Sustainability Task Force

A Committee of the Chico City Council
Vice Mayor Schwab, Chair

Meeting of October , 2007 – 3:00 p.m. to 5:00 p.m.

Council Chamber Building, 421 Main Street, Conference Room No. 1

AGENDA

1. **Consideration of the Greenhouse Gas Inventory/Audit Costs and Recommendations for Possible Funding** - report provided

2. **Consideration of the Sustainability Task Force Work Plan Presentation to Council**

3. **Update on Request for Endorsement of the Focus the Nation Day of Discussion Centered on Global Warming** - original request provided

4. **Next Meeting Consideration**

   The next meeting of the Sustainability Task Force is scheduled for October 15, 2007 from 3:00 - 5:00 p.m.

5. **Business from the Floor**

   Members of the public may address the Committee at this time on any matter not already listed on the agenda, with comments being limited to three minutes. The Committee cannot take any action at this meeting on requests made under this section of the agenda.

6. **Adjournment** – The meeting will adjourn no later than 5:00 p.m. The next meeting of the Sustainability Task Force is scheduled for October 15, 2007 from 3:00 p.m. – 5:00 p.m. in Conference Room No. 1.

Distribution available in the office of the City Clerk:

Prepared: ***9/29/07***
Posted : ***9/29/07***
Prior to: ***1:00 pm***

Chico City Clerk's Office
411 Main Street, Chico, CA 95928
(530) 896-7250

Please contact the City Clerk at 896-7250 should you require an agenda in an alternative format or if you need to request a disability-related modification or accommodation in order to participate in a meeting. This request should be received at least three working days prior to the meeting in order to accommodate your request.

Members:

Dr. Scott G. McNall
Anthony Watts
Julian Zener
Jim Stevens
Ken Grossman
Jason Bougie
Jim Goodwin
Scott Wolf
Jim Pushnik
Tom DiGiovanni
Jon Luvaas
Tami Ritter
Kristin Cooper - Carter
Ann Schwab, Chair

Sustainability Task Force Agenda Staff Report — Meeting Date: 10/1/07

DATE: September 12, 2007

TO: SUSTAINABILITY TASK FORCE

FROM: MANAGEMENT ANALYST HERMAN, 896-7241

RE: ADDITIONAL INFORMATION REGARDING GREENHOUSE GAS INVENTORIES

BACKGROUND:

At its 9/17/07 meeting, the Task Force requested that staff provide additional information regarding the cost of CSU, Chico proposal to prepare a greenhouse gas (GHG) inventory and to determine whether the City should retain Kennedy Jenks to oversee the inventory process, provide sample inventories or action plans from other cities, and to provide estimated cost savings other cities may have experienced from implementing GHG emission reduction programs.

DISCUSSION:

CSU, Chico GHG Inventory Proposal:

Staff met with Mark Stemen from CSU, Chico. The University provided staff a more detailed proposal and a cost breakdown to conduct the GHG inventory. A copy of the scope of work proposed and the estimated costs are attached. In summary, the proposal indicates that for $30,000 the University will conduct the following tasks:

1. Collect the necessary data for the community wide GHG inventory.
2. Provide a forecast and backcast of the community's GHG emissions.
3. Analyze Historic and Existing GHG Reduction Measures
4. Identify potential new GHG reduction measures.
5. Suggest possible emission reduction targets.

The proposal also indicates that, in addition to Dr. Stemen, the GHG inventory team will include Daniel Salazar, who recently worked with ICLEI to prepare GHG inventories for the City of Fort Bragg and CSU, Chico. To help analyze this proposal, staff contacted the City of Fort Bragg and ICLEI regarding Mr. Salazar's work.

The City of Fort Bragg indicated that they received a $10,000 grant to pay for the inventory and also provided approximately $10,000 in staff time as a local match requirement for the grant. They were pleased with the report that was prepared, a copy of which is attached, and are seeking another grant to possibly obtain Mr. Salazar to prepare a Climate Action Plan. Based on their GHG inventory, Fort Bragg has set a 30% emission reduction target for its community. ICLEI staff said that Mr. Salazar seemed to understand what is needed and necessary for the inventory, but was not sent a copy of the final inventory so could not verify the inventory information.

Staff has also submitted an application for membership with ICLEI, and as a member, ICLEI will provide technical services to the City and the CSU, Chico when preparing the inventory. ICLEI staff has prepared inventories for some cities and indicated that the cost for these ranged from $10,000 to $20,000 depending on the availability of data and whether it was a targeted government or a community wide inventory. ICLEI indicated that using their software for a targeted "city operations only" inventory would be more difficult and costly. ICLEI offered to review the CSU, Chico's proposal and scope of work for the City, which staff has submitted to them. ICLEI staff also said that preparing "backcasting" GHG emissions to 1990 is difficult, and advised that most cities are using a more current year, such as 2005, as their baseline.

Sample Inventories and Estimated Cost Savings:

Staff has also attached copies of inventories and Climate Action Plans from the Cities of Chula Vista and San Diego. Most cities are readily reporting its GHG emissions reduction and energy reduction figures but are not necessarily providing cost savings or avoidances. However, an emission reduction fact sheet released by the Mayor of San Diego in October 2006 indicated that the City:

- Saved taxpayers $1,000,000 by rerouting its trash collection routes to reduce miles traveled.
- Saved 24 million KWh and $3 million annually through its energy conservation programs.
- Produced 516,000 kilowatt hours of electricity by fitting 10 City Buildings with solar panels, resulting in a cost savings of $65,000 per year in energy costs, and reducing GHG emissions in an amount equivalent to planting 120 trees, or taking 59 polluting cars out of commission.

ICLEI said that they are producing a new software program that will help communities prepare action plans and to also help quantify emission reductions and costs for implementing certain emission reduction measures. The software is expected to be released in December 2007.

Staff also talked to Jim Graydon with Kennedy Jenks regarding their proposal (see attached letter). Based on the above information and with the availability of assistance from ICLEI, staff determined that Kennedy Jenk's services may not be needed for the GHG inventory phase, and that retaining a consultant to prepare an action plan may be more appropriate.

ATTACHMENTS:
CSU, Chico Proposal
Kennedy Jenks Proposal
Fort Bragg GHG Inventory
San Diego Inventory and Action Plan
Chula Vista GHG Inventory

California State University, Chico
Chico, California 95929-0425
Department of Geography and Planning
Watershed Projects
530-898-4083
Fax: 530-898-6781

September 12, 2007

Dave Burkland
Assistant City Manager
City of Chico Administration
Chico, CA 95928

Dear Dave,

California State University, Chico would like to express interest in performing a greenhouse gas inventory for the City of Chico to help fulfill the requirements of the Mayor's Climate Agreement.

We have the capacity and expertise to perform the inventory. We propose to put together an interdisciplinary team of faculty from the colleges of Natural Science, Business, Engineering, and Behavioral and Social Sciences. Mark Stemen, from the department of Geography and Planning, will lead the team under the direction of the Institute for Sustainable Development. In the past eight years Dr. Stemen has overseen over $200,000 in contracts with the City and the County where students have provides state mandated recycling education. Dr. Stemen has also directed a greenhouse gas inventory of CSU, Chico and is currently directing another inventory of Butte Community College.

A recent Master's graduate and a team of students from CSU, Chico, will perform the actual work. In 2007, Daniel Salazar recently completed a greenhouse gas inventory of CSU, Chico as part of his master's degree in Geography and Planning. Immediately after graduation Mr. Salazar then went to the city of Ft. Bragg to conduct a greenhouse gas inventory for the city using the ICLEI software. For the Chico inventory, Mr. Salazar will oversee a team of student interns who will help in data collection.

We estimate that the inventory could be completed in four months, depending on scope and city staff availability. We can begin in October.

The scope of work will include a greenhouse gas inventory for 2006, an estimate of 1990 levels and, recommendations for the Sustainability Task Force on ways to reduce GHG levels in the City of Chico to 12% below the estimated 1990 level. The scope of work does not include a timeline or a specific action plan.

On behalf of the team, I thank you for your consideration.

