TO: TOWN COUNCIL

FROM: TOWN MANAGER

RE: GREENHOUSE GAS EMISSIONS INVENTORY

ISSUE
Chrissy Prestella of the Sierra Business Council will give a presentation on a greenhouse gas emissions inventory that was conducted in Loomis.

RECOMMENDATION
Hear presentation and give direction to Staff if needed.

CEQA
There are no CEQA issues at present but there could be depending on what it is that THE Town will need to do in order to reduce greenhouse gases in the future.

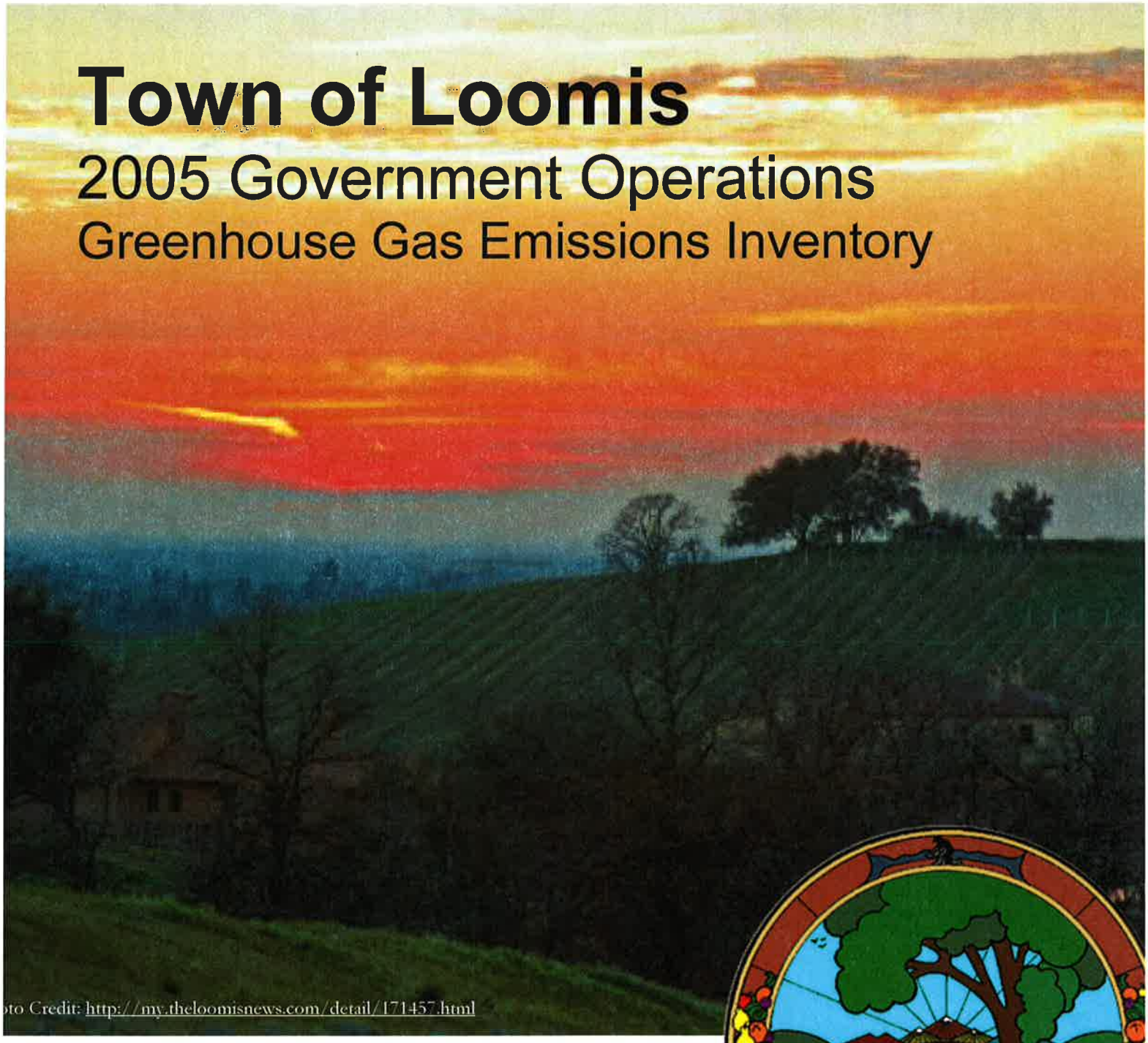
MONEY
Town costs and/or revenues are unknown at present. Depends on the types of projects the Town undertakes to lessen its greenhouse gas impacts. Deciding on things to implement will likely be determined on a project by project basis.

