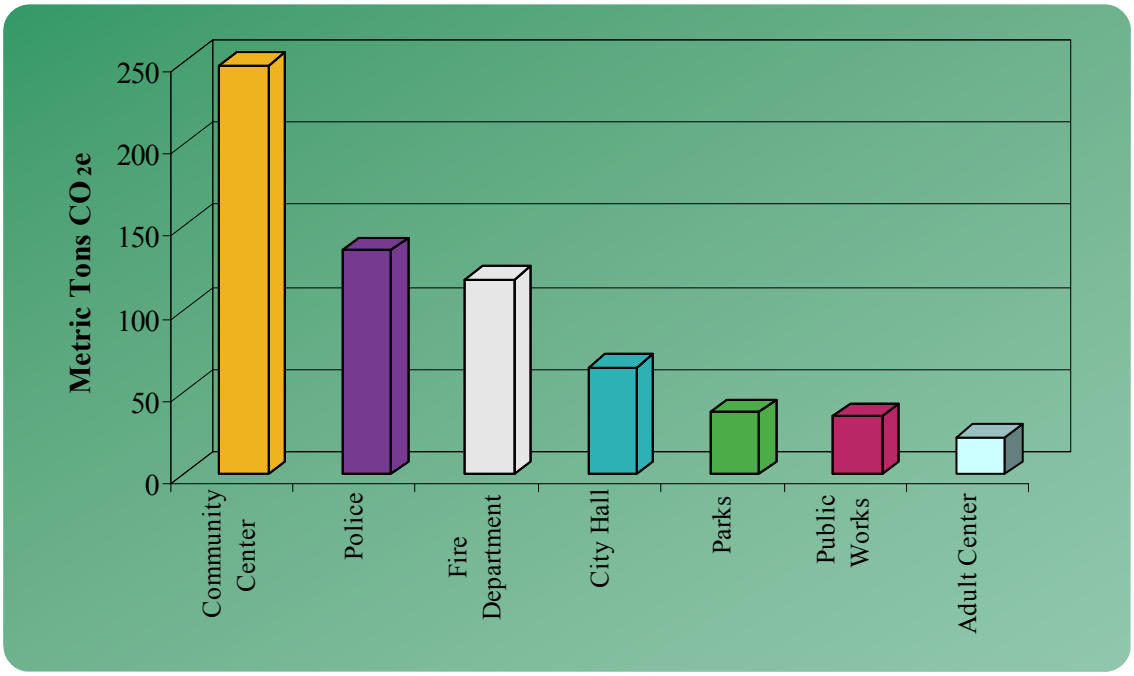
[9] 2005 cost data was estimated using 2007 data as a proxy for buildings and facilities, public lighting, and water transport.

than 1 percent came from the combustion of diesel (see Figure 3.4)[10]. The City spent approximately $389,057 in 2007 on the fuels and electricity that were the cause of these emissions.

Table 3.4: Energy Use and Emissions from Major Facilities

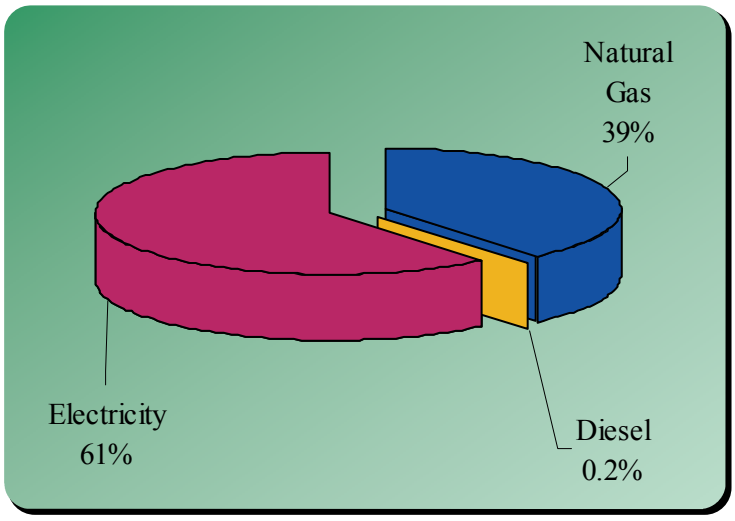
Facility	Greenhouse Gas Emissions (metric tons CO_2e)	Percent Emissions of All Facilities	Electricity Use (kWh)	Natural Gas Use (therms)
Community Center	248	37%	219,001	36,366
Police	136	21%	474,641	3,333
Fire Department	118	18%	374,137	4,485
City Hall	65	10%	188,520	3,390
Parks	38	6%	146,812	161
Public Works	35	5%	139,360	125
Adult Center	22	3%	83,058	300
TOTAL	**663**	**100%**	**1,625,529**	**48,160**

Figure 3.3: Emissions from Major Facilities



10 Estimated emissions from leaked refrigerants and fire suppressants were not reported and therefore are not included in the total emissions used to calculate these percentages.

Figure 3.4: Emissions from Major Facilities by Source



3.4.2 Streetlights, Traffic Signals, and Other Public Lighting

Like most local governments, La Mesa operates a range of public lighting, from traffic signals and sidewalk lighting to streetlights and outdoor lights. Electricity consumed in the operation of this infrastructure is a significant source of greenhouse gas emissions.

In 2005, public lighting in La Mesa consumed a total of 1,654,976 kilowatt hours (kWh) of electricity, producing approximately 413 metric tons CO_2e. Table 3.5 depicts 2005 emissions per lighting type and estimated electricity consumption. The City spent approximately $337,018 on the electricity for the lighting.

Table 3.5: Energy Use and Emissions from Public Lighting

Source	Greenhouse Gas Emissions (metric tons CO_2e)	Percent Emissions of All Lighting	Electricity Use (kWh)
Streetlights	267	65%	1,069,794
Traffic Signals/Controllers	145	35%	581,090
Outdoor Lighting	1	0.2%	4,092
TOTAL	**413**	**100.0%**	**1,654,976**

3.4.3 Water Transport

This section addresses any equipment used for the distribution of water and stormwater.[11] Typical systems included in this section are water pumps/lifts and sprinkler and other irrigation controls. La Mesa only operates minor water transport equipment such as irrigation and sprinkler systems. Electricity is the only source of greenhouse gas emissions from the operation of La Mesa's water transport equipment.

In 2005, the operation of the City's water transport equipment produced approximately 5 metric tons of CO_2e from the above sources. Table 3.6 depicts 2005 emissions from irrigation and sprinkler systems. The City spent approximately $2,121 on the electricity for operating this equipment.

Table 3.6: Energy Use and Emissions from Water Transport Equipment

Source	Greenhouse Gas Emissions (metric tons CO_2e)	Percent Emissions of Water Transport Equipment	Electricity Use (kWh)
Irrigation / Sprinkler Systems	5	100%	20,807
TOTAL	**5**	**100%**	**20,807**

3.4.4 Vehicle Fleet and Mobile Equipment

The majority of local governments use vehicles and other mobile equipment as an integral part of their daily operations—from maintenance trucks used for parks and recreation to police cruisers and fire trucks. These vehicles and equipment burn gasoline, diesel, and other fuels, which results in greenhouse gas emissions. In addition, vehicles with air conditioning or refrigeration equipment use refrigerants that can leak from the vehicle. Emissions from vehicles and mobile equipment compose a significant portion of emissions within most local governments.

[11] While equipment that transports water and stormwater may be managed separately in La Mesa's operations, the types of equipment are similar, and therefore the ways to reduce emissions from this equipment, are similar. For this reason, this section groups equipment used for transporting water and wastewater.

Table 3.7: Vehicle Fleet and Mobile Equipment Emissions

Function	GHG Emissions (metric tons CO_2e)	Percent of All Mobile Emissions	Gasoline Consumption (gal)	Diesel Consumption (gal)	Cost
Police Department	353	41%	39,500	167	$76,559
Public Works	286	33%	16,799	13,234	$53,062
Fire Department	134	16%	4,782	9,008	$32,423
Community Development	8	1%	924	0	$1,834
Administrative Services	1	0.2%	149	0	$282
Community Services	1	0.1%	88	0	$175
Off Site Fuel*	22	3%	2,499	0	$6,179
Propane**	13	2%	2,167	0	$4,053
Refrigerants*	44	5%	-	-	-
TOTAL	**863**	**100.0%**	**66,908**	**22,409**	**$174,566**

* These are not included in the fuel management software and therefore could not be assigned to any one department.

** Gallons consumed refers to gallons of propane, not gasoline

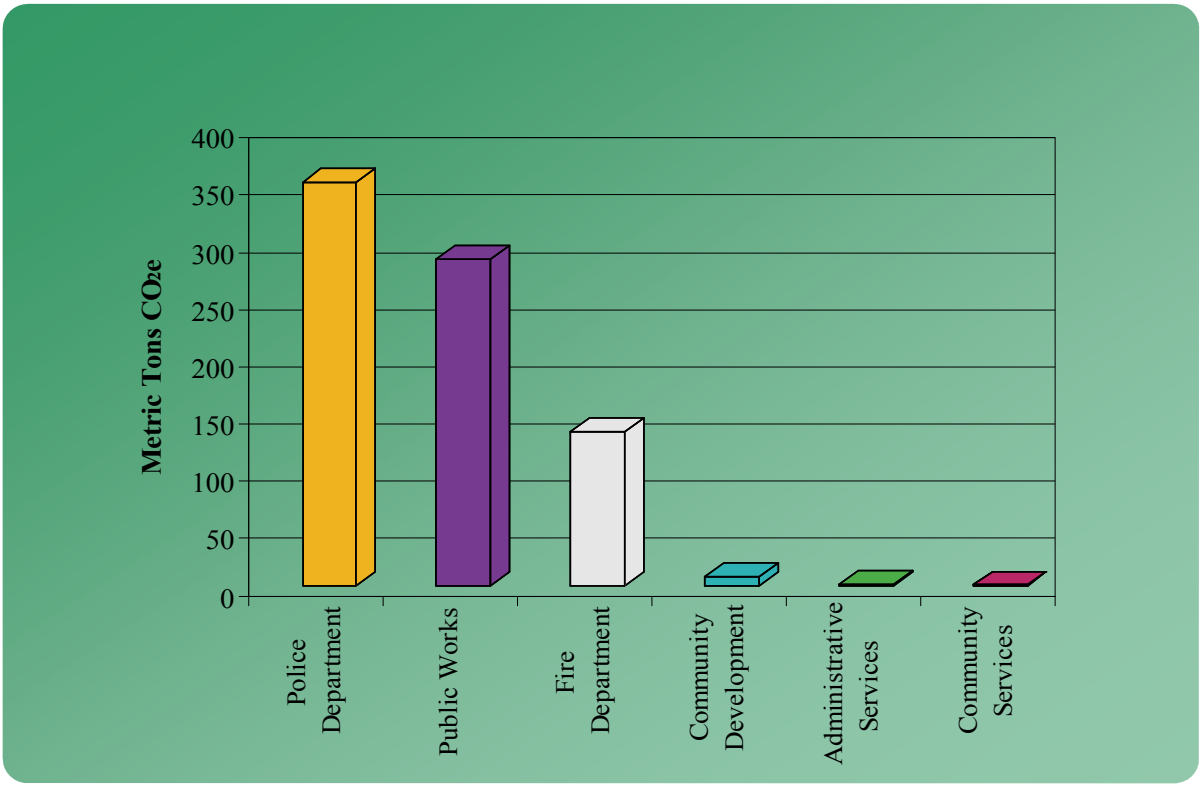
In 2005, La Mesa operated a vehicle fleet with 48 passenger vehicles, 59 light duty trucks/vans/sport utility vehicles and 31 heavy duty vehicles. La Mesa's vehicle fleet performed a number of essential services, from public safety to building and public infrastructure maintenance. In 2005, the majority of vehicles in the fleet (43 percent) were used in the Public Works Department to maintain the City's infrastructure and facilities, while the next largest user was the Police Department with 40 percent of the fleet followed by the Fire Department with 12 percent. The rest of the fleet was made up of the Community Development, Administrative Services, and Community Services Departments. Of all mobile emissions calculated, emissions from vehicles made up 92 percent, mobile equipment made up 3 percent, and leaked refrigerants made up 5 percent of mobile emissions[12].

In 2005, La Mesa emitted approximately 863 metric tons of CO_2e as a result of the combustion of fuels to power the city's vehicle fleet and due to leaked mobile refrigerants. Table 3.7 shows estimated costs associated with the activities that generated these emissions, and Figure 3.5 depicts 2005 emissions per department. Across departments, the vehicles used by the Police department were the largest emitters of greenhouse gases, representing 40 percent of total vehicle fleet emissions. The second and third largest emitters in the fleet were the vehicles from public works (45 percent) and fire (15 percent). Of total mobile emissions, 67 percent came from the combustion of

12 An LGOP alternative method was used to estimate fugitive emissions from refrigerants. While the method is compliant with LGOP guidance, it is prone to overestimate emissions, as it assumes leakage rate and the full charge capacity to be on the high end of typical ranges.

gasoline, 26 percent came from the combustion of diesel, and the remaining 7 percent came from the combustion of propane and leaked refrigerants. La Mesa spent approximately $174,566 in 2005 on the fuels and refrigerants that were the cause of these emissions.

Figure 3.5: Emissions from Mobile Sources



3.4.5 Government-Generated Solid Waste

Many local government operations generate solid waste, much of which is eventually sent to a landfill. Typical sources of waste in local government operations include paper and food waste from offices and facilities, construction waste from public works, and plant debris from parks departments. Organic materials in government-generated solid waste (including paper, food scraps, plant debris, textiles, wood waste, etc.) generate methane as they decay in the anaerobic environment of a landfill. An estimated 75 percent of this methane is routinely captured via landfill gas collection systems[13]; however, a portion escapes into the atmosphere, contributing to the greenhouse effect. As such, estimating emissions from waste generated by government operations is an important component of a comprehensive emissions inventory.