Sincerely,

Dr. Mark Stemen
Coordinator, Environmental Studies Program
Department of Geography and Planning
California State University, Chico

cc. Dr. Scott McNall

Scope of Work of Chico Greenhouse Gas Inventory

- Collect Inventory Data
- Forecast and Backcast GHG Emissions
- Analyze Historic and Existing GHG Reduction Measures
- Identify and Rank New Reduction Strategies / Control Measures
- Suggest Possible Emissions Reduction Targets

Questions

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- Staff contacts
- Space for interns
- Indemnification
- Budget flexibility
- Contract/purchase order
- Start date

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ISD/ Faculty Development				$3,156
			Total other	$3,156
			Total direct costs	$24,194
Facilities and administrative costs @ 24% MTDC				$5,806
			TOTAL PROJECT COSTS	$30,000

i. Output (1000 gal.) /Year
ii. Electricity (annual kWh) and cost
iii. Fuel for Digester
    1. Natural Gas (annual Therms) and Cost (US Dollar)
    2. Methane (annual gallons) and Cost (US Dollar)
    3. Other
iv. Facility technology and background

6. Waste
    a. Amount of Waste (tons or metric tonnes)
    b. Hauling and Tipping Cost
    c. Landfill
        i. Destination
        ii. Waste Disposal Technology (managed landfill, controlled incineration, open dump, etc.
        iii. Methane recovery (% recovered)
    d. Waste Stream (waste type and share)
        i. Paper Products %
        ii. Food Waste %
        iii. Plant Debris %
        iv. Wood/Textiles %
        v. All other Waste %
    e. Number of Municipal Employees (full time equivalency)
7. Refrigerants
    a. HFC 23 (lbs.)
    b. HFC -125 (lbs.)
    c. HFC-134 (lbs.)
    d. HFC152a (lbs.)
    e. Sulfur Hexafluoride (lbs.)

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        i. Number of Households
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2. Commercial
    a. Commercial Establishments
        i. Number of Commercial Establishments
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    a. Industrial Establishments
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Data and materials needed for green house gas emissions inventory of the City of Chico

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2. Copy of Public Facilities Master Plan
3. City Laptop Computer with CACP Software Installed and backed-up with Network

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    a. List of each government building including:
        i. Annual Operating Hours
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    a. List of Entire City Fleet including
        i. Sub-Fleets (Fire, Police, Public Works, City Hall, etc.)
        ii. Annual Vehicle Miles for each sub-fleet
        iii. Year, Make, Model
        iv. Fuel type (gas, diesel, nat. gas, hybrid, electric, etc.
        v. Fuel efficiency (miles per gallon)
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            1. Each vehicle (preferred)
            2. Each Sub-Fleet (acceptable)
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    a. Electricity (annual kWh) and Cost
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    a. List of Stations (lift stations, booster pumps, etc)
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iv. Annual Growth Rate of Industrial Establishments

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i. Number of Industrial Employees
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4. Transportation
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b. Percentage of Vehicles for each fuel-type
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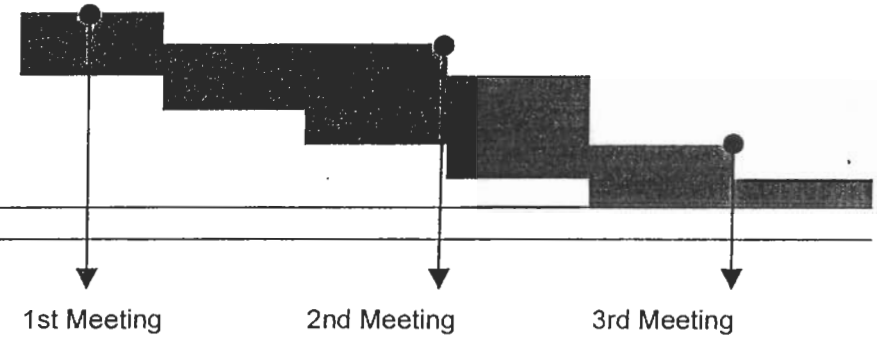
Timeline: City of Chico Green House Gas Emissions Inventory

Task	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
Task 1: Inventory						
Project Start-Up						
Inventory Data Collection						
Historic and Existing Measures Analysis						
Task 2: Forecast Emissions						
Task 3: Reduction Strategies / Control Measures						
Task 4: Identify Emissions Reduction Target						



Kennedy/Jenks Consultants
Engineers & Scientists
180 E. 4th Street, #500
Chico, CA 95928
530-891-9293
530-891-9283

RECEIVED
SEP 25 2007

25 September 2007

hand-delivered

David Burkland
Interim City Manager
City of Chico
411 Main Street
Chico, CA 95928

Subject: City of Chico Climate Action Plan

Dear Mr. Burkland:

Pursuant to the Sustainability Task Force Meeting of 17 September 2007, Kennedy/Jenks Consultants is pleased to submit this proposal to assist the City of Chico in developing a community greenhouse gas inventory and to facilitate the creation of the City's Climate Action Plan.

We understand that the City is interested in meeting the greenhouse gas (GHG) reduction targets of 7% below 1990 levels by 2012 as called for in the U.S. Mayor's Climate Protection Agreement. To accomplish this goal the City has established a Sustainability Task Force to guide municipal decisions as well as community-wide efforts to conduct a GHG inventory and develop an Action Plan. Kennedy/Jenks Consultants proposes to work with the Task Force, City staff and the selected GHG inventory team to accomplish both tasks within the schedule adopted by City Council.

Our scope of services would include the following tasks to be initiated as requested by the City:

1. Assist City staff in evaluating the CSU Chico proposal to conduct GHG Baseline Inventory and Forecast using the International Council for Local Environmental Initiatives (ICLEI) protocol and the Clean Air and Climate Protection (CACP) software. Review the proposal for adequacy, completeness and cost reasonableness.

2. Attend kick-off meeting with City staff and CSU Chico project staff to review scope and schedule, outline of deliverables, and review strategy proposed to develop community inventory.

3. Review and provide comments on draft deliverables from CSU Chico project team.

4. Attend final project meeting and assist in developing emissions reduction targets and preliminary recommendations for high impact Climate Action Plan elements for municipal operations and community actions.

5. Presentations to the Task Force or City Council, as requested.

The work will be completed by Alan Zelenka, Kennedy/Jenks' Energy Services Leader with assistance from Dawn Lesley, P.E., LEED, Kennedy/Jenks' Director of Sustainable Design, and Cindy Ryals, Engineering & Science Specialist. Alan has over 20 years of experience in the energy business, and until recently was the Power Manager and Legislative Affairs Manager for the Emerald People's Utility District (where he developed their GHG inventory and climate action plan). He currently serves as Chair of The Climate Trust, a national organization dedicated to solving global warming with a special emphasis on offset projects (projects that reduce GHGs). The Climate Trust's current portfolio will offset nearly 2.6 million metric tons of carbon dioxide from more than $9 million invested in offset project contracts - making them one of the largest and most experienced offset buyers in the U.S. and world markets. In addition to understanding the energy business and climate change, Alan is also a City Councilor in Eugene, Oregon and understands the special needs of city government and citizen task forces. Having conducted numerous public involvement processes, Alan is very skilled at facilitating working groups and guiding them to successful completion within schedule and budget constraints.

As we discussed, Kennedy/Jenks proposes to provide these services on a time and materials basis in accordance with the attached Rate Schedule dated January 1, 2007. Our estimated fee for the tasks listed above is:

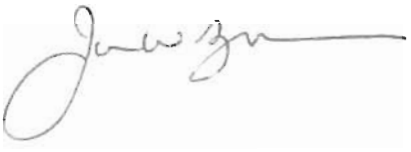
Task	Estimated Fee
Task 1: Review Proposal	$1,000
Task 2: Kick-off Meeting and Methodology Review	$2,600
Task 3: Review Administrative Draft and Final Draft Deliverables	$4,100
Task 4: Final Meeting and Recommendations	$4,200
Task 5: Presentations	TBD
Total:	$11,900

We understand that CSU Chico has proposed a six-month schedule for the inventory task. We are available to begin immediately upon receipt of your authorization.

We look forward to working with you and the Sustainability Task Force. If you have any questions please call me at (530) 891-9293 or Alan Zelenka at (541) 228-6331.

Very truly yours,

KENNEDY/JENKS CONSULTANTS



Jim Graydon, P.E.
Vice President

Kennedy/Jenks Consultants

Client/Address: City of Chico
411 Main Street
Chico, CA 95828

Contract/Proposal Date: September 25, 2007

Schedule of Charges

January 1, 2007

Personnel Compensation

Classification	Hourly Rate
CAD-Technician	$90
Designer-Senior Technician	$110
Engineer-Scientist-Specialist 1	$100
Engineer-Scientist-Specialist 2	$105
Engineer-Scientist-Specialist 3	$120
Engineer-Scientist-Specialist 4	$135
Engineer-Scientist-Specialist 5	$150
Engineer-Scientist-Specialist 6	$170
Engineer-Scientist-Specialist 7	$185
Engineer-Scientist-Specialist 8	$205
Engineer-Scientist-Specialist 9	$215
Project Administrator	$85
Administrative Assistant	$65
Aide	$55

In addition to the above Hourly Rates, a three percent Communications Charge will be added to Personnel Compensation for normal and incidental copies, communications and postage.