DISCUSSION
Last year the Town was asked to join into an effort by the Sierra Business Council to prepare a greenhouse gas emissions inventory. Loomis joined with the counties of: Placer, Sierra, Nevada, Plumas and Alpine; and the cities of Ione, Grass Valley, Placerville, Sutter Creek, Auburn, Jackson, and Lincoln.

This program was made possible through the generous support of the Pacific Gas and Electric Company (PG&E). ICLEI - Local Governments for Sustainability was contracted to assist in quantifying greenhouse gas emissions. 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 services and consultancy related to climate planning. Throughout 2010 ICLEI provided training and technical assistance to participating regional organizations, interns, and local government staff and facilitated the completion of the report.

Town of Loomis

2005 Government Operations
Greenhouse Gas Emissions Inventory



oto Credit: http://my.theloomisnews.com/detail/171457.html

Narrative Report

Produced by Katherine Straus

Supported by Pacific Gas and Electric Company
In Collaboration with Sierra Business Council and
ICLEI-Local Governments for Sustainability USA
March 2011

Credits and Acknowledgements

Town of Loomis

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Sierra Business Council

Christina Prestella, Program Manager
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Pacific Gas and Electric Company (PG&E)

PG&E provides comprehensive climate planning assistance to local governments, from providing energy usage data and assistance with greenhouse gas inventories, to training and guidance on climate action plans.

This program is funded by California utility customers and administered by PG&E under the auspices of the California Public Utilities Commission.

ICLEI-Local Governments for Sustainability USA

Brian Holland, Regional Officer
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This report was prepared by Katherine Straus, Green Communities Intern at Sierra Business Council. The authors would like to thank Loomis staff for providing much of the insight and local information necessary for the completion of this report.

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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 Town of Loomis (Loomis). The inventory measures the greenhouse gas emissions resulting specifically from Loomis'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, Loomis 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 Town of Loomis, established in 1850 and incorporated in 1984, covers an area of 7.3 square miles and is located off of Interstate 80 in western Placer County, just 25 miles northeast of Sacramento. With approximately 11 employees and an operating budget of $2.8 million, Loomis recognizes the opportunity to take meaningful steps towards making its government operations as efficient as possible. The benefits of these actions include lower energy bills, and 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, Loomis is working to improve government services in a smart and targeted way that will benefit all of the Town's approximately 6,873 residents. Many of the services provided for Loomis residents, such as public transportation, are operated by Placer County. Loomis does however own and operate a town park as well as provide senior services for residents. Electricity for the Town's facilities is distributed by the Pacific Gas and Electric Company (PG&E).

As a semi-rural, yet growing community in California's Central Valley, Loomis 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. 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, Loomis is acting now to limit future impacts that threaten the lives and property of Loomis's residents and businesses, make government operations more efficient, and improve the level of service it offers to the residents of Loomis.

Inventory Results

The following figures summarize the results of the LGO greenhouse gas emissions inventory for Loomis, by sector and source. As shown in Figure 1, the greatest source of emissions is from the vehicle fleet (82%), followed by buildings and facilities (7%), and employee commute (5%). Figure 2 indicates that when broken down by source, diesel is responsible for the greatest percentage of emissions (79%), followed by gasoline (8%), and electricity (7%). Table 1 identifies emissions by scope and emission type. As shown in Table 1, Scope 1 emissions from CO_2 are the greatest contributor of greenhouse gas emissions.