13 This is a default methane collection rate per LGOP. This rate can vary from 0 to 99 percent based upon the presence and extent of a landfill gas collection system at the landfill/s where the waste is disposed. Most commonly, captured methane gas is flared into the atmosphere, which converts the methane gas to CO_2 and effectively negates the human-caused global warming impact of the methane. Increasingly, landfill methane is being used to power gas-fired turbines as a carbon-neutral means of generating electricity.

Inventorying emissions from government-generated solid waste is considered optional by LGOP for two reasons. First, the emissions do not result at the point of waste generation (as with fuel combustion), but in a landfill located outside of La Mesa's jurisdictional boundaries. In addition, the emissions are not generated in the same year that the waste is disposed, but over a lengthy decomposition period. Since inventorying these emissions is considered optional, LGOP does not provide guidance on recommended methods for quantifying these types of emissions. ICLEI therefore devised data collection and calculation methods based upon previous experience and national standards. See Appendix D for more information on quantifying emissions from government-generated solid waste.

It is estimated that the waste disposed by government facilities in 2005 cumulatively produced 5.5 metric tons of methane gas, or 115 metric tons CO_2e. Please see Table 3.8 for a breakdown of emissions per facility.

Table 3.8: Emissions from Government-Generated Solid Waste

Facility	Greenhouse Gas Emissions (metric tons CO_2e)	Estimated Landfilled Waste (Tons)
Parks	42	167
Public Works	36	144
Fire Department	14	54
Community Center	11	42
Police Department	8	31
City Hall	1	5
Minor Facilities	3	12
TOTAL	**115**	**454**

3.4.6 Employee Commute

Fuel combustion from employees commuting to work is another important emissions source from La Mesa's operations. Similar to the City's vehicle fleet, personal employee vehicles use gasoline and other fuels which, when burned, generate greenhouse gas emissions. Emissions from employee commutes are considered optional to inventory by LGOP because the vehicles are owned and operated privately by the employees. However, LGOP encourages reporting these emissions because local governments can influence how their employees commute to work through incentives and commuting programs. One example of this is the cities 9/80 workweek policy that allows most employees to work only 9 days per 2-week pay period, but still have a total of 80 hours. For this reason, employee commute emissions were included in this report as an area where La Mesa could achieve significant reductions in greenhouse gases.

To calculate emissions, the City administered a survey to its employees regarding their commute patterns and preferences. ICLEI then extrapolated the results of the survey to represent emissions from all employees. See Appendix C for a detailed description of the survey and methods used to calculate emissions.

In 2009, employees commuting in vehicles to and from their jobs at City of La Mesa emitted an estimated 998 metric tons of CO_2e. Table 3.9 shows estimated emissions and vehicle miles traveled for all City employees.

Table 3.9: Emissions from Employee Commutes

	Greenhouse Gas Emissions (metric tons CO_2e)	Estimated Vehicle Miles Traveled to Work	Average Estimated Vehicle Miles Traveled to Work
All Employees (Estimated)	998	1,164,851	4,363

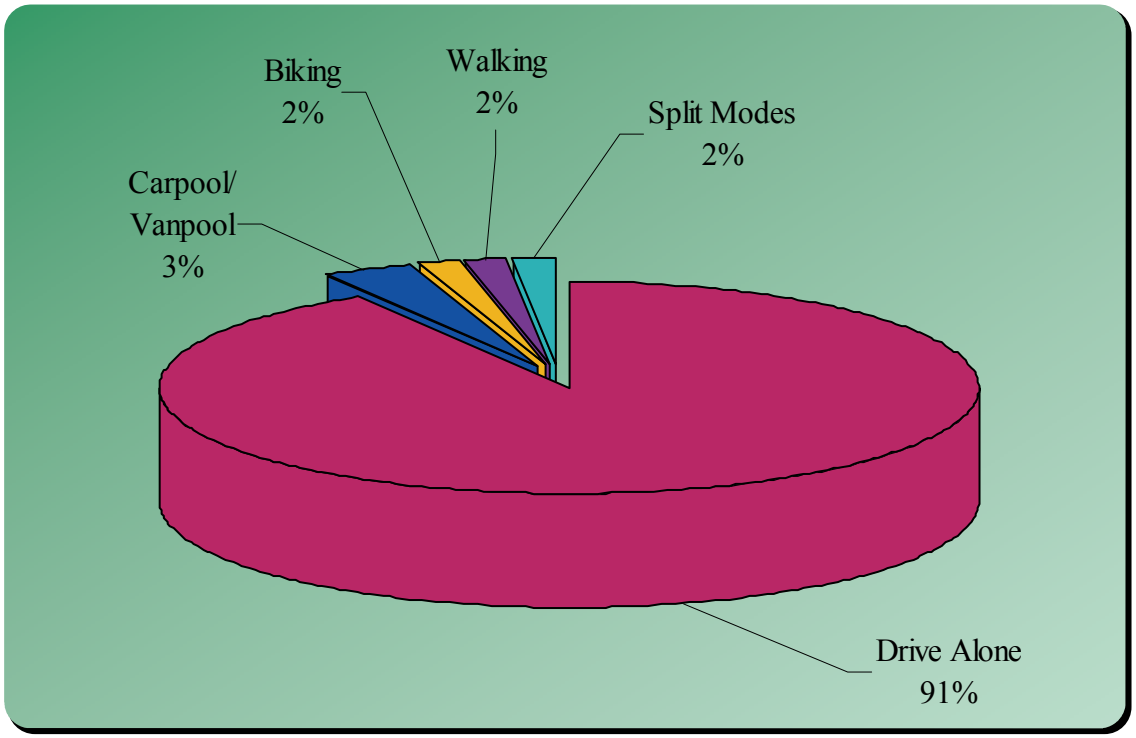
3.4.6.1 Employee Commute Indicators

In addition to estimating greenhouse gas emissions from employee commutes, ICLEI examined other policy-relevant information that was extracted from the employee commute survey—in this way City staff can develop the most effective policies to reduce emissions from employee commutes. These measures often have co-benefits including increased productivity, reduced commute times and costs, and improvement in the quality of life for employees. No extrapolation was done with the following data; analyses were done using data from survey respondents only.

Commute Modes

In 2009, the majority (91 percent) of respondents commuted to work driving alone. Nine percent of all respondents used some form of alternative transportation (bicycle, public transit, carpool, etc) to commute to work, with carpooling being the most common form of alternative transportation (3 percent of total respondents), followed by biking, walking and split modes (2 percent of total respondents used in each mode). See Figure 3.6 for an analysis of the most common commute mode for employees who responded to the survey.

Figure 3.6: Employee Commute Modes



Commute Time and Costs

Table 3.10 shows the median time, cost, and distance of La Mesa's employees' commutes. In addition to reducing the City's greenhouse gas emissions, commuting alternatives may reduce commuting costs, time spent in traffic, and overall employee satisfaction.

Table 3.10: Distance and Time to Work and Cost of Employee Commutes (Responding Employees)

	Median Time to Work (daily minutes)	Median Cost of Commute (weekly)	Median Distance To Work (daily miles)
Responding Employees	10	$15	5

Section Four: Community Inventory Results

4.1 Community Inventory Summary

In 2005, activities and operations taking place within La Mesa's jurisdictional boundaries resulted in approximately 535,827 metric tons of CO_2e emissions. This number includes all Scope 1 emissions from the on-site combustion of fuels in the residential and commercial / industrial sectors, and from the combustion of gasoline and diesel in vehicles traveling on local roads and state highways within La Mesa. This number also includes all Scope 2 emissions associated with community electricity consumption, and Scope 3 emissions from solid waste and wastewater generated by the La Mesa community.[8]

4.1.1 Summary by Scope

As shown in Table 4.1 and Figure 4.1, Scope 1 sources produced the largest amount of community greenhouse gas emissions in 2005, totaling 441,147 metric tons of CO_2e. Scope 2 emissions constituted the second largest amount (78,150 metric tons of CO_2e), and Scope 3 emissions totaled 16,531 metric tons of CO_2e.[9]

Table 4.1: Community Emissions Summary by Scope in Metric Tons

Activity	CO_2e emitted (metric tons)	Scope Total (metric tons)
Scope 1		**441,147**
Transportation Fuels	374,888	
Natural Gas	66,259	
Scope 2		**78,150**
Purchased Electricity	78,150	
Scope 3		**16,531**
Community-Generated Solid Waste	13,942	
Wastewater	2,589	

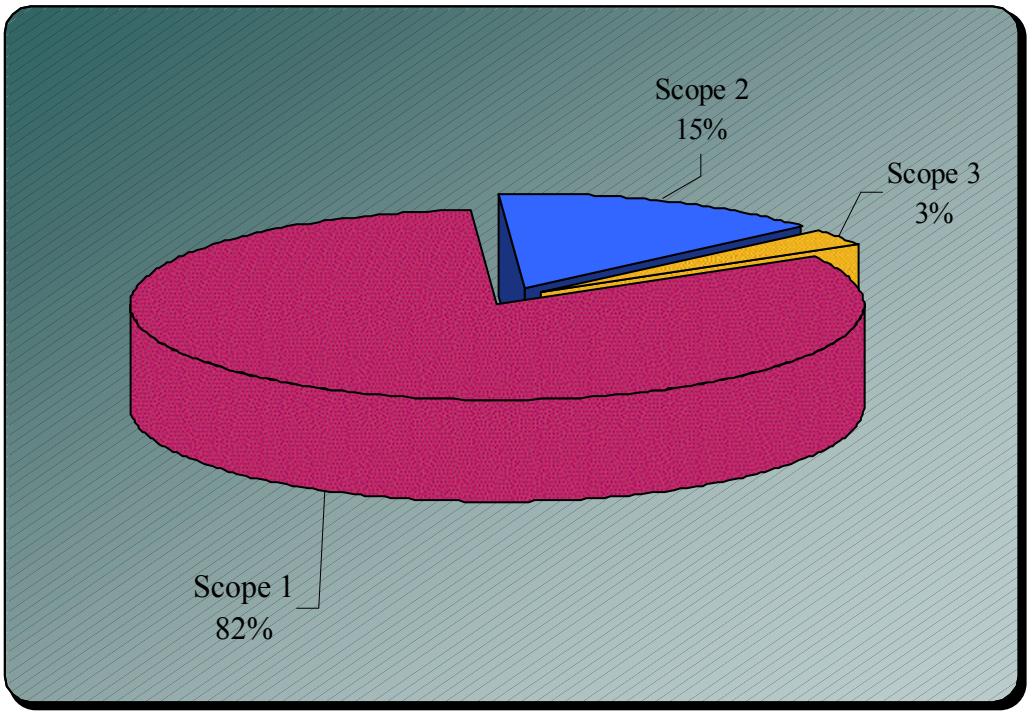
Scope 1 Emissions

In 2005, La Mesa's community produced 441,147 metric tons CO_2e of Scope 1 greenhouse gas emissions. The largest source (85 percent) of Scope 1 emissions resulted from mobile combustion of fuels. The second largest source of Scope 1 emissions was stationary combustion of natural gas, constituting 15 percent of Scope 1 emissions.

[8] For a detailed description of scopes, please see Section 2: Methodology

[9] These emissions have not been totaled as this may result in double counting and a percentage is not significantly relevant to forming emissions reduction policy. The summaries by sector and source have percentage breakdowns, as do individual sources of emissions.

Figure 4.1 Community Emissions by Scope



Scope 2 Emissions

In 2005, La Mesa's community generated 78,150 metric tons of CO_2e in the form of Scope 2 emissions from purchased electricity. All Scope 2 emissions in this inventory result from electricity consumed within La Mesa but produced outside of La Mesa.

Scope 3 Emissions

In 2005, La Mesa's community generated 16,531 metric tons of CO_2e in the form of Scope 3 emissions. Scope 3 sources included in this report are an estimate of methane emissions that will result from the anaerobic decomposition of solid waste and estimated emissions related to the treatment of wastewater, generated by the La Mesa community during 2005.

4.1.2 Summary by Sector

By better understanding the relative scale of emissions from each primary sector, La Mesa can more effectively focus emissions reductions strategies to achieve the greatest emission reductions. For this reason, an analysis of emissions by sector is included in this report, based on the total of 535,827 metric tons of CO_2e. The five sectors included in this inventory are the following:

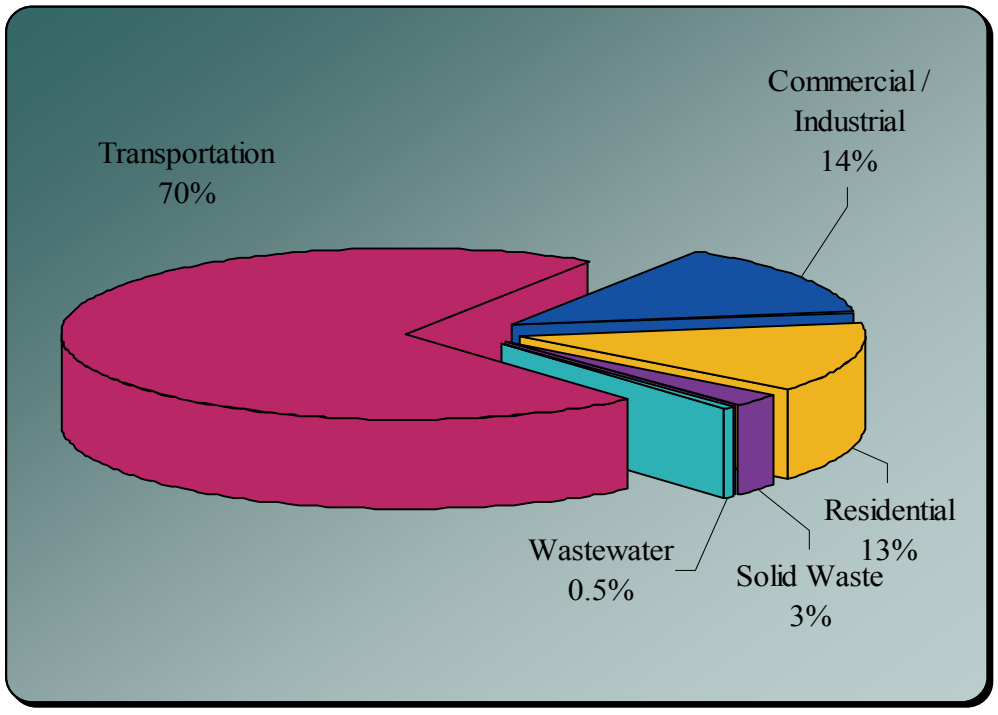
1. Residential
2. Commercial / Industrial
3. Transportation
4. Solid Waste
5. Wastewater

As visible in Figure 4.2, the transportation sector was the largest emitter (70 percent) in 2005. Emissions from the commercial / industrial sector produced the second highest quantity, resulting in 14 percent of total emissions, or 75,013 metric tons of CO_2e. The remainder of emissions came from residential (13 percent), waste (3 percent) and wastewater (0.5 percent). Please see detailed sector emissions analyses below for more detail.