Direct Expenses

Reimbursement for direct expenses, as listed below, incurred in connection with the work, will be at cost plus ten percent for items such as:

a. Maps, photographs, reproductions, printing, equipment rental, and special supplies related to the work.
b. Consultants, soils engineers, surveyors, contractors, and other outside services.
c. Rented vehicles, local public transportation and taxis, travel and subsistence.
d. Specific telecommunications and delivery charges.
e. Special fees, insurance, permits, and licenses applicable to the work.
f. Outside computer processing, computation, and proprietary programs purchased for the work.

Reimbursement for vehicles used in connection with the work will be at the rate of 48 cents per mile or at a negotiated monthly rate.

Reimbursement for use of computerized drafting systems (CAD), geographical information systems (GIS), and other specialized software and hardware will be at the rate of $12 per hour.

Rates for professional staff for legal proceedings or as expert witnesses will be at rates one and one-half times the Hourly Rates specified above.

Other in-house charges for prints and reproductions, equipment usage, laboratory analyses, etc. will be at standard company rates.

Excise and gross receipts taxes, if any, will be added as a direct expense.

The foregoing Schedule of Charges is incorporated into the agreement for the services provided, effective January 1, 2007 through December 31, 2007. After December 31, 2007, invoices will reflect the Schedule of Charges currently in effect.

California State University, Chico
Chico, California 95929-0425
Department of Geography and Planning
Watershed Projects
530-898-4083
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September 12, 2007

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Assistant City Manager
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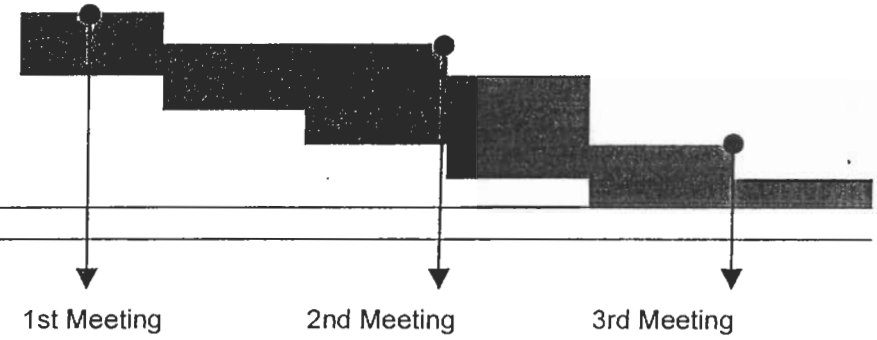
Task 3: Reduction Strategies / Control Measures						
Task 4: Identify Emissions Reduction Target						



City of Fort Bragg
GREENHOUSE GAS EMISSIONS INVENTORY

August 15, 2007

Prepared by:

Daniel Abeyta Salazar
Cities for Climate Protection Intern

The first step to reduce our carbon footprint.

Acknowledgments

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1. Introduction

1.1. Climate Change

Over the past twenty years, the extent, cause and impacts of global climate change have been debated with some uncertainty. However, over 21,500 of the world's top climate scientists have reached consensus that global climate change is a human-created environmental and economic challenge of significant scope. According to the report *Climate Change 2007: The Physical Science Basis* prepared by over 1,500 scientists of the International Panel on Climate Change (IPCC):

> *"Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level" (IPCC, 2007).*
>
> *"Most of the observed increase in global average temperatures since the mid-20thcentury is very likely[1] due to observed increase in anthropogenic greenhouse gas concentrations" (IPCC, 2007).*
>
> *"Continued greenhouse gas emissions at or above current rates would cause further warming and induce many changes in the global climate system during the 21st century that would very likely be larger than those observed in the 20th century" (IPCC, 2007).*

While the effects of global climate change may be difficult to perceive in Fort Bragg, many long time residents have noted an increase in summer temperatures combined with a decline in the number of foggy days, and more severe winter storms and colder winter temperatures. Some sober indicators of climate change include[2]:

- The six hottest years of recorded history (looking at average global temperatures) have all occurred in the last eight years (see chart below).
- The year 2005 was the hottest on record for the global climate. The average global surface temperature of 14.77 degrees Celsius (58.6 degrees Fahrenheit) was the highest since recordkeeping began in 1880.
- Using records stored in ice, tree rings, and fossils, scientists have estimated that the northern hemisphere is warmer now than at any time in the past 1,200 years.
- Another study reported that atmospheric levels of CO_2 and methane, another greenhouse gas, are higher today than at any time in the last 650,000 years.

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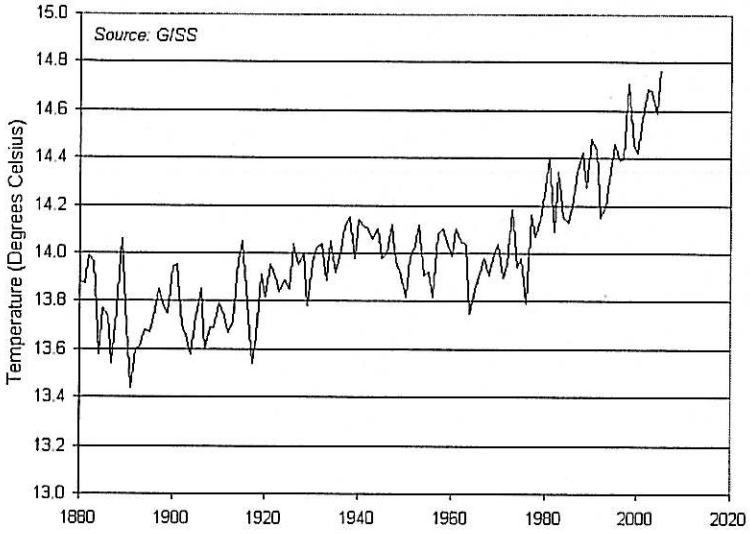
[1] The IPCC defines *Very likely* as greater than 90 percent.

[2] "2005 Hottest Year on Record," Joseph Florence, http://www.earth-policy.org/Indicators/Temp/2006.htm

- The rise in sea surface temperature has also contributed to a record-breaking Atlantic hurricane season, with 27 named storms and 15 hurricanes in 2005.

Average Global Temperature, 1880-2005



Greenhouse Gas (GHG) emissions are generated in this locale and contribute to global warming. Moreover, the City government and, to a greater extent, the local community are primary contributors of GHG emissions and air pollutants generated on the North Coast of Mendocino County.

1.2. Carbon Footprints and Greenhouse Gas Inventories

The process of conducting a GHG inventory is relatively new. GHG inventories originated as an international response to mitigate global climate change. Most fundamentally, the GHG inventory is implemented to measure the amount of heat trapping gases that a particular city or business contribute to global warming. By quantifying emissions an institution/community is able to benchmark its status as emissions generators and define its "carbon footprint."

The United States Environmental Protection Agency (EPA) has recently completed the "Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1900-2004" which defined a GHG inventory as follows:

> *"A greenhouse gas inventory is an accounting of the amount of greenhouse gases emitted to or removed from the atmosphere over a specific period of time (e.g., one year). A greenhouse gas inventory also provides information on the activities that cause emissions and removals, as well as background on the methods used to make the calculations. Policy makers use greenhouse gas inventories to track emission trends, develop strategies and*

policies and assess progress. Scientists use greenhouse gas inventories as inputs to atmospheric and economic models" (EPA, 2006).

1.3. Local Solutions for a Global Problem

While international and national efforts to mitigate global climate change have stalled in part due to a lack of leadership at the national and global level, many cities and localties across the country and around the world have initiated local GHG emissions studies and programs to reduce GHG emissions. Top-down efforts are undergoing vigorous downscaling, while bottom-up initiatives are taking root and growing rapidly in local places. Actions to abate GHGs are rarely global and are not currently carried out at the national level by our government. However, reductions in GHGs are possible when individuals and organizations change their behavior and activities, and employ different technologies.

Monitoring GHG emissions is critical first step to setting a goal for emissions reductions, developing polices and programs to achieve that goal, and measuring progress towards reductions. This work represents the first comprehensive effort to quantify GHG emissions generated by the City of Fort Bragg and the Fort Bragg community.

1.4. Eight Reasons to Take Action

1. **Reduce our Contribution to Global Climate Change.** The number one reason for a Green House Gas Action Plans is to reduce the quantity of CO2 produced by the City and thereby slow our contribution to Climate Change.

2. **Improve Service Delivery.** Energy efficiency initiatives will enable the City to offer services more efficiently and economically.

3. **Reduce Cost**. By reducing energy consumption, the City and local citizens will save money on energy bills. While energy efficiency initiatives may require an initial capital investment, paybacks of between four and seven years can be expected in many cases and savings will continue beyond the payback period. Furthermore, by reducing energy consumption, the City and its citizens will be less vulnerable to fluctuations in the market price of energy.

