City of Oakley

2005 Government Operations

Greenhouse Gas Emissions Inventory

Photo source: City of Oakley

Narrative Report

Produced by Isabelle Reining
Supported by Pacific Gas and Electric Company
In collaboration with Association of Bay Area Governments and
ICLEI-Local Governments for Sustainability USA

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Credits and Acknowledgements

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Pacific Gas and Electric Company (PG&E)

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Executive Summary

The Purpose of Conducting an Inventory

Each day, local governments operate buildings, vehicle fleets, street lights, traffic signals, water systems, and wastewater plants; local government employees consume resources commuting to work and generate solid waste which is sent for disposal. All of these activities directly or indirectly cause the release of carbon dioxide and other greenhouse gases into the atmosphere. This report presents the findings and methodology of a local government operations (LGO) greenhouse gas emissions inventory for the City of Oakley. Oakley is located in eastern Contra Costa County and covers over 16 square miles. With a 2005 population estimate[1] of 26,824, there were approximately 72 city employees. The City's annual 2005 budget was $26,206,299 for fiscal year 2004-2005 and $29,778,000 for fiscal year 2005-2006. The inventory measures the greenhouse gas emissions resulting specifically from the City of Oakley's government operations, arranged by sector to facilitate detailed analysis of emissions sources. The inventory addresses where and what quantity of emissions are generated through various local government activities. Through analysis of a local government's emissions profile, the City of Oakley can tailor strategies to achieve the most effective greenhouse gas emission reductions.

Strategies by which local governments can significantly reduce emissions from their operations include increasing energy efficiency in facilities and vehicle fleets, utilizing renewable energy sources, reducing waste, and supporting alternative modes of transportation for employees. The benefits of these actions include lower energy bills, improved air quality, and more efficient government operations, in addition to the mitigation of local and global climate change impacts. By striving to save taxpayer money through efficient government operations, Oakley is working to improve government services in a smart and targeted way that will benefit all of the City's residents.

The City of Oakley recognizes that climate change resulting from the greenhouse gas emissions of human activities is a reality. Global average surface temperatures are rising due to intensification of activities that release carbon dioxide and other greenhouse gases into the atmosphere. Oakley is located within climate zone 3, and characterized as hot-dry, according to U.S. Department of Energy's Climate Zones.[2] A hot-dry climate is defined as a region that receives less than 20 inches of annual precipitation and where the monthly average outdoor temperature remains above 45°F throughout the year. Oakley is located within the National Oceanic and Atmospheric Administration (NOAA) climate division 5 for California (San Joaquin Drainage). In 2005 this division had 2841 heating degree days[3] and 1328 cooling

[1]US Census Bureau Population Estimates for California: http://factfinder.census.gov/servlet/SAFFPopulation?_event=Search&geo_id=01000US&_geoContext=01000US&_street=&_county=oakley&_cityTown=oakley&_state=04000US06&_zip=&_lang=en&_sse=on&ActiveGeoDiv=geoSelect&_useEV=&pctxt=fph&pgsl=010&_submenuId=population_0&

[2] US Department of Energy Climate Zones: http://www1.eere.energy.gov/buildings/building_america/climate_zones.html

[3] Heating and Cooling Degree Days are a measurement designed to reflect demand for energy needed to heat or cool a facility, and are calculated as the difference between the average daily temperature for a region and a baseline temperature (usually 65 degrees F).

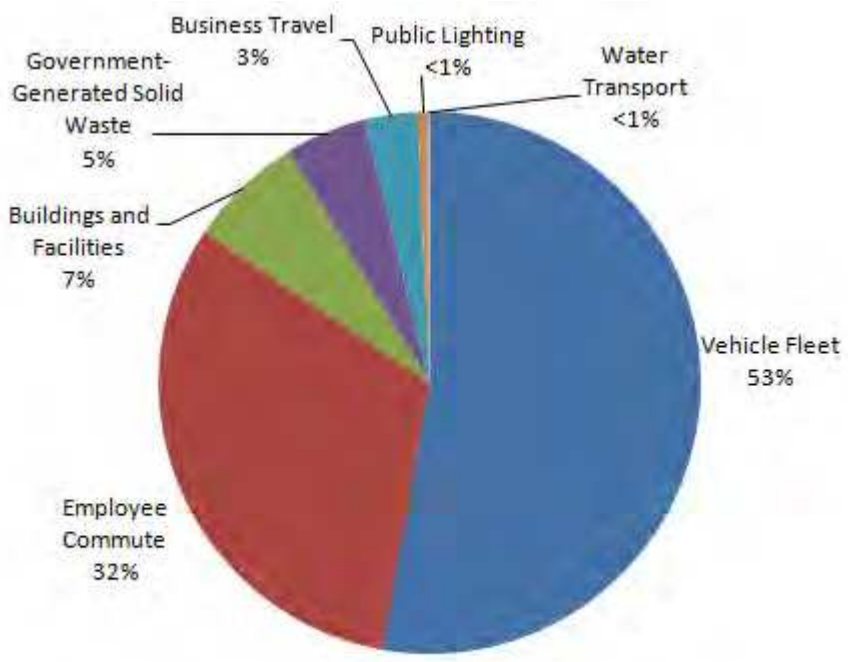
degree days.[4] Potential impacts of climate change include rising sea levels, more severe and frequent storms, increased flooding, greater rates of coastal erosion, loss of critical habitat and ecosystems, more severe heat waves, increased precipitation, extended drought conditions, larger wildfires, shortages in water supply, formation of ground level ozone, and heightened exposure to vector born diseases.

By conducting this inventory, Oakley is acting now to limit future impacts that threaten the lives and property of the City's residents and businesses, make government operations more efficient, and improve the level of service it offers to city residents.

Inventory Results

In 2005, the City of Oakley's greenhouse gas emissions from government operations totaled 764 metric tons of CO_2e. The following figures summarize the results of the LGO greenhouse gas emissions inventory, by sector and source. Figure 1 shows that the sector producing the most greenhouse gas emissions in the City of Oakley is the vehicle fleet (53%) followed by employee commute (32%). As shown in Figure 2, gasoline use is the source that contributes the majority of emissions in the City of Oakley (83%). Table 1 outlines the total emissions in terms of metric tons of carbon dioxide equivalent (CO_2 e) that fall under each scope, as well as by individual greenhouse gases.

Figure 1: 2005 Government Operations CO_2e Emissions by Sector



[4] http://www7.ncdc.noaa.gov/CDO/CDODivisionalSelect.jsp

Figure 2: 2005 Government Operations CO_2e Emissions by Source

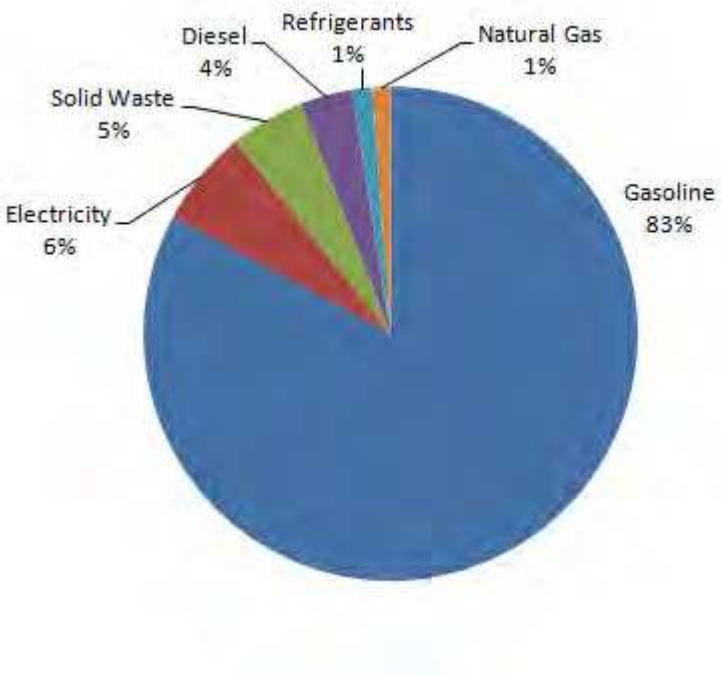


Table 1: LGO Protocol Report - Overall Emissions by Scope

Total Emissions							
	CO_2e	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6
Scope 1	346.900	335.031	0.011	0.006	0.008		
Scope 2	48.577	48.179	0.003	0.001	0.000		
Scope 3	368.210	328.383	1.775	0.008	0.000		
Information Items	269.592	141.347	0.009	0.003			

For more detail on the concepts of scopes, sources, and sectors, and to review more granular data produced through the inventory study, please refer to the full report on the following pages.

