Attachment 2

Town of Portola Valley 2005 Community-Scale Greenhouse Gas Emissions Inventory

1. San Mateo County Community-Scale Greenhouse Gas Emissions Inventories

1.1 Background

The County of San Mateo RecycleWorks and City and County Association of Governments (C/CAG) have been working to support all the cities in San Mateo County through the process of completing both their government operations and community-scale greenhouse gas emission inventories. This community-scale inventory has been completed on behalf of the Town of Portola Valley through CO_2 San Mateo County, a program funded in part by the Bay Area Air Quality Management District (BAAQMD).

In 2009, C/CAG contracted with ICLEI, Local Governments for Sustainability (ICLEI) to support this effort through trainings and technical support. ICLEI had previously been involved in the county, hosting two community-scale inventory trainings in 2007 and 2008 for San Mateo and Santa Clara County local governments. ICLEI has also supported a number of local governments in the county in performing community and government operations inventories. This inventory culminates all of that work and creates a standard emissions inventory for all local governments in the county.

Using the results of this community inventory, each of the San Mateo County local governments may now use these inventory results to move forward into the target setting and climate action planning milestones of ICLEI's Five-Milestone process see (Section 1.2).

1.2 Purpose of Inventory

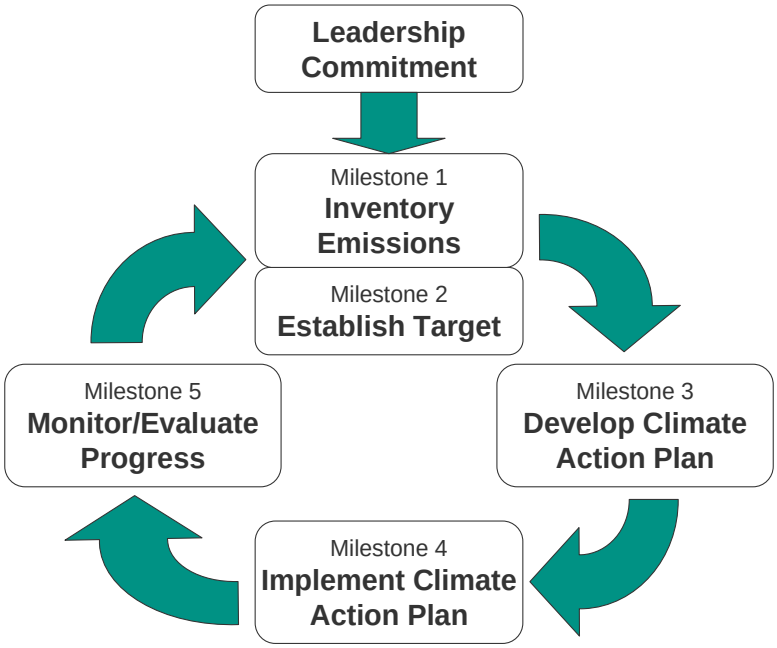
The objective of this greenhouse gas emissions inventory is to identify the sources and quantify the volumes of greenhouse gas emissions resulting from activities taking place throughout the community of Portola Valley in 2005. This inventory serves two purposes:

- It creates an emissions baseline against which the Town can set emissions reductions targets and measure future progress.
- It demonstrates the largest sources of emissions from community activities, and therefore allows the Town to most effectively target its emissions reductions policy

While the Town of Portola Valley has already begun to reduce greenhouse gas emissions through its actions, this inventory represents the first step in a systems approach to reducing Portola Valley's emissions. This system, developed by ICLEI, is called the Five-Milestone Process and is utilized by over 550 local governments in the U.S. to structure their climate protection efforts. The process is as follows:

- Milestone 1: Conduct a baseline emissions inventory and forecast
- Milestone 2: Adopt an emissions reduction target for the forecast year
- Milestone 3: Develop a local climate action plan
- Milestone 4: Implement the climate action plan
- Milestone 5: Monitor progress and report results

Figure 1.1 The Five-Milestone Process



2. Emissions Inventory Methodology

2.1 Methodology Standards

As local governments all over the world continue to rapidly join the climate protection movement, the need for a standardized approach to quantifying greenhouse gas (GHG) emissions is more pressing than ever. The community emissions inventory follows the standard outlined in the draft International Local Government GHG Emissions Analysis Protocol (IEAP). ICLEI has been developing this guidance since the inception of its Cities for Climate Protection Campaign in 1993, and has recently formalized version 1 of the IEAP as a means to set a common framework for all local government worldwide. Using this framework, ICLEI has worked with California Air

Resources Board (ARB), the Bay Area Air Quality Management District, the Metropolitan Transportation Commissions, and other state and regional agencies to develop a common method for inventorying community emissions in the Bay Area. This method has been used by the majority of local governments in the Bay Area.