4. **Improve Air Quality and Public Health**. The combustion of fossil fuels used to produce electricity, heat buildings, and power vehicles, emits a variety of pollutants that are known to have negative health impacts and reduce local air quality. Less energy consumption means less local air pollutants such as sulfur dioxide (SO), nitrogen oxides, volatile organic compounds, particulate matter, and carbon monoxide. Climate change may lead to an increased spread of vector-borne and heat-related diseases, so taking steps to reduce greenhouse gas emissions reduces the likelihood of climate-related health problems.

5. **Improve Asset Management.** Asset management is proactive approach to facility management that includes a systematic review of the state of facility operations and implementation of a logical repair/upgrade schedule. Preventative maintenance improves the value of the City's assets by reducing operating cost, modernizing equipment, and decreasing deferred maintenance. Furthermore, increasing the efficiency of facilities and operations leads to better-run operations, greater client satisfaction, along with increased energy efficiency and the resulting cost savings emission reductions.

6. **Community Leadership**. By taking concrete steps to address climate change, the City of Fort Bragg will provide a solid example to the community and other small cities to follow.

7. **Quality of Life fro Citizens/ Healthy Cities.** The City can use savings generated by improved efficiency to improve critical community services, such as crime reduction, community beautification and youth programs. Programs that reduce emissions, such as bike paths, public transit, and smart growth, increase our quality of life by improving air quality, promoting active lifestyles and creating a more beautiful community. Together, these measures help to build a healthier, more sustainable community.

8. **Job Creation.** The transition to a low emissions society will require innovation and effort. The transition will create new jobs, as homes and businesses are retrofitted. The transition to a "climate friendly economy" will require new educational programs, new technologies and new businesses, which will in turn create new jobs in our community.

2. Project Background, Purpose & Methodology

2.1. Project Background

The City of Fort Bragg received a grant from the Mendocino Air Quality Management District to hire a Master Degree level intern to conduct a GHG inventory. The project was initiated in May of 2007 and partnered with the International Council for Local Environmental Initiatives (ICLEI) Cities for Climate Protection (CCP) Campaign to obtain technical and policy guidance.

2.2. ICLEI's Cities for Climate Protection Campaign

ICLEI's CCP campaign is a global effort to reduce GHGs at the community level. As a part of Fort Bragg's participation in the CCP campaign, the City has voluntarily committed to complete the following milestones:

I. Conduct a baseline emissions inventory and forecast.
II. Set an emissions reduction target.
III. Develop an action plan to meet the emissions reductions target.
IV. Implement the action plan.
V. Monitor and verify progress and results.

This report completes milestone I and milestones II – V are explained in detail in Chapter Five: Next Steps.

2.3. Purpose of the Study

If you don't measure it, you can't manage it.

Completion of the GHG inventory represents the first milestone of ICLEI's CCP campaign. The purpose of this study is to inventory GHGs produced by the City of Fort Bragg's government and the larger community of residents and businesses. Benchmarking the City's emissions will aid policy makers to forecast emission trends, identify the point sources of emissions generated, and set goals for future reductions and mitigation.

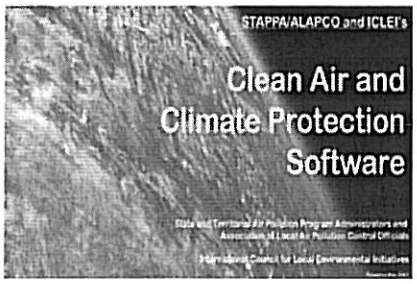
The underlying purpose of this study is to move the Fort Bragg community towards sustainability. In order to attain sustainability it is necessary to make the change from valuing what we measure to measuring what we value. By measuring what we value we potentially produce a powerful indicator that can influence our current and future behaviors. A good indicator should be resonant, valid, and motivational.

- **Resonant**—clear and easy to interpret and within the sphere of understanding and relevance of the user.
- **Valid**—data from which the indicator is drawn need to be as comprehensive and credible as possible; and the method used to develop the indicator must be as transparent as possible.
- **Motivational**—reflect issues that are within the sphere of influence of the user, as to provoke and inspire change.

This project also aspires to assist in identifying and developing information that can improve and complete our understanding of GHG emissions. This includes the gap between knowledge of how emissions are generated locally and how those emissions contribute to global climate change. Furthermore, this investigation is intended to assist in finding common ground between operations and policy makers. The ultimate purpose of this study is to provide a starting point to help the City government and community lower their emissions.

2.4. Design of the Investigation

2.4.1. Software



This project was completed using Clean Air Climate Protection (CACP) Software developed by Torrie Smith Associates (2003) in conjunction with State and Territorial Air Pollution Program Administrators (STAPPA), Association of Local Air Pollution Control Officials (ALAPCO), and International Council for Local Environmental Initiatives (ICLEI).

2.4.2. Project Organization

The CACP Software is divided into two distinct analyses: a government analysis and a community analysis. The community analysis creates an inventory of the GHGs and criteria air pollutants (CAPs) produced within the Fort Bragg city limits. The government analysis creates an inventory of the GHGs and CAPs produced by all City government operations. **All GHG emissions and CAPs detailed in the government analysis are included in, and not in addition to, the community analysis (figure 2.1)**. In both analyses emissions are quantified on data entered from fuel use, electricity use, and waste production.

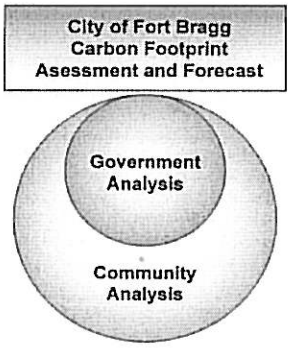
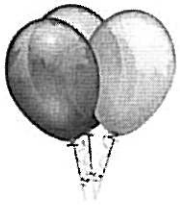


Figure 2.1: Basic project organization.

2.4.3. Understanding Analysis Results



There are six greenhouses gases that are typically measured and monitored in GHG inventories. They are: carbon dioxide (CO_2), nitrous oxide (NO_2), methane (CH_4), sulfur hexafluoride (SF_6), and hydrofluorocarbons (HFCs). The CACP software does not, however, quantify the amounts of these individual gases. Instead, the CACP software quantifies all GHGs in CO_2 equivalency (CO_2E). This is a convenient way to compare separate gases with distinct global warming properties on the same playing field. Due to the scale of this project all results are conveyed in metric tonnes of carbon dioxide equivalency ($MTCO_2E$). A metric tonne is equivalent to 2,205 pounds and one pound of CO_2 can fill about 120 party balloons. This means that one $MTCO_2E$ could fill over 264,500 party balloons.

There are five Criteria Air Pollutants (CAPs) inventoried in this project. These pollutants harm both health and the environment, though they do not contribute directly to global climate change. They are carbon monoxide (CO), sulfur dioxide (SO_x), nitrous oxide (NOx), volatile organic compounds (VOC), and particulate matter smaller than 10mm (PM10).

- Carbon monoxide can cause harmful health effects by reducing oxygen delivery to the body's organs (like the heart and brain) and tissues.
- SO_x contributes to respiratory illness, particularly in children and the elderly, and aggravates existing heart and lung diseases. SO_x contributes to the formation of acid rain, which: damages trees, crops, historic buildings, and monuments; and makes soils, lakes, and streams acidic. SO_x also contributes to the formation of atmospheric particles that cause visibility impairment, most noticeably in national parks.
- NO_x causes a wide variety of health and environmental impacts because of various compounds and derivatives in the family of nitrogen oxides, including nitrogen dioxide, nitric acid, nitrous oxide, nitrates, and nitric oxide. One member of the NOx, nitrous oxide or NO_x, is a greenhouse gas. It accumulates in the atmosphere with other greenhouse gasses causing a gradual rise in the earth's temperature.
- Particle pollution - especially fine particles - contains microscopic solids or liquid droplets that are so small that they can get deep into the lungs and cause serious health problems. Numerous scientific studies have linked particle pollution exposure to a variety of health problems.[3]

Results concerning the listed CAPs will be conveyed in pounds (lbs.) and will be listed separately as there is currently no way to combine these distinct air pollutants for analysis.

[3] US EPA, http://www.epa.gov/air/urbanair/

3. City of Fort Bragg Government Analysis

3.1. Government Analysis Scope

The government analysis covers all buildings and facilities, operations, lands, programs, employee commute, and vehicles owned and operated directly by the City of Fort Bragg government. Data acquisition and results can be divided in to the following sectors: buildings, vehicle fleet, employee commute, streetlights, water/sewage, and waste (figure 3.1). Energy, fuel, and waste data were available beginning in the year 2002-2003 FY. The most recent year of complete data was 2005-2006 FY. Results for the government analysis include both years to ensure accuracy and to identify trends. The government analysis is more detailed than the community analysis because more data was readily available and it includes detail for more sectors, identifies specific point-sources of emissions and air pollutants, and includes two years of data.