Table 4.2: Community Emissions Summary by Sector

Sector	Greenhouse Gas Emissions (metric tons CO_2e)
Transportation	374,888
Commercial / Industrial	75,013
Residential	69,396
Solid Waste	13,942
Wastewater	2,589
TOTAL	**535,827**

Figure 4.2 Community Emissions Summary by Sector



4.1.3 Summary by Source

When considering how to reduce emissions, it is also helpful to look not only at which sectors are generating emissions, but also at the specific raw resources and materials (gasoline, diesel, electricity, natural gas, solid waste, etc.) whose use and generation directly result in the release of greenhouse gases. Such analysis can help target resource management in a way that will successfully reduce greenhouse gas emissions. Below (Figure 4.3 and Table 4.3) is a summary of La Mesa's 2005 greenhouse gas emissions by fuel type or material, based upon the total community emissions of 535,827 metric tons.

Figure 4.3 Community Emissions Summary by Source

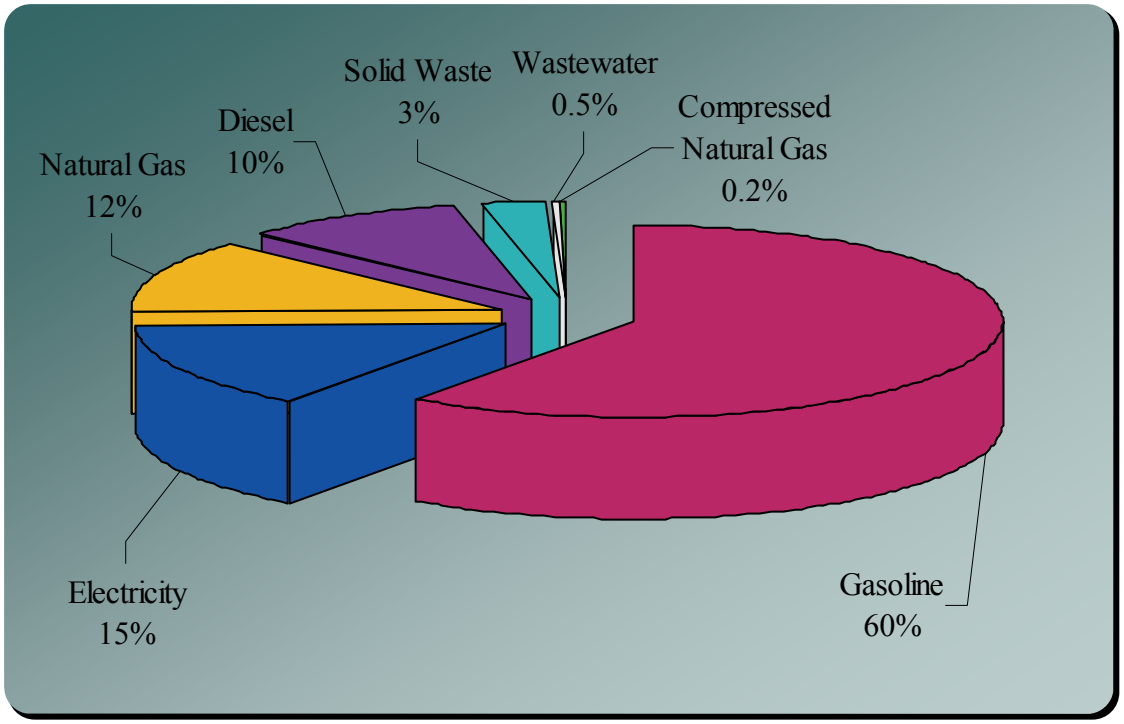


Table 4.3: 2005 Community Emissions by Source

Source	Greenhouse Gas Emissions (metric tons CO_2e)
Gasoline	321,803
Electricity	78,150
Natural Gas	66,259
Diesel	52,177
Solid Waste	13,942
Wastewater	2,589
Compressed Natural Gas	908
TOTAL	**535,827**

4.1.4 Per Capita Emissions

Per capita emissions can be a useful metric for measuring progress in reducing greenhouse gases and for comparing one community's emissions with neighboring cities and against regional and national averages. That said, due to differences in emission inventory methods, it can be problematic to produce directly comparable per capita emissions numbers, and one must be cognizant of a margin of error when comparing figures between jurisdictions.

As detailed in Table 4.4, dividing the total community-wide GHG emissions by population yields a result of 9.6 metric tons of CO_2e per capita. It is important to note that this number is not the same as the carbon footprint of the average individual living in La Mesa (which would include lifecycle emissions, emissions resulting from air travel, and other indirect emissions).

Table 4.4: Per Capita Emissions

Estimated 2005 Population	55,908
Community GHG Emissions (MT CO_2e)	535,827
Per Capita GHG Emissions (MT CO_2e)	9.6

4.2 Community Inventory Detail by Sector

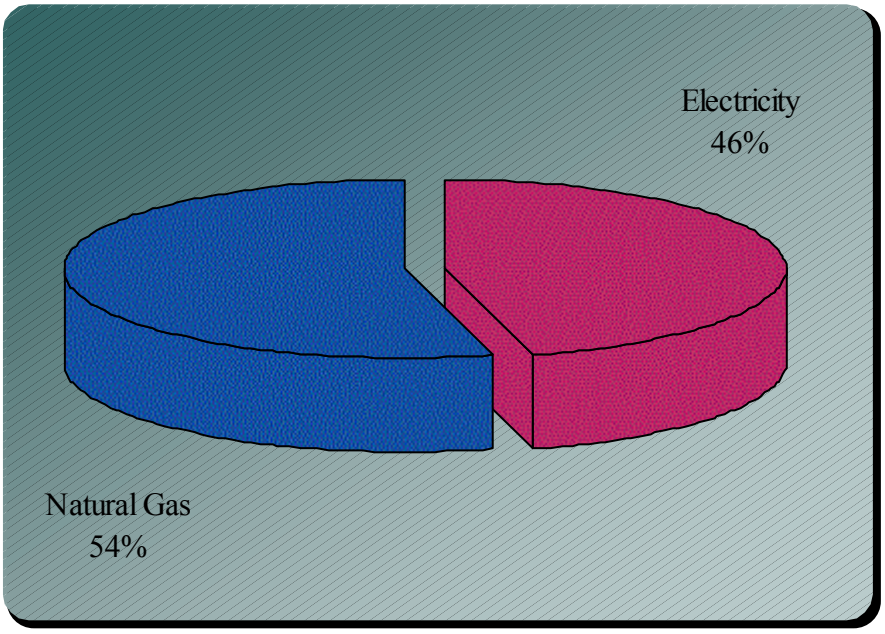
This section explores community activities and emissions by taking a detailed look at each primary sector.

4.2.1 Residential Sector

Energy consumption associated with La Mesa homes produced 69,396 metric tons of greenhouse gas emissions in 2005 (13 percent of total community emissions). All residential sector emissions are the result of electricity consumption and the on-site combustion of natural gas. Emissions from lawn equipment, wood-fired stoves, transportation and waste generation are not included in these totals.

In 2005, La Mesa's entire residential sector consumed 127.4 million kWh of electricity and 7 million therms of natural gas. As shown in Figure 4.4, 54 percent of total residential emissions were the result of natural gas use, and 46 percent were the result of electricity consumption. Natural gas is typically used in residences as a fuel for home heating, water heating and cooking, and electricity is generally used for lighting, heating, and to power appliances.

Figure 4.4 Residential Emissions by Source



4.2.2 Commercial / Industrial Sector

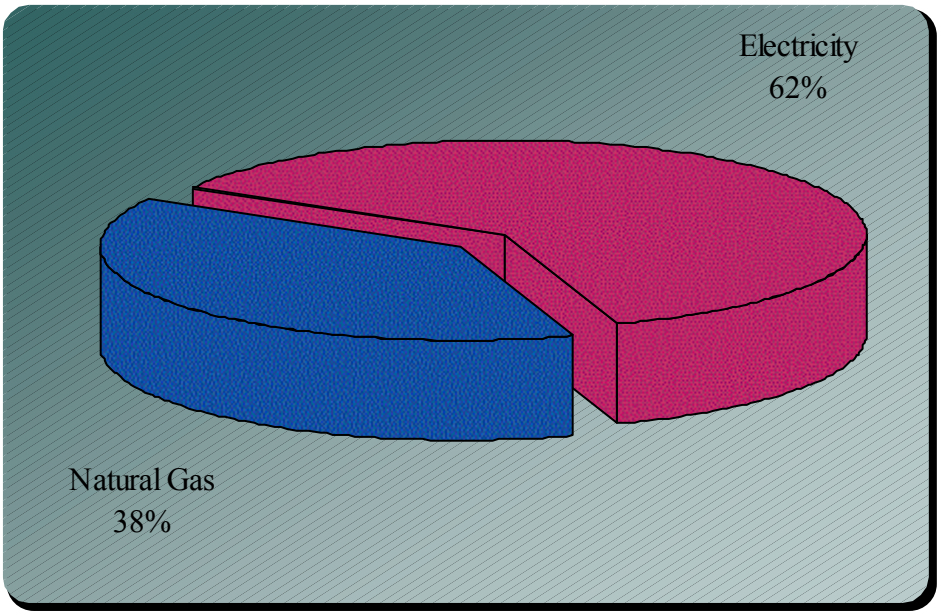
The commercial / industrial sector includes emissions from the operations of businesses as well as public agencies. For example, the majority of buildings and facilities included in the government operations inventory are also included as a subset of the commercial / industrial sector. In 2005, buildings and facilities within the commercial / industrial sector produced 75,013 metric tons of greenhouse gas emissions (14 percent of total community emissions). All commercial / industrial sector emissions included in this inventory are the result of electricity consumption and the on-site combustion of natural gas. It is important to note that emissions from off-road equipment, transportation, waste generation, stationary combustion other than natural gas, and other industrial processes are not included in these totals.

La Mesa businesses generated 2.9 metric tons of GHG emissions per job in 2005.[10] This metric provides an indication of the carbon intensity of economic activity in La Mesa.

As shown in Figure 4.5, 38 percent of total commercial / industrial emissions were the result of natural gas use, and 62 percent were the result of electricity consumption. Natural gas is typically used in the commercial / industrial sector to heat buildings, fire boilers, and generate electricity; and electricity is generally used for lighting, heating, and to power appliances and equipment.

[10] 2005 jobs data was provided by SANDAG Technical Services Department, *Current Estimates,* August 2009.

Figure 4.5 Commercial / Industrial Emissions by Source



4.2.3 Transportation Sector

As with many other local governments, transportation within La Mesa's geographical boundary constitutes the greatest percentage (70 percent) of community wide greenhouse gas emissions – 374,888 metric tons CO_2e.

As shown in Table 4.6, 95 percent of Transportation Sector emissions came from on-road travel, with the remaining 5 percent originating from off-road vehicle use. Of on-road transportation activity, travel on local city roads constituted 35 percent of emissions, and 61 percent came from travel on state highways within the jurisdictional boundaries of La Mesa. An estimated 86 percent of on-road transportation emissions were due to gasoline consumption with the remaining 14 percent coming from diesel use.

Please see Appendix E for more detail on methods and emissions factors used in calculating emissions from the Transportation Sector.

