City of Albany

Baseline Greenhouse Gas Emissions Inventory Report

December 2006

Conducted by ICLEI's Cities for Climate Protection® Campaign
in partnership with the City of Albany

City of Albany Baseline Greenhouse Gas Emissions Inventory

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Acknowledgements

This Greenhouse Gas Emissions Inventory Report was completed through the generous support of many individuals and organizations. The staff at the City of Albany has been most helpful in gathering the data and doing the subsequent analysis. Particular thanks go to Nicole Almaguer, Environmental Resource Associate at the City of Albany.

Many thanks are also due to StopWaste.Org. Their generous support of ICLEI and the jurisdictions in Alameda County was instrumental to this project's success.

I. Introduction

Since the early 1990's scientific consensus holds that the world's population is releasing greenhouse gases faster than the earth's natural systems can absorb them. These gases are released as by-products of fossil fuel combustion, waste disposal, energy use, land-use changes, and other human activities. This release of gases, such as carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), creates a blanket around the earth that allows light to pass through but traps heat at the surface preventing its escape into space. Known as the greenhouse effect or global climate change, models show that this phenomenon will lead to a 2^oF to 10^oF temperature increase over the next 100 years. Already the Intergovernmental Panel on Climate Change warns that most of the warming observed over the last 50 years is attributable to human activities.

Changes in the earth's temperature will have impacts for residents of Alameda County, California. These impacts could include:

- Warmer weather associated with increased heat waves
- Wetter weather with an increase in annual rainfall of 20% to 30% leading to more serious storm events
- Rising sea levels that will threaten coastal infrastructure, ecosystems, and water supplies
- Decrease in the Sierra snow pack that will effect fresh water availability and tourism opportunities
- Increase in insect born diseases

Although one city cannot independently resolve the issue of climate change, local governments can make a positive impact through cumulative local action. Cities and counties have the ability to reduce greenhouse gas emissions through effective land use and transportation planning, wise waste management, and the efficient use of energy.

A. Baseline Emissions Inventory Report: Purpose

This report presents the results of the City of Albany's baseline greenhouse gas emissions inventory. The inventory was conducted by ICLEI – Local Governments for Sustainability in partnership with the City of Albany. The purpose of the baseline emissions inventory is to determine the levels of greenhouse gas emissions that the City of Albany emits in its base year, 2004, on a municipal level and a community-wide level. This information will be used to help the city adopt an emissions reduction target and develop an emissions reduction action plan. The inventory provides important information on the jurisdictions emissions profile so that subsequent emissions reduction strategies can be tailored to the community's specific situation.

B. The Alameda County Climate Protection Project

In June 2006 the City of Albany, along with 10 other local governments in Alameda County, committed to becoming a member of ICLEI and participating in the Alameda County Climate Protection Project. The project was launched by ICLEI in partnership with StopWaste.Org and the Alameda County Conference of Mayors. In committing to the project, the City of Albany embarked on an ongoing, coordinated effort to reduce the emissions that cause global warming, improve air quality, reduce waste, cut energy use and save money.

C. ICLEI and the Cities for Climate Protection Campaign

ICLEI's mission is to improve the global environment through local action. The Cities for Climate Protection® (CCP) Campaign is ICLEI's flagship campaign designed to educate and empower local governments worldwide to take action on climate change. ICLEI provides resources, tools, and technical assistance to help local governments measure and reduce greenhouse gas emissions in their communities and their internal municipal operations.

ICLEI's CCP Campaign was launched in 1993 when municipal leaders, invited by ICLEI, met at the United Nations in New York and adopted a declaration that called for the establishment of a worldwide movement of local governments to reduce greenhouse gas emissions, improve air quality, and enhance urban sustainability. The CCP Campaign achieves these results by linking climate change mitigation with actions that improve local air quality, reduce local government operating costs, and improve quality of life by addressing other local concerns. The CCP Campaign seeks to achieve significant reductions in U.S. greenhouse gas emissions by assisting local governments in taking action to reduce emissions and realize multiple benefits for their communities.

ICLEI uses the performance-oriented framework and methodology of the CCP Campaign's Five Milestones to assist U.S. local governments in developing and implementing harmonized local approaches for reducing global warming and air pollution emissions, with the additional benefit of improving community livability. The milestone process consists of:

- Milestone 1: Conduct a baseline emissions inventory and forecast
- Milestone 2: Adopt an emissions reduction target
- Milestone 3: Develop a Climate Action Plan for reducing emissions
- Milestone 4: Implement policies and measures
- Milestone 5: Monitor and verify results

In 2006 the City of Albany adopted a resolution to take action for climate protection and officially joined ICLEI's Cities for Climate Protection Campaign.

II. Emissions Inventory

A. Reasoning, Methodology & Model

ICLEI's Cities for Climate Protection methodology enables local governments to systematically estimate and track greenhouse gas emissions from energy use and waste related activities at the community-wide scale and those resulting directly form municipal operations. The municipal operations inventory is a subset of the community-scale inventory.

Once completed, these inventories provide the basis for creating an emissions forecast and reduction target, and enable the quantification of emissions reductions associated with implemented and proposed measures.

1. Emissions Analysis Software

To facilitate local government efforts to identify and reduce greenhouse gas emissions, ICLEI developed the Clean Air and Climate Protection (CACP) Software package with Torrie Smith Associates. This software estimates emissions derived from energy consumption and waste generation within a community. The CACP software determines emissions using specific factors (or coefficients) according to the type of fuel used. Emissions are aggregated and reported in terms of equivalent carbon dioxide units, or eCO_2. Converting all emissions to equivalent carbon dioxide units allows for the consideration of different greenhouse gases in comparable terms. For example, methane is twenty-one times more powerful than carbon dioxide in its capacity to trap heat, so the model converts one ton of methane emissions to 21 tons of eCO_2.