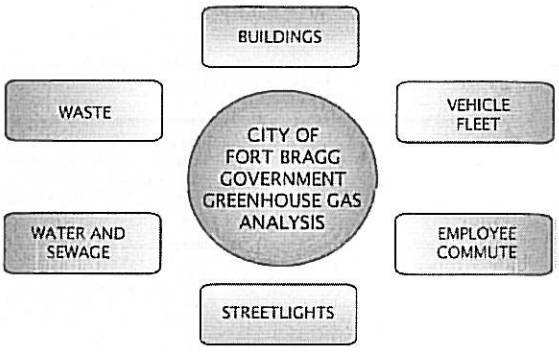


Figure 3.1: City of Fort Bragg Government Greenhouse Gas Analysis by sector.

3.2. Government Analysis Results

3.2.1. Overview

From fiscal years '02-'03 to '05-'06 the City of Fort Bragg Government's annual GHG emissions increased from 1,059 $MTCO_2E$ to 1,181 MTCO2E an increase of over 11 percent. Additionally, energy consumption and associated costs have also increased (Table 1.1). Energy use has increased 7.3 percent while the city's energy cost has increased nearly 17 percent, no doubt because the price of energy (electricity, propane, gasoline, diesel, etc) has increased substantially over this timeframe.

Significant growth in government generated emissions occurred even though the number of municipal employees, buildings, and vehicles has had little or no increase.

Most of the emissions growth is attributable to Sewer and Water operations.

Table 3.1: 02-03 vs. 05-06 comparative analysis for the City of Fort Bragg government GHG emissions, energy use, and cost.

Cost (US Dollars)	02-'03 FY	05-'06 FY	Unit Increase	% Increase
Emissions (MTCO2E)	1,059	1,181	122	**11.5%**
Energy (MMBtu)	11,711	12,571	860	**7.3%**

Figure 3.2 shows the percentage of GHG emissions emitted from each sector. The water/sewage sector emissions exceed those of other sectors, claiming nearly half (45%) of total government generated emissions. The vehicle fleet (21%) ranks second, followed by the building sector (11%), streetlights sector (10%), waste sector (7%), and the employee commute (6%).

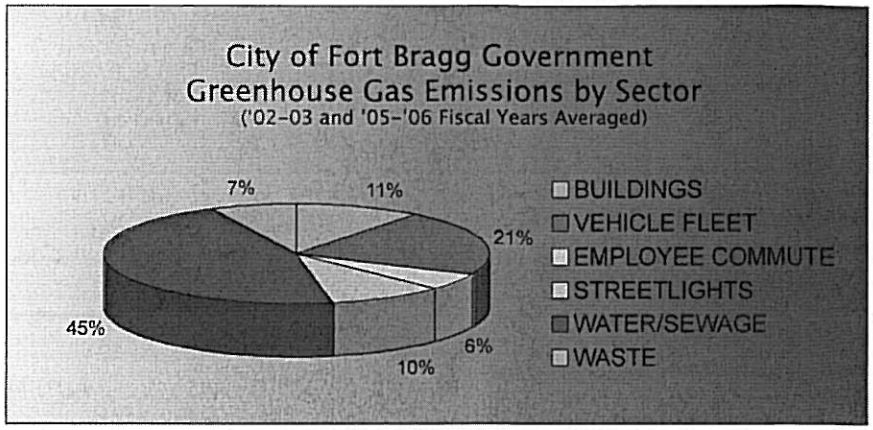


Figure 3.2: Government Greenhouse Gas Emissions by Sector.

From fiscal years '02-'03 to '05-'06 GHG emissions have increased in all sectors with exception of the waste and employee commute sectors. The most dramatic increase originated in the water/sewage sector.

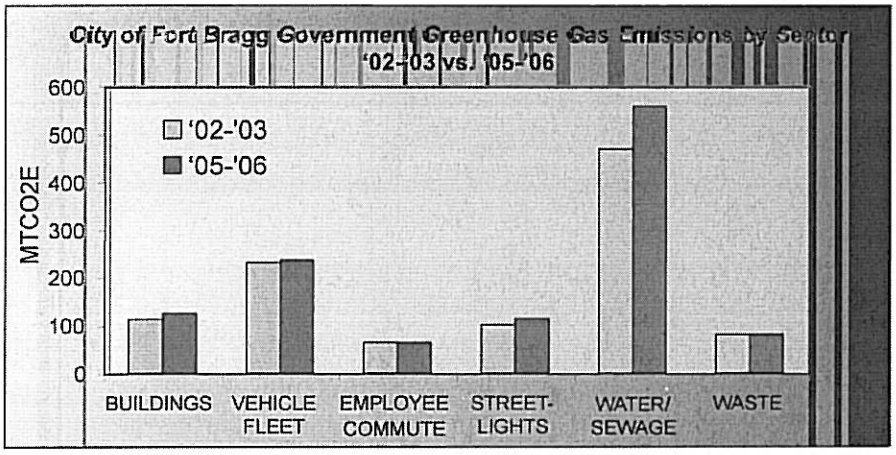


Figure 3.3: Comparative analysis of government greenhouse gas emissions by sector for fiscal years '02-'03 and '05-'06.

3.2.2. Source of Government Greenhouse Gas Emissions

GHG emissions generated by the City of Fort Bragg government originate from six sources. Figure 1.4 shows that the majority of GHG emissions were generated from purchased

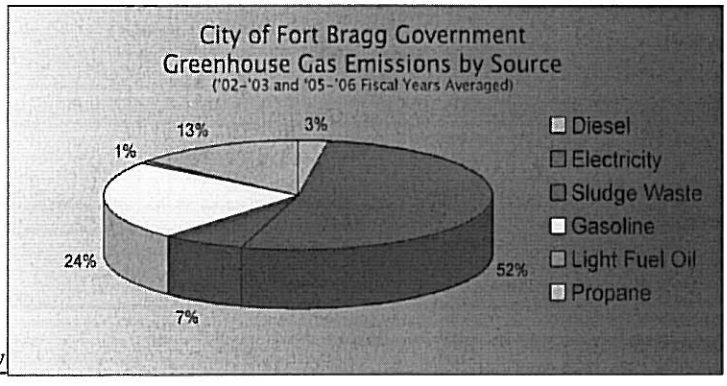


Fig 3.4: Government Greenhouse Gas Emissions by Source.

electricity (52%), followed by gasoline (24%), propane (13%), sludge waste (7%), diesel (3%), and light fuel oil (1%).

A comparison of fiscal years '02-'03 and '05-'06 shows that annual government GHG emissions remained stable from sludge and gasoline. Light fuel oil experienced a nominal decreased while the largest increase was in electricity which increased by 20 percent. The majority of this increase originates from the building and water/sewage sector that is described in detail in the sector analysis.

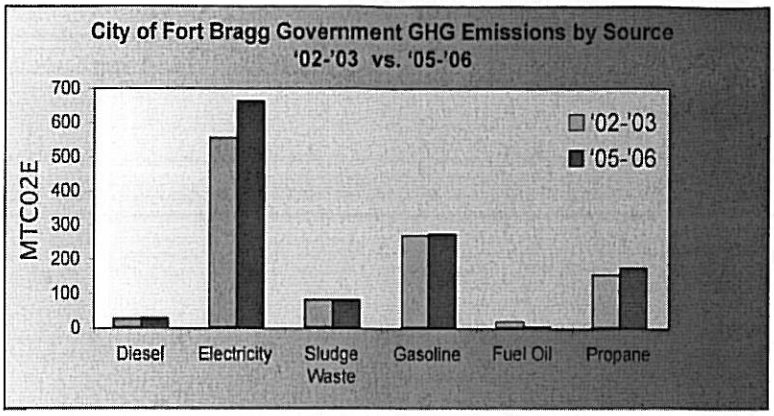


Fig 3.5: Government Greenhouse Gas Emissions by Source. Comparative Analysis '02-'03 and '05-'06.

3.2.3. Government Generated Air Pollutants

In both years approximately 70 percent of all Criteria Air Pollutants (CAP are not GHGs but do impact human health and the environment) generated from government operations were carbon monoxide. The vehicle fleet sector accounted for roughly 70 percent of carbon monoxide produced while the employee commute accounted for nearly 25 percent. In both years the combustion of gasoline was the primarily source of the pollutant. The water/sewage sector accounted for the third largest producer of total air pollutants and produced more sulfur dioxide and particulate matter than all other sectors combined.