Regional and Local Context

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. The AB 32 Scoping Plan was developed to identify strategies for meeting the AB 32 goal, and was adopted by the California Air Resources Board (ARB) in December 2008. Among many other strategies, it encourages local governments to reduce emissions in their jurisdictions by 15 percent below current (i.e. 2008 or earlier) levels by 2020. 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) required the Office of Planning and Research to create greenhouse gas planning guidelines for the California Environmental Quality Act (CEQA). In addition, ARB 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 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 ARB to establish regional transportation-related greenhouse gas targets and requires the large MPOs to develop regional "Sustainable Communities Strategies" 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.

Pacific Gas and Electric Company Supports Inventory Project

With the support of Pacific Gas and Electric Company (PG&E), ICLEI - Local Governments for Sustainability was contracted to work with the Association of Bay Area Governments (ABAG) to assist in the quantification of greenhouse gas emissions in the City of Oakley and the following other participating communities: Sausalito, Napa, Yountville, Lafayette, Concord, Pleasant Hill, and Sonoma County jurisdictions. ICLEI is a nonprofit association of local governments that provides information, delivers training resources, organizes conferences, facilitates networking and city-to-city exchanges, carries out research and pilot projects, and offers technical and consultant services related to climate planning. Throughout the spring of 2011, ICLEI provided training and technical assistance to participating regional organizations, interns, and local government staff and facilitated the completion of this report. ABAG is the regional planning agency for the nine counties and 101 cities and towns in the San Francisco Bay Area region and provides opportunities for collaboration among these local governments to address regional issues. ABAG recruited local governments and interns for this project, and oversaw the training workshops and development of the emissions inventories and final reports.

Climate Change Mitigation Activities in Oakley

The City of Oakley has already begun to address energy efficiency and other greenhouse gas reduction issues. The following climate change mitigation measures have been taken or are in process in the City of Oakley:

- City Hall was built with a number of LEED recommended features to facilitate water and energy savings including recycled building materials, a cool roof, energy efficient HVAC systems, low to no VOC paint, and waterless urinals. Bike racks and showers are provided on-site to encourage bike commuting by employees.
- The City is installing energy efficient LED streetlights for energy conservation.
- The City has implemented an environmentally preferable purchasing policy that covers city supplies and requires environmental materials where possible in city projects.
- The City implemented a recycling program at City Hall and throughout the community in conjunction with Oakley Disposal to facilitate disposal of recyclables such as green-waste, plastic, glass, cardboard, and paper. Recycling bins are located at every workstation at City Hall.
- The City uses mulching lawnmowers and water efficient landscaping in parks and landscape areas.
- The City conducted a series of workshops on composting to educate the public about recycling organic materials and also provides discounted compost bins to the public.
- The City gives priority to and expedites Solar Photovoltaic Permit Submittals at no extra charge.
- The City has reduced Permit Fees by 50% for Energy Conserving Permits such as more efficient water heaters, skylights, dual pane window installations and HVAC change outs.

- The City added at least one hybrid vehicle to its vehicle fleet in 2010.
- The City is moving towards paper-less options for newsletters and agenda notifications.
- The City participated in the Earth Hour campaign on March 26, 2011 by powering down the civic center and community message board.
- The City has joined the Contra Costa County Climate Leaders and the International Council for Local Environmental Initiatives (ICLEI), two organizations dedicated to climate protection and sustainable development.

Photo source: City of Oakley

Introduction

General Methodology

Local Government Operations Protocol

A national standard called the Local Government Operations Protocol (LGO Protocol)[5] has been developed and adopted by the California Air Resources Board (ARB) in conjunction with ICLEI, the California Climate Action Registry, and The Climate Registry. This standard provides accounting principles, boundaries, quantification methods, and procedures for reporting greenhouse gas emissions from local government operations. The LGO Protocol forms the basis of ICLEI's Clean Air & Climate Protection Software (CACP 2009), which allows local governments to compile data and perform the emissions calculations using standardized methods.

Greenhouse Gases and Carbon Dioxide Equivalent

In accordance with LGO Protocol recommendations, CACP 2009 calculates and reports all six internationally recognized greenhouse gases regulated under the Kyoto Protocol (Carbon Dioxide, Methane, Nitrous Oxide, Hydrofluorocarbons, Perfluorocarbons, and Sulfur Hexafluoride). Emissions summaries found throughout this report also use CACP 2009's ability to combine emissions from the various greenhouse gases into carbon dioxide equivalent, CO_2e. Since equal quantities of each greenhouse gas have more or less influence on the greenhouse effect, converting all emissions to a standard metric, CO_2e, allows apples-to-apples comparisons amongst quantities of all six emissions types. Greenhouse gas emissions are reported in this inventory as metric tons of CO_2e ($MTCO_2e$).

Table 2 exhibits the greenhouse gases and their global warming potential (GWP), a measure of the amount of warming a greenhouse gas may cause compared to the amount of warming caused by carbon dioxide.

Table 2: 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

[5] http://www.icleiusa.org/programs/climate/ghg-protocol/local-government-operations-protocol

Calculating Emissions

In general, emissions can be quantified in two ways.

1. Measurement-based methodologies refer to the direct measurement of greenhouse gas emissions from a monitoring system. Emissions measured this way may include those emitted from a flue of a power plant, wastewater treatment plant, landfill, or industrial facility. This method is the most accurate way of inventorying emissions from a given source, but is generally available for only a few sources of emissions.

2. Calculation-based methodologies refer to an estimate of emissions calculated based upon measurable ***activity data*** and ***emission factors***. Table 3 provides examples of common emissions calculations.

Table 3: Basic Emissions Calculations

Activity Data x	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

The Scopes Framework

This inventory reports greenhouse gas emissions by sector and additionally by "scope", in line with the LGO Protocol and World Resources Institute (WRI)/World Business Council for Sustainable Development (WBCSD) Greenhouse Gas Protocol Corporate Standard.

Scope 1: Direct emissions from sources within a local government's operations that it owns and/or controls, with the exception of direct CO_2 emissions from biogenic sources. 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 purchased or acquired electricity, steam, heating, or cooling.

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.

ICLEI and the LGO Protocol provide standard methodologies for calculating emissions from the sources shown in the following table. Other sources of emissions, such as those associated with the production of consumed products do not yet have standard calculation methodologies and are thus excluded from this inventory.

Table 4: Inventoried Emissions Sources by Scope

Scope 1	Scope 2	Scope 3
Fuel consumed at facilities	Purchased electricity consumed by facilities	Solid waste generated by government operations
Fuel consumed by vehicle fleet and mobile equipment	Purchased electricity consumed by electric vehicles	Fuel consumed by vehicles during employee commuting
Fuel consumed to generate electricity	Purchased steam	
Leaked refrigerants from facilities and vehicles	Purchased cooling (chilled water)	
Leaked / deployed fire suppressants		
Solid waste in government landfills		
Wastewater decomposition and treatment at a municipal wastewater treatment plant		

Organizational Boundaries

The organizational boundary for the inventory determines which aspects of operations are included in the emissions inventory, and which are not. Under the LGO Protocol, 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 policies that impact 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.

LGO Protocol 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, this inventory was conducted according to the operational control framework.

Types of Emissions

As described in the LGO Protocol, 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).

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, LGO Protocol specifies that up to 5 percent of total emissions can be reported using methodologies that deviate from the recommended methodologies in LGO Protocol. 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***.

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

- Scope 1 fugitive emissions from leaked refrigerants from HV/AC and refrigeration equipment
- Scope 1 mobile combustion CO_2 emissions from vehicle fleet
- Scope 1 CH_4 and N_2O emissions from vehicle fleet
- Scope 1 fugitive emissions from leaked refrigerants from vehicle fleet

Information Items

Information items are emissions sources that are not included as Scope 1, 2, or 3 emissions in the inventory, but are reported here separately in order to provide a more complete picture of emissions from Oakley's government operations.

A common emission that is categorized as an information item is the leakage of ozone depleting substances used as refrigerants and fire suppressants. Ozone depleting substances (including R-12, R-22, and Halons) are being phased out under the Montreal Protocol, an internationally accepted agreement designed to protect the ozone layer. While these substances do have global warming potential, and therefore contribute to climate change, they are not classified as greenhouse gas emissions in the LGO protocol because they are already being phased out. However, ICLEI encourages local governments to assess their emissions from these leaked chemicals in order to get a better sense of emissions coming from leaked refrigerants.