Table 4.5: 2005 Transportation Emissions by Type

Source	Greenhouse Gas Emissions (metric tons CO_2e)	Share of On-Road Emissions
On-Road Transportation		
Local Roads	129,766	35%
State Highways	228,070	61%
On-Road Subtotal	*357,836*	*95%*
Off-Road Transportation	17,052	5%
TOTAL	**374,888**	**100%**

4.2.4 Solid Waste Sector

As noted above in Figure 4.2, the solid waste sector constituted 3 percent of total emissions for the La Mesa community in 2005. Emissions from the solid waste sector are an estimate of methane generation from the decomposition of municipal solid waste (MSW) and alternative daily cover (ADC) sent to landfill in the base year (2005). These emissions are considered Scope 3 because they are not generated in the base year, but will result from the decomposition of 2005 waste over the full 100+ year cycle of its decomposition. As stated in the Government Inventory section, about 75 percent[11] of landfill methane emissions are captured through landfill gas collection systems, but the remaining 25 percent escape into the atmosphere as a significant contributor to global warming. Please see Table 4.10 below for a summary of emissions per waste type.[12]

Table 4.6: Waste Emissions Sources

Source	Greenhouse Gas Emissions (metric tons CO_2e)	Share of Total Waste Emissions
Paper Products	6,774	49%
Food Waste	2,666	19%
Plant Debris	2,513	18%
Wood / Textiles	1,990	14%
TOTAL	**13,942**	**100%**

4.2.5 Wastewater Sector

The wastewater sector contributed 2,589 metric tons of greenhouse gas emissions, constituting 0.5 percent of total emissions for the La Mesa community in 2005. Emissions from the wastewater sector are an estimate of methane and nitrous oxide generated in the process of wastewater treatment. These emissions are considered Scope 3

[11] US EPA AP 42.
[12] Waste characterization figures were provided by the 2004 *California Waste Characterization Study*, http://www.ciwmb.ca.gov/Publications/default.asp?pubid=1097

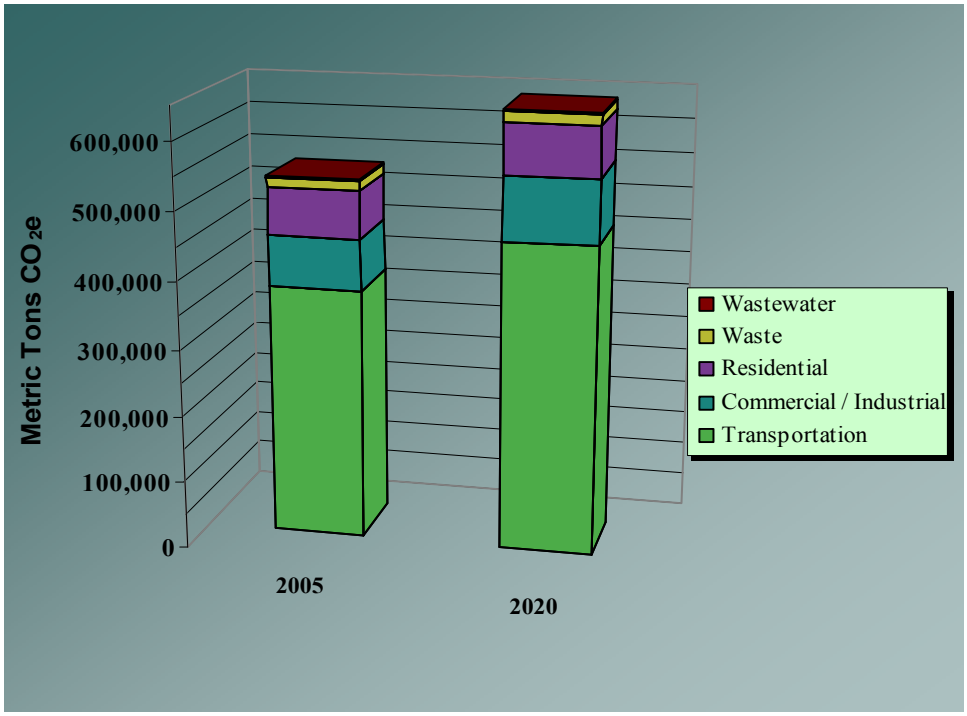
because they occur at treatment facilities outside the jurisdictional boundaries and "downstream" from the community where the wastewater in generated. In the San Diego region, about 71 percent[13] of wastewater treatment methane emissions are captured through biogas collection systems, but the remainder escape into the atmosphere and contribute the jurisdiction's impact on climate change.

4.3 Community Emissions Forecast

To illustrate the potential emissions growth based on projected trends in energy use, driving habits, job growth, and population growth from the baseline year going forward, this report includes an emissions forecast for the year 2020. Under a business-as-usual scenario, La Mesa's emissions will grow by approximately 20 percent by the year 2020, from 535,827 to 644,351 metric tons CO_2e. Figure 4.7 and Table 4.11 show the results of the forecast. A variety of different reports and projections were used to create the emissions forecast, as profiled on the following page.

[13] *San Diego County Greenhouse Gas Inventory*, USD Energy Policy Initiatives Center.

Figure 4.6 Community Emissions Forecast for 2020



4.3.1 Residential Forecast

For the residential sector, a households projection for La Mesa conducted by the San Diego Association of Government (SANDAG) was used to estimate average annual compound growth in residential energy demand (0.4 percent). SANDAG estimates that the number of households in La Mesa was 24,040 in 2005, and will be 24,546 in 2020.[14]

4.3.2 Commercial / Industrial Forecast

The California Energy Commission's *California Energy Demand 2008-2018* shows that commercial floor space and the number of jobs have closely tracked the growth in energy use in the Commercial Sector. Using job growth projections for La Mesa also provided by SANDAG, it was calculated that the average annual growth in energy use in the commercial / industrial sector between 2005 and 2020 will be 1.6 percent.[15]

4.3.3 Transportation Forecast

Growth in transportation emissions over the forecast period is closely related to planned transportation infrastructure investments and the associated vehicle activity, as measured in vehicle miles traveled (VMT). Long-term

[14] SANDAG 2030 Regional Growth Forecast Update (2006).
[15] Ibid.

transportation infrastructure is planned through the 2030 San Diego Regional Transportation Plan, published by SANDAG in 2007, and travel activity projections performed by SANDAG are based on this plan. These projections forecast a 22 percent increase in regional VMT between 2005 and 2020; this trend was applied to La Mesa's 2005 VMT to estimate 2020 travel activity. While this increase is attributed to regional travel as a whole and not specifically local travel in La Mesa, local VMT is likely to follow a similar trend, and this forecasting approach is more reliable than applying state-wide travel forecasts to the local level.[16]

4.3.4 Solid Waste and Wastewater Forecast

Population is the primary determinate for growth in emissions pertaining to waste and wastewater generation. Therefore, the average annual population growth rate from 2005 to 2020 (0.5 percent, as calculated from above-referenced SANDAG population projections) was used to estimate future emissions from waste disposal and treatment of wastewater.

Table 4.7: Community Emissions Growth Forecast by Sector

Sector	2005 (metric tons CO_{2e})	2020 (metric tons CO_2e)	Annual Growth Rate	Percent Change from 2005 to 2020
Residential	69,396	73,743	0.4%	6%
Commercial / Industrial	75,013	94,757	1.6%	26%
Transportation	374,888	457,907	1.3%	22%
Waste	13,942	15,134	0.5%	9%
Wastewater	2,589	2,810	0.5%	9%
TOTAL	**535,827**	**644,351**	--	**20%**

[16] New fuel efficiency standards under the federal Corporate Average Fuel Economy (CAFE) program and State of California "Clean Car" standards under AB 1493 (Pavley) could significantly reduce the demand for transportation fuel in La Mesa. An analysis of potential fuel savings from these measures at a scale that would be useful for the purpose of this report has not been conducted, nor would such an analysis produce a true business-as-usual estimation.

Section Five: Conclusion

Conclusion

By participating in the San Diego Regional Climate Protection Initiative and other sustainability initiatives, the City of La Mesa has taken steps toward reducing its impacts on the environment. Policymakers and staff have chosen to take a leadership role in addressing climate change, and this leadership will allow the City to make decisions to create and implement innovative approaches to reduce its emissions. With increasing guidance and support from the state and the federal governments, La Mesa should be increasingly empowered to make the necessary changes to promote its vision for a more sustainable future.

This conclusion discusses the inventory as a baseline for emissions targets and suggests steps for La Mesa to move forward to reduce emissions both from its internal operations and from the La Mesa community..

5.1 Toward Setting Emissions Reduction Targets

This inventory provides an emissions baseline that the City can use to inform Milestone Two of ICLEI's Five-Milestone process—setting emissions reduction targets. The greenhouse gas emissions reduction target is a goal to reduce emissions to a certain percentage below base year levels by a chosen planning horizon year. An example target might be a 20 percent reduction in emissions below 2005 levels by 2020. A target provides an objective toward which to strive and against which to measure progress. It allows a local government to quantify its commitment to fighting climate change—demonstrating that the jurisdiction is serious about its commitment and systematic in its approach.

In selecting a target, it is important to strike a balance between scientific necessity, ambition, and what is realistically achievable. ICLEI recommends that regardless of La Mesa's chosen long-term emissions reduction target (e.g., 15-year, 40-year), it should establish interim targets for every two- to three-year period. Near-term targets facilitate additional support and accountability, and help to ensure continued momentum around the City's local climate protection efforts. To monitor the effectiveness of its programs, La Mesa should plan to re-inventory its emissions on a regular basis; many jurisdictions are electing to perform annual inventories. See Appendix F for more information on how to re-inventory the City's emissions.

5.1.1 The Long-Term Goal

ICLEI recommends that the City of La Mesa's near-term climate work should be guided by the long-term goal of reducing its emissions by 80 percent to 95 percent from the 2005 baseline level by the year 2050. By referencing a long-term goal that is in accordance with current scientific understanding, La Mesa can demonstrate that it intends to do its part to reduce emissions over the long haul.

It is important to keep in mind that it will be next to impossible for local governments to reduce emissions by 80 to 95 percent without the assistance of state and federal policy changes that create new incentives and new sources of funding for emissions reduction projects and programs. However, in the next 15 years, there is much that local governments can do to reduce emissions independently. It is also important that La Mesa works to reduce its emissions sooner, rather than later: the sooner a stable level of greenhouse gases in the atmosphere is achieved, the less likely it is that some of the most dire climate change scenarios will be realized.

5.1.2 State of California Targets and Guidance

An integral component of the State of California's climate approach has been establishing three core emissions reduction targets at the community level. While these targets are specific to the community-scale, they can be used to inform emissions targets for government operations as well. Figure 4.1 highlights adopted emissions targets for the State. The AB 32 Scoping Plan also provides further guidance on establishing targets for local governments; specifically the Plan suggests creating an emissions reduction goal of 15 percent below "current" levels by 2020. This target has informed many local government's emission reduction targets for municipal operations—most local governments in California with adopted targets have targets of 15 to 25 percent reductions under 2005 levels by 2020.

Figure 5.1: California Greenhouse Gas Reduction Targets

On June 1, 2005, California Governor Schwarzenegger signed Executive Order S-3-05 establishing climate change emission reductions targets for the State of California. The California targets are an example of near-, mid- and long-term targets:

Reduce emissions to 2000 levels by 2010
Reduce emissions to 1990 levels by 2020
Reduce emissions to 80 percent below 1990 levels by 2050

5.1.3 Department Targets

If possible, ICLEI recommends that La Mesa consider department-specific targets for each of the departments that generate emissions within its operations. This allows City staff to do a more in-depth analysis of what is achievable in each sector in the near, mid and long-term, and also provides encourages each department head to consider their department's impact on the climate and institute a climate-conscious culture in its operations.

5.2 Creating an Emissions Reduction Strategy

This inventory identifies the major sources of emissions from the City of La Mesa , therefore, where policymakers will need to target emissions reductions activities if they are to make significant progress toward adopted targets. For example, since employee commute was a major source of emissions from the City's operations, it is possible that La Mesa could meet near-term targets simply by implementing a few major actions within that sector. In addition, medium-term targets could be met by focusing emissions reduction actions on the vehicle fleet, building and facilities and public lighting, and the long term (2050) target will not be achievable without major reductions in all of those sectors.

Given the results of the inventory, ICLEI recommends that the City of La Mesa focus on the following tasks in order to significantly reduce emissions from its government operations:

- Provide City employees with incentives and encouragement to increase the use of alternative transportation such as bicycling, public transportation, vanpooling, or telecommuting.
- Educate employees on fuel-efficient driving practices and convert the fleet to more fuel-efficient or alternative fuel vehicles on a replacement basis
- Investigate using Neighborhood Electric Vehicles for parking enforcement
- Complete energy audits and energy efficiency retrofits in existing City facilities
- Use energy efficient pumps and/or solar heating for Community Center public swimming pool
- Increase energy conservation behavior by educating and motivating employees; institute facility energy reduction challenges or implement a "green employee" awards program.
- Take advantage of local utility technical assistance, rebates, and incentives for energy efficiency.
- Create a climate protection revolving loan fund to finance and prioritize projects that reduce costs, save natural resources, and create jobs.

In addition to the types of actions described above, which reduce emissions from government operations, ICLEI recommends developing policies and actions that will help to reduce emissions throughout the community. Examples include:

- Promoting growth through redevelopment and infill that maintains or improves the quality of life for existing neighborhoods.
- Adopting local parking standards that encourage reduced single-occupancy vehicle travel.
- Adopting building codes that exceed Title 24 energy requirements, on either a mandatory or voluntary basis.
- Establish water conservation guidelines and standards for existing development, new development and City facilities

- Provide public education programs on waste prevention, source reduction, recycling, yard waste, wood waste, and hazardous waste

By identifying and implementing a set of these types of strategies, the City of La Mesa should be able to reduce and reverse its impact upon global warming. In the process, it may also be able to improve the quality of its services, reduce costs, stimulate local economic development, and inspire local residents and businesses to redouble their own efforts to combat climate change.

Appendices

Appendix A: The Local Government Operations Protocol

This inventory follows the standard outlined in the Local Government Operations Protocol, which was adopted in 2008 by the California Air Resources Board (CARB) and serves as the national standard for quantifying and reporting greenhouse emissions from local government operations. This and the other inventories conducted for the San Diego Regional Climate Protection Initiative are among the first to follow LGOP, representing a strong step toward standardizing how inventories are conducted and reported.

A.1 Local Government Operations Protocol

A.1.1 Background

In 2008, ICLEI, CARB, and the California Climate Action Registry (CCAR) released LGOP to serve as a U.S. supplement to the International Emissions Analysis Protocol. The purpose of LGOP is to provide the principles, approach, methodology, and procedures needed to develop a local government operations greenhouse gas emissions inventory. It leads participants through the process of accurately quantifying and reporting emissions, including providing calculation methodologies and reporting guidance. LGOP guidance is divided into three main parts: identifying emissions to be included in the inventory, quantifying emissions using best available estimation methods, and reporting emissions.

The overarching goal of LGOP is to allow local governments to develop emissions inventories using standards that are consistent, comparable, transparent, and recognized nationally, ultimately enabling the measurement of emissions over time. LGOP adopted five overarching accounting and reporting principles toward this end: relevance, completeness, consistency, transparency and accuracy. Methodologies that did not adhere to these principles were either left out of LGOP or included as Scope 3 emissions. LGOP was created solely to standardize how emissions inventories are conducted and reported; as such it represents a currently accepted standard for inventorying emissions but does not contain any legislative or program-specific requirements. Mandates by the State of California or any other legislative body, while possibly using LGOP as a standard, do not currently exist, and California local governments are not currently required to inventory their emissions. Program-specific

requirements, such as ICLEI's Milestones or CCAR's reporting protocol, are addressed in LGOP but should not be confused with LGOP itself.