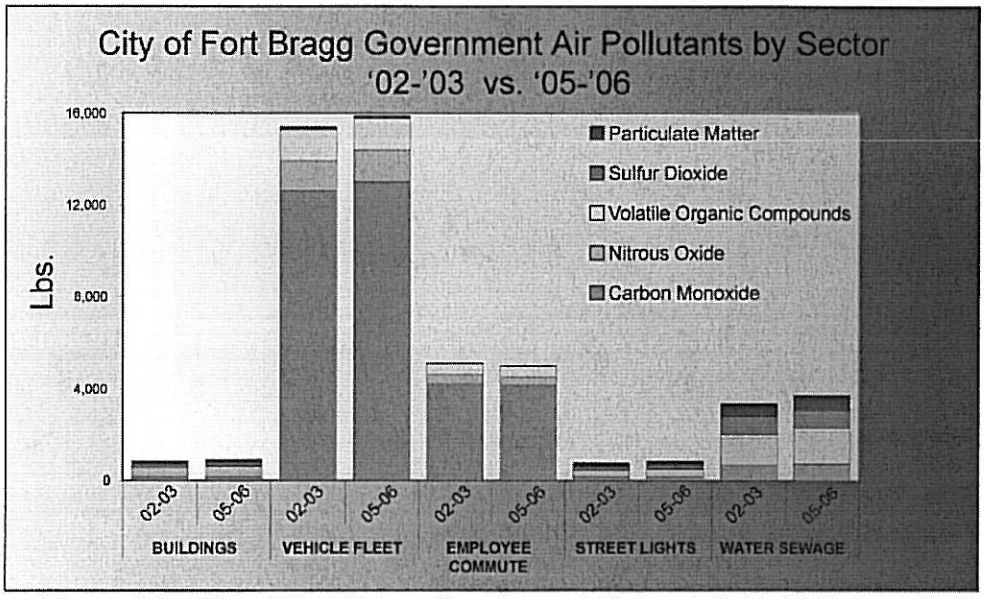


Figure 3.6: City of Fort Bragg Government Generated Air Pollutants by Sector

3.2.4. Vehicle Fleet Sector Analysis

The vehicle fleet sector contributes 234 $MTC0_2E$, representing approximately 21 percent, of total government generated emissions (Fig. 1.3). GHG emissions generated from this sector originate from the burning of gasoline, diesel, and a minute amount of liquefied petroleum gas (LPG) in city owned/operated vehicles.

Data averaged from the '02-'03 and '05-'06 fiscal years indicates that the city purchases approximately 21,000 gallons of gasoline and 2,800 gallons of diesel annually. **Fuel usage and associated GHG emissions have stayed markedly stable (2.5% increase), while the price of fuel has increased dramatically (64.5%)** (see Table 3.2). For example, in the FY of '02-'03 the City paid an average of only $1.61 per gallon of gasoline. By FY '05-'06 the price of gasoline increased to $2.61 per gallon, an increase of over 60 percent. Diesel fuel underwent similar but slightly smaller increase of 50 percent.

Table 3.2: Vehicle Sector comparative analysis of fiscal years '02-'03 and '05-'06 including GHG emissions, energy use, and cost.

Over forty percent of fleet vehicles are over ten years old. Many of the older vehicles are specialized equipment (i.e. fire engines, backhoes, dump trucks, graders, etc.) that have high replacement costs and are in good working order. Nevertheless, older vehicles are typically less efficient, and were manufactured when air pollutant and GHG emissions standards were much lower or non-existent. The City has recently made an effort to improve the efficiency of its fleet with the purchase of two hybrid vehicles by the Public Works Department and an electric vehicle by the Police Department. The impact of these vehicles is not included in this analysis as they were purchased in 2007, however they should reduce the generation of GHGs in future years.

3.2.5. Building Sector Analysis

The building sector contributes approximately 120 $MTC0_2E$ a year, representing about 11 percent of total government generated emissions (Figure 3.2). GHG emissions generated from this sector originate from purchased electricity and propane.

Electricity is primarily used in City buildings for lighting and office equipment. Average data from 02-03 and 05-06 shows that the City purchases approximately 226,385 kWh, and pays nearly $32,767 annually for electricity. The price of electricity used in city buildings decreased from 2002 to 2006 (however the base year had exceptionally high rates due to the electricity-deregulation crisis in California): in the FY of '02-'03 the city paid an average of only $0.16 per kWh and by FY '05-'06 the price decreased to $0.14.

Propane is primarily used to heat water and air in the buildings. Averaging data from '02-'03 and '05-'06 shows the city purchases approximately 1,600 gallons of propane, and pays just over $2,000 annually. The price of propane per gallon has increased considerably. For example, in the FY of '02-'03 the city paid an average of only $0.97 per gallon and by FY '05-'06 the price increased to $1.61, an increase of over 65 percent.

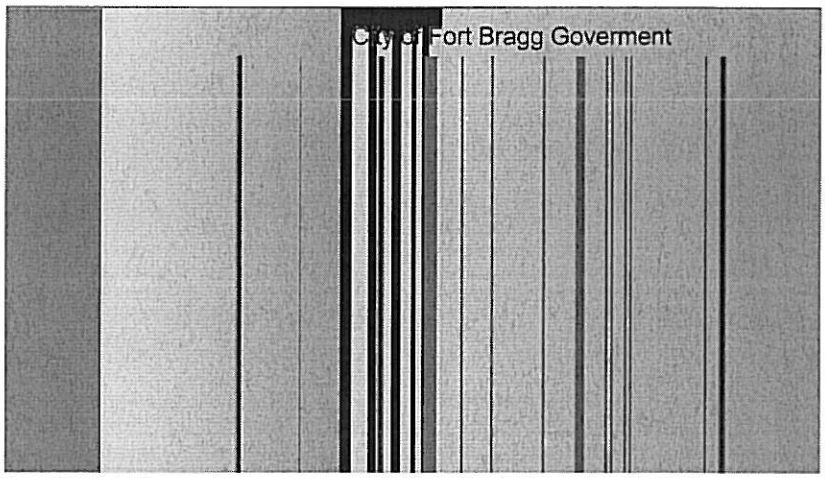


Figure 3.8: City of Fort Bragg Government GHG Emissions by Building and Source. (Values are averaged for '02-'03 and '05-'06 Fiscal Years.)

The Police Station generated the most GHG emissions of any City Building, although it is the newest and most energy efficient building. This is probably due to its extensive hours of operation (the Police Station operates 24 hours a day, 365 days a year). City Hall[5] contributed the second largest amount of GHG emissions followed by the Main Fire House, the Guest House, Town Hall, Corporation Storage Barn, Bainbridge Restroom[6], HWY 20 Fire Dept., and the Fort Building (Fig. 3.8).

3.2.6. Waste Sector Analysis

The waste sector contributes an average of 81 $MTCO_2E$ of GHGs annually, representing about 7 percent of total government GHG emissions (Figure 3.2). Emissions generated in the Waste sector originate primarily from the decomposition of waste at the landfill in the form of methane gas. However, the fuel used to haul the waste to the Redwood Landfill in Novato, nearly 150 miles away in southern Sonoma County, should also be considered. Redwood Landfill currently does not capture or utilize this powerful[7] GHG.

The waste sector is the least straightforward sector in the government analysis. This is due to some data unavailability and limitations of the CACP software.

Waste Sector Data Limitation

The City of Fort Bragg has an agreement with Waste Management where there is no charge for waste generated by the government. Because of this agreement there is no billing data indicating the tonnage or cost for government generated waste. For this reason, "typical" waste was omitted from this part of the analysis. All waste generated by the government, however, is included in the community analysis.

3.2.7. Streetlights Sector Analysis

The streetlight sector generates an average of 107.5 $MTCO_2E$ of GHGs annually, representing about 10 percent of total government generated GHG emissions (Figure 3.2). These emissions originate entirely from purchased electricity used to illuminate street and highway lights and the traffic control signal lights.

Averaging data from 02-03 and 05-06 shows that the city purchased approximately 290,250 kWh, and pays nearly $84,000 annually for the streetlights sector. The cost of

[5] City Hall, or 416 N. Franklin, rents a large portion of the building to the Recreation Center. The Recreation Center pays 70 percent of utilities (electric and propane) while the city pays the remaining 30 percent. This analysis only includes the 30 percent paid by the city. If, however, the entire building was included emissions generated from 416 N. Franklin would surpass amounts produced by the Police Station.

[6] Electrical use at the Bainbridge Restroom includes the large lights that are used to illuminate the public tennis courts.

[7] CH_4 is one of the three most important GHG that causes the earth's lower atmosphere to warm. CH_4 is more than twenty times as effective as CO_2 at trapping heat in the atmosphere

electricity purchased for this sector has increased slightly. In the FY of '02-'03 the city paid an average of only $0.28 per kWh and by FY '05-'06 the price increased to $0.29, a change of just 1%.

Table 3.3: Streetlight sector comparative analysis of fiscal years '02-'03 and '05-'06. including GHG emissions, energy use, and cost.