Emissions from these chemicals and other Information Items are quantified for information purposes only are not included in any Scope 1, 2, or 3 emissions totals. Table 5 lists the quantity of emissions from information items in terms of carbon dioxide equivalent, CO_2e.

Information items quantified for this inventory include:

- Emissions from electricity used for LS-1 designated streetlights. These lights are owned, operated, maintained, and directly paid for by PG&E and billed to the City of Oakley.
- Ozone depleting chemicals used as refrigerant in air conditioning equipment (R-22).
- Dry chemical used in fire extinguisher equipment (ABC Dry Chemical). There are no emissions associated with this chemical, therefore it is not included in Table 5 below.

Table 5: LGO Protocol Report – Information Items

Information Items	CO_2e
PG&E owned and operated streetlights (LS-1)	142.5
Refrigerant R-22 or HFCF-22 (0.070208 metric tons)	127.1
Total Information Items	**269.6**

Understanding Totals

It is important to realize that the totals and sub-totals listed in the tables and discussed in this report are intended to represent all-inclusive, complete totals for the City of Oakley's operations. However, these totals are only a summation of inventoried emissions using available estimation methods. Each inventoried sector may have additional emissions sources associated with them that were unaccounted for, such as Scope 3 sources that could not be estimated.

Also, local governments provide different services to their citizens, and the scale of the services (and thus the emissions) is highly dependent upon the size and purview of the local government. For these reasons, comparisons between local government totals should not be made without keen analysis of the basis for figures and the services provided.

Photo source: City of Oakley

Inventory Results

Emissions Total

In 2005, Oakley's greenhouse gas emissions from government operations totaled 764 metric tons of CO_2e. This number represents a roll-up of emissions. It includes Scope 1, 2, and 3 emissions. While the roll-up is a valuable figure, the breakdown of emissions information from local government operations by scopes, sources, and sectors allows the comparative analysis and insight needed for effective decision-making on target setting, developing GHG reduction measures, or monitoring. The LGO Protocol and ICLEI identify reporting by scopes, sources, and sectors as the strongly preferred form of reporting a greenhouse gas inventory. For more details on the breakdown of Oakley's emissions by scopes, sources, and sectors, refer to subsequent sections within Inventory Results. Refer to the Understanding Totals section of this report's Introduction for more information on calculating totals.

Buildings and Other Facilities

Facility operations contribute to greenhouse gas emissions in two major ways. First, facilities consume electricity and fuels such as natural gas. This consumption is associated with the majority of greenhouse gas emissions from facilities. 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. Refrigerants and fire suppressants are very potent greenhouse gases, and have Global Warming Potential (GWP) of up to many thousand times that of CO_2. For example, HFC-134a, a very common refrigerant, has a GWP of 1300, or 1300 times that of CO_2. Therefore, even small amounts of leaked refrigerants can have a significant effect on greenhouse gas emissions.

In 2005 Oakley operated seven facilities. At that time city offices and the police department were housed throughout several facilities including a portion of the current City Hall building, an additional office space, and a temporary office trailer in downtown Oakley. The inventory also includes emissions from a community building, a retail store, and the two city parks with PG&E energy use at restrooms or other facilities (Crockett Park and Laurel Ballfields). Data relating to electricity consumption for buildings and facilities was obtained from PG&E and data for refrigerants was obtained from Oakley staff.

The buildings and facilities operated by the City of Oakley account for 52 metric tons of CO_2e as shown in Table 6. This sector contributes 7% of the City's total government operations CO_2 emissions as shown previously in Figure 1. Table 6 and Figure 3 show emissions by facility and that City Hall produces the highest emissions (40 metric tons of CO_2e) which are 76% of the total emissions for the buildings and facilities sector, followed by parks (14%) and other buildings (10%). Figure 4 and Table 7 show emissions by the fuel or refrigerant source used to operate these buildings

and facilities. Electricity use accounts for the majority of these emissions (83%), followed by natural gas (17%), and a very small contribution from refrigerants (less than 1%). Table 8 shows the top five facilities that contribute emissions to this sector, listed in order of total emissions. Scope 2 emissions from purchased electricity are the highest emission type in this sector, as shown in Table 9.

Figure 3: Buildings and Other Facilities Emissions by Facility

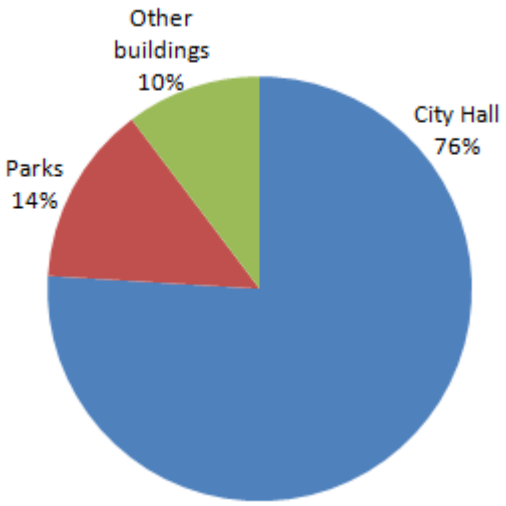


Table 6: Buildings and Other Facilities Emissions by Facility

Facility	metric tons CO2e
City Hall	39.8
Parks	7.2
Other buildings	5.4
Totals	**52**

Figure 4: Buildings and Other Facilities Emissions by Source

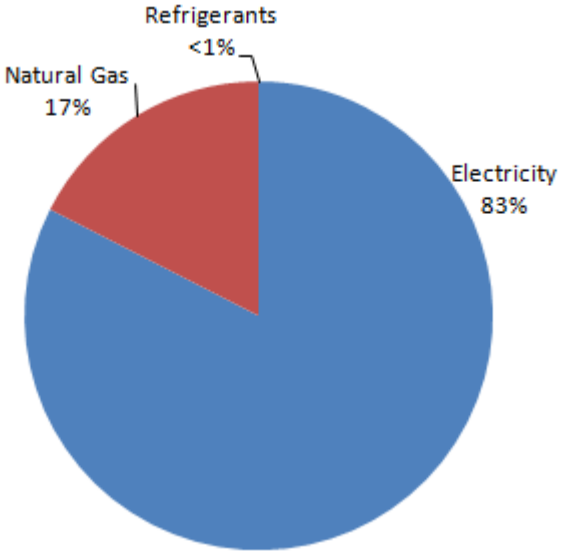


Table 7: Buildings and Other Facilities Emissions by Source

Source	metric tons CO2e	Cost ($)	Consumption
Electricity	43.2	$ 30,355	193,284 kWh
Natural Gas	9.2	$ 2,359	1,724 therms
Refrigerants	0.0	-	0.000003 tonnes HFC-134a
Totals	**52**	**$ 32,714**	

Table 8: Top 5 Largest Contributors to Emissions from Buildings Sector

Facility	% of Five Largest Contributors Total Emissions from Electricity	% of Five Largest Contributors Total Emissions from Natural gas	% of Five Largest Contributors Total Emissions from Other Sources	CO2e Emissions from Electricity	CO2e Emissions from Natural Gas	CO2e Emissions from Other Sources	Total CO2e Emissions
City Hall	65%	12%	0%	33.6	6.3	0.0	39.8
Crockett Park	7%	0%	0%	3.8			3.8
Laurel Ballfields	7%	0%	0%	3.4			3.4
Community Building	2%	4%	0%	1.0	2.3		3.3
Office Space	2%	1%	0%	1.0	0.6		1.6
Totals	**82%**	**18%**	**0%**	**43**	**9**	**0**	**52**

Table 9: LGO Protocol Report - Buildings Sector Emissions by Scope and Emission Type

BUILDINGS & OTHER FACILITIES

Scope	Emission Type	Greenhouse Gas Emissions (metric tons)						
SCOPE 1		CO_2e	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6
	Stationary Combustion	9.164	9.141	0.001	0.000			
	Fugitive Emissions	0.004				0.000		
	Total Direct Emissions	**9.168**	**9.141**	**0.001**	**0.000**	**0.000**		
SCOPE 2		CO_2e	CO_2	CH_4	N_2O			
	Purchased Electricity	43.240	42.886	0.003	0.001			
	Purchased Steam							
	District Heating & Cooling							
	Total Indirect Emissions	**43.240**	**42.886**	**0.003**	**0.001**			
SCOPE 3		CO_2e						
	[*Not Applicable*]							
INDICATORS	Operating Hours							
	Square Footage							
	Number of Employees	72						

Streetlights, Traffic Signals, and Other Public Lighting

Like most local governments, Oakley operates a range of public lighting including traffic signals and streetlights. All of the emissions associated with the operation of this infrastructure are due to electricity consumption. Data relating to electricity consumption for public lighting was obtained from PG&E.