The emissions coefficients and methodology employed by the software are consistent with national and international inventory standards established by the Intergovernmental Panel on Climate Change (1996 Revised IPCC Guidelines for the Preparation of National GHG Emissions Inventories), the U.S. Voluntary Greenhouse Gas Reporting Guidelines (EIA form1605), and, for emissions generated from solid waste, the U.S. EPA's Waste Reduction Model (WARM).

The CACP software has been and continues to be used by over 200 U.S. cities and counties to quantify the reduction in their greenhouse gas emissions. However, it is worth noting that, although the software provides cities/counties with a sophisticated and useful tool, calculating emissions from energy use with precision is difficult. The model depends upon numerous assumptions, and it is limited by the quantity and quality of available data. With this in mind, it is useful to think of any specific number generated by the model as an approximation, rather than an exact value.

2. Inventory Sources and Data Collection Process

An inventory of greenhouse gas emissions requires the collection of information from a variety of sectors and sources. For community electricity and natural gas data, ICLEI consulted Pacific Gas & Electric Company (PG&E). The Metropolitan Transportation Commission (MTC), Bay Area Air Quality Management District (BAAQMD), and Bay Area Rapid Transit (BART) served as sources of transportation data. Solid waste data was gathered from StopWaste.Org, Waste Management, Inc., Alameda County Industries, Republic Services, Inc. and the U.S. Environmental Protection Agency (U.S. EPA).

Nicole Almaguer, Environmental Resource Associate at the City of Albany, coordinated the City's municipal data collection process.

These data were entered into the software to create a community emissions inventory and a municipal emissions inventory. The community inventory represents all the energy used and waste produced within the City of Albany and its contribution to greenhouse gas emissions. The municipal inventory is a subset of the community inventory, and includes emissions derived from internal government operations.
There are two main reasons for completing separate emissions inventories for community and municipal operations. First, the government is committed to action on climate change, and has a higher degree of control to achieve reductions in its own municipal emissions than those created by the community at large. Second, by proactively reducing emissions generated by its own activities, the Albany government takes a visible leadership role in the effort to address climate change. This is important for inspiring local action in Albany as well as for inspiring other communities.

The City of Albany's inventory is based on the year 2004. When calculating Albany's emissions inventory, all energy consumed within the city limits was included. This means that, even though the electricity used by Albany's residents is produced elsewhere, the energy and emissions associated with it appears in Albany's inventory. The decision to calculate emissions in this manner reflects the general philosophy that a community should take full ownership of the impacts associated with its energy consumption, regardless of whether the generation occurs within the geographical limits of the community.

B. Inventory Results

The results below represent the City of Albany's completion of the first milestone of ICLEI's CCP campaign.

1. Community Emissions Inventory

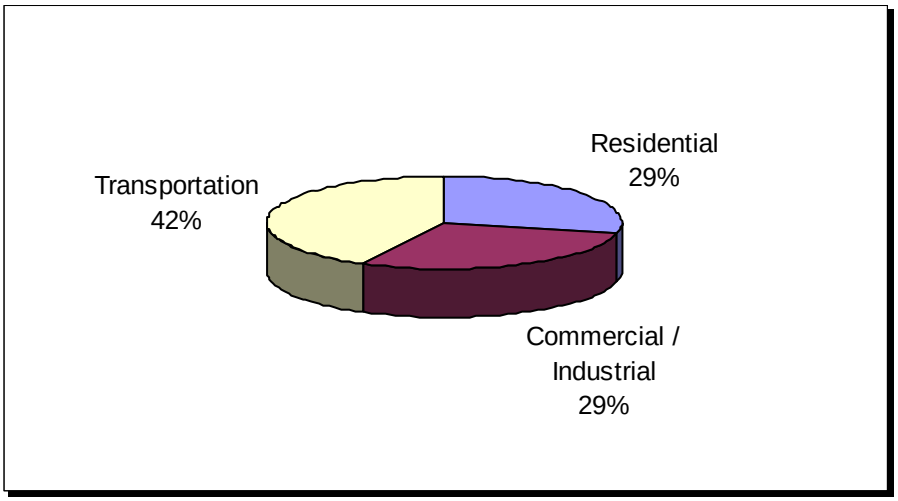
In the base year 2004, the City of Albany emitted approximately 83,429 tons of eCO_2 from the residential, commercial/industrial, transportation and waste sectors. Burning fossil fuels in vehicles and for energy use in buildings and facilities is a major contributor to Albany's greenhouse gas emissions. Fuel consumption in the transportation sector is the single biggest source of emissions, contributing 42.5% of total emissions. Table (1) and Figure (a) below show Albany's total greenhouse gas emissions from all major sources for the year 2004. The residential and commercial/industrial sectors represent emissions that result from electricity and natural gas used in both private and public sector buildings and facilities. The transportation sector includes emissions from private, commercial and fleet vehicles driven within the City's geographical boundaries as well as the emissions from transit vehicles and the city-owned fleet.