Also, while LGOP standardizes inventories from government operations, it does not seek to be a wholly accurate inventory of all emissions sources, as certain sources are currently excluded or otherwise impossible to accurately estimate. This and all emissions inventories therefore represent a best estimate of emissions using best available data and calculation methodologies; it does not provide a complete picture of all emissions resulting from La Mesa's operations, and emissions estimates are subject to change as better data and calculation methodologies become available in the future.

A.1.2 Organizational Boundaries

Setting an organizational boundary for greenhouse gas emissions accounting and reporting is an important first step in the inventory process. The organizational boundary for the inventory determines which aspects of operations are included in the emissions inventory, and which are not[14]. Under LGOP, two control approaches are used for reporting emissions: operational control or financial control. A local government has operational control over an operation if it has full authority to introduce and implement its operating policies at the operation. A local government has financial control if the operation is fully consolidated in financial accounts. If a local government has joint control over an operation, the contractual agreement will have to be examined to see who has authority over operating policies and implementation, and thus the responsibility to report emissions under operational control.[17] Local governments must choose which approach is the most applicable and apply this approach consistently throughout the inventory.

While both control approaches are acceptable, there may be some instances in which the choice may determine whether a source falls inside or outside of a local government's boundary. LGOP strongly encourages local governments to utilize operational control as the organization boundary for a government operations emissions inventory. Operational control is believed to most accurately represent the emissions sources that local governments can most directly influence, and this boundary is consistent with other environmental and air quality reporting program requirements. For this reason, all inventories in the San Diego Regional Climate Protection Initiative are being conducted according to the operational control framework.

14 Please see Local Government Operations Protocol for more detail on defining your organizational boundary: http://www.icleiusa.org/programs/climate/ghg-protocol

A.1.3 Types of Emissions

The greenhouse gases inventoried in this report are described in Section 2.1 As described in LGOP, emissions from each of the greenhouse gases can come in a number of forms:

Stationary or mobile combustion: These are emissions resulting from on-site combustion of fuels (natural gas, diesel, gasoline, etc.) to generate heat, electricity, or to power vehicles and mobile equipment.

Purchased electricity: These are emissions produced by the generation of power from utilities outside of the jurisdiction.

Fugitive emissions: Emissions that result from the unintentional release of greenhouse gases into the atmosphere (e.g., leaked refrigerants, methane from waste decomposition, etc.).

Process emissions: Emissions from physical or chemical processing of a material (e.g., wastewater treatment).

A1.4 Quantifying Emissions

Emissions can be quantified two ways:

Measurement-based methodologies refer to the direct measurement of greenhouse gas emissions (from a monitoring system) emitted from a flue of a power plant, wastewater treatment plant, landfill, or industrial facility. This methodology is not generally available for most types of emissions and will only apply to a few local governments that have these monitoring systems.

The majority of the emissions recorded in the inventory can be and will be estimated using **calculation-based methodologies** to calculate their emissions using activity data and emission factors. To calculate emissions, the equation below is used:

Activity Data x Emission Factor = Emissions

Activity data refer to the relevant measurement of energy use or other greenhouse gas–generating processes such as fuel consumption by fuel type, metered annual energy consumption, and annual vehicle mileage by vehicle type. Emissions factors are calculated ratios relating emissions to a proxy measure of activity at an emissions source (e.g., CO_2 generated/kWh consumed). For a list of common emissions calculations see Table 2.2.

The guidelines in LGOP are meant to provide a common method for local governments to quantify and report greenhouse gas emissions by using comparable activity data and emissions factors. However, LGOP recognizes that local governments differ in how they collect data concerning their operations and that many are not able to meet the data needs of a given estimation method. Therefore, LGOP outlines both "recommended" and "alternative" methods

to estimate emissions from a given source. In this system, recommended methods are the preferred method for estimating emissions, as they will result in the most accurate estimate for a given emission source. Alternative methods often require less intensive data collection, but are likely to be less accurate. This approach allows local governments to estimate emissions based on the data currently available to them. It also allows local governments that are unable to meet the recommended methods to begin developing internal systems to collect the data needed to meet these methods.

This inventory has used the recommended activity data and emissions factors wherever possible, using alternative methods where necessary. For details on the methodologies used for each sector, see Appendix B.

A.1.5 Reporting Emissions

A.1.5.1 Significance Thresholds

Within any local government's own operations there will be emission sources that fall within Scope 1 and Scope 2 that are minimal in magnitude and difficult to accurately measure. Within the context of local government operations, emissions from leaked refrigerants and backup generators may be common sources of these types of emissions. For these less significant emissions sources, LGOP specifies that up to 5 percent of total emissions can be reported using estimation methods not outlined in LGOP.[15]

In this report, the following emissions fell under the significance threshold and were reported using best available methods:

- Scope 1 emissions from facility back up generators
- Scope 1 emissions from propane and of site fuel used by the City's fleet
- Scope 1 fugitive emissions from mobile refrigerants

A.1.5.2 Units Used in Reporting Emissions

LGOP requires reporting of individual gas emissions, and this reporting is included in Appendix B. In this narrative report, emissions from all gases released by an emissions source (e.g., stationary combustion of natural gas in facilities) are combined and reported in metric tons of carbon dioxide equivalent (CO_2e). This standard is based on the global warming potential (GWP) of each gas, which is a measure of the amount of warming a greenhouse gas may cause, measured against the amount of warming caused by carbon dioxide. For the GWPs of reported greenhouse gases, see Table 2.1.

15 In the context of registering emissions with an independent registry (such as the California Climate Action Registry), emissions that fall under the significance threshold are called *de minimis*. This term, however, is not used in LGOP and was not used in this inventory.

A.1.5.3 Information Items

Information items are emissions sources that, for a variety of reasons, are not included as Scope 1, 2, or 3 emissions in the inventory. In order to provide a more complete picture of emissions from a city's operations, however, these emissions can be quantified and reported.

No information items were identified in this report.

A.2 Baseline Years

Part of the local government operations emissions inventory process requires selecting a "performance datum" with which to compare current emissions, or a base year. Local governments should examine the range of data they have over time and select a year that has the most accurate and complete data for all key emission sources. It is also preferable to establish a base year several years in the past to be able to account for the emissions benefits of recent actions. A local government's emissions inventory should comprise all greenhouse gas emissions occurring during a selected *calendar* year.

For the San Diego Regional Climate Protection Initiative, 2005 was chosen as the baseline year, since this year is increasingly becoming the standard for such inventories; the 1990 baseline year for California is usually difficult for most local governments to meet and would not produce the most accurate inventory.

After setting a base year and conducting an emissions inventory for that year, local governments should make it a practice to complete a comprehensive emissions inventory on a regular basis to compare to the baseline year. ICLEI recommends conducting an emissions inventory at least every five years.

Appendix B:
LGOP Standard Report

Local Government Operations Standard Inventory Report

1. Local Government Profile

Jurisdiction Name:	City of La Mesa
Street Address:	8130 Allison Avenue
City, State, ZIP, Country:	La Mesa, CA 91942
Website Address:	www.cityoflamesa.com
Size (sq. miles):	9
Population:	56,666
Annual Budget:	50,000,000
Employees (Full Time Equivalent):	267
Climate Zone:	3B
Annual Heating Degree Days:	1063 *
Annual Cooling Degree Days:	866 **
Lead Inventory Contact Name:	Scott Munzenmaier
Title:	Administrative Analyst I
Department:	Public Works
Email:	smunzenmaier@ci.la-mesa.ca.us
Phone Number:	619.667.1338

* http://www.ncdc.noaa.gov/oa/climate/online/ccd/nrmhdd.txt
** http://www.ncdc.noaa.gov/oa/climate/online/ccd/nrmcdd.txt

Services Provided:

☐ Water treatment	☐ Mass transit (buses)	☐ Hospitals	☐ Natural gas utility
☐ Water distribution	☐ Mass transit (light rail)	☐ Airport	☐ Other (Specify below)
☐ Wastewater treatment	☐ Mass transit (ferries)	☐ Seaport/shipping terminal	
☑ Wastewater collection	☐ Schools (primary/secondary)	☐ Marina	
☐ Electric utility	☐ Schools (colleges/universities)	☐ Stadiums/sports venues	
☑ Fire Protection	☐ Solid waste collection	☐ Convention center	
☑ Police	☐ Solid waste disposal	☑ Street lighting and traffic signals	

2. GHG Inventory Details

Reporting Year:	2005
Protocol Used:	Local Government Operations Protocol, Version 1.0 (September 2008)
Control Approach:	Operational Control

GHG Emissions Summary (All Units in Metric Tons Unless Stated Otherwise)

Note: CO_2e totals listed here are summed totals of the estimated emissions of each inventoried gas based upon their global warming potentials (Appendix E of LGOP)

BUILDINGS & OTHER FACILITIES

SCOPE 1

	CO_2e	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6
Stationary Combustion	257.059	256.399	0.024	0.000			
Fugitive Emissions							
Total Direct Emissions from Buildings & Facilities	257.059	256.399	0.024	0.000	0.000	0.000	0.000

SCOPE 2

	CO_2e	CO_2	CH_4	N_2O
Purchased Electricity	405.883	402.920	0.021	0.008
Purchased Steam				
District Heating & Cooling				
Total Indirect Emissions from Buildings & Facilities	405.883	402.920	0.021	0.008

SCOPE 3

	CO_2e
See list at bottom for some examples	

INDICATORS

Operating Hours	
Square Footage	130,811.000
Number of Employees	

STREETLIGHTS AND TRAFFIC SIGNALS

SCOPE 2

	CO_2e	CO_2	CH_4	N_2O
Purchased Electricity	413.236	410.219	0.022	0.008
Total Indirect Emissions from Streetlights and Traffic Signals	413.236	410.219	0.022	0.008

SCOPE 3

	CO_2e
See list at bottom for some examples	

INDICATORS

The city operates 225 traffic signals and 967 street lights

WATER DELIVERY FACILITIES

SCOPE 2

	CO_2e	CO_2	CH_4	N_2O
Purchased Electricity	5.195	5.157	0.000	0.000
Purchased Steam				
District Heating & Cooling				
Total Indirect Emissions from Water Delivery Facilities	5.195	5.157	0.000	0.000

SCOPE 3

	CO_2e
See list at bottom for some examples	

INDICATORS

Gallons of Drinking Water Treated	
Gallons of Water Transported	

VEHICLE FLEET

SCOPE 1

	CO_2e	CO_2	CH_4	N_2O	HFCs	PFCs
Mobile Combustion	862.213	809.935	0.019	0.026		
Fugitive Emissions					13.280	
Total Direct Emissions from Vehicle Fleet	862.213	809.935	0.019	0.026	13.280	0.000

SCOPE 2

	CO_2e	CO_2	CH_4	N_2O
Purchased Electricity for Electric Vehicles				
Total Indirect Emissions from Vehicle Fleet	0.000	0.000	0.000	0.000

SCOPE 3

	CO_2e
See list at bottom for some examples	

INDICATORS

Number of Vehicles	138
Vehicle Miles Traveled	679,432
Number of Pieces of Equipment	20
Equipment Operating Hours	

WASTE GENERATION

SCOPE 3

	CO_2e
Waste All Facilities	115.164

INDICATORS

Short tons of solid waste accepted for disposal	454.12
Short tons of recyclable materials accepted for processing	51.70

EMPLOYEE COMMUTE

SCOPE 3

	CO_2e
Mobile Combustion	997.699

INDICATORS

Vehicle Miles Traveled	1,164,851
Number of Vehicles	

Total Emissions

	CO_2e	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6
SCOPE 1	1,119.272	1,066.334	0.044	0.027	13.280	0.000	0.000
SCOPE 2	824.315	818.296	0.043	0.016	0.000	0.000	0.000
SCOPE 3	1,112.863						
INFORMATION ITEMS							

POSSIBLE SOURCES OF OPTIONAL SCOPE 3 EMISSIONS

- Employee Commute
- Employee Business Travel
- Emissions From Contracted Services
- Upstream Production of Materials and Fuels
- Upstream and Downstream Transportation of Materials and Fuels
- Waste Related Scope 3 Emissions
- Purchase of Electricity Sold to an End User
- Transmission and Distribution Losses from Consumed Electricity
- Other Scope 3

POSSIBLE INFORMATION ITEMS

- Biogenic $C0_2$ from Combustion
- Carbon Offsets Purchased
- Carbon Offsets Sold
- Renewable Energy Credits (Green Power) Purchased
- Renewable Energy Credits Sold (GreenPower)
- Ozone-depleting Refrigerants/Fire Suppressants not in LGOP
- Other Information Items

Local Government Operations Standard Inventory Report

3. Activity Data Disclosure

Every emission source must be accompanied by a reference for the activity data. This worksheet is meant to assist in recording activity data and the methods used to gather those data for government operations. Activity data represent the magnitude of human activity resulting in emissions; data on energy use, fuel consumtion, vehicle miles traveled, and waste generation are all examples of activity data that are used to compute GHGs. Detailed disclosure should be made of the activity data used and at what quantities. This disclosure should also cite the source(s) of the data and the methodology used, including whether that methodology is a recommended method or an alternate method.

Deviations from the primary methodology should be explained in detail. All assumptions and estimations should be cited as such. Local governments may also use this space in the reporting format to discuss the rationale for the inclusion or exclusion of optional inventory components. It is good practice to include appropriate citations (such as website URL, report title, etc) and all contact information that is necessary to verify the source and accuracy of the activity data.