Figure 5 and Table 10 below show that streetlights account for 80% of emissions from public lighting in the City of Oakley, while traffic signals and controllers account for 20%. As shown in Table 11, all of the emissions in this sector fall under Scope 2 – Purchased Electricity.

Information on the PG&E streetlights designated as LS-1 accounts is included at the bottom of Table 10. These lights are owned, operated, maintained and directly paid for by PG&E; and billed to the City of Oakley. The LS-1 emissions of 143 metric tons of CO_2e are included as an "Information Item" because they provide a more comprehensive look at emissions from public lighting and are a potential source of emissions reductions.

Figure 5: Public Lighting Emissions by Subsector

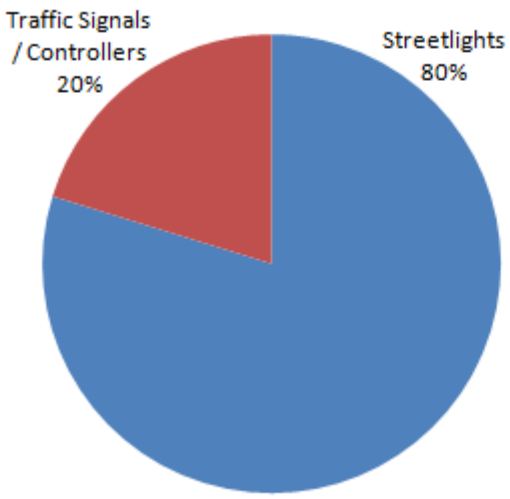


Table 10: Public Lighting Emissions by Subsector

Subsector (Light Type)	metric tons CO2e	% of Sector Emissions	Electricity Use (kWh)	Cost ($)
Streetlights	3.1	80%	13,808	$ 1,455
Traffic Signals / Controllers	0.8	20%	3,504	$ 569
Totals	**4**	**100%**	**17,312**	**$ 2,024**
Information item:				
PG&E owned and operated streetlights (LS-1)	143		637,046	$ 161,480

Table 11: LGO Protocol Report – Public Lighting Emissions by Scope and Emission Type

STREETLIGHTS, TRAFFIC SIGNALS, AND OTHER PUBLIC LIGHTING					
Scope	**Emission Type**	**Greenhouse Gas Emissions (metric tons)**			
SCOPE 2		CO_2e	CO_2	CH_4	N_2O
	Purchased Electricity	3.873	3.841	0.000	0.000
	Total Indirect Emissions	3.873	3.841	0.000	0.000
SCOPE 3		CO_2e			
	[*Not Applicable*]				
INDICATORS					

Water Delivery Facilities

This sector includes emissions from equipment used for the distribution or transport of water, including drinking water, sprinkler systems and irrigation. The water transport equipment operated by Oakley includes sprinklers and irrigation controllers. All of the emissions associated with the operation of Oakley's water transport equipment are due to electricity consumption. Data relating to electricity consumption for water transport was obtained from PG&E.

Table 12 below shows that irrigation and sprinkler systems contribute 100% of water delivery emissions in the City of Oakley and a total of 1 metric ton of CO_2e. As shown in Table 13, these emissions fall under Scope 2 – purchased electricity and carbon dioxide is the primary greenhouse gas produced.

Table 12: Water Delivery Facilities Emissions by Subsector

Subsector (Equipment Type)	metric tons CO2e	% of Sector Emissions	Electricity Use (kWh)	Cost ($)
Irrigation / Sprinkler Systems	1.5	100%	6,546	$ 2,520
Totals	**1**	**100%**	**6,546**	**$ 2,520**

Table 13: LGO Protocol Report - Water Delivery Facilities Emissions by Scope and Emission Type

WATER TRANSPORT FACILITIES								
Scope	**Emission Type**	**Greenhouse Gas Emissions (metric tons)**						
SCOPE 1		CO_2e	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6
	Stationary Combustion							
	Total Direct Emissions							
SCOPE 2		CO_2e	CO_2	CH_4	N_2O			
	Purchased Electricity	1.464	1.452	0.000	0.000			
	Purchased Steam							
	District Heating & Cooling							
	Total Indirect Emissions	**1.464**	**1.452**	**0.000**	**0.000**			
SCOPE 3		CO_2e						
	[*Not Applicable*]							
INDICATORS	Gallons of Drinking Water Treated							
	Gallons of Water Transported							

Vehicle Fleet and Mobile Equipment

The vehicles and mobile equipment used in Oakley's daily operations, including police cruisers and maintenance trucks used for parks and recreation, burn gasoline which results in greenhouse gas emissions. In addition, vehicles with air conditioning or refrigeration equipment use refrigerants that can leak from the vehicle.

In 2005, Oakley operated a vehicle fleet of 24 passenger vehicles, three vans and one sport utility vehicle (SUV). Oakley's vehicle fleet performed a number of essential services, from law enforcement to parks maintenance and recreation programs. In 2005, the majority of vehicles in the fleet (89% percent) were used in the police department and all vehicles ran on gasoline. The vehicle fleet emissions data below also include a portion of gasoline used in vehicles and equipment operated by landscaping contractors when maintaining city property. Emissions for leaked refrigerants were calculated using the default method, which can significantly overestimate the actual amount of leaked refrigerant. This method is, however, in line with LGO Protocol methods and is a conservative approach used because more exact figures are not available. Please refer to the Inventory Methodologies section for a full description of the methods used.

The Vehicle Fleet sector is the largest contributor of greenhouse gas emissions from city operations. Figure 6 and Table 14 show that almost all (98%) of the vehicle fleet emissions in the City of Oakley come from gasoline, with a small amount (2%) of emissions from refrigerants. Figure 7 shows that police department vehicles contributed 80% of vehicle

fleet emissions, followed by landscaping contractors (17%) and recreation department vehicles (3%). It should be noted that the data used did not include vehicles in other departments (Building, Parks, and Public Works) but is considered representative of the vehicle fleet in 2005 based on the number and type of vehicles included in the data. Also, Figure 7 only includes gasoline emissions (not refrigerant emissions) because vehicle refrigerant emissions could not be assigned to individual departments. Table 15 includes the total vehicle fleet emissions in metric tons of CO_2e broken down by scope as well as individual greenhouse gases. Emissions from the city-owned vehicle fleet fall under Scope 1, but emissions from fuel used by landscaping contractors fall under Scope 3 because these operations are not directly controlled by the City.

Figure 6: Vehicle Fleet Emissions by Source

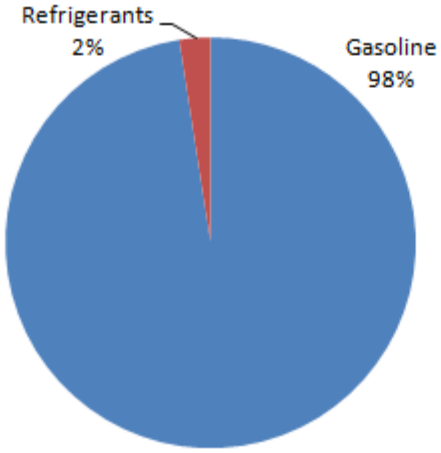


Table 14: Vehicle Fleet Emissions by Source

Source	metric tons CO_2e	Consumption	Cost ($)
Gasoline	393.4	44,580 gallons	$ 135,699
Refrigerants	9.9	0.01 metric tons	-
Totals	**403**		**$ 135,699**

Figure 7: Vehicle Fleet Gasoline Emissions by Department

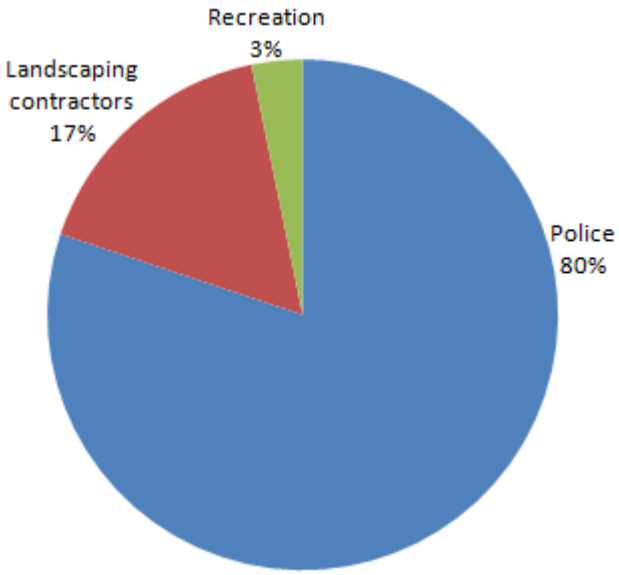


Table 15: LGO Protocol Report - Vehicle Fleet Emissions by Scope and Emission Type