Table (1): Albany Community Emissions Summary

Potential Sources	Equiv eCO_2 (tons)	Energy (MMBtu)
Residential	23,788	362,869
Commercial/Industrial	24,178	359,039
Transportation	35,463	412,405
TOTAL	83,429	1,134,314

Source: CACP Model output

Figure (a): Albany Community Greenhouse Gas Emissions - Year 2004



Source: CACP Model output

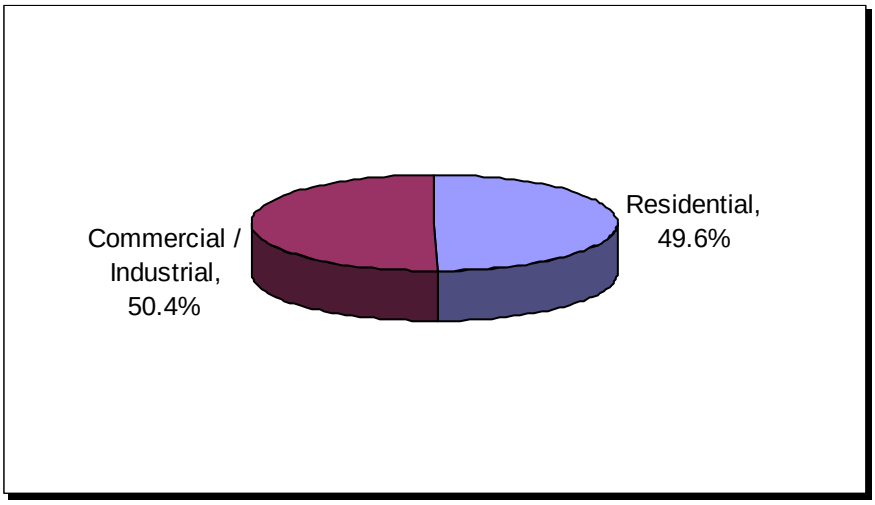
Energy / Stationary Source Emissions

In 2004, Albany's total stationary energy consumption was about 65,169,529 kWh of electricity and 4,994,865 therms of natural gas. Stationary energy use by all sectors (residential, commercial and industrial activities) accounts for 57.5% of total greenhouse gas emissions in Albany. These emissions are a result of the combustion of fossil fuel. Albany's stationary energy use resulted in a total of approximately 47,966 tons of eCO_2 emissions in 2004.

The City of Albany receives its electricity from Pacific Gas & Electric Company (PG&E). The 2004 emissions coefficients for electricity provided by PG&E are included in the notes in Appendix B. The types of power sources that make up a utility's electricity generation mix have a significant impact on a city's greenhouse gas emissions. A coal fired power plant, for example, releases 1.3 tons of eCO_2 per megawatt-hour of electricity generated versus 0.7 tons for gas turbines and 0 tons for renewable sources such as solar, wind, or hydroelectric power.

Figure (b) shows the breakdown of greenhouse gas emissions by sector for both electricity and natural gas combined. Of the total 47,966 tons of eCO_2 emitted due to stationary energy use, 49.6% was from residential buildings and 50.4% was from commercial/industrial buildings.

Figure (b): Albany Community Greenhouse Gas Emissions Breakdown (Residential and Commercial/Industrial) - Year 2004



Source: CACP Model output

Residential
In 2004, Albany's 16,729 residents consumed 26,519,392 kWh of electricity, or about 3757 kWh per household, and 2,723,591 therms of natural gas, or about 386 therms per household. This consumption resulted in a release of 23,788 tons of eCO_2. Major residential energy uses include refrigeration, lighting and water heating.

Commercial/Industrial
In 2004, Albany's commercial/industrial sector buildings consumed 38,650,137 kWh of electricity and 2,271,274 therms of natural gas. This consumption resulted in a release of 24,178 tons of eCO_2 into the atmosphere.

Transportation Emissions

The transportation sector is responsible for about 42.5% of Albany's greenhouse gas emissions. Motor vehicles driven within the City's geographical boundaries emitted approximately 35,463 tons of eCO_2 in 2004.

Calculations for transportation emissions are based on figures for total vehicle miles traveled (VMT) in the City of Albany. MTC supplied the necessary VMT data, while BAAQMD provided data that enabled us to break down total VMT by percentage driven by a given vehicle type.

Solid Waste Emissions

In 2004, Albany sent approximately 7064 tons of solid waste to landfills. Albany also has recycling and composting measures in place; however, due to lack of data availability, the emissions impact of these practices is not included in this analysis.

The way in which ICLEI's CACP software calculates solid waste emissions deserves detailed explanation. The software is designed to be used in communities with a variety of waste disposal methods, including open dumping, landfilling and incineration. The emissions calculations from waste disposal are based on the U.S. EPA's Waste Reduction Model (WARM) and are consistent with national standards. The CACP software calculates waste sector emissions based on a number of factors,

including: the methane recovery factor at the landfills to which the city's solid waste is sent; the total amount of solid waste sent to the landfill(s); the composition of the waste sent to the landfill(s); and emissions coefficients derived from the WARM model.

A weighted average of the methane recovery factors for the landfills to which Albany sends its waste equals approximately 74.9%. This estimate is based on data supplied by the U.S. EPA's Landfill Methane Outreach Program (LMOP).

Based on emissions coefficients for the waste sector, and because more than 74.9% of the methane produced from Albany's solid waste is estimated to be recovered (either captured perpetually under the liner of the landfill or captured and then flared), waste emissions appear to be slightly negative, -1,628 tons of eCO_2 in 2004.

However, because the model does not capture the emissions credit achieved through the city's recycling efforts, we are choosing to "zero out" the emissions credit attributed to landfilling for the purposes of this inventory. Zeroing out the emissions credit for landfilling is consistent with the action taken by a number of ICLEI members, including the City and County of San Francisco.