ARB is currently working to establish a community greenhouse gas methodology specifically for California local governments. This methodology will serve as a corollary to the recently adopted Local Government Operations Protocol (LGOP). The LGOP, which ARB adopted in 2008, serves as the national standard for quantifying and reporting greenhouse emissions from local government operations.

2.2 Baseline Years

An initial aspect of the emissions inventory process is the requirement to select a base year for emissions, which will be used to establish a baseline emissions inventory against which all future inventories will be compared. A good baseline year is the earliest year where there is accurate and complete data for all key emission sources. It is also preferable to establish a base year several years in the past to be able to account for the emissions benefits of recent actions. .A local government's emissions inventory should comprise all greenhouse gas emissions occurring during a selected *calendar* year.

For the reasons mentioned above, this inventory utilizes 2005 as the baseline year, as this year is increasingly becoming the standard for such inventories. This is in line with state guidance, which, while establishing its baseline year as 1990, has recognized that local govenrments do not have complete data going back that far. Therefore, ARB recommended that local governments use a "current" or recent year as a baseline.

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

2.3 Boundaries of Greenhouse Gas Inventory Analysis

Any inventory is a subset of measurable emissions based upon a certain boundary . The boundary of this community inventory is emissions that result from activities taking place within the geopolitical boundary of the local government, over which the local government has direct control.[1] This boundary is used as activities that occur within the community boundary can be controlled or influenced by jurisdictional policies and programs. Though a local government cannot maintain direct control of an emissions source within its boundaries, it is still important to inventory these emissions as local government policies and programs can still have an indirect influence on these emissions. For example, although much of the traffic on state highways within a jurisdiction can be pass-through,

[1] Sphere of Influence areas are generally not considered in community-scale inventories since a local government maintains only indirect control over these areas.

inventorying emissions from this source encourages a local govenment to collaborate in regional transportation planning and further examine its own transportation and land use policies.

Within the boundaries of this inventory, emissions are organized according to sectors.

2.4 Emissions Sectors

ICLEI recommends that local governments examine their emissions in the context of the sector that is responsible for those emissions. Many local governments will find a sector-based analysis more directly relevant to policy making and project management, as it assists in formulating sector-specific reduction measures and climate action plan components.

Community Sectors

The IEAP outlines the following sectors, in accordance with the Intergovernmental Panel on Climate Change (IPCC):

Stationary Combustion: Including utility delivered fuel consumption at stationary sites, utility delivered electricity / heat consumption at stationary sites, decentralized fuel consumption at stationary sites (e.g. propane, kerosene, stationary diesel from small vendors), utility consumed fuel for electricity / heat generation, etc.

Mobile Combustion: Including tailpipe emissions from vehicles traveling on roads within the geopolitical boundary of the local government, tailpipe emissions from off-road vehicles operating within the geographical boundaries, rail traffic occurring within geographical boundaries, marine transportation occurring between two jurisdictions, etc.

Fugitive and Other Energy Emissions: Including leaked natural gas from distribution infrastructure located within geopolitical boundaries, leaked refrigerants from residential and commercial / industrial facilities, etc.

Industrial Processes and Product Use: Including non-energy related emissions generated in the production of cement, in the refining of fuels, in the processing of coal, etc.

Agriculture, Forestry and Other Land Use: Including emissions from the use of nitrogenous fertilizers, methane emissions from livestock farms, negative net biogenic carbon flux, etc.

Waste: Including fugitive methane emissions at landfills, fugitive methane and nitrous oxide emissions at waste water treatment facilities, estimated future emissions associated with base 2005 waste disposal, etc.

In most cases, a local government can enhance this inventory by further subdividing these sectors in a manner consistent with the way that the local government is accustomed to considering their community (for example,

splitting stationary combustion into residential, commercial and industrial sectors) . It is not mandatory that a local government conduct an analysis of all sectors listed by the IPCC, and this emissions inventory contains the sectors indicated in Table 2.1.