	'02-'03	'05-'06	Unit Increase	% Increase
GHG Emissions ($MTCO_2E$)	101	114	13	**13%**
o Street and Highway (~700)	92	103	11	**12%**
o Traffic Control Signal (~10)	9	11	2	22%
Energy (MMBtu)	1,070	1,117	47	**4%**
Cost ($)	$86,004	$92,123	6,119	**7%**

Ninety-one percent of emissions generated by the streetlights sector were generated from 700+ streetlights in Fort Bragg (Figure 3.9). Each streetlight uses about 1.5 MMBtu of energy, cost about $125, and generates one-tenth of a $MTC0_2E$ annually. The City currently uses Sodium lamps which are one of the most energy efficient street light technologies available. In contrast, traffic control signals are much more energy intensive, cost significantly more to operate and generate nearly seven times the emissions per light. There are, however, less than 10 traffic control signal lights in the City of Fort Bragg and all are LED lights, again the most energy efficient type of signal available.

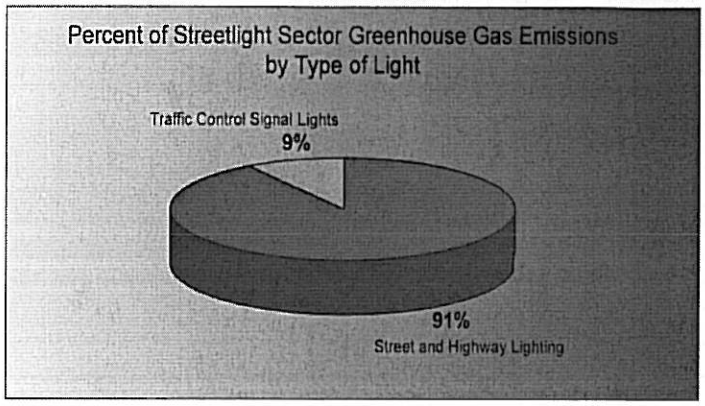


Figure 3.9: Percent of streetlight sector greenhouse gas emissions by type of light.

3.2.8. Water and Sewage Sector Analysis

The water and sewage sector is the largest contributor of GHG emissions to the City's carbon footprint, averaging 515 $MTCO_2E$ of GHGs annually. This represents about 45% of total government generated GHG emissions (Figure 3.2). More than half (56%) of those emissions originate from operations at the waste water treatment facility (Figure 3.10). Emissions generated by Madsen Hole Lift Station rank second,

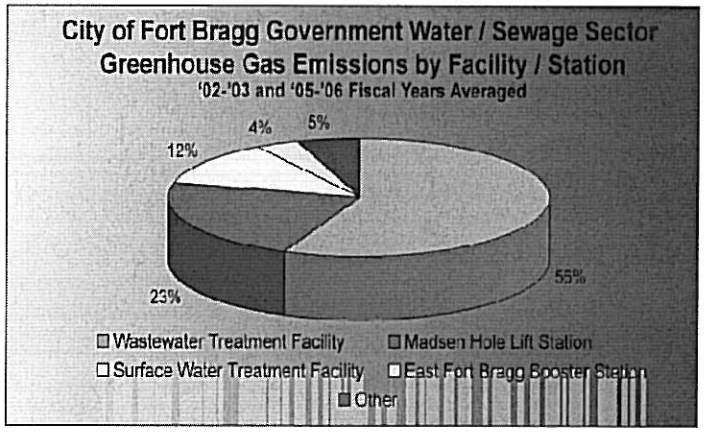


Figure 3.10: Percent of government Water/Sewage sector greenhouse gas emissions

followed by the Surface Water Treatment Plant, Other Pumping Stations[8], and the East Fort Bragg Booster Station.

Emissions generated in the water/sewage sector originate almost entirely from purchased electricity with an exception of the wastewater treatment facility where about one-third of emissions are generated from the combustion of propane used to heat digesters and other operations.

In addition to emissions generated by electricity and propane the Water/Sewage sector also emits methane from the digesters that decompose human waste. In normal operating conditions the methane released from the digesters is flared, or ignited, greatly reducing its potential global warming potential. However, on occasion, the flare does go out and has to be relit manually. During these times the methane, a greenhouse gas 23 times more potent than CO_2, is released directly into the atmosphere. The CACP software does not account for the methane emitted from the digesters and as of yet no efforts have been made to quantify the emissions from this source.

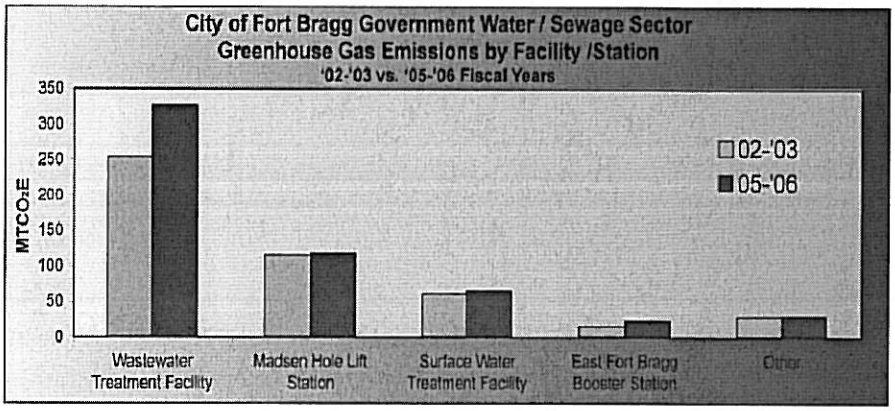


Figure 3.11: Comparative analysis of Government Water/Sewage sector greenhouse gas emissions by facility/station for fiscal years '02-'03 and '05-'06.

All water/sewage sub-sectors had increases in emissions from fiscal year '02-'03 to '05-'06. The Wastewater Treatment Facility had an increase of about 30 percent, representing 73 $MTCO_2E$.

The wastewater treatment facility is the single largest contributor to government generated GHG emissions.

[8] Other Pumping Stations refers to the Highway 20 Water Tank, Native American Sewer Lift Station, Pudding Creek Sewer Lift Station, Sanderson Sewer Lift Station, South Fort Bragg Booster Station, and the South Harbor Sewer Lift Station.

Table 3.4: Comparative analysis of the Water/Sewage sector GHG emissions, energy, and cost.

	'02-'03	'05-'06	Unit Increase	% Increase
Emissions $MTCO_2E$	470	559	89	18.9%
o Wastewater Treatment Facility	253	326	73	28.9%
o Madsen Hole Lift Station	115	118	3	2.6%
o Surface Water Treatment Plant	60	65	5	8.3%
o East Fort Bragg Booster Station	15	22	7	46.6%
o Other	27	28	1	3.7%
Energy (MMBtu)	44.4	47.3	2.9	6.5%
Cost ($)	$205,824	$240,254	$34,330	16.7%

3.2.9. Employee Commute Sector Analysis

The City of Fort Bragg employee commute sector generates 64 MTCO2E of GHG emissions a year, representing approximately six percent of total government generated emissions (Figure 3.2). While the employee commute sector is the smallest contributing sector of GHG emissions, it ranks second in production of air pollutants (Figure 3.6). The employee commute sector has one characteristic that distinguishes it from all other government sectors:

The employee commute represents the only sector that city employees have complete control over the amount of GHG emissions and air pollution generated.

Data for the employee commute sector was gathered by a survey (see APPENDIX B). Thirty-eight of the sixty-seven city employees (57%) completed and returned the survey. Upon analyzing the survey results some interesting findings surfaced.

Table 3.5: Interesting findings fro the employee commuter survey.

Interesting Findings From the Employee Commuter Survey
• Average distance from home to work = 2.96 miles.
• 84% of employees drive to work despite their close proximity to work.
• Gasoline is the only fuel source used in City employee commuter vehicles.
• The most utilized commuting vehicle is the mid-sized auto, followed by large trucks and compact auto.
• Employees who walk or bike average a distance of 335 miles/year.

4. Community Analysis

4.1. Community Analysis Scope

The community analysis provides an estimate of all of the GHG and CAPs emissions produced within the City of Fort Bragg (Figure 4.2) by both residents in their homes and local businesses and agencies. The Baseline year for the analysis was the 2005-2006 fiscal year. Four key sectors are included in the community analysis: Residential, Commercial, Waste, and Transportation. CCP protocol calls for an additional sector, the industrial sector, but because industrial operations are either non-existent or negligible in Fort Bragg it has been excluded in this analysis. Each of the four key sectors may be broken down further into source sub-sectors as indicated in Figure 4.1.

Energy and fuel data for the community analysis was unavailable or unreliable in years prior to the '05-'06 fiscal year. For this reason the '05-'06 fiscal year was chosen as the baseline year for the community analysis. The community analysis is simplified in comparison to the government analysis because it is based on only one year of data, has fewer sectors, draws from more generalized data sources, and does not showcase specific point sources of emissions and air pollutants.