Furthermore, the benefits gained from recycling and the associated reduction in "upstream" energy use far outweigh sending waste to the landfill. For example, if Albany recycled an additional 20,000 tons of waste, then the City would reduce its annual eCO_2 emissions by an additional amount of 53,000 tons.

Recycling reduces CO_2 emissions because manufacturing products with recovered materials avoids emissions from the energy that would have been used during extraction, transporting and processing of virgin raw materials. Recycling paper also conserves forests, which contribute to carbon sequestration – a process that removes carbon from the atmosphere and stores it for long periods of time. Both forests and organic material in the soil sequester carbon.

Further, recent studies have begun to question the U.S. EPA's estimates for the amount of methane that is actually captured by methane recovery systems at landfills. Many hypothesize that the efficiency with which methane recovery systems capture methane is currently overestimated, and that much more of the potent greenhouse gas is actually escaping from landfills into the atmosphere. The CACP software is designed to follow EPA guidelines and the tool will be updated appropriately when those guidelines change.

Table (2) shows the approximate breakdown of the materials Albany sent to landfills in 2004. Organic materials such as food and yard waste disposed of in landfills decompose and emit methane, a greenhouse gas 21 times more potent than CO_2. Materials that do not breakdown and release greenhouse gases are aggregated into the "All Other Waste" category.

Table (2): Albany Waste Composition

Waste Type	Waste Share
Paper Products	32.5%
Food Waste	19.3%
Plant Debris	6.2%
Wood/Textiles	7.5%
All Other Waste	34.5%
Total	**100%**

Source: StopWaste.Org

2. Municipal Operations Emissions Inventory

ICLEI's emissions analysis software and methodology enable a jurisdiction to inventory the emissions that result from municipal operations. As was noted earlier, the municipal inventory is a subset of the community inventory.

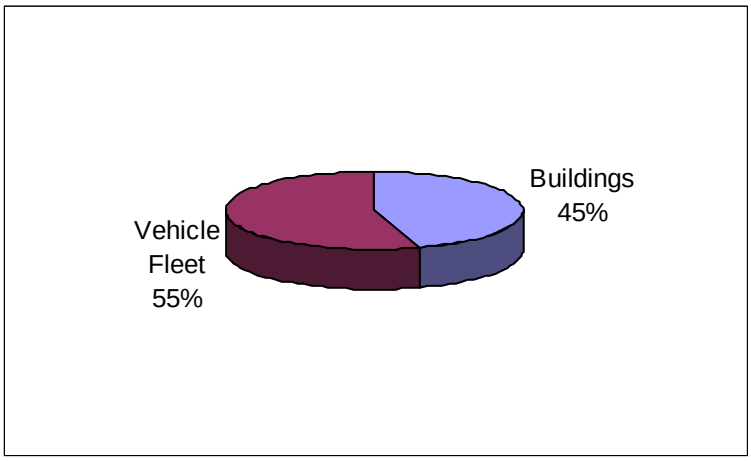
In the base year of 2004, Albany's municipal operations generated 966 tons of eCO_2. As Table (3) and Figure (c) show, the City's vehicle fleet accounted for the majority of emissions, followed by buildings.

Table (3): Albany Municipal Emissions Summary

Potential Sources	Equiv eCO_2 (tons)	Energy (MMBtu)	Cost ($)
Buildings	436	6,117	0
Vehicle Fleet	530	6,141	114,535
TOTAL	966	12,259	114,535

Source: CACP Model output

Figure (c): Albany Municipal Greenhouse Gas Emissions – Year 2004



Source: CACP Model output

Municipal emissions in Albany constitute about 1% of Albany's total emissions. Local government emissions typically fall between 1 to 5 percent of overall community emissions. As a minor contributor to total emissions, actions to reduce municipal energy use may have a limited impact on Albany's overall community emissions levels. However, municipal action has symbolic value and demonstrates leadership that extends beyond the magnitude of emissions actually reduced.

Energy/Stationary Source Emissions

In 2004, Albany municipal buildings and facilities consumed 1,128,722 kWh of electricity and 22,652 therms of natural gas, which resulted in a release of 436 tons of eCO_2 emissions into the atmosphere.

Transportation Emissions

The City's vehicle fleet consumed approximately 48,893 gallons of gasoline equivalent and emitted about 560 tons of eCO_2. The municipal fleet includes all vehicles owned and operated by the City of Albany plus some contractor vehicles performing City functions (e.g., Waste Management garbage trucks).

Solid Waste Emissions

The City sent 159 tons of solid waste to landfills in 2004. Based on available data and the methodology employed by U.S. EPA's WARM model, municipal waste emissions appear to be slightly negative at -1 tons of eCO_2. As was discussed in the section on community solid waste emissions (see page 10), this negative number will be zeroed out for the purpose of this inventory.

Table (4): Albany's Emissions Summary

Albany's Emissions Summary		
	Community Analysis	**Municipal Operations Analysis**
Base year	2004	2004
Quantity of eCO_2 emissions in base year (tons)	83,429	966

Source: CACP Model Output

III. Forecast for Greenhouse Gas Emissions

Based on the community and municipal operations emissions inventories developed for Albany for the base year 2004, the next step was to forecast future emissions for the year 2020. The emission forecast represents a business-as-usual prediction of how greenhouse gas (GHG) emissions may change in the City of Albany over time for the community sector.