Figure 1: 2005 Government Operations CO_2e Emissions by Sector

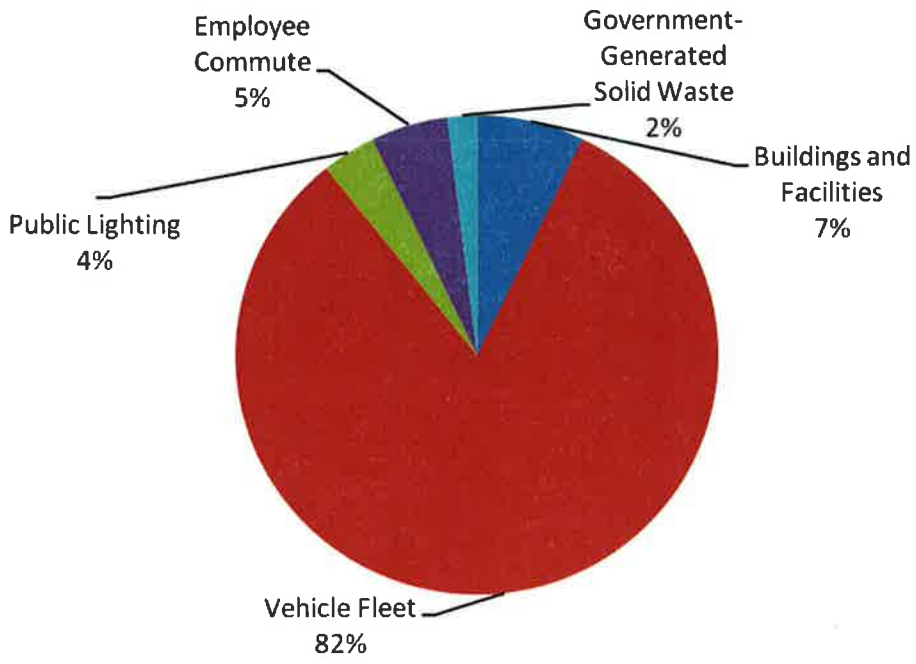

Figure 2: 2005 Government Operations CO_2e Emissions by Source

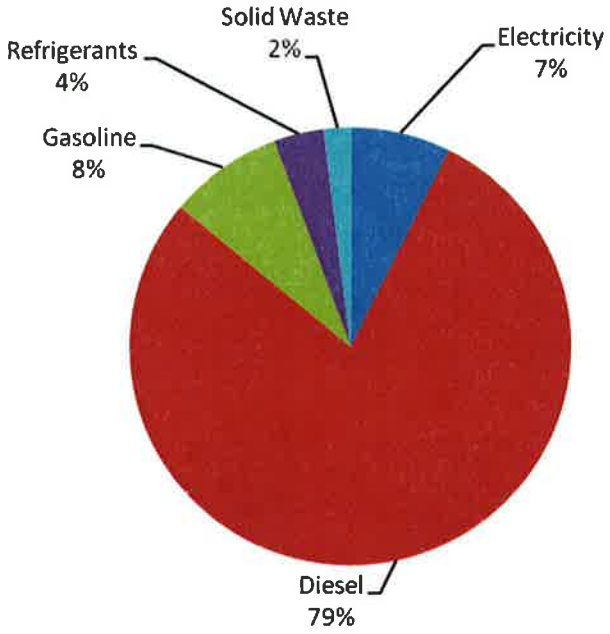

Table 1: LGO Protocol Report - Overall Emissions by Scope

Total Emissions	CO_2e	CO_2	CH_4	N_2O
Scope 1	388.14	371.33	.001	.001
Scope 2	33.26	32.99	.002	.001
Scope 3	32.44	23.57	.423	0
Information Items	6.55	6.45	0	0

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 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-Sponsored Inventory Project

With funding from California utility customers under the auspices of the California Public Utilities Commission, and administrative duties generously provided by the Pacific Gas and Electric Company (PG&E),, ICLEI - Local Governments for Sustainability was contracted to work with Sierra Business Council to assist in the quantification of greenhouse gas emissions in Loomis and the following other participating communities: the cities of Ione, Jackson,

Loomis, Plymouth, Sutter Creek, Placerville, Amador, Auburn, Lincoln, Nevada City and Grass Valley and the counties of Alpine, Nevada, Plumas, and Placer. 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 services and consultancy related to climate planning. Throughout 2010, ICLEI provided training and technical assistance to participating regional organizations, interns, and local government staff and facilitated the completion of this report.