BUILDINGS & OTHER FACILITIES (Chapter 6)

SCOPE 1

Stationary Combustion

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit	Data Sources and References
Natural Gas	CO_2e					
	CO_2	Primary	Known Fuel Use (utitity bill)	48,160	Therm	SDGE, Steve Campbell,
	CH_4	Primary	Known Fuel Use (utitity bill)	48,160	Therm	SDGE, Steve Campbell,
	N_2O	Primary	Known Fuel Use (utitity bill)	48,160	Therm	SDGE, Steve Campbell,
	HFCs					
	PFCs					
	SF_6					
Generators	CO_2e					
	CO_2	Primary	Estimate based on Run Time	85	Gallon	Mike Carlin, mcarlin@ci.la-
	CH_4	Primary	Estimate based on Run Time	85	Gallon	Mike Carlin, mcarlin@ci.la-
	N_2O	Primary	Estimate based on Run Time	85	Gallon	Mike Carlin, mcarlin@ci.la-
	HFCs					
	PFCs					
	SF_6					

SCOPE 2

Purchased Electricity

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit	Data Sources and References
Electricity	CO_2e					
	CO_2	Primary	Known Fuel Use (utitity bill)	1,625,529	kWh	SDGE, Steve Campbell,
	CH_4	Primary	Known Fuel Use (utitity bill)	1,625,529	kWh	SDGE, Steve Campbell,
	N_2O	Primary	Known Fuel Use (utitity bill)	1,625,529	kWh	SDGE, Steve Campbell,
	HFCs					
	PFCs					
	SF_6					

STREETLIGHTS AND TRAFFIC SIGNALS (Chapter 6.2)

SCOPE 2

Purchased Electricity

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit	Data Sources and References
Electricity (Streetlights, Traffic Signals and Outdoor Lighting)	CO_2e					
	CO_2	Primary	Known Electricity Use	1,654,976	kWh	SDGE, Steve Campbell,
	CH_4	Primary	Known Electricity Use	1,654,976	kWh	SDGE, Steve Campbell,
	N_2O	Primary	Known Electricity Use	1,654,976	kWh	SDGE, Steve Campbell,
	HFCs					
	PFCs					
	SF_6					

WATER DELIVERY FACILITIES (Chapter 6)

SCOPE 2

Purchased Electricity

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit	Data Sources and References
Electricity	CO_2e					
	CO_2	Primary	Known Electricity Use	20,807	kWh	SDGE, Steve Campbell,
	CH_4	Primary	Known Electricity Use	20,807	kWh	SDGE, Steve Campbell,
	N_2O	Primary	Known Electricity Use	20,807	kWh	SDGE, Steve Campbell,
	HFCs					
	PFCs					
	SF_6					

VEHICLE FLEET (Chapter 7)

SCOPE 1

Mobile Combustion

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit	Data Sources and References
Gasoline	CO_2e					
	CO_2	Primary	Known Fuel Use	64,741	Gallon	Jack Phillips, 619-667-1393,
	CH_4	Primary	Annual Mileage by vehicle type, model year, and fuel type	Varies by vehicle type, model year,	miles	Jack Phillips, 619-667-1393, jphillips@ci.la-mesa.ca.us
	N_2O	Primary	Annual Mileage by vehicle type, model year, and fuel type	Varies by vehicle type, model year,	miles	Jack Phillips, 619-667-1393, jphillips@ci.la-mesa.ca.us
	HFCs					
	PFCs					
	SF_6					

Diesel	CO_2e					
	CO_2	Primary	Known Fuel Use	22,409	Gallon	Jack Phillips, 619-667-1393,
	CH_4	Primary	Annual Mileage by vehicle type, model year, and fuel type	Varies by vehicle type, model year,	miles	Jack Phillips, 619-667-1393, jphillips@ci.la-mesa.ca.us
	N_2O	Primary	Annual Mileage by vehicle type, model year, and fuel type	Varies by vehicle type, model year,	miles	Jack Phillips, 619-667-1393, jphillips@ci.la-mesa.ca.us
	HFCs					
	PFCs					
	SF_6					

Fugitive Emissions

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit	Data Sources and References
Refrigerants	R-134A	Alternate	Estimation based on fleet inventory and refrigerants used	34	Kg	Jack Phillips, 619-667-1393, jphillips@ci.la-mesa.ca.us

WASTE GENERATION (Scope 3)

SCOPE 3

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit	Data Sources and References
Generated Waste	CH_4	Alternate	Estimated waste weight based upon volume and number of containers	454	Tons	Jeff Ritchie, V.P.- EDCO

EMPLOYEE COMMUTE (Scope 3)

SCOPE 3

Stationary Combustion

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit	Data Sources and References
Gasoline	CO_2e					
	CO_2	Alternate	Proxy Year Estimated Fuel Use-based upon daily vehicle miles traveled for all repspondents extrapolated to represent all local government employees	96,848	gallons	Online and paper surveys of all employees; see Appendix C of Narrative report for examples; Data in posession of Scott Munzenmaier, Administrative Analyst I, Public Works
	CH_4	Alternate	Proxy Year Estimated Fuel Use-based upon daily vehicle miles traveled for all repspondents extrapolated to represent all local government employees	96,848	gallons	Online and paper surveys of all employees; see Appendix C of Narrative report for examples; Data in posession of Scott Munzenmaier, Administrative Analyst I, Public Works
	N_2O	Alternate	Proxy Year Estimated Fuel Use-based upon daily vehicle miles traveled for all repspondents extrapolated to represent all local government employees	96,848	gallons	Online and paper surveys of all employees; see Appendix C of Narrative report for examples; Data in posession of Scott Munzenmaier, Administrative Analyst I, Public Works
	HFCs					
	PFCs					
	SF_6					

Diesel	CO_2e					
	CO_2	Alternate	Proxy Year Estimated Fuel Use-based upon daily vehicle miles traveled for all repspondents extrapolated to represent all local government employees	15,677	gallons	Online and paper surveys of all employees; see Appendix C of Narrative report for examples; Data in posession of Scott Munzenmaier, Administrative Analyst I,
	CH_4	Alternate	Proxy Year Estimated Fuel Use-based upon daily vehicle miles traveled for all repspondents extrapolated to represent all local government employees	15,677	gallons	Online and paper surveys of all employees; see Appendix C of Narrative report for examples; Data in posession of Scott Munzenmaier, Administrative Analyst I, Public Works
	N_2O	Alternate	Proxy Year Estimated Fuel Use-based upon daily vehicle miles traveled for all repspondents extrapolated to represent all local government employees	15,677	gallons	Online and paper surveys of all employees; see Appendix C of Narrative report for examples; Data in posession of Scott Munzenmaier, Administrative Analyst I, Public Works
	HFCs					
	PFCs					
	SF_6					

POSSIBLE SOURCES OF OPTIONAL SCOPE 3 EMISSIONS
Employee Commute
Employee Business Travel
Emissions From Contracted Services
Upstream Production of Materials and Fuels
Upstream and Downstream Transportation of Materials and Fuels
Waste Related Scope 3 Emissions
Purchase of Electricity Sold to an End User
Transmission and Distribution Losses from Consumed Electricity
Other Scope 3

POSSIBLE INFORMATION ITEMS
Biogenic CO_2 from Combustion
Carbon Offsets Purchased
Carbon Offsets Sold
Renewable Energy Credits (Green Power) Purchased
Renewable Energy Credits Sold (GreenPower)
Ozone-depleting Refrigerants/Fire Suppressants not in LGOP
Other Information Items

Local Government Operations Standard Inventory Report

ICLEI Local Governments for Sustainability

4. Calculation Methodology Disclosure

In addition to activity data, every emission source must be accompanied by the emission factor used, a reference for each emission factor, and the calculation

STREETLIGHTS AND TRAFFIC SIGNALS (Chapter 6.2)

SCOPE 2

Purchased Electricity

Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Electricity (Streetlights, Traffic Signals and Outdoor Lighting)	CO_2e			
	CO_2	Default	546.46 lbs /MWh	SDG&E (2005); LGOP v1 Table G.5
	CH_4	Default	0.029 lbs/ MWh	CA Grid Average (2004 proxy); LGOP v1 Table G.6
	N_2O	Default	0.011 lbs /MWh	CA Grid Average (2004 proxy); LGOP v1 Table G.6
	HFCs			
	PFCs			
	SF_6			

BUILDINGS & OTHER FACILITIES (Chapter 6)

SCOPE 1

Stationary Combustion

Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Natural Gas	CO_2e			
	CO_2	Default	53.06 kg/MMBtu	LGOP v1 Table G.1
	CH_4	Default	5 g/MMBtu	LGOP v1 Table G.3
	N_2O	Default	0.1 g/MMBtu	LGOP v1 Table G.3
	HFCs			
	PFCs			
	SF_6			
Generators-Diesel; Natural Gas	CO_2e			
	CO_2	Default	73.15 kg/MMBtu ;53.06 kg/MMBtu	LGOP v1 Table G.1
	CH_4	Default	11 g/MMBtu ;5 g/MMBtu	LGOP v1 Table G.3
	N_2O	Default	.6 g/MMBtu ; 0.1 g/MMBtu	LGOP v1 Table G.3
	HFCs			
	PFCs			
	SF_6			

SCOPE 2

Purchased Electricity

Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Electricity	CO_2e			
	CO_2	Default	546.46 lbs /MWh	SDG&E (2005); LGOP v1 Table G.5
	CH_4	Default	0.029 lbs/ MWh	CA Grid Average (2004 proxy); LGOP v1 Table G.6
	N_2O	Default	0.011 lbs /MWh	CA Grid Average (2004 proxy); LGOP v1 Table G.6
	HFCs			
	PFCs			
	SF_6			

WATER DELIVERY FACILITIES (Chapter 6)

SCOPE 2

Purchased Electricity

Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Electricity	CO_2e			
	CO_2	Default	546.46 lbs /MWh	SDG&E (2005); LGOP v1 Table G.5
	CH_4	Default	0.029 lbs/ MWh	CA Grid Average (2004 proxy); LGOP v1 Table G.6
	N_2O	Default	0.011 lbs /MWh	CA Grid Average (2004 proxy); LGOP v1 Table G.6
	HFCs			
	PFCs			
	SF_6			

VEHICLE FLEET (Chapter 7)

SCOPE 1

Mobile Combustion

Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Gasoline	CO_2e			
	CO_2	Default	8.81 kg/gallon	LGOP v1 Table G.9
	CH_4	Default	Varies by model year	LGOP v1 Table G.10; Table G.12 for other equipment
	N_2O	Default	Varies by model year	LGOP v1 Table G.10; Table G.12 for other equipment
	HFCs			
	PFCs			
	SF_6			

Diesel	CO_2e			
	CO_2	Default	10.15 kg/gallon	LGOP v1 Table G.9
	CH_4	Default	Varies by model year	LGOP v1 Table G.10; Table G.12 for other equipment
	N_2O	Default	Varies by model year	LGOP v1 Table G.10; Table G.12 for other equipment
	HFCs			
	PFCs			
	SF_6			

Fugitive Emissions

Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Refrigerants	R- 134A	Default	GWP-1,300	LGOP v1 Table E.1&E.2

WASTE GENERATION (Scope 3)

SCOPE 3

Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Generated Waste	CH_4	Alternate	Varies by waste type	EPA Waste Reduction Model http://www.epa.gov/climatechange/wycd/waste/calculators/Warm_home.html; Public Administration waste charaterization

EMPLOYEE COMMUTE (Scope 3)

SCOPE 3

Stationary Combustion

Emissions Source Nam	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Gasoline	CO_2e			
	CO_2	Default	8.81 kg/gallon	LGOP v1 Table G.9
	CH_4	Default	.03451 g/mi	LGOP v1 Table G.13
	N_2O	Default	.04935 g/mi	LGOP v1 Table G.13
	HFCs			
	PFCs			
	SF_6			

Diesel	CO_2e			
	CO_2	Default	10.15 kg/gallon	LGOP v1 Table G.9
	CH_4	Default	.00098 g/mi	LGOP v1 Table G.13
	N_2O	Default	.00148 g/mi	LGOP v1 Table G.13
	HFCs			
	PFCs			
	SF_6			

POSSIBLE SOURCES OF OPTIONAL SCOPE 3 EMISSIONS	POSSIBLE INFORMATION ITEMS
Employee Commute	Biogenic $C0_2$ from Combustion
Employee Business Travel	Carbon Offsets Purchased
Emissions From Contracted Services	Carbon Offsets Sold
Upstream Production of Materials and Fuels	Renewable Energy Credits (Green Power) Purchased
Upstream and Downstream Transportation of Materials and Fuels	Renewable Energy Credits Sold (GreenPower)
Waste Related Scope 3 Emissions	Ozone-depleting Refrigerants/Fire Suppressants not in LGOP
Purchase of Electricity Sold to an End User	Other Information Items
Transmission and Distribution Losses from Consumed Electricity	
Other Scope 3	

Appendix C: Employee Commute

Emissions from employee commutes make up an important source of emissions from any local government's operations. The scale of emissions from employee commutes is often large in comparison with many other facets of local government operations, and local governments can affect how their employees get to and from work through a variety of incentives. For this reason, ICLEI recommends estimating emissions from employee commutes as part of a complete government operations greenhouse gas emissions inventory.

To assist in the data collection process, ICLEI provided the jurisdictions with both an online and a paper copy of an employee commute survey.[16] The questions in the survey were aimed at finding three categories of information:

- **Activity data** to calculate emissions from employee commute (vehicles miles traveled, vehicle type, vehicle model year) both current and in 2005.
- **Indicator data** to help La Mesa understand how much time and money employees spend as they commute, as well as how many employees use alternative modes of transportation to get to work.
- **Policy data** that will serve as guidance for La Mesa as it adopts policies aimed at reducing emissions from employee commutes. These questions asked employees for their interest in alternative modes of transportation as well as what policies would be most effective in allowing them to switch modes of transportation away from driving alone.

This section provides the emissions estimation methodology and both surveys. Individual survey results are in the possession of La Mesa staff.

C.1 Methodology Summary

The methodology for estimating the employee commute emissions portion of the inventory is similar to the mobile emissions methodology outlined in the mobile emissions section of Appendix B. La Mesa administered the employee commute survey to 267 current employees working for the City, and 123 employees responded to the

16 The paper survey was administered only to employees that do not have access to a computer. The survey asked slightly different questions but was aimed at garnering the same emissions and policy-relevant data as the electronic survey.

survey (a response rate of 46 percent). The survey was administered in 2009 and current data was used as a proxy for 2005 data.