The forecast projects the growth (or reduction) in greenhouse gas emissions that will occur in a given future year. Projections are based on the assumption that energy consumption will grow as population increases. For the community analysis, the forecast was conducted by applying population growth factors to Albany's base year residential, commercial/industrial, and transportation data. For the municipal government analysis, no growth was anticipated in the municipal government operations. Table (5) provides an emissions summary for Albany's base year and forecast year.

Table (5): Albany's Emissions Summary

Albany's Emissions Summary		
	Community Analysis	**Municipal Operations Analysis**
Base year	2004	2004
Indicators used to generate forecast	0.40% (Annual population growth rate based on ABAG data)	No growth anticipated
Quantity of eCO_2 emissions in base year (tons)	83,429	966
Forecast year	2020	2020
Business-as-usual projection of eCO_2 emissions in *2020* (tons)	87,888	966

Source: CACP Model Output and ABAG

Conducting an emissions forecast is essential for setting an emissions reduction target, since the amount of GHG emissions Albany pledges to reduce will be derived from projected emissions.

IV. Conclusion

This baseline greenhouse gas emissions inventory report represents a "snapshot" of the greenhouse gases that the City of Albany emits in its base year, 2004, on a community-wide level and a municipal level. The report also approximates the greenhouse gases that the City will emit in the year 2020.

This information will be used to help the City adopt an emissions reduction target and develop a climate action plan. The climate action plan consists of policies and measures that, when implemented, will serve to get the City to its target. The inventory also serves to inform the City regarding the major sources of greenhouse gas emissions. For example, the community-wide inventory for the City of Albany reveals that the transportation sector is responsible for 42.5% of total emissions.

The inventory also reveals the fact that Albany's municipal government emissions represent a small percentage of community-wide emissions, in this case 1%. By proactively reducing emissions generated by its own activities, the Albany government takes a visible leadership role in the effort to address climate change. This is important for inspiring local action in Albany as well as for inspiring action in other communities.

Appendix A – Data Summary Reports, Data Sources, Assumptions and Notes for the Municipal Inventory

Albany

Government Greenhouse Gas Emissions in 2004

Summary Report

	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (MMBtu)	Cost ($)
Buildings	436	45.2	6,117	0
Vehicle Fleet	530	54.8	6,141	114,535
Waste	0	0.0		0
Total	966	100.0	12,259	114,535

Government Greenhouse Gas Emissions in 2004
Detailed Report

	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (MMBtu)	Cost ($)
Buildings				
Albany, CA				
All Municipal Facilites				
Electricity	296	30.7	3,852	0
Natural Gas	140	14.5	2,265	0
Subtotal All Municipal Facilites	436	45.2	6,117	0

Notes:
1. The PG&E coefficient set is based on the PG&E-specific eCO2 emissions factor for 2005 and default criteria air pollutant emissions factors for the 2004 Region 13 - Western Systems Coordinating Council/CNV Average Grid Electricity Set. The PG&E coefficient set does not have emissions factors for CH4 and N2O as the eCO2 emissions factor includes CH4 and N2O emissions in CO2 equivalents.
2. The eCO2 emissions factor is pending independent verification and certification by the California Climate Action Registry; the confirmed eCO2 factor will be made public by CCAR at the end of 2006, at which time the emissions factor used in this analysis should be updated if it has changed.
3. Industrial consumption data is reported within the Commercial sector due to PUC confidentiality rules that prohibit the release of such data in certain cases.
4. Only aggregate electricity and natural gas data were available. This record is presumed to include: Civic Center (City Hall, Police & Fire), Albany Library & Community Center, Albany Child Care, Memorial Park 'barn', Memorial Park tennis, and Terrace Park Restroom & Storage. This data includes all streetlights owned by the City of Piedmont.

Data Sources:
1. Electricity, natural gas, FTE and floor area data provided on September 20, 2006 by Nicole Almaguer, Environmental Resources Associate, City of Albany, nalmaguer@albanyca.org, (510) 528-5754
2. Request for electricity and natural gas data processed by Greg San Martin, Climate Protection Program Manager, PG&E, GJS8@pge.com, (415) 973-6905, and Jasmin Ansar, Manager, Environmental Policy, PG&E, JxA2@pge.com, (415) 973-4570
3. PG&E-specific eCO2 emissions factor of 0.525 lbs/kWh (or 262.5 short tons CO2/GWh) of delivered electricity in 2005 provided by Greg San Martin

Data collected and entered by Brooke Owyang Lee, Program Assistant, ICLEI, brooke.lee@iclei.org
Last updated October 4, 2006
Data summary file: City of Albany GHG Data 2004.xls

Subtotal Buildings	436	45.2	6,117	0
Vehicle Fleet				
Albany, CA				
Community Development				
Gasoline	23	2.4	269	4,695
Diesel	21	2.1	238	1,890
Subtotal Community Development	44	4.5	507	6,585
Fire Department				
Gasoline	17	1.7	194	3,428
Diesel	30	3.1	343	2,869
Subtotal Fire Department	47	4.8	537	6,297

Government Greenhouse Gas Emissions in 2004
Detailed Report

	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (MMBtu)	Cost ($)
Police Department				
Gasoline	149	15.5	1,746	26,617
Subtotal Police Department	149	15.5	1,746	26,617
Recreation Department				
Gasoline	17	1.8	198	3,448
Subtotal Recreation Department	17	1.8	198	3,448

Notes:
1. Costs are assumed to be inclusive of taxes.