Introduction

General Methodology

Local Government Operations Protocol

A national standard called the Local Government Operations Protocol (LGO Protocol) has been developed and adopted by the 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 1 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

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 2 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 WRI/WBCSD GHG 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 by 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 fugitive emissions from leaked/deployed fire suppressants
- Scope 1 CH_4 and N_2O emissions 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 usually reported separately in order to provide a more complete picture of a local government's operations. However, there were no information items quantified for this inventory.

A common emission that is categorized as an information item is carbon dioxide emitted in the combustion of biogenic fuels. Local governments will often burn fuels that are of biogenic origin (wood, landfill gas, organic solid waste, biofuels, etc.) to generate power. Common sources of biogenic emissions are the combustion of landfill gas from landfills or biogas from wastewater treatment plants, as well as the incineration of organic municipal solid waste at incinerators.

Carbon dioxide emissions from the combustion of biogenic fuels are not included in Scope 1 based on established international principles. Methane and nitrous oxide emissions from biogenic fuels are considered Scope 1 stationary combustion emissions and are included in the stationary combustion sections for the appropriate facilities. These

principles indicate that biogenic fuels (e.g., wood, biodiesel), if left to decompose in the natural environment, would release CO_2 into the atmosphere, where it would then enter back into the natural carbon cycle. Therefore, when wood or another biogenic fuel is combusted, the resulting CO_2 emissions are akin to natural emissions and should therefore not be considered as human activity-generated emissions. The CH_4 and N_2O emissions, however, would not have occurred naturally and are therefore included as Scope 1 emissions.

Information items included in this inventory include:

- Scope 2 emissions from purchased electricity for streetlights with a LS-1 rate. These streetlights are owned, operated, maintained and paid for directly by PG&E, although costs are indirectly paid for by the City as they are incorporated in Loomis's general rate case with PG&E.

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 Loomis'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.

It is important to understand that in the case where a local government operates a municipal utility that generates electricity for government facilities, the associated emissions should be considered Scope 1 emissions within the Power Generation Facilities sector, and not Scope 2 emissions within each of the other facilities sectors, when calculating a total. This is advised by the LGO Protocol and done to avoid reporting the same emissions twice, also known as double counting.

Inventory Results

Emissions Total

In 2005, Loomis's greenhouse gas emissions from government operations totaled 481.65 metric tons of CO_2e. This number represents a roll-up of emissions, and is not intended to represent a complete picture of emissions from Loomis's operations. This roll-up number was calculated specifically to avoid double counting. Refer to the Understanding Totals section of this report's Introduction for more information on calculating totals and avoiding double counting.

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 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.

Loomis operates three facilities: the Corporation Yard, the Town Hall and the Model Station. Figure 3 and Table 5 demonstrate that the Town Hall is the greatest source of emissions (47%), followed by the Loomis Depot (32%), and lastly the Corporation Yard (21%). As shown in Figure 4 and Table 6, electricity (52%) and refrigerants (48%) are the two main sources of emissions in the Buildings and Other Facilities sector. Table 7 identifies buildings and facilities emissions by scope and type, and demonstrates that buildings and facilities emissions can be categorized as Scope 2 emissions from purchased electricity, as well as Scope 1 emissions from leaked refrigerants.