To calculate emissions, the survey collected the following information:

- The number of days and number of miles employees drive alone to work (one-way) in an average week
- The number of days they carpooled and how often they drove the carpool in an average week
- The vehicle type of their vehicle and the type of fuel consumed

When analyzing the survey results it became evident that while the majority of La Mesa staff work a 9/80 work week most responded to the survey with a 4 or 5 day work week. Because this is only half of their schedule it is not as accurate as possible. This weekly data was converted into annual VMT estimates by the following equation:

Number of days driven to work/week x to-work commute distance x 2 x 48 weeks worked/year

Actual CO_2e emissions from respondents' vehicles were calculated by converting vehicle miles traveled per week by responding employees into annual fuel consumption by fuel type (gasoline, diesel). The VMT data collected were converted to fuel consumption estimates using fuel economy of each vehicle type.[17]

ICLEI then extrapolated estimated fuel consumption to represent La Mesa's 267 employees in 2009. This was a simple extrapolation, multiplying the estimated fuel consumption number by the appropriate factor to represent all current employees. For example, if 46 percent of employees responded, fuel consumption numbers were more than doubled to estimate fuel consumption for all employees. This is not a statistical analysis and no uncertainty has been calculated as there is uncertainty not only at the extrapolation point but also in the calculation of actual emissions. Therefore, the resulting calculated emissions should be seen as directional and not as statistically valid.

17 Fuel efficiency estimates from www.fueleconomy.gov, EPA *Green Fleets Guide* and other national sources.

C.2 Employee Commute Survey

1. Introduction
The purpose of this survey is to gather information on your commute to work so your employer can offer the best transportation options to you while reducing the jurisdiction's impact on the environment. The survey should take no more than 15 minutes.

Unless otherwise indicated, all questions refer to a ONE-WAY commute TO WORK only. Please do not include any traveling you do during work hours (meetings, site visits, etc). Any question with an asterisk (*) next to it requires an answer in order to proceed.

Please note that this survey is completely anonymous. We will not collect or report data on any individuals who respond to the survey.

Thank you very much.

2. Workplace
Please provide the following information regarding your workplace. Click "Next" at the bottom when finished or click "Prev" to go back.

*1. What local government do you currently work for?
Carlsbad
County of San Diego
Encinitas
Imperial Beach
La Mesa
National City
Poway
Solana Beach
San Marcos
Vista

*2. What department do you work in?

3. Commuter Background Information
Please provide the following information regarding your background. Click "Next" at the bottom when finished or click "Prev" to go back.

*1. What city/town do you live in?

*2. How many miles do you live from your place of work?
(please enter a whole number)

3. How many minutes does your commute to work typically take?
(please enter a whole number)

4. In a typical week, how much money do you spend on your ROUND TRIP commute? (transit fees, gas, tolls, etc-please enter a number)

5. If you drive to work, what type of vehicle do you usually drive?
Full-size auto
Mid-size auto
Compact/hybrid
Light truck/SUV/Pickup
Van

Heavy Truck
Motorcycle/scooter

6. What year is your vehicle?
(please enter a four digit year)

7. What type of fuel does your vehicle use?
Gas
Diesel
Biodiesel (B20)
Biodiesel (B99 or B100)
Electric
Other (please specify-if Ethanol please indicate grade)

4. Employment Information
Please provide the following information regarding your employment. Click "Next" at the bottom when finished or click "Prev" to go back.

1. Do you typically travel to work between 6-9 am Monday-Friday?
Yes
No
If No, please specify what time of day you commute:

2. Does your position allow you to have flexible hours or to telecommute?
Yes
No

*3. Are you a full time employee or part time employee?
Full
Part

5. Part Time Employees
Please provide the following information regarding your part time employment. Click "Next" at the bottom when finished or click "Prev" to go back.

*1. What is the average number of days you work per week?
(please enter a number)

6. Temporary Employees

Are you a temporary employee?
Yes
No

7. Temporary Employees

How many weeks is your temporary assignment? (please enter a number)

8. Current Daily Commute
Please provide the following information regarding your current daily commute. Click "Next" at the bottom when finished or click "Prev" to go back.

*1. In a typical week, do you drive to work alone at least once?
Yes
No

9. Drive Alone

Click "Next" at the bottom when finished or click "Prev" to go back.

*1. How many DAYS a week do you drive alone to work?
(please enter a number)

*2. How many MILES PER DAY do you drive TO WORK ONLY?
(please enter a number)

10. Carpool
Click "Next" at the bottom when finished or click "Prev" to go back.

*1. In a typical week, do you carpool to work at least once?
Yes
No

11. Carpool
*1. How many DAYS a week do you carpool?
(please enter a number)

*2. How many MILES do you drive TO WORK ONLY when you carpool?
(please enter a number)

3. How many PEOPLE are in your carpool?
(please enter a number)

*4. How many DAYS a week are you the driver of the carpool?
(please enter a number)

12. Public Transit
*1. In a typical week, do you take public transit to work at least once?
Yes
No

13. Public Transit
*1. How many DAYS a week do you take public transit TO WORK?
(please enter a number)

2. What type of public transit do you take TO WORK?
Bus
Ferry
Light Rail
Train
Other (please specify)

14. Bike/Walk
*1. In a typical week, do you bike or walk to work at least once?
Yes
No

15. Bike/Walk
1. How many DAYS a week do you bike to work?
(please enter a number)

2. How many DAYS a week do you walk to work?
(please enter a number)

16. Telecommute

1. If you telecommute:
How many DAYS do you telecommute in a typical week?
(please enter a number)
If you do not telecommute, leave this question blank.

17. Commute Preference Information
Please answer the following questions regarding your CURRENT commute.

1. Why have you chosen your current commute mode?

2. Would you consider taking any of the following transportation modes? (check all that apply):
Public Transportation
Carpooling
Vanpooling
Bicycling
Walking
Other (please specify)

*3. Is there a transit route that you would use to commute by public transit?
Yes
No

4. If no to question 3, please explain why not.

5. If you drive alone, which, if any, of the following benefits would encourage you to take alternative forms of transportation? (check all that apply)
Vanpool/carpool incentives
Pre-tax transit checks
Parking cash-out (reimbursement to give up your parking spot)
Improved transit options
Improved walking routes/conditions
Telecommuting option
Free/inexpensive shuttle
Free public transit benefit
Subsidizing bicycle purchase
Improved bike routes/conditions
Better information about my commute options
None of the above
Other (please specify)

28. Comments

1. If you have other concerns or issues related to your commute, or if something we should know about was not captured in any survey questions, please describe below.

29. Thank You
Thank you for responding to this survey!

Appendix D: Government-Generated Solid Waste Methodology

Emissions from the waste sector are an estimate of methane generation that will result from the anaerobic decomposition of all organic waste sent to landfill in the base year. It is important to note that although these emissions are attributed to the inventory year in which the waste is generated, the emissions themselves will occur over the 100+ year timeframe that the waste will decompose. This frontloading of emissions is the approach taken by EPA's Waste Reduction Model (WARM). Attributing all future emissions to the year in which the waste was generated incorporates all emissions from actions taken during the inventory year into that year's greenhouse gas release. This facilitates comparisons of the impacts of actions taken between inventory years and between jurisdictions. It also simplifies the analysis of the impact of actions taken to reduce waste generation or divert it from landfills.

D.1 Estimating Waste Tonnages from La Mesa's Operations

Like most local governments, La Mesa does not directly track the amount of waste generated from its operations. Therefore, to estimate the amount of waste generated, ICLEI worked with EDCO, the hauler of waste for La Mesa in 2009. The amount of waste was estimated by compiling pick-up accounts owned by the City. Garbage trucks do not weigh waste at each pick-up, therefore, it is not possible to directly track disposal figures in mass per facility. Mass of waste generation was estimated using volumetric container size (gallons, yards, etc.) data, along with pick-up frequency and average fill of containers. These data produced a comprehensive annual volumetric figure, which was then converted to mass using standard conversion factors supplied by the California Integrated Waste Management Board (CIWMB). Estimated waste *generation* was converted to final *disposal* (quantity sent to landfill) by applying average waste diversion percentages for each account. Where applicable, self-haul waste (waste brought directly from the local government to landfills) was included as part of this total.

D.2 Emissions Calculation Methods

As some types of waste (e.g., paper, plant debris, food scraps, etc.) generate methane within the anaerobic environment of a landfill and others do not (e.g., metal, glass, etc.), it is important to characterize the various

components of the waste stream. Waste characterization for government-generated solid waste was estimated using the CIWMB's 2004 statewide waste characterization study.[18]

Most landfills in the San Diego region capture methane emissions either for energy generation or for flaring. EPA estimates that 60 percent to 80 percent[19] of total methane emissions are recovered at the landfills to which La Mesa sends its waste. Following the recommendation of LGOP, ICLEI adopted a 75 percent methane recovery factor.

Recycling and composting programs are reflected in the emissions calculations as reduced total tonnage of waste going to the landfills. The model, however, does not capture the associated emissions reductions in "upstream" energy use from recycling as part of the inventory.[20] This is in-line with the "end-user" or "tailpipe" approach taken throughout the development of this inventory. It is important to note that, recycling and composting programs can have a significant impact on greenhouse gas emissions when a full lifecycle approach is taken. Manufacturing products with recycled materials avoids emissions from the energy that would have been used during extraction, transporting and processing of virgin material.

D.2.1 Methane Commitment Method

CO_2e emissions from waste disposal were calculated using the methane commitment method outlined in the EPA WARM model. This model has the following general formula:

$CO_2e = W_t * (1-R)A$

Where:

W_t is the quantify of waste type "t"

R is the methane recovery factor,

A is the CO_2e emissions of methane per metric ton of waste at the disposal site (the methane factor)

While the WARM model often calculates upstream emissions, as well as carbon sequestration in the landfill, these dimensions of the model were omitted for this particular study for two reasons:

This inventory functions on an end-use analysis, rather than a life-cycle analysis, which would calculate upstream emissions), and this inventory solely identifies emissions sources, and no potential sequestration "sinks."

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[18] CIWMB Waste Characterization Study-Public Administration Group available at http://www.ciwmb.ca.gov/WasteChar/BizGrpCp.asps.

[19] AP 42, section 2.4 Municipal Solid Waste, 2.4-6, http://www.epa.gov/ttn/chief/ap42/index.html

20 "Upstream" emissions include emissions that may not occur in your jurisdiction resulting from manufacturing or harvesting virgin materials and transportation of them.

Appendix E: Community Inventory Methodology

This appendix expands on the description of methodology provided in Section 2, describing in more detail the data sources and processes used to calculate emissions in the community inventory.

E.1 Overview of Inventory Contents and Approach

The community inventory describes emissions of the major greenhouse gases from the residential, commercial / industrial, transportation, solid waste, and wastewater sectors. As explained in Section 2, emissions are calculated by multiplying activity data—such as kilowatt hours or gallons of gasoline consumed—by emissions factors, which provide the quantity of emissions per unit of activity. Activity data is typically available from electric and gas utilities, planning and transportation agencies and air quality regulatory agencies. Emissions factors are drawn from a variety of sources, including the California Climate Action Registry, the Local Governments Operations Protocol, and air quality models produced by the California Air Resources Board (CARB).

In this inventory, all GHG emissions are converted into carbon dioxide equivalent units, or CO_2e, per guidance in the Local Government Operations Protocol (LGOP). The LGOP provides standard factors to convert various greenhouse gases into carbon dioxide equivalent units; these factors are known as Global Warming Potential factors, representing the ratio of the heat-trapping ability of each greenhouse gas relative to that of carbon dioxide.

The community inventory methodology is based on guidance from ICLEI's draft International Local Government GHG Emissions Analysis Protocol (IEAP), as well as methods utilized in the *San Diego County Greenhouse Gas Inventory* produced by the University of San Diego's Energy Policy Initiatives Center (EPIC), and in ongoing climate change planning work at SANDAG.

E.1.1 Emissions Sources Included and Excluded

In general, local jurisdictions should seek to measure all emissions of the six Kyoto Protocol greenhouse gases[18] occurring within the jurisdictional boundaries. In practice, this level of detail may not be feasible for the local jurisdiction. The table below describes sources included in this community inventory, followed by sources that were excluded:

Sector	Emissions Source	Sector	Emissions Source
Residential	Bundled Electricity	**Transportation**	***On-Road Transportation***
	Direct Access Electricity		Travel on Local/Regional Roads
	Bundled Natural Gas		Travel on State Highways
	Direct Access Natural Gas		
Commercial / Industrial	Bundled Electricity		***Off-Road Sources***
	Direct Access Electricity		Lawn and Garden Equipment
	Bundled Natural Gas		Construction Equipment
	Direct Access Natural Gas		Industrial Equipment
Solid Waste	Community-generated Solid Waste		Light Commercial Equipment
	Landfill Waste-in-Place	**Wastewater**	Community-generated Wastewater

Local governments will often choose to exclude emissions sources that meet the following criteria:

- ***Below the significance threshold***. In the ICLEI reporting standard, emissions sources can be excluded from the analysis (e.g. are "de minimis") if, when combined, the excluded emissions total less than 5% of the total of the emissions from the Community or Government Inventory.[19]
- ***Insufficient data or accepted standard methodology.*** The science is still evolving in many sectors, and accurate records or standards for measuring emissions are not always available. Examples include non-combustion industrial emissions sources or emissions from composting activities.
- ***Emissions largely located outside the jurisdiction's boundaries.*** These types of emissions could include such sources as aviation departing from local airports or regional transit emissions.

[18] CO_2, CH_4, N_2O, SF_6, perfluorocarbons (PFCs) and hydrofluorocarbons (HFCs)
[19] Note: an inventory should include at least 95% of the emissions released by the government and community as a whole. Therefore, if a large number of small emissions sources occur within the jurisdiction, they cannot all be ignored.