Data Sources:
1. Unleaded fleet consumption by vehicle type, associated costs and no-growth projection provided on August 10, 2006 by Nicole Almaguer, Environmental Resources Associate, City of Albany, nalmaguer@albanyca.org, (510) 528-5754
2. Diesel fuel costs provided on August 14, 2006 by Nicole Almaguer.

Data collected and entered by Brooke Owyang Lee, Program Assistant, ICLEI, brooke.lee@iclei.org
Last updated October 4, 2006
Data summary file: City of Albany GHG Data 2004.xls

Waste Management Inc.				
CNG	0	0.0	1	7,226
Diesel (ULSD)	273	28.3	3,152	64,361
Subtotal Waste Management Inc.	273	28.3	3,153	71,587

Notes:
1. LNG fuel consumption is entered as CNG, as CACP software lacks emissions factors for LNG. LNG emissions profile is comparable with CNG. No CNG fuel consumption was reported.
2. The City of Albany does not own or operate the Waste Management Inc. fleet. However, it is included in the government emissions inventory because waste hauling is an essential municipal service. This record comprises the portion of fuel consumed by the WM fleet for all service within the city, including the commercial/industrial, residential and government sectors.

Data Sources:
1. Fuel consumption, associated costs and fleet data provided on August 14, 2006 by Jason Silva Waste Management, JSilva4@wm.com

Data collected and entered by Brooke Owyang Lee, Program Assistant, ICLEI, brooke.lee@iclei.org
Last updated August 15, 2006
Data summary file: City of Albany GHG Data 2004.xls

Subtotal Vehicle Fleet	530	54.8	6,141	114,535

Government Greenhouse Gas Emissions in 2004
Detailed Report

	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (MMBtu)	Cost ($)
Waste				
Albany, CA				
Government Waste			*Disposal Method - Managed Landfill*	
Plant Debris	0	0.0		0
Subtotal Government Waste	0	0.0		0

Notes:
1. In 2004, the City of Albany's government facilities sent approximately 158.98 tons of solid waste to landfills. Because 74.9% of the methane produced by Albany's solid waste is estimated to be recovered, waste emissions appear to be negative: -1 ton of eCO2. Many cities choose to eliminate this emissions "credit" by replacing the waste tonnage input data with zero. StopWaste.Org urged ICLEI to do so for the purposes of this inventory. For future reference, the notes below include the original waste data that resulted in the negative emissions number.
2. Albany's estimated waste composition:
    a. Plant Debris: 1.3%
    b. All Other Waste: 98.7%
3. The weighted average methane recovery factor for Albany (74.9%) is based on tonnage hauled to each landfill.

Data Sources:
1. Government operations solid waste data (*included in the notes above)* provided on July 20, 2006 by Meghan Starkey, Senior Program Manager, Alameda County Waste Management Authority (StopWaste.org), mstarkey@stopwate.org, (510) 614-1699
2. Waste characterization data (*included in the notes above)* is based on the 2000 Alameda County Waste Characterization study available online at http://www.stopwaste.org/home/index.asp?page=590
3. Methane recovery factors for individual landfill sites (*explained in the notes above)* provided by Victoria Ludwig, Program Manager EPA Landfill Methane Outreach Program, Ludwig.Victoria@epamail.epa.gov

Data collected and entered by Brooke Owyang Lee, Program Assistant, ICLEI, brooke.lee@iclei.org
Last updated December 13, 2006
Data summary file: City of Albany Community Waste Data 2004.xls

Subtotal Waste	0	0.0		0
Total	966	100.0	12,259	114,535

Appendix B – Data Summary Reports, Indicator Report, Data Sources, Assumptions and Notes for the Community Inventory

Albany

Community Greenhouse Gas Emissions in 2004

Summary Report

	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (MMBtu)
Residential	23,788	28.5	362,869
Commercial	24,178	29.0	359,039
Transportation	35,463	42.5	412,405
Waste	0	0.0	
Total	83,429	100.0	1,134,314

Community Greenhouse Gas Emissions in 2004
Detailed Report

	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (MMBtu)
Residential			
Albany, CA			
Residential			
Electricity	6,961	8.3	90,510
Natural Gas	16,827	20.2	272,359
Subtotal Residential	23,788	28.5	362,869
Subtotal Residential	23,788	28.5	362,869
Commercial			
Albany, CA			
Commercial/Industrial			
Electricity	10,146	12.2	131,912
Natural Gas	14,032	16.8	227,127
Subtotal Commercial/Industrial	24,178	29.0	359,039

Notes:
1. The PG&E coefficient set is based on the PG&E-specific eCO2 emissions factor for 2005 and default criteria air pollutant emissions factors for the 2004 Region 13 - Western Systems Coordinating Council/CNV Average Grid Electricity Set. The PG&E coefficient set does not have emissions factors for CH4 and N2O as the eCO2 emissions factor includes CH4 and N2O emissions in CO2 equivalents.
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Data collected and entered by Brooke Owyang Lee, Program Assistant, ICLEI, brooke.lee@iclei.org
Last updated October 7, 2006
Data summary file: City of Albany GHG Data 2004.xls

Subtotal Commercial	24,178	29.0	359,039

Community Greenhouse Gas Emissions in 2004
Detailed Report

	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (MMBtu)
Transportation			
Albany, CA			
Community Transportation			
Gasoline	22,600	27.1	264,130
Diesel	12,863	15.4	148,275
Subtotal Community Transportation	35,463	42.5	412,405

Notes:
1. The VMT data provided by MTC includes Daily VMT (DVMT) for weekdays only. VMT including weekends is calculated with the MTC's weekdays/weekends VMT ratio: 1.1489. Hence Annual VMT = DVMT x (number of weekdays in the base year) + DVMT/1.1489 x (365 - number of weekdays in the base year).
2. The VMT by fuel and vehicle type is calculated using Alameda County VMT % (by vehicle type) and the default CACP fleet breakdown by fuel type.