Figure 3: Buildings and Other Facilities Emissions by Department

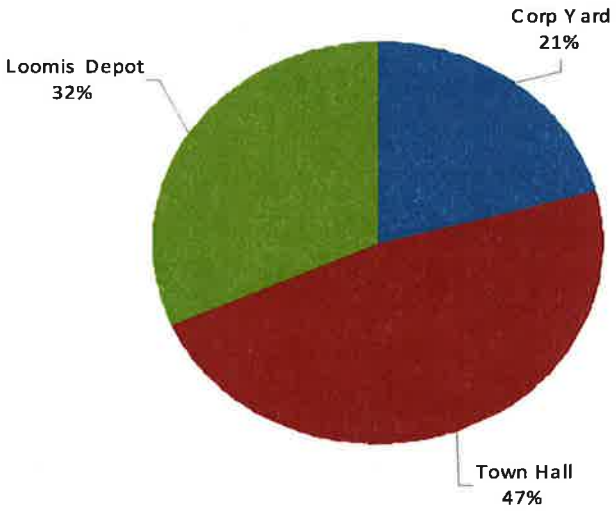

Table 5: Buildings and Other Facilities Emissions by Department

Department	metric tons CO_2e
Corp Yard	3.54
Town Hall	8.07
Loomis Depot	5.40
Totals	17.02

Figure 4: Buildings and Other Facilities Emissions by Source

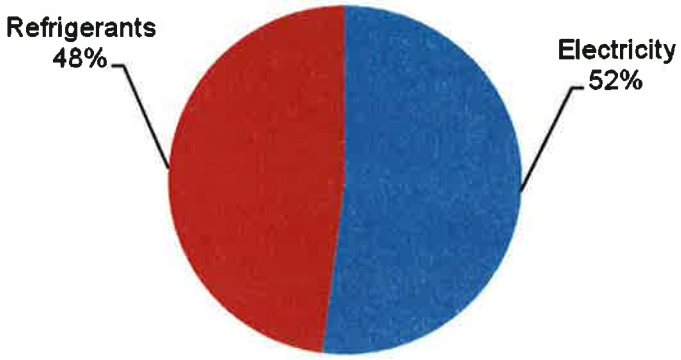

Table 6: Buildings and Other Facilities Emissions by Source

Source	metric tons CO_2e
Electricity	17.02
Refrigerants	15.65
Totals	**32.67**

Table 7: LGO Protocol Report- Buildings and Facilities 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	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Fugitive Emissions	15.65	0.000	0.000	0.000	0.000	0.000	0.000
	Total Direct Emissions	15.65	0.000	0.000	0.000	0.000	0.000	0.000
SCOPE 2		CO_2e	CO_2	CH_4	N_2O			
	Purchased Electricity	17.02	16.88	0.001	0.000			
	Purchased Steam	0.000	0.000	0.000	0.000			
	District Heating & Cooling	0.000	0.000	0.000	0.000			
	Total Indirect Emissions	17.02	16.88	0.001	0.000			
INDICATORS	Number of Employees	11						

Streetlights, Traffic Signals, and Other Public Lighting

Like most local governments, Loomis operates a range of public lighting including traffic signals, streetlights, and other forms of outdoor lighting. The majority of 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 8 show emissions by subsector. Traffic Signals and Controllers are responsible for the majority of emissions in this sector (51%), followed by streetlights (40%), and other outdoor lighting (9%). As seen in Table 9, emissions from the lighting sector can be categorized as Scope 2 emissions from purchased electricity.

Figure 5: Public Lighting Emissions by Subsector

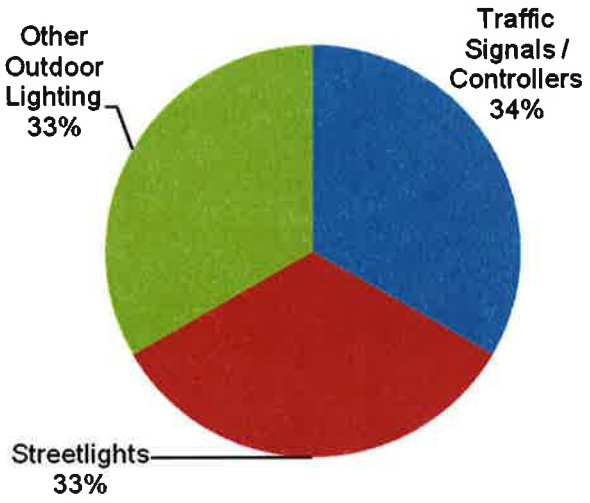

Table 8: Public Lighting Emissions by Subsector

Subsector (Light Type)	metric tons CO_2e	% of Sector Emissions	Electricity Use (kWh)	Cost ($)
Traffic Signals / Controllers	4.95	51%	22,133	$3,731
Streetlights	3.88	40%	17,357	$1,871
Other Outdoor Lighting	0.91	9%	4,066	$674
Totals	9.74	100%	43,556	$6,276