VEHICLE FLEET							
Scope	**Emission Type**	**Greenhouse Gas Emissions (metric tons)**					
SCOPE 1		CO_2e	CO_2	CH_4	N_2O	HFCs	PFCs
	Mobile Combustion	327.864	325.891	0.010	0.006		
	Fugitive Emissions	9.867				0.008	
	Total Direct Emissions	**337.731**	**325.891**	**0.010**	**0.006**	**0.008**	
SCOPE 2		CO_2e	CO_2	CH_4	N_2O		
	Purchased Electricity for Electric Vehicles						
	Total Indirect Emissions						
SCOPE 3		CO_2e					
	Landscaping contractor fuel use	65.525					
INDICATORS	Number of Vehicles	29					
	Vehicle Miles Traveled						
	Number of Pieces of Equipment						
	Equipment Operating Hours						

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. 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. Emissions from this sector are considered Scope 3 because they are generated indirectly through the decomposition of waste. Waste generation is a recommended reporting sector because local governments can influence the amount of waste their operations produce and the resultant emissions through various programs (e.g. recycling, composting, purchasing policies).

As shown in Figure 8 and Table 16, the largest portion of emissions from City of Oakley waste comes from public trash cans (45%), followed by parks' waste (38%), and City buildings (17%). Table 17 shows the total amount of Scope 3 emissions from government generated waste.

Figure 8: Government Waste Emissions by Facility

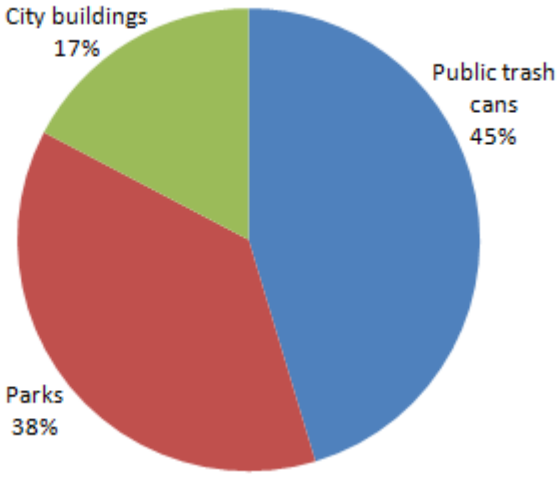


Table 16: Government Waste Emissions by Facility

Facility	metric tons CO2e
Public trash cans	16.8
Parks	13.8
City buildings	6.4
Totals	**37**

Table 17: LGO Protocol Report - Government Waste Emissions by Scope and Emission Type

SOLID WASTE GENERATION		
Scope	**Emission Type**	**Greenhouse Gas Emissions (metric tons)**
SCOPE 3		CO_2e
	Waste All Facilities	37.074
INDICATORS	Short tons of solid waste	300
	Short tons of recyclable materials	

Employee Commute

Emissions in the Employee Commute sector are due to combustion of fuels in vehicles used by city employees commuting to and from work in their personal vehicles. Emissions from this sector are considered Scope 3 emissions because the vehicles used are not owned or operated by the local government. However, employee commute is a required reporting sector because local governments can often influence these emissions through various programs (e.g., carpools, telecommute options, flex schedule options) despite not having direct control over them. Results from a survey designed by ICLEI and administered by Oakley staff are shown below. The survey was used to collect the data needed to calculate emissions and also capture other information that will help Oakley set effective policy addressing this sector. A total of 49 employees completed the survey, about 64% of current employees.

The total emissions from employee commutes are 241 metric tons of CO_2e as shown in Table 19. This sector is the second largest contributor to total city emissions for its operations behind emissions from Vehicle Fleet. Table 23 shows that 98% of City of Oakley employees drive to work alone, while 2% use a combination of transport modes (in this case, driving alone and carpooling). Figure 9 and Table 18 show that the majority of survey respondents reported using passenger cars for their commute (57%), followed by 39% who use light trucks, SUVs, pick-ups or vans and 4% who use motorcycles. Tables 20, 21, and 22 show the reasons employees selected for not carpooling, taking public transit, or walking/biking and the percent of total respondents that selected each reason. The top reasons given for not carpooling are: other people do not match employee's schedule or route (71%) and working late or irregular hours (47%). The top reasons listed for not taking public transit are: transit service doesn't match routes or work schedules (55%) and it takes too long (49%). The top reasons for not walking or biking to work are: employee lives too far away (65%) and lack of a safe or easy route for walking or biking (35%). As shown in Table 24, the highest percentage (29%) of employees travel six to ten miles to work, 18% travel five miles or less and smaller percentages of employees travel between 11 and 100 miles to work. For 35% of employees it takes between six and 15 minutes to travel to work and it takes over 45 minutes for 31% of employees to get to work, as shown in Table 25.

Figure 9: Employee Commute Number of Respondents by Vehicle Class

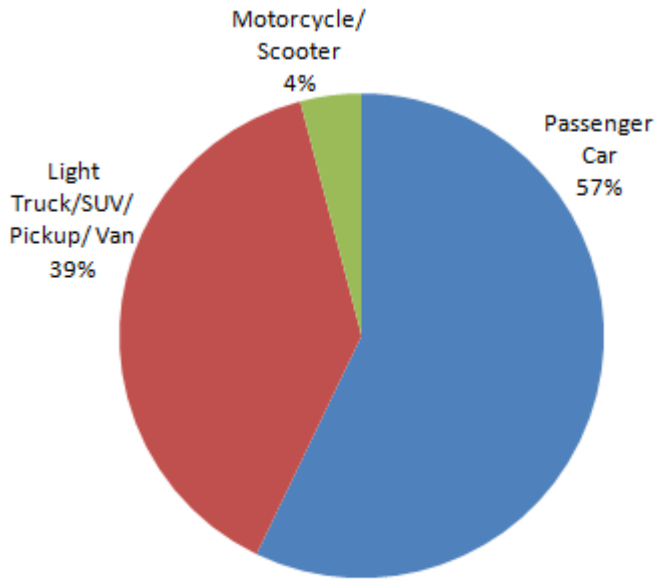


Table 18: Employee Commute Number of Respondents by Vehicle Class

Vehicle Class	Number of Respondents
Passenger Car	28
Light Truck/SUV/Pickup/Van	19
Motorcycle/Scooter	2
Totals	**49**

Table 19: LGO Protocol Report - Employee Commute Emissions by Scope and Emission Type

EMPLOYEE COMMUTE		
Scope	**Emission Type**	**Greenhouse Gas Emissions (metric tons)**
SCOPE 3		CO_2e
	Mobile Combustion	241.404
INDICATORS	Vehicle Miles Traveled	636,642
	Number of Vehicles	

Table 20: Employee Commute - Reasons for Not Carpooling

Note: Respondents were able to select multiple reasons, so each category has the potential for 100% response rate.

Reason	Percentage
Other people do not match my schedule or route	71%
Work late or irregular hours	47%
Dislike being dependent on others	45%
Like the privacy when I'm in my own car	37%
Need to make stops on the way to work or home	37%
May not be able to get home quickly in an emergency	33%
Difficult to find others to carpool/vanpool	24%
Need my car on the job	24%
Makes my trip too long	12%
Other	8%
I don't know enough about carpooling or vanpooling	0%
Never considered carpooling or vanpooling	0%

Table 21: Employee Commute - Reasons for Not Taking Transit

Note: Respondents were able to select multiple reasons, so each category has the potential for 100% response rate.

Reason	Percentage
Transit service doesn't match my route or schedule	55%
It takes too long	49%
Need to make stops on the way to work or home	43%
I work late or irregular hours	41%
May not be able to get home quickly during an emergency	35%
Like the privacy when I'm in my own car	33%
Need my car on the job	29%
It is not safe or easy to walk to work from the transit stop	12%
It is too far to walk to work from the transit stop	12%
It costs too much	10%
Other	10%
Not enough parking at the transit stop from which I'd depart	4%
Never considered using public transit	4%
I don't know enough about taking transit	0%

Table 22: Employee Commute - Reasons for Not Walking/Biking

Note: Respondents were able to select multiple reasons, so each category has the potential for 100% response rate.