Data Sources:
1. Citywide VMT data provided on July 18, 2006 by Harold Brazil, Air Quality Associate, Metropolitan Transportation Commission (MTC) hbrazil@mtc.ca.gov, (510) 817-5747
2. VMT by vehicle type data provided on July 5, 2006 by Amir Fanai, Principal Air Quality Engineer, Bay Area Air Quality Management District, AFanai@baaqmd.gov

Data collected by Brooke Owyang Lee, Program Assistant, ICLEI, brooke.lee@iclei.org
Data entered by Brooke Owyang Lee and Palak Joshi, Program Assistant, ICLEI, palak.joshi@iclei.org
Last updated October 11, 2006

Subtotal Transportation	35,463	42.5	412,405
Waste			
Albany, CA			
ADC			*Disposal Method -*
Plant Debris	0	0.0	
Subtotal ADC	0	0.0	

Notes:
1. In 2004, the City of Albany sent an estimated 0.49 tons of ADC to landfills. Because 74.9% of the methane produced by Albany's solid waste is estimated to be recovered, waste emissions appear to be negative: -0.662 tons of eCO2. Many cities choose to eliminate this emissions "credit" by replacing the waste tonnage input data with zero. StopWaste.Org urged ICLEI to do so for the purposes of this inventory. For future reference, the notes below include the original waste data that resulted in the negative emissions number.
2. Albany's ADC tonnage by landfill:
    a. Redwood: 0.49 tons
3. Albany's ADC is composed entirely of Green Materials.
4. The weighted average methane recovery factor for Albany (74.9%) is based on total tonnage hauled to each landfill.

Data Sources:
1. Landfill data (*included in the notes above)* provided on July 20, 2006 by Meghan Starkey, Senior Program Manager, Alameda County Waste Management Authority (StopWaste.org), mstarkey@stopwate.org, (510) 614-1699
http://www.stopwaste.org/home/index.asp?page=590
2. Methane recovery factors for individual landfill sites (*explained in the notes above)* provided by Victoria Ludwig, Program Manager EPA Landfill Methane Outreach Program, Ludwig.Victoria@epamail.epa.gov

Community Greenhouse Gas Emissions in 2004
Detailed Report

	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (MMBtu)
Community-wide Waste			*Disposal Method - Managed Landfill*
Paper Products	0	0.0	
Food Waste	0	0.0	
Plant Debris	0	0.0	
Wood/Textiles	0	0.0	
Subtotal Community-wide Waste	0	0.0	

Notes:
1. In 2004, the City of Albany sent an estimated 7064.03 tons of solid waste to landfills. Because 74.9% of the methane produced by Albany's solid waste is estimated to be recovered, waste emissions appear to be negative: -1,627 tons of eCO2. Many cities choose to eliminate this emissions "credit" by replacing the waste tonnage input data with zero. StopWaste.Org urged ICLEI to do so for the purposes of this inventory. For future reference, the notes below include the original waste data that resulted in the negative emissions number.
2. Albany's waste tonnage by landfill:
    a. Altamont: 7656.9 tons
    b. Keller Canyon Special Waste: 224.25
    c. Vasco Road: 672 tons
    d. West Contra Costa: 419.89 tons
    e. Other landfills: 21.36 tons
3. Albany's waste composition:
    a. Paper products: 32.5%
    b. Food Waste: 19.3%
    c. Plant Debris: 6.2%
    d. Wood/Textiles: 7.5%
    e. All Other Waste: 34.5%
4. The weighted average methane recovery factor for Albany (74.9%) is based on tonnage hauled to each landfill. Other landfills include B & J/Hay Road, Bena, Keller Canyon and Redwood. These landfills receive less than 1% of the total waste from the City of Albany.
5. Recycling and compost tonnage has been omitted from this analysis as complete recycling and compost data was not available.

Data Sources:
Landfill data (*included in the notes above)* provided on July 20, 2006 by Meghan Starkey, Senior Program Manager, Alameda County Waste Management Authority (StopWaste.org), mstarkey@stopwate.org, (510) 614-1699
Waste characterization data (*included in the notes above)* is based on the 2000 Alameda County Waste Characterization study available online at http://www.stopwaste.org/home/index.asp?page=590
Methane recovery factors for individual landfill sites (*explained in the notes above)* provided by Victoria Ludwig, Program Manager EPA Landfill Methane Outreach Program, Ludwig.Victoria@epamail.epa.gov

Data collected and entered by Brooke Owyang Lee, Program Assistant, ICLEI, brooke.lee@iclei.org
Last updated December 13, 2006
Data summary file: City of Albany Community Waste Data 2004.xls

Subtotal Waste	0	0.0	
Total	83,429	100.0	1,134,314

Albany

Community Greenhouse Gas Emissions in 2004

Indicators Report

	Equiv CO_2 (tons)	Energy (MMBtu)
Residential		
Residential		
Per household	3.4	51.4
Sector Average		
Per capita	3.4	51.4
Per household	3.4	51.4
Commercial		
Sector Average		
Per capita	3.4	50.9
Transportation		
Sector Average		
Per capita	5.0	58.4
Waste		
Sector Average		
Per capita	0.0	