Table 9: 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	9.74	9.66	0.001	0.000
	Total Indirect Emissions	9.74	9.66	0.001	0.000
INFORMATION ITEM		CO_2e			
	LS1 Streetlights	6.50			

Vehicle Fleet and Mobile Equipment

The vehicles and mobile equipment used in Loomis's daily operations 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.

In 2005, Loomis operated a vehicle fleet with three passenger vehicles and two pieces of heavy equipment. Loomis's vehicle fleet performed a number of essential services, from road maintenance to work-related travel for employees. In 2005, two of the passenger vehicles were used by the Public Works Department and one was used by the Administration Department. In order to estimate emissions from leaked vehicle refrigerants, the default method was used. This method overestimates emissions from leaked refrigerants but is in line with LGO Protocol methods.

As demonstrated in Figure 6 and Table 10, diesel is the overarching source of emissions in the vehicle fleet sector (96%). Table 11 reports emissions by scope and emission type, and shows that the largest contribution of vehicle fleet emissions comes from Scope 1, mobile combustion.

Figure 6: Vehicle Fleet Emissions by Source

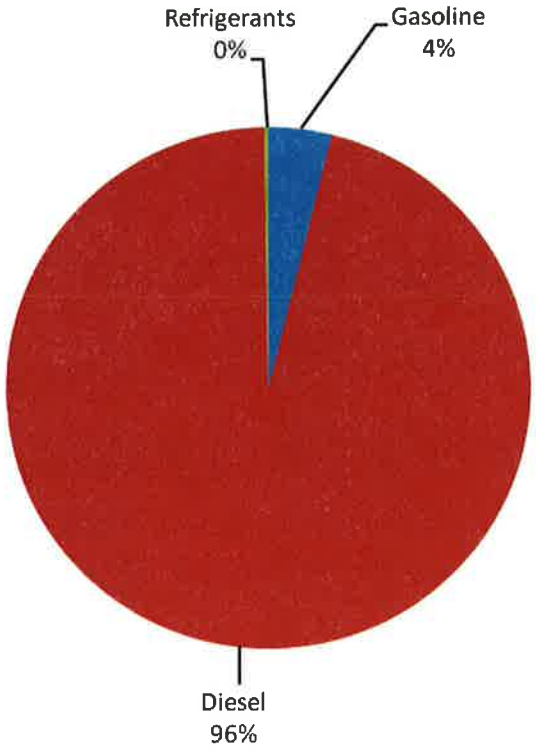

Table 10: Vehicle Fleet Emissions by Source

Source	metric tons CO_2e	Consumption (gal)	Cost ($)
Gasoline	14.40	22,660	N/A**
Diesel	357.19	34,984	N/A**
Refrigerants	0.90	1*	N/A**
Totals	372.49	62,679	$11,556

* Amount is in units of kg
**Data on cost is not available

Table 11: 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
	Mobile Combustion	371.587	317.33	.001	.001
	Fugitive Emissions	.90	.000	.000	.000
	Total Direct Emissions	372.487	371.33	.001	.001
INDICATORS	Number of Vehicles	3			
	Number of Pieces of Equipment	2			

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.

Figure 7 and Table 12 show that emissions from government waste come from two subsectors, the Corporation Yard and the Town Hall, each responsible for 50% of emissions. As seen in Table 13, emissions from solid waste generation fall under the category of Scope 3 emissions.