Reason	Percentage
I live too far away	65%
There isn't a safe or easy route for walking or biking	35%
Weather	31%
May not be able to get home quickly in an emergency	29%
Need to make stops on the way to work or home	22%
It's not easy to look good and feel comfortable for work after walking or biking	20%
Workplace does not have adequate facilities for showering/changing	14%
Other	10%
No place at work to store bikes safely	6%
Never considered walking or biking to work	6%
I don't know enough about walking or biking to work	0%

Table 23: Employee Commute - Travel Mode Data

Mode	Percentage
Drive Alone	98%
Carpooling/Vanpooling	0%
Public Transportation	0%
Bicycling	0%
Walking	0%
Telecommute/Other	0%
Split Modes	2%

Table 24: Employee Commute - Miles from Work Data

Miles	Percentage
0-5	18%
6-10	29%
11-15	6%
15-20	4%
21-25	4%
26-30	8%
31-35	0%
36-40	6%
41-45	6%
46-50	6%
51-75	8%
76-100	4%
Over 100	0%

Table 25: Employee Commute - Time to Work Data

Time (Minutes)	Percentage
Less than 5	6%
6 to 15	35%
16 to 25	12%
26 to 35	12%
36 to 45	4%
Over 45	31%

Business Travel

The Business Travel sector includes emissions associated with government employees traveling on behalf of the local government in vehicles that are not owned or maintained by the local government (such as personal or rental vehicles) and are thus considered Scope 3 emissions. In the City of Oakley a number of essential services are performed through business travel including building inspections, code enforcement, infrastructure maintenance, construction management, and public works inspections. While employees in several City of Oakley departments undertake incidental business travel, only the Public Works and Building/Code Enforcement departments systematically track business travel distances, therefore only data from those departments was available for this inventory. These two departments account for the vast majority of regular business travel conducted by government employees. Business travel data was collected through mileage reimbursement forms submitted by employees and is distinct from any travel conducted with city-owned vehicles in the same departments which is covered in the vehicle fleet sector.

As Figure 10 and Table 26 show, the Building and Code Enforcement department accounts for 58% of the business travel emissions inventoried, while the Public Works department accounts for 42%. Figure 11 and Table 27 show that the majority (84%) of business travel emissions come from the use of light trucks, SUVs, pick-ups, or vans. Passenger cars account for the other 16% of emissions. Table 28 shows these Scope 3 emissions produced 24 metric tons of CO_2e.

Figure 10: Business Travel Emissions by Department

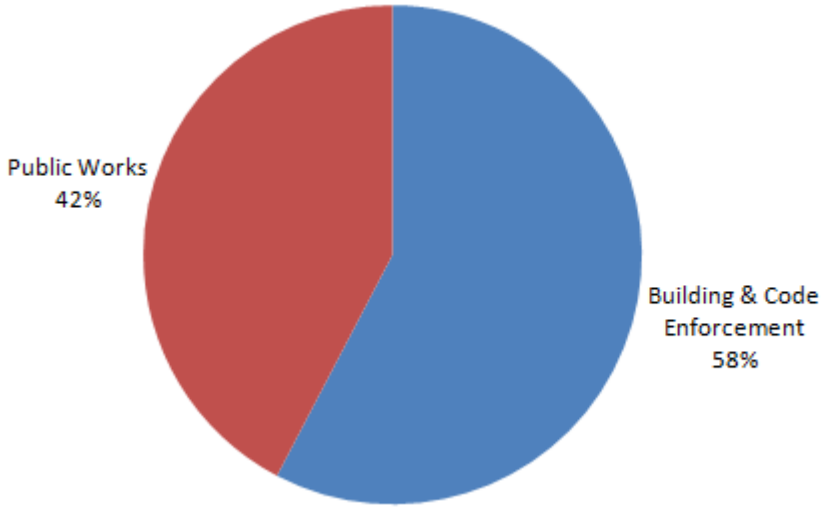


Table 26: Business Travel Emissions by Department

Department	metric tons CO2e
Building & Code Enforcement	14.0
Public Works	10.2
Totals	**24**

Figure 11: Business Travel Emissions by Vehicle Class

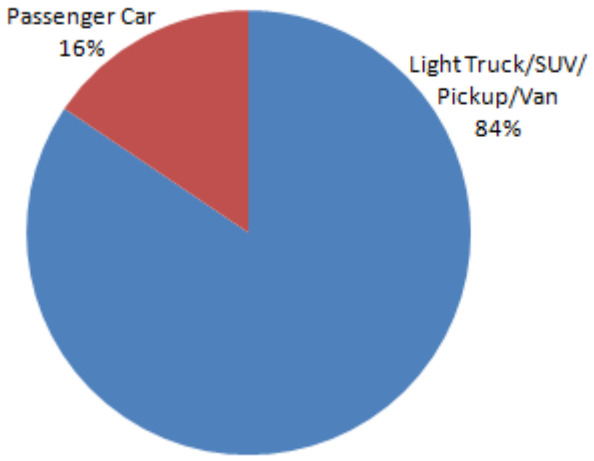


Table 27: Business Travel Emissions by Vehicle Class

Vehicle Class	metric tons CO2e
Light Truck/SUV/Pickup/Van	20.4
Passenger Car	3.8
Totals	**24**

Table 28: LGO Protocol Report – Business Travel Emissions by Scope and Emission Type

BUSINESS TRAVEL		
Scope	**Emission Type**	**Greenhouse Gas Emissions (metric tons)**
SCOPE 3		CO_2e
	Mobile Combustion	24.207
INDICATORS	Vehicle Miles Traveled	38,813
	Number of Vehicles	10