Appendix C – Data Summary Reports, Data Sources, Assumptions and Notes for the Community Emissions Forecast

Albany

Community Greenhouse Gas Emissions in 2020

Summary Report

	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (MMBtu)
Residential	25,345	28.8	386,618
Commercial	25,760	29.3	382,537
Transportation	36,783	41.9	428,585
Waste	0	0.0	
Total	87,888	100.0	1,197,740

Community Greenhouse Gas Emissions in 2020
Detailed Report

	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (MMBtu)
Residential			
Albany, CA			
Residential			
Electricity	7,417	8.4	96,433
Natural Gas	17,928	20.4	290,184
Subtotal Residential	25,345	28.8	386,618
Subtotal Residential	25,345	28.8	386,618
Commercial			
Albany, CA			
Commercial/Industrial			
Electricity	10,810	12.3	140,545
Natural Gas	14,951	17.0	241,992
Subtotal Commercial/Industrial	25,760	29.3	382,537

Notes:
1. The PG&E coefficient set is based on the PG&E-specific eCO2 emissions factor for 2005 and default criteria air pollutant emissions factors for the 2004 Region 13 - Western Systems Coordinating Council/CNV Average Grid Electricity Set. The PG&E coefficient set does not have emissions factors for CH4 and N2O as the eCO2 emissions factor includes CH4 and N2O emissions in CO2 equivalents. The business-as-usual projections assume no change in the PG&E eCO2 emissions factor.
2. The eCO2 emissions factor is pending independent verification and certification by the California Climate Action Registry; the confirmed eCO2 factor will be made public by CCAR at the end of 2006, at which time the emissions factor used in this analysis should be updated if it has changed.
3. Industrial consumption data is reported within the Commercial sector due to PUC confidentiality rules that prohibit the release of such data in certain cases.
4. Projections are based on the assumption that consumption (and therefore emissions) will grow as the population increases. The annual population growth rate is extrapolated from the Association of Bay Area Governments' population projection data for 2000-2020 as published in Projections 2005.

Data Sources:
1. Electricity and natural gas data provided on September 20, 2006 by Nicole Almaguer, Environmental Resources Associate, City of Albany, nalmaguer@albanyca.org, (510) 528-5754
Data Sources:
2. Request for electricity and natural gas data processed by Greg San Martin, Climate Protection Program Manager, PG&E, GJS8@pge.com, (415) 973-6905, and Jasmin Ansar, Manager, Environmental Policy, PG&E, JxA2@pge.com, (415) 973-4570
3. PG&E-specific eCO2 emissions factor of 0.525 lbs/kWh (or 262.5 short tons CO2/GWh) of delivered electricity in 2005 provided by Greg San Martin
4. Population and household indicator data are published by the Association of Bay Area Governments

Data collected and entered by Brooke Owyang Lee, Program Assistant, ICLEI, brooke.lee@iclei.org
Last updated October 7, 2006
Data summary file: City of Albany GHG Data 2004.xls

Subtotal Commercial	25,760	29.3	382,537

Community Greenhouse Gas Emissions in 2020
Detailed Report

	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (MMBtu)
Transportation			
Albany, CA			
Community Transportation			
Gasoline	23,110	26.3	270,976
Diesel	13,673	15.6	157,609
Subtotal Community Transportation	36,783	41.9	428,585

Notes:
1. The VMT data provided by MTC includes Daily VMT (DVMT) for weekdays only. VMT including weekends is calculated with the MTC's weekdays/weekends VMT ratio: 1.1489. Hence Annual VMT = DVMT x (number of weekdays in the base year) + DVMT/1.1489 x (365 - number of weekdays in the base year).
2. The VMT by fuel and vehicle type is calculated using Alameda County VMT % (by vehicle type) and the default CACP fleet breakdown by fuel type.
3. Projections are based on the assumption that consumption (and therefore emissions) will grow as the population increases. The annual population growth rate is extrapolated from the Association of Bay Area Governments' population projection data for 2000-2020 as published in Projections 2005.

Data Sources:
1. Citywide VMT data provided on July 18, 2006 by Harold Brazil, Air Quality Associate, Metropolitan Transportation Commission (MTC) hbrazil@mtc.ca.gov, (510) 817-5747
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3. Population and household indicator data are published by the Association of Bay Area Governments

Data collected by Brooke Owyang Lee, Program Assistant, ICLEI, brooke.lee@iclei.org
Data entered by Brooke Owyang Lee and Palak Joshi, Program Assistant, ICLEI, palak.joshi@iclei.org
Last updated October 11, 2006

Subtotal Transportation	36,783	41.9	428,585
Waste			
Albany, CA			
ADC			*Disposal Method -*
Plant Debris	0	0.0	
Subtotal ADC	0	0.0	
Community-wide Waste			*Disposal Method - Managed Landfill*
Paper Products	0	0.0	
Food Waste	0	0.0	
Plant Debris	0	0.0	
Wood/Textiles	0	0.0	
Subtotal Community-wide Waste	0	0.0	

Notes:
1. Given the fact that the community-wide waste and ADC tonnage were entered as zero tons in the base year inventory, the forecast for waste emissions is also zero. Reference 2005 Greenhouse Gas Emissions in 2005 waste sector notes for waste emissions analysis methodology and

Community Greenhouse Gas Emissions in 2020
Detailed Report

	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (MMBtu)
rationale.			
Subtotal Waste	0	0.0	
Total	87,888	100.0	1,197,740