Table 2.1. Emissions Inventory Sectors

Sector	Description
Residential	Electricity and natural gas usage in homes
Commercial/Industrial	Electricity and natural gas usage in businesses
Transportation	Fuel consumption in on-road vehicles and off-road equipment
Waste Generation	Future emissions from the expected decomposition of waste generated by the community in the base year
Agriculture	Emissions from farm equipment, biomass burning, soil management and animal methane
Wastewater	Emissions form the decomposition of wastewater

2.5 Units Used in Reporting Greenhouse Gas Emissions

In this narrative report, emissions from all gases released by an emissions source (e.g. stationary combustion of natural gas in facilities) are combined and reported in metric tons of carbon dioxide equivalent (CO_2e). This standard is based on the Global Warming Potential (GWP) of each gas, which is a measure of the amount of warming a greenhouse gas may cause, measured against the amount of warming caused by carbon dioxide. See Table 2.2 below for the GWPs of the gases discussed in this section.

Table 2.2: Greenhouse Gases

Gas	Chemical Formula	Activity	Global Warming Potential (CO_2e)
Carbon Dioxide	CO_2	Combustion	1
Methane	CH_4	Combustion, Anaerobic Decomposition of Organics (Landfills, Wastewater), Fuel Handling	21
Nitrous Oxide	N_2O	Combustion, Wastewater Treatment	310
Hydrofluorocarbons	Various	Leaked Refrigerants, Fire Suppressants	43-11,700
Perfluorocarbons	Various	Aluminum Production, Semiconductor Manufacturing, HVAC Equipment Manufacturing	6,500-9,200
Sulfur Hexafluoride	SF_6	Transmission and Distribution of Power	23,900

2.6 Quantification Methods

It is important to understand that all emissions inventories are almost always a sum of *estimated,* and not actual , emissions. Emissions are quantified using the best available methods and best available data, and are subject to change as better data or estimation methods become available. Emissions can be quantified in two ways:

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

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

Activity Data x Emission Factor = Emissions

Activity Data

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

Emission Factors

Emission factors are used to convert energy usage or other activity data into associated emissions quantities. They are usually expressed in terms of emissions per unit of activity data (e.g. lbs CO_2/kWh). Please see Appendix B for a listing of emissions factors used in this report. Table 2.3 demonstrates an example of common emission calculations that use this formula.

Table 2.3: Basic Emissions Calculations

Activity Data	Emissions Factor	Emissions
Electricity Consumption (kWh)	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$2 emitted
Vehicle Miles Traveled	CH_4, N_2O emitted/mile	CH_4, N_2O emitted

3. Community Inventory Summary

In 2005, activities and operations taking place within the Town of Portola Valley's boundary resulted in approximately 33,210 metric tons of CO_2e. This number includes all emissions from the combustion of fuels in the residential, commercial / industrial, transportation, and mobile emissions sectors within Portola Valley's boundaries. This number also includes emissions associated with community electricity consumption (emissions that occur as a result of electricity consumption within the geopolitical boundary of the Town, but that occur at sources located outside of the Town's jurisdiction), and future emissions from waste generated by the Portola Valley community.[2]

3.1 Summary by Sector

By better understanding the relative scale of emissions from each primary sector, the Town of Portola Valley can more effectively focus emissions reductions strategies to achieve the greatest emission reductions. For this reason, an analysis of emissions by sector is included in this report, based on the total of 33,210 metric tons of CO_2e.

As visible in Figure 3.1 and Table 3.1, the residential energy sector was the largest emitter in 2005 at 41%. Emissions from transportation on local roads produced the second highest quantity, resulting in 39% of total emissions. Commercial energy use is the next largest source of emissions at 13%. The remainder of emissions came from transportation on off-road equipment (4%); community-generated waste (2%); and agriculture (1%). While transportation on state highways generated 163 CO_2e, this small amount did not even make up 0.5% of the Town's total emissions. Please see sector emissions analyses below for more detail.