Figure 7: Government Waste Emissions by Subsector

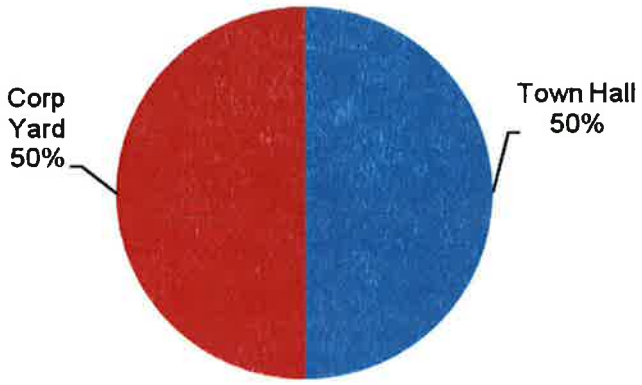

Table 12: Government Waste Emissions by Subsector

Department	metric tons CO_2e
Town Hall	4.44

Corp Yard	4.44
Totals	8.88

Table 13: 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	8.88
INDICATORS	Short tons of solid waste	26

Employee Commute

Emissions in the Employee Commute sector are due to combustion of fuels in vehicles used by government employees for commuting to work at Loomis. Results from a survey designed by ICLEI and administered by Loomis are shown below. The survey was used to collect the data needed to calculate emissions and also capture other information that will help Loomis set effective policy addressing this sector.

Table 14 identifies employee commute emissions by scope and emission type. As shown below, all employee commute emissions fall into Scope 3, and CO_2e is the sole contributor to Scope 3 emissions. Table 15 reports employee's reasons for not carpooling. The most common reason for not carpooling was that "other people do not match my schedule or route" (87.5%). Table 16 gives reasons for not taking public transit. Seventy-five percent of employees responded that they do not take transit because it "does not match my route or schedule." In Table 17 employees responded to reasons for not walking or biking to work. Living too far away was the primary reason for not walking or biking to work (62.5%). As shown in Table 18, the preferred travel modes for employees are driving alone to work (75%), and carpooling/vanpooling (25%).

Table 14: 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	23.57
INDICATORS	Number of Vehicles	8

Table 15: Employee Commute - Reasons for Not Carpooling Data

Reason	Percentage
Other people do not match my schedule or route	87.5%
May not be able to get home quickly in an emergency	50%
Need to make stops on the way to work or home	50%
Work late or irregular hours	37.5%
Dislike being dependent on others	37.5%
Difficult to find others to carpool/vanpool	12.5%
Need my car on the job	12.5%
Makes my trip too long	12.5%
Like the privacy when I'm in my own car	0%
I don't know enough about carpooling or vanpooling	0%
Never considered carpooling or vanpooling	0%
Other	0%

*Other responses included: "Not enough room for family; May need to leave to feed animals; live too close to work."

Table 16: Employee Commute - Reasons for Not Taking Transit

Reason	Percentage
Transit service doesn't match my route or schedule	75%
May not be able to get home quickly during an emergency	62.5%
Need to make stops on the way to work or home	50%
It takes too long	37.5%
I work late or irregular hours	37.5%
Not enough parking at the transit stop from which I'd depart	12.5%
Need my car on the job	12.5%
I don't know enough about taking transit	12.5%
Other	12.5%
It costs too much	0%
It is not safe or easy to walk to work from the transit stop	0%
It is too far to walk to work from the transit stop	0%
Like the privacy when I'm in my own car	0%
Never considered using public transit	0%

*Other responses include: "We don't have public transit options"

Table 17: Employee Commute - Reasons for Not Walking/Biking

Reason	Percentage
I live too far away	62.5%
Weather	50%
There isn't a safe or easy route for walking or biking	37.5%
It's not easy to look good and feel comfortable for work after walking or biking	37.5%
Need to make stops on the way to work or home	37.5%
May not be able to get home quickly in an emergency	25%
Workplace does not have adequate facilities for showering/changing	12.5%
Other	12.5%

No place at work to store bikes safely	0%
Never considered walking or biking to work	0%
I don't know enough about walking or biking to work	0%

Table 18: Employee Commute - Travel Mode Data

Mode	Percentage
Drive Alone	75%
Carpooling/Vanpooling	25%
Public Transportation	0%
Bicycling	0%
Walking	0%
Telecommute/Other	0%
Split Modes	0%

Inventory Methodologies

Buildings and Other Facilities

Energy usage data on buildings and other facilities was obtained from PG&E, Sierra Pacific Power, and Plumas Sierra Utilities. Data from PG&E was produced by the Rate Data Analysis Group, Phase 1 Gas and Electric GHG Summary for Incorporated Cities and Unincorporated Portions of Sierra County for year 2005, based on energy usage of PG&E service accounts.