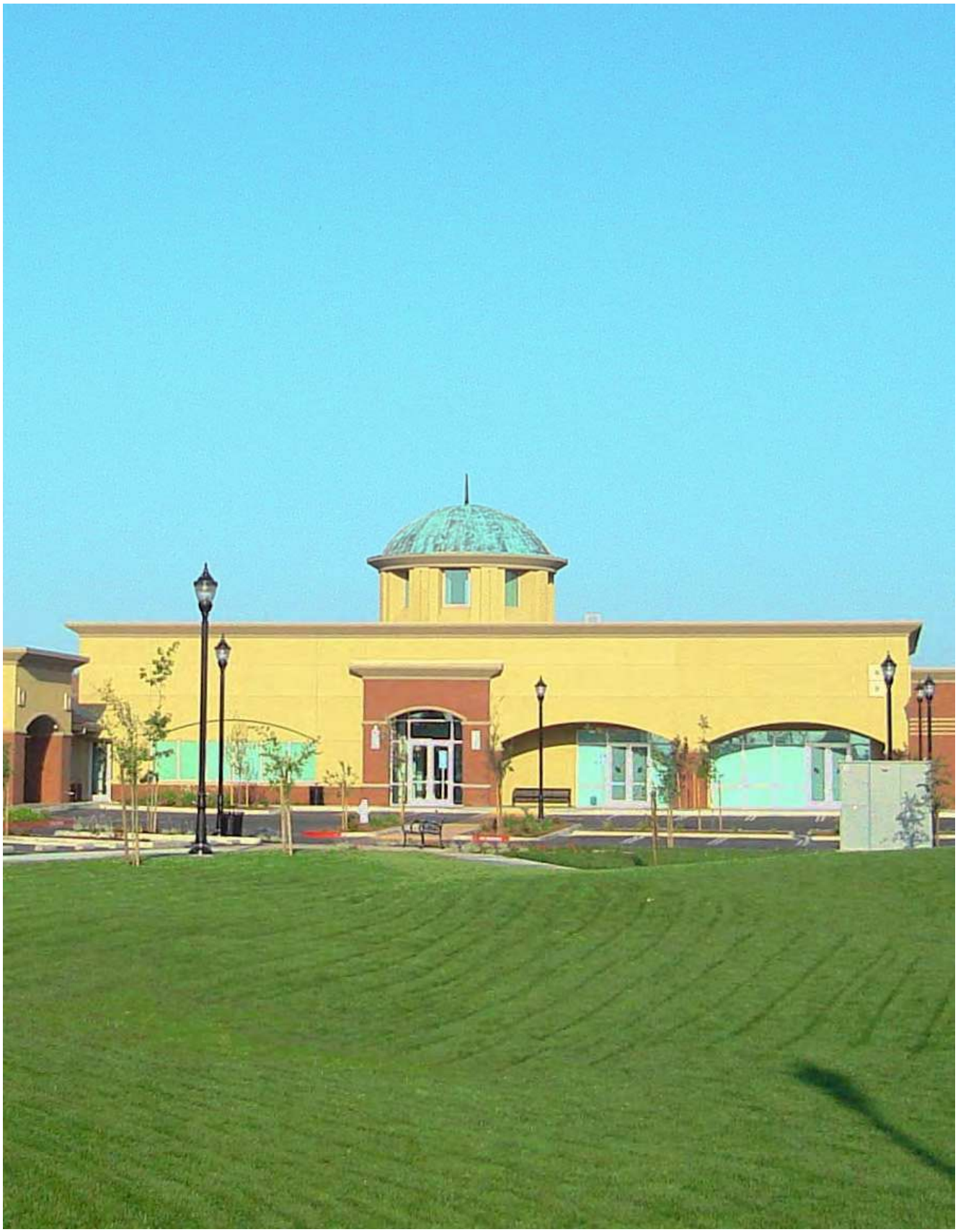


Photo source: City of Oakley

Inventory Methodologies

Buildings and Other Facilities

Pacific Gas and Electric Company (PG&E) provided energy usage data for 2005 based on PG&E service accounts listing "City of Oakley" as the customer. This data included electricity (kilowatt hours- kWh) and natural gas (therms) usage and costs for City of Oakley buildings and facilities. Scope 1 emissions were calculated using default emissions factors for natural gas, and Scope 2 emissions were calculated using verified PG&E-specific emission factors for electricity, which were included in the 2009 CACP software.

Refrigerant and fire suppressant data for buildings and facilities was collected through coordination with Cecilia Nichols-Fritzler, Assistant to the City Manager, and an inventory of equipment in city facilities. Data was not available on the equipment in operation in 2005, therefore 2010 data was used as proxy year data. The only refrigerant that contributed fugitive emissions from Oakley facilities was HFC-134a (R-134a) used in refrigerators. Specific data on refrigerant usage quantities was not available; therefore the Default Emission Rates method was used. Refrigerant charge capacity was recorded from the decal on each refrigerator and estimated annual fugitive emissions were calculated using the operating emissions factors for domestic refrigeration equipment provided in the Master Data Workbook. Scope 1 fugitive emissions were calculated using standard emission factors in CACP.

Emissions from R-22 refrigerant used in the HVAC system at City Hall and in A/C units at the Community Building are included as an "Information Item" only. R-22 is classified as an ozone depleting chemical and its use is being phased out under the Montreal Protocol. While this substance does have global warming potential, it is not classified as a greenhouse gas in the LGO protocol. For A/C equipment at the Community Building, R-22 charge capacity was estimated based on manuals for similar equipment. No information could be obtained on the R-22 refrigerant capacity of the units at City Hall; therefore the higher end of the default charge capacity range provided in the Master Data Workbook was used. This has likely resulted in a significant overestimate of R-22 use and associated emissions. CACP does not include a category for R-22 emissions; therefore metric tons of CO_2-equivalent from this source were calculated manually using the global warming potential for R-22 (1810).[6]

Oakley does not use any fire suppression chemicals with global warming potential. ABC Dry Chemical (monoammonium phosphate) is used in the fire extinguishers at city facilities and is included as an "Information Item" only. Total capacity of ABC Dry Chemical in city equipment (18.14 kg) was estimated based on the number of units and the capacity of each unit provided by Bill Fee of Mazzy's Fire Protection, the City's service provider.

[6] http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-chapter2.pdf

Streetlights, Traffic Signals, and Other Public Lighting

Pacific Gas and Electric Company (PG&E) provided energy usage data for 2005 based on PG&E service accounts listing "City of Oakley" as the customer. This data included electricity (kilowatt hours- kWh) usage and costs for City of Oakley streetlights and traffic signals/controllers. No additional fuel sources were used in Oakley's public lighting in 2005. Scope 2 emissions were calculated using verified PG&E-specific emission factors for electricity, which were included in the 2009 CACP software. Emissions from accounts listed as "LS1" are included as "Information Items" only. These lights are owned, operated, maintained and directly paid for by PG&E; and billed to the City of Oakley.

Water Transport Facilities

Pacific Gas and Electric Company (PG&E) provided energy usage data for 2005 based on PG&E service accounts listing "City of Oakley" as the customer. This data included electricity (kilowatt hours- kWh) usage and costs for City of Oakley sprinklers and irrigation controllers. No additional fuel sources were used for water transport in 2005. Scope 2 emissions were calculated using verified PG&E-specific emission factors for electricity, which were included in the 2009 CACP software. According to Keith Coggins, Engineering Development Manager, the City installed one back-up generator for storm water transport in November 2005. Since no fuel purchases were made for this generator in 2005, emissions were assumed to be zero and are not included in this inventory.

Wastewater Treatment Facilities

Wastewater treatment in the City of Oakley is provided by a special district (Ironhouse Sanitary District) whose operations do not fall under the city government's operational control, therefore wastewater treatment facilities were not included in this inventory. The City does have influence over the amount of water used in its operations, therefore in future inventories it may be helpful to estimate emissions associated with the volume of wastewater produced specifically by city facilities and operations.

Vehicle Fleet and Mobile Equipment

Scope 1 mobile combustion emissions from gasoline used by Oakley's vehicle fleet were calculated using fuel consumption data. 2005 data was not available, therefore 2010 data was used as proxy year data. Fuel consumption data was obtained with the assistance of Paul Abelson, Finance Director, from the statements for Arco and Shell credit cards used to purchase fuel for city vehicles. These credit cards are only used for vehicles in the Police and Recreation departments (other departments did not track fuel consumption), therefore the data only covers 32 of the 39 total vehicles owned by the City in 2010. However, this data sub-set is considered sufficient to serve as proxy year data for the 28 vehicles owned by the City in 2005. In CACP, both transport average and fuel CO_2 coefficients were set to default and CO_2, CH_4, and N_2O emissions were all calculated from fuel use data.

Scope 1 fugitive emissions from vehicle fleet refrigerants in mobile air conditioning systems were calculated using the Default Emission Rates method because the City does not directly track refrigerant use in vehicles. This process is in line with LGO Protocol methods, but may result in a significant overestimate of the amount of leaked refrigerants and associated emissions. An inventory of all vehicles owned, purchased, and sold in 2005 (totaling 28 vehicles) was obtained from Paul Abelson, Finance Director. Police Sergeant Jeff Billeci reported that all city vehicles use R-134a type refrigerant. The refrigerant charge capacity of vehicles was obtained through internet research for 12 vehicles with known model years and the upper end of the capacity range provided in the Master Data Workbook was used for the 16 vehicles with unknown model years. Estimated leakage of refrigerants was then calculated using default operating emissions factors. Scope 1 fugitive emissions were calculated using standard emission factors in CACP.

Scope 3 CO_2 emissions from gasoline used by landscaping contractors were calculated based on fuel use estimates. Danny Yore, Parks and Landscape Supervisor, collected fuel use estimates for 2010 (proxy year) for two of the three companies that provide landscaping services to the City of Oakley. Estimates were reported as aggregate gasoline use figures for vehicles and other mobile equipment including mowers and power equipment. No information was available to assign fuel to individual vehicles or designate on- or off-road use; therefore only CO_2 emissions were calculated from this data. Transport average was set to highway fuel CO_2 only and Fuel CO_2 was set to default in CACP.

Transit Fleet

Public transit in the City of Oakley is provided by a special district (Tri Delta Transit) whose operations are not dedicated to the City and do not fall under the city government's operational control, therefore transit fleet was not included in this inventory.

Government-Generated Solid Waste

Scope 3 emissions from government-generated solid waste were calculated using estimated volumes of waste produced by city operations. Waste data for 2005 were not available, therefore current (2011) waste levels were used and were reported to be similar to 2005 levels. A private company, Oakley Disposal, conducts waste collection services in the City of Oakley. Dave Adler, Regional Manager of Oakley Disposal, provided estimated volumes of waste produced by city facilities and collected by his company. This included waste from City Hall, the Community Building, Creekside Park, Summer Lake Park, and Laurel Ballfields. For entry into CACP these waste volumes were grouped as either "City Building" or "Parks" waste. Waste characterization defaults provided by the California Integrated Waste Management Board (CIWMB) 1999 Waste Characterization Study were used to designate the share of different waste categories.