Figure 3.1 2005 Town of Portola Valley Emissions by Sector

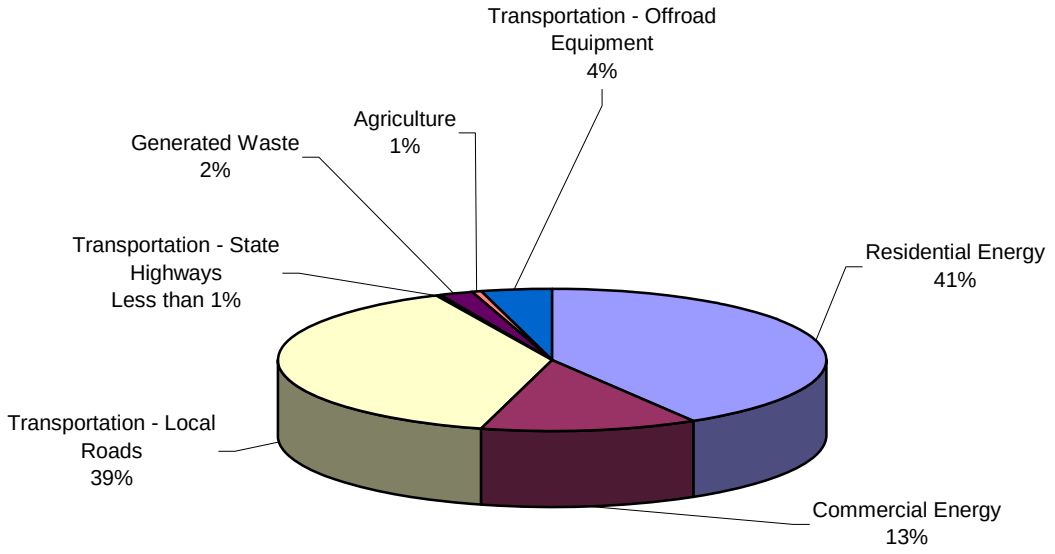


Table 3.1: 2005 Community Emissions by Sector

Sector	Greenhouse Gas Emissions (metric tons CO_2e)	Percentage of Greenhouse Gas Emissions
Residential	13,720	41%
Commercial*	4,276	13%
Transportation-Local Roads	12,880	39%
Transportation-State Highways	163	Less than 1%
Transportation – Off-Road Equipment*	1,411	4%
Generated Waste	561	2%
Agriculture	199	1%
TOTAL	**33,210**	**100%**

***Includes emissions from Government Operations (160 metric tons CO_2e = 0.48% of total)**

Table 3.2: 2005 Community Emissions by Sector and Source (where applicable)

Sector	Source	Greenhouse Gas Emissions (metric tons CO_2e)	Percentage of Greenhouse Gas Emissions
Residential	**Electricity**	4,407	**13%**
	Natural Gas	9,313	**28%**
Commercial	**Electricity**	1,679	**5%**
	Natural Gas	2,597	**8%**
Transportation	**Local Roads-Gasoline**	11,802	**36%**
	Local Roads-Diesel	1,078	**3%**
	State Highways-Gasoline	149	**Less than 1%**
	State Highways-Diesel	14	**Less than 1%**
	Off-Road Equipment (Residential)	94	**Less than 1%**
	Off-Road Equipment (Commercial)*	1,317	**Less than 4%**
Waste	**Paper Products**	268	**1%**
	Food Waste	105	**Less than 1%**
	Plant Debris	28	**Less than 1%**
	Wood or Textiles	79	**Less than 1%**
	All Other Waste	0	**0%**
Waste – Landfill Cover	**Paper Products**	81	**Less than 1%**
	All Other Waste	0	**0%**
Agriculture	**Agricultural Equipment**	68	**Less than 1%**
	Animal Waste	60	**Less than 1%**
	Soil Management	70	**Less than 1%**
	Biomass Burning	1	**Less than 1%**
TOTAL		**33,210**	

***Please note that emissions from agricultural equipment are not included in the transportation/off-road equipment sector; they are included in the Agricultural Sector.**

3.3 Per Capita Emissions

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

As detailed in Table 3.3, dividing the total community-wide GHG emissions by population yields a result of approximately seven metric tons of CO_2e per capita. It is important to understand that this number is not the same as the carbon footprint of the average individual living in Portola Valley, as the per capita number includes emissions from activities by people who work or drive through Portola Valley, not only those who live in the community.

Table 3.3: 2005 Community Per Capita Emissions

Estimated 2005 Population*	4,462
Community GHG Emissions (metric tons CO_2e)	33,210
Per Capita GHG Emissions (metric tons (CO_2e)	7.44

***2000 Census Data**

3.4 Recommendations

Based on the findings from this Inventory, the following are suggested steps for Portola Valley:

- Set emissions-reduction targets.
- Continue to monitor progress and re-inventory emissions every five years.
- Near-term climate goals should be guided by the long-term goal of reducing emissions by 80 percent by 2050.
- Follow AB 32 suggestions of achieving at least 15 percent lower emissions by 2020.
- Consider sector-specific targets.
- Meet near-term targets by implementing simple actions for highest emitting sectors.