Streetlights, Traffic Signals, and Other Public Lighting

Energy usage data on streetlights, traffic signals and other public lighting was obtained from PG&E, Sierra Pacific Power, and Plumas Sierra Utilities. Data from PG&E was produced by the Rate Data Analysis Group, Phase 1 Gas and Electric GHG Summary for Incorporated Cities and Unincorporated Portions of Sierra County for year 2005, based on energy usage of PG&E service accounts.

Vehicle Fleet and Mobile Equipment

Information containing a vehicle inventory list, fuel type, and vehicle miles traveled was provided by Matt Lopez in the Loomis Planning Department. Diesel consumption for the two Public Works tractors was estimated based on the fact that tractors may use between 3-20 gallons/hour. Consumption was calculated using the average of this range, and multiplying it by the operational hours of the equipment. The Loomis Fire Protection District's vehicle fleet was included in the inventory as a contracted service. Barbara Leak, from the Fire Protection District, provided a vehicle and equipment inventory list with corresponding data on VMT, fuel consumption and fuel costs for 2005. Although Loomis employs an outside company for waste hauling services, data on the company's vehicle fleet was not available and was therefore not included in the inventory as a contracted service.

Based on the vehicle inventory list provided by the Loomis Planning Department, an internet search by vehicle make and model was used to determine refrigerant types. Estimated leakage for the refrigerants was calculated by multiplying together the full charge capacity of the vehicle, the operating emissions factor, and the amount of time the vehicle was in use (assumed to be 1 year).

Government Generated Solid Waste

Data on government generated solid waste was obtained through email correspondence with Matt Lopez in the Town of Loomis Planning Department.

Employee Commute

Information on employee commute was gathered through a survey administered by email to Loomis employees. Eight out of 11 employees responded to the survey, leading to a 73% response rate, as well as an emissions calculations response rate of 73%. Although the survey was administered to those employed by the Town in 2010, the 2010 survey data was extrapolated using the number of people employed by the town in 2005, which was 14. In instances where either fuel efficiency was not provided or a range was given, EPA average fuel efficiencies were used.

Next Steps

ICLEI's Five Milestone Process

While Loomis has already begun to reduce greenhouse gas emissions through its actions, this inventory represents the first step in a systematic approach to reducing Loomis'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 8: 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 Loomis'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. Loomis should give itself enough time to implement chosen emissions reduction measures—noting that the farther out the target year is, the more Loomis should pledge to reduce. ICLEI recommends that regardless of the chosen long-term emissions reduction target (e.g., 15-year, 40-year), Loomis 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, Loomis 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, Loomis 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 Loomis 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 now – why wait to 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" 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 Loomis consider department-specific targets for each of the departments that generate emissions within its operations. This allows Loomis 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 Loomis'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 diesel and gasoline were major sources of emissions from Loomis's operations, it is possible that Loomis could meet near-term targets by implementing a few major actions within its vehicle fleet. Medium-term targets could be met by focusing emissions reduction actions in the buildings and facilities sector, and the long-term (2050) target will not be achievable without major reductions in all of these 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 Loomis 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
- Comprehensive municipal retrofit of existing buildings

- Develop policies to encourage employee carpooling

Using these strategies as a basis for a more detailed overall emissions reductions strategy, or climate action plan, Loomis 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, Loomis staff identified the following gaps in data that, if resolved, would allow Loomis to meet the recommended methods outlined in LGO Protocol in future inventories.

- Direct tracking of refrigerants recharged into HVAC and refrigeration equipment
- Direct tracking of fire suppressants recharged into fire suppression equipment
- Cost of fuels for vehicles and equipment
- Refrigerants recharged into vehicles in the vehicle fleet

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 Loomis to use to assist with future monitoring inventories. These tools are designed to work in conjunction with 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 (including emails), 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