Danny Yore, Oakley Parks and Landscape Supervisor, provided an additional estimate of waste volumes from public trash cans on city streets and in parks that are managed by a different company (Kennedy and Associates). While the waste in these trash cans is not exclusively produced by city operations it was included in this inventory because the

management of this waste is under the City's operational control. It is possible that there is some overlap between the public trash can waste and the parks' waste figures provided by Oakley Disposal, as some of the public trash cans may be emptied into park dumpsters. At the time of this inventory the level or existence of any overlap in these figures could not be determined. The public trash can figure did not include any plant waste because landscaping contractors self-haul the plant waste produced while maintaining city parks and landscaping. Therefore, upon entry into CACP waste share percentages were edited from the CIWMB defaults to 0% plant waste and 44.1% all other waste. Other percentages were not edited. There may be an additional volume of plant waste produced by the operations of landscaping contractors on city facilities that could not be quantified and is not included in this inventory.

Employee Commute

Scope 3 emissions from City of Oakley employees commuting to and from work were calculated through the use of a current (2011) survey covering commute distance, frequency, and mode of transport. The survey was developed by ICLEI and distributed to employees by Kenneth Strelo, Senior Planner. The majority of employees completed the web-based survey and hard-copies were distributed to Police Department employees. A total of 49 survey responses were received. Vehicle Miles Traveled (VMT) was calculated using the survey data on commute distance and frequency, standardized by the number of employees in 2005. Fuel consumption was calculated using VMT and vehicle fuel efficiency reported by respondents, standardized by the number of employees in 2005. In CACP, CO_2 emissions were calculated from the fuel consumption data, while CH_4 and N_2O emissions were calculated from VMT data. For motorcycles, data was entered separately in CACP, only fuel consumption was entered (not VMT) and both transport average and fuel CO_2 coefficients were set to default.

Business Travel

Scope 3 emissions from employee business travel (in vehicles not owned by the local government) were calculated from the mileage reports submitted along with timesheets for employees in the Public Works and Building departments. Christine Keller, Administrative Assistant, assisted in the collection of these reports and gathered vehicle type information from employees. Annual VMT was calculated from mileage figures on one year of forms covering the week ending 7/23/06 to week ending 7/15/07. This proxy year data was the oldest available and travel distances are assumed to be similar to 2005 levels. While employees in other departments also use personal vehicles for city business these two departments conduct the majority of regular business travel and are the only departments that systemically track mileage. In CACP, both transport average and fuel CO_2 coefficients were set to default, and Scope 3 CO_2, CH_4, and N_2O emissions were all calculated from VMT data.

Photo source: City of Oakley

Next Steps

ICLEI's Five Milestone Process

While the City of Oakley has already begun to reduce greenhouse gas emissions through its actions, this inventory represents the first step in a systematic 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 12: ICLEI's Five Milestones for Climate Mitigation

ICLEI staff are available to local governments who are members and should be contacted to discuss the full range of resources available at each stage of the Milestone process. The following sections provide a glimpse at next steps and help capture the lessons learned in conducting this inventory.

Setting Emissions Reduction Targets

This inventory provides an emissions baseline that can be used to inform Milestone Two of ICLEI's Five-Milestone process—setting emissions reduction targets for Oakley's municipal operations. 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 30 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 global warming—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. Oakley should give itself enough time to implement chosen emissions reduction measures—noting that the farther out the target year is, the more the City should pledge to reduce. ICLEI recommends that regardless of the chosen long-term emissions reduction target (e.g., 15-year, 40-year), Oakley should establish linear interim targets for every two- to three-year period. Near-term targets facilitate additional support and accountability, and linear goals help to ensure continued momentum around local climate protection efforts. To monitor the effectiveness of its programs, Oakley should plan to re-inventory its emissions on a regular basis; many jurisdictions are electing to perform annual inventories. ICLEI recommends conducting an emissions inventory every three to five years.

The Long-Term Goal

ICLEI recommends that 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, Oakley can demonstrate that it intends to do its part towards addressing greenhouse gas emissions from its internal operations.

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 Oakley 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. Additionally, cost saving projects can be undertaken immediately and will increase the quality of local government service and operations, while reducing taxpayer costs.

State of California Targets and Guidance

An integral component of the State of California's climate protection approach has been the creation of 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. 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

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" (i.e. 2008 or earlier) 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.

Departmental Targets

If possible, ICLEI recommends that Oakley 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 encourages department leaders to consider their department's impact on the climate and institute a climate-conscious culture within their operations.

Creating an Emissions Reduction Strategy

This inventory identifies the major sources of emissions from Oakley's operations and, therefore, where policymakers will need to target emissions reductions activities if they are to make significant progress toward adopted targets. For example, since the Vehicle Fleet sector was a major source of emissions from Oakley's operations, it is possible that the City could meet near-term targets by implementing a few major actions within the Vehicle Fleet sector of emissions. Medium-term targets could be met by focusing emissions reduction actions on the other major sector, Employee Commute, and the long term (2050) target will not be achievable without major reductions in all sectors.

Please note that, whenever possible, reduction strategies should include cost-saving projects that both reduce costs (such as energy bills) while reducing greenhouse gas emissions. These "low hanging fruit" are important because they frequently represent win-win situations in which there is no downside to implementation. Selecting these projects in the order of largest to smallest benefit ensures that solid, predictable returns can be realized locally. These projects lower recurring expenditures, save taxpayer dollars, create local jobs, and benefit the community environmentally.

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

- Change procurement policy to specify high fuel efficiency for each vehicle class.

- Promote procurement of hybrid, plug-in hybrid, and electric vehicles where possible.
- Provide recycling containers along with public trash cans.
- Expand office recycling program to include green-waste collection at City Hall.
- Implement a Commute Trip Reduction (CTR) program to encourage employees to carpool, bike, walk, and use public transit (http://www.vtpi.org/tdm/tdm9.htm). Such a program could include incentive programs for using efficient commute options, rideshare matching, and telework programs.

Using these strategies as a basis for a more detailed overall emissions reductions strategy, or climate action plan, Oakley should be able to reduce its impact on 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.

Improving Emissions Estimates

One of the benefits of a local government operations emissions 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 the accuracy of the emissions estimate and may have other implications for government operations as a whole.

During the inventory process, City of Oakley staff identified the following gaps in data that, if resolved, would allow the City to meet the recommended methods outlined in LGO Protocol in future inventories.

- Track odometer readings for all vehicles in city-owned fleet.
- Track fuel consumption of all vehicles in city-owned fleet.
- Direct tracking of refrigerants recharged into HVAC and refrigeration equipment.
- Direct tracking of refrigerants recharged into vehicles in the vehicle fleet.
- Track fuel consumption by landscaping contractors.
- Track waste generated from government facilities.
- Track business travel mileage and vehicle types in all departments.
- Estimate emissions from wastewater produced by city operations.

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.

Project Resources

ICLEI has created tools for the City of Oakley to use to assist with future monitoring inventories. These tools are designed to work in conjunction with the LGO Protocol, which is the primary reference document for conducting an emissions inventory. The following tools should be saved as resources and supplemental information to this report:

- The "Master Data Workbook" that contains most or all of the raw data, data sources, emissions, notes on inclusions and exclusions, and reporting tools.
- The "Data Gathering Instructions" on the types of emissions and data collection methodology for each inventory sector.
- The "Quality Control Checklist for Master Data Workbook" which provides a list of items to review in the Master Data Workbook to ensure information was entered correctly.
- The "CACP 2009 Data Entry Instructions" which provides guidance on how to enter data collected in the Master Data Workbook into CACP 2009 to calculate greenhouse gas emissions.
- Clean Air & Climate Protection Software (CACP) "Backup" file which contains the calculations of emissions based on inputs from the Master Data Workbook. CACP software is required to open the Backup file.
- The "Checklist for Reviewing the Government Analysis Inputs/Outputs, Details Export" which provides a list of items to review in this CACP export file to ensure information was entered correctly.
- CACP "Government Analysis Inputs/Outputs, Summary with Notes Export Report", which contains a summary report in Excel format of all calculated emissions, with explanatory notes included.
- CACP "Government Analysis Inputs/Outputs, Details Export Report", which contains a detailed report in Excel format of all calculated emissions.
- The "Completing the Inventory Report" instructions from ICLEI for LGO greenhouse gas inventories.
- The "Charts and Tables Data Conditioning Sheet" created by ICLEI and completed by the author to aid in creating the charts and tables within the MDW.
- A presentation with slides was also completed by the author to summarize project findings.