In this inventory, the following emissions were below the significance threshold and were not included:

- SF_6, perfluorocarbons (PFCs), and hydrofluorocarbon (HFCs) emissions
- N_2O emissions from transportation
- Emissions of minor off-road sources (those not included in the table above)
- Stationary emissions from propane and diesel fuels
- Non-combustion industrial emissions sources

The following sources were excluded because they occurred largely outside the jurisdiction's boundaries:

- Aviation
- Rail
- Regional public transit

E.2 Emissions Forecast

This inventory includes a "business-as-usual" forecast to 2020, estimating emissions that will occur if no new emissions reduction policies are implemented. The forecast is based on household, population, and job projections from SANDAG's *2030 Regional Growth Forecast Update*. As a business-as-usual projection, the forecast does not take into account legislation or regulation currently under development, and relies on demographic data as the basis for estimating growth in each sector. The forecasting approach varies for each sector:

- Residential emissions are based on projected growth in local jurisdiction *households*.
- Commercial / industrial sector emissions are correlated with forecasted *job growth* in the local jurisdiction.
- Transportation emissions are based on projected growth rates in *regional vehicle miles traveled* associated with SANDAG's Regional Transportation Plan 2030.
- Solid waste and wastewater emissions are correlated with forecasted *population* growth in the local jurisdiction.

E.3 The Built Environment: Residential, Commercial, and Industrial Sectors

Electricity and natural gas sold to San Diego Gas & Electric customers as bundled service (both energy generation and transmission/distribution) was provided by Benjamin Lopez at SDG&E. Direct access electricity and natural gas was also provided by SDG&E, which records the direct access resources that are distributed through its grid. Bundled SDG&E electricity emissions were calculated in ICLEI's CACP software using SDG&E-specific emissions factors provided by the California Climate Action Registry. Direct access electricity consumption was calculated in CACP using EPA eGrid emissions factors for the WECC California eGrid subregion. All natural gas

emissions were calculated in CACP with default emissions factors from the Local Government Operations Protocol.

E.4 On-road Transportation and Off-road Mobile Sources

E.4.1 On-road Transportation

On-road transportation emissions were derived from local jurisdiction vehicle miles traveled (VMT) data and regional vehicle and travel characteristics. Observed 2005 VMT on non-State facilities (referred to in the inventory as "local roads") was obtained from Caltrans' Highway Performance Monitoring System reports. VMT on state highways in the local jurisdiction was derived from a GIS shapefile output from the SANDAG transportation model, which is the basis of air quality reporting associated with the Regional Transportation Plan. For state highway segments that crossed jurisdictional boundaries, the segments were clipped in GIS and only the portion within the boundaries was accounted for.

The EMFAC2007 model developed by CARB was used to calculate emissions from these VMT figures. EMFAC defaults for San Diego County include regionally-specific information on the mix of vehicle classes and model years, as well as ambient conditions and travel speeds, that determine fuel efficiency. The model estimates carbon dioxide and methane emissions from these factors and inputted vehicle activity data.

Because inputting local VMT without changing regional defaults for vehicle population and vehicle trips would result in an over-estimation of emissions, regionally-specific ratios of VMT to vehicle population and trips were held constant.

EMFAC outputs are reported in short tons per day. Results were converted to metric tons per year. Because state highway VMT and associated emissions were based on average *weekday* traffic volumes, a 5-day to 7-day conversion factor was obtained from Caltrans and applied to the output to allow for annualizing.[20] Methane emissions were converted to carbon dioxide equivalent units based on the Global Warming Potential factor from LGOP.

E.4.2 Off-road Mobile Sources

Off-road emissions were obtained from the CARB OFFROAD2007 model. The model was run using default equipment population, usage, and efficiency data for San Diego 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.

[20] Provided by Kim Sturmer, Caltrans. The 2008 5-day to 7-day factor (only available) for state highways is 0.94.

Methane and nitrous oxide emissions were converted to carbon dioxide equivalent units based on the Global Warming Potential factors from LGOP.

E.5 Solid Waste

Emissions from solid waste were captured in two ways: emissions from landfills located in the jurisdiction in the base year ("landfill waste-in-place"), and future emissions from decomposition of waste generated in the local jurisdiction in the base year ("community-generated solid waste").

E.5.1 Landfill Waste-in-Place

Methane emissions were obtained from CARB, which utilized a First Order Decay Model (FOD) to estimate emissions from County waste disposal facilities.[21] The FOD model incorporates data on waste disposal and facility conditions extending back several decades to calculate methane and carbon dioxide equivalent emissions. In one case (Bonsall Sanitary Landfill), data was not available from CARB, and a figure based on observed emissions was provided by San Diego County. Data was not available for several inactive facilities in unincorporated San Diego County that were closed prior to reporting regulations came into effect; emissions from these facilities were not reported.

E.5.2 Community-Generated Solid Waste

Community-generated solid waste emissions were calculated in CACP using waste disposal data obtained from the California Integrated Waste Management Board Disposal Reporting System, which records tonnages of municipal solid waste and alternative daily cover by local jurisdiction. Emissions were calculated using the same methodology as described in Appendix D for government-generated solid waste.

E.6 Wastewater

This inventory utilizes wastewater emissions estimates from the EPIC San Diego County inventory. EPIC obtained a per capita wastewater emissions estimate from CARB for 2005. This figure was reduced to account for biogas capture at regional wastewater facilities using gas capture data provided by the San Diego County Air Pollution Control District. For the purposes of this inventory, this per capita County-wide emissions rate was scaled to the local jurisdiction level by population share.

[21] Provided by Larry Hunsaker, CARB, on November 27, 2007. This data is embedded in the community master data file provided to the local jurisdiction with this report.

Appendix F: Conducting a Monitoring Inventory

The purpose of this appendix is to assist La Mesa staff in conducting a monitoring inventory to measure progress against the baseline established in this inventory report. Conducting such an inventory represents milestone five of the Five- Milestone Process, and allows a local government to assess how well it is progressing toward achieving its emissions reduction targets.

This inventory was conducted by ICLEI in conjunction with Scott Munzenmaier, Administrative Analyst I at La Mesa, who served as the lead data gathering coordinator for the inventory. To facilitate a monitoring inventory, ICLEI has documented all of the raw data, data sources, and calculation methods used in this inventory. Future inventories should seek to replicate or improve upon the data and methods used in this inventory. Wherever possible, however, ICLEI strongly recommends institutionalizing internal data collection in order to be able to meet the recommended methods outlined in LGOP.

F.1 ICLEI Tools for Local Governments

ICLEI has created a number of tools for La Mesa to use to assist them in future monitoring inventories. These tools are designed to work in conjunction with LGOP, which is, and will remain, the primary reference document for conducting an emissions inventory. These tools include:

- A "master data sheet" that contains most or all of the raw data (including emails), data sources, emissions calculations, data templates, notes on inclusions and exclusions, and reporting tools (charts and graphs and the excel version of LGOP reporting tool).
- A copy of all electronic raw data, such as finance records or Excel spreadsheets.
- LGOP reporting tool (included in the master data sheet and in Appendix B) that has all activity data, emissions factors, and methods used to calculate emissions for this inventory.

- Sector-specific instructions that discuss the types of emissions, emissions calculations methods, and data required to calculate emissions from each sector, as well as instructions for using the data collection tools and calculators in the master data sheet.
- The appendices in this report include detailed methodologies for calculating emissions from Scope 3 employee commute and government-generated solid waste, as well as two versions of the employee commute survey.

It is also important to note that all ICLEI members receive on-demand technical assistance from their ICLEI liaison, which local staff should feel free to contact at any point during this process.

F.2 Relationship to Other San Diego Regional Climate Protection Initiative Inventories

While the emissions inventories for the 10 participating local governments were conducted simultaneously using the same tools, a local government operations inventory is based on data specific to each local government's operations. For this reason, data must be collected internally within each local government, and the availability of data (and thus emissions estimation methods) will vary between local governments.

That said, local governments in the San Diego Regional Climate Protection Initiative may benefit by cooperating during the re-inventorying process. For example, by coordinating inventories, they may be able to hire a team of interns to collectively perform the inventories – saving money in the process. In addition, local staff may be able to learn from each other during the process or conduct group training sessions if necessary. As a whole, the Climate Protection Initiative provides the basis for a continuing regional platform for climate actions, and ICLEI recommends taking advantage of this opportunity during all climate actions, including conducting future greenhouse gas emissions inventories.

F.3 Improving Emissions Estimates

One of the benefits of a local government operations inventory is that local government staff can identify areas in their current data collection systems where data collection can be improved. For example, a local government may not directly track fuel consumption by each vehicle and instead will rely upon estimates based upon VMT or purchased fuel to calculate emissions. This affects both the accuracy of the emissions estimate and may have other implications for government operations as a whole.

During the inventory process, ICLEI and local government staff identified the following gaps in data that, if resolved, would allow La Mesa to meet the recommended methods outlined in LGOP in future inventories.

- Direct tracking of refrigerants recharged into HVAC and refrigeration equipment
- Direct tracking of refrigerants recharged into fleet vehicles

- Direct tracking of offsite fuel use and propane use for vehicle fleet
- Direct tracking of CO_2 Fire extinguishers on each fire truck
- Fuel consumption by diesel and other generators
- Odometer readings of individual vehicles in the entire fleet
- Waste generated from government facilities

ICLEI encourages staff to review the areas of missing data and establish data collection systems for this data as part of normal operations. In this way, when staff are ready to re-inventory for a future year, they will have the proper data to make a more accurate emissions estimate.

F.4 Conducting the Inventory

ICLEI recommends the following approach for San Diego Regional Climate Protection Initiative local governments that wish to conduct a monitoring inventory:

Step 1: Identify a Climate Steward

This steward will be responsible for the jurisdiction's climate actions as a whole and could serve as an ICLEI liaison in all future climate work. In the context of a monitoring inventory, the steward will be responsible for initiating discussions on a new inventory.

Step 2: Determine which Sectors to Inventory

There are many ways to determine which sectors apply to a local government's operations, but the easiest to review will be LGOP Standard Report, which is located both in Appendix B and in the master data sheet. This document clearly delineates which sectors will need to be inventoried within a local government's operations and which LGOP sectors do not apply to a jurisdiction.

Step 3: Gather Support: Identify Data Gathering Team and Leads

Coordination and acceptance among all participating departments is an important factor in coordinating a successful inventory. To that end, the inventory coordinator should work with the city/town/county administrator to identify all staff who will need to be part of the inventory. To facilitate this process, ICLEI has documented all people associated with the inventory in the master data sheet—these names are located in the final completed data form for each sector. Once this team has been identified, the inventory coordinator should hold a kickoff meeting with the administrator, all necessary staff, and relevant department heads which clearly communicates the priority of the inventory in relationship to competing demands. At this meeting, the roles of each person, including the inventory coordinator, should be established.

Step 4: Review Types of Emissions and Available Methodologies for Applicable Sectors

Local staff should then review LGOP and the instructions documents provided through this inventory to better understand the types of emissions for each sector (for example, within Mobile Emissions, CO_2 emissions and CH_4/N_2O emissions represent two different data requirements and emissions calculations methodologies). Each emissions type may have more than one possible estimation methodology, and it is important that the inventory coordinator understands all possible methodologies and be able to communicate this to all parties assisting in the data gathering.

Step 5: Review Methodologies Used for the 2005 Inventory to Determine Data to Collect

In order to duplicate or improve upon the methods used in this inventory, local staff should again review the methods used for this inventory—these methods are again located in Appendix B—and within the master data sheet. These methods reflect the data limitations for each local government (as many local governments could not obtain data necessary to meet the recommended methods in LGOP). Wherever possible, these methods should be duplicated or, if it is possible, replaced with the recommended methods outlined in LGOP. Using these methodologies, staff will determine what data needs to be collected and communicate this effectively to the data gathering team.

Step 6: Begin Data Collection

With the exception of electricity and natural gas for stationary sources, all data collection will be internal. To obtain stationary source energy consumption data, staff will need to contact the ICLEI representative to determine who the contact is for SDG&E data (other utilities will need to be contacted directly).

Step 7: Use the Data Forms as a Resource During Data Gathering

A number of questions will come up during the data gathering process that may be difficult to answer. ICLEI has attempted to capture all of the questions that arose during the 2005 inventory and how they were addressed through the master data sheet. Within the master data sheet, staff should review the raw data, working data, and completed data forms to review how raw data was converted to final data, and also to review any notes taken by ICLEI staff during the 2005 inventory process.

For example, reviewing the stationary sources SDG&E data within the master data sheet will allow local staff to review how individual accounts were separated into each category and which counts may have been excluded from the inventory.

Step 8: Use Emissions Software to Calculate Emissions

ICLEI has provided the staff lead on the 2005 inventory with a backup of the software used to calculate many of the emissions included in this report. Staff should use this (or more current ICLEI software) to calculate emissions by inputting the activity data into the software. ICLEI staff and ICLEI trainings are available to assist local government staff in calculating emissions.

Step 9: Report Emissions

The master data sheet also contains the LGOP Standard Reporting Template, which is the template adopted by CARB as the official reporting template for government operations emissions inventory. This tool, as well as the charts and graphs tool provided by ICLEI can be used to report emissions from government operations. Also, local government staff should utilize this narrative report as guide for a narrative report if they so choose.

Step 10: Standardize and Compare to Base Year

Conducting a monitoring inventory is meant to serve as a measuring point against the baseline year represented in this report. In order to make a more accurate comparison, it is necessary to standardize emissions from stationary sources based upon heating and cooling degree days (staff can use a ratio of heating /cooling degree days to standardize across years).

In addition, it is important, when comparing emissions across years, to clearly understand where emissions levels may have changed due to a change in methodology or due to excluding an emissions source. For example, if the default method was used to estimate refrigerant leakage in 2005 (this method highly overestimates these emissions), and the recommended method was available in a monitoring year, this would appear as a dramatic reduction in these emissions even though actual leaked refrigerants may be similar to the base year. Changes such as these should not be seen as progress toward or away from an emissions reduction target, but emissions estimates should be adjusted to create as much of an apples-to-apples comparison as possible. If such an adjustment is not possible, staff should clearly note the change in methodology between years when comparing emissions.