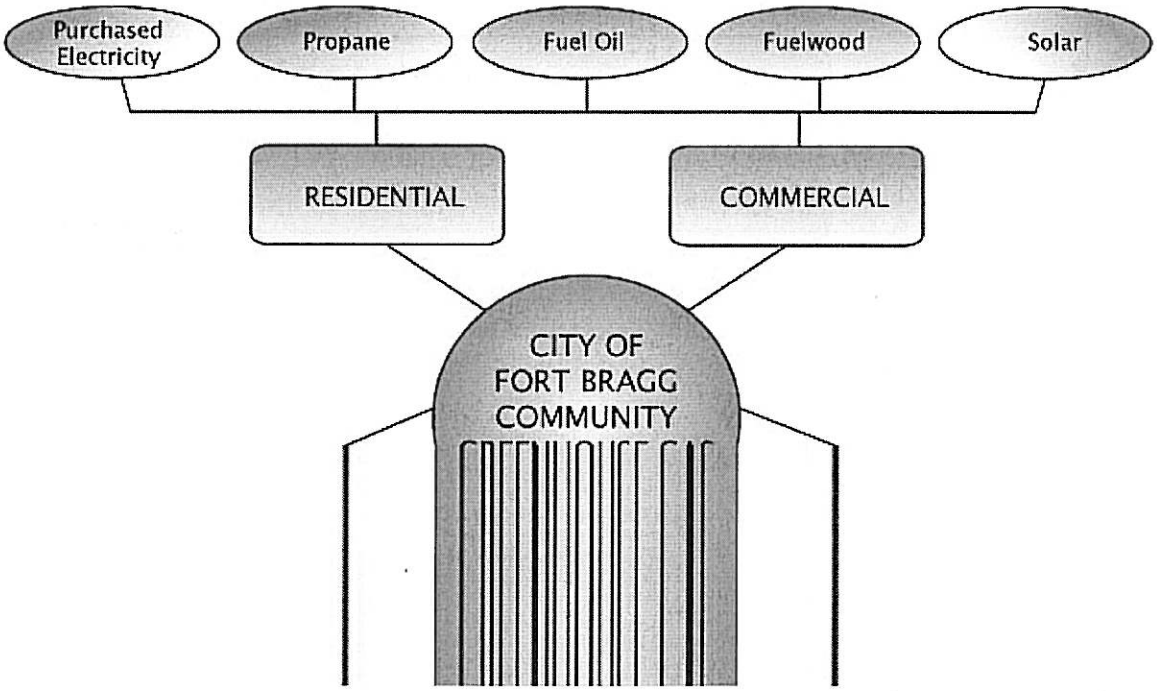


Figure 4.1 Community analysis design flowchart.

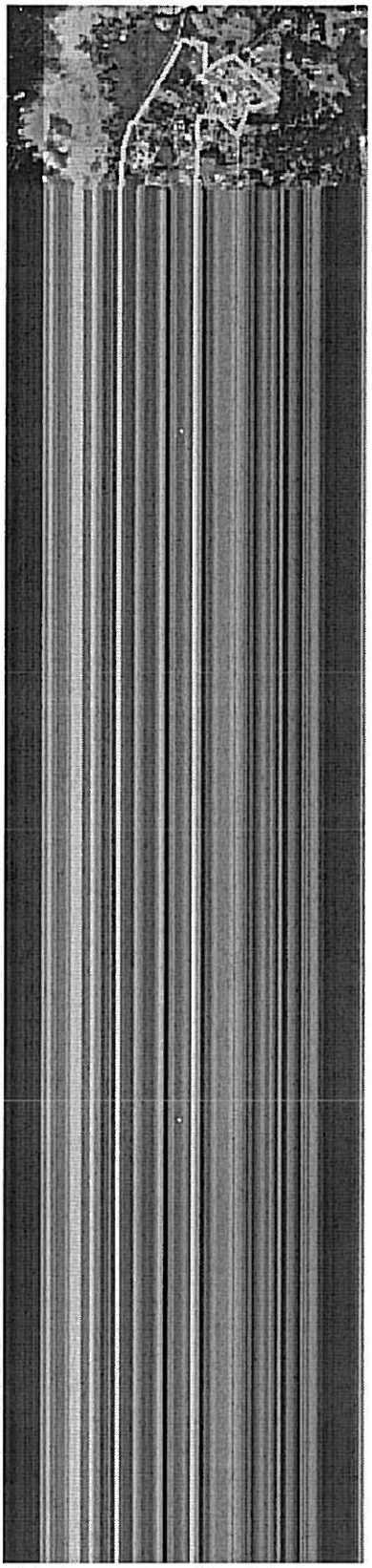


Figure 4.2 Fort Bragg City Limits.

4.2. Community Analysis Results

4.2.1. Overview

During the 2005-2006 fiscal year, the Fort Bragg community generated 138,824 $MTCO_2E$. Nearly 70 percent of these emissions were produced from the transportation sector. The residential sector was the second largest contributor, accounting for 15%, followed by the commercial sector (13%), and the waste sector (3%) (Figure 4.2).

Table 4.1 provides a summary of energy use, CAP and GHG emissions produced by each sector.

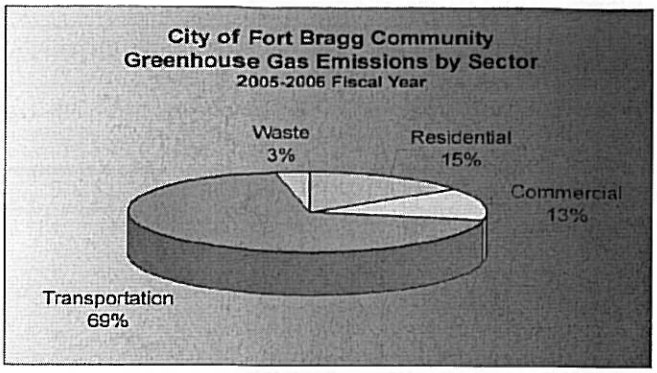


Figure 4.3: Community greenhouse gas emissions by sector (2005-2006 fiscal year).

Table 4.1: Community analysis GHG emissions, energy, and MMBtu per$MTCO_2E$ by sector.

SECTOR	Energy (MMBtu)	NO_x (lbs.)	SO_x (lbs.)	CO (lbs.)	VOC (lbs.)	PM_{10} (lbs.)	Emissions ($MTCO_2E$)	MMBtu/ $MTCO_2E$
Residential	298,957	61,010	25,700	270,691	49,072	46,444	21,289	14
Commercial	198,591	45,155	29,700	22,085	2,709	17,427	17,583	11
Transportation	1,232,465	707,389	38,740	5,595,541	578,435	20,143	95,866	13
Waste	N/A	N/A	N/A	N/A	N/A	N/A	4,086	N/A
TOTAL	**1,730,014**	**813,554**	**94,128**	**5,888,317**	**630,216**	**84,013**	**138,824**	**12.5**

It is difficult and sometimes misleading to compare per capita emissions in different communities. Factors such as the fuel used to generate electricity, the availability of alternative fuels in the community and the type and pace of business development in the region can make comparison difficult. That said, it is useful to understand Fort Bragg's per capita emissions in regards to broader state and national per capita emissions. Reduction efforts at the State and Federal levels should effect Fort Bragg's emissions. Likewise Fort Bragg's efforts to reduce its emissions will reduce State and National emission outputs.

Emissions in Fort Bragg are considerably lower than the national average. During the 2005-2006 fiscal year, Fort Bragg generated approximately 20 $MTCO_2E$ of GHGs per capita. In 2004, per capita GHG emissions in the U.S. were approximately 24.1 $MTCO_2E$.[9] However, total U.S. emissions include some sources which are not included in this CCP inventory (e.g. agricultural soil management, air transportation and industrial emissions not related to energy use). If these additional remote sources of GHG emissions

[9] Source: Based on 2004 populations estimates published by US Census Bureau and total GHG emissions produced in the US in 2004 as published by US EPA.

had been included in this inventory, the per capita emissions in Fort Bragg would be closer to the national average.

By end-use sector, 21% of the national energy related emissions are residential, 17% are commercial, 28% are industrial and 33% are transportation related. By distribution, the transportation sector (69%) is considerably higher in Fort Bragg than the national average, while the commercial sector (13%) and residential sector (15%) are considerably lower in Fort Bragg than the national average.

4.2.2. Source (Fuel Type) of Community Greenhouse Gas Emissions

This section of the report provides an analysis of GHG emissions by fuel type. The majority of GHG emissions generated by the Fort Bragg community originate from gasoline (57%), followed by electricity (15%), diesel (12%), propane (8%), heating oil (5%), and from waste (3%) (Figure 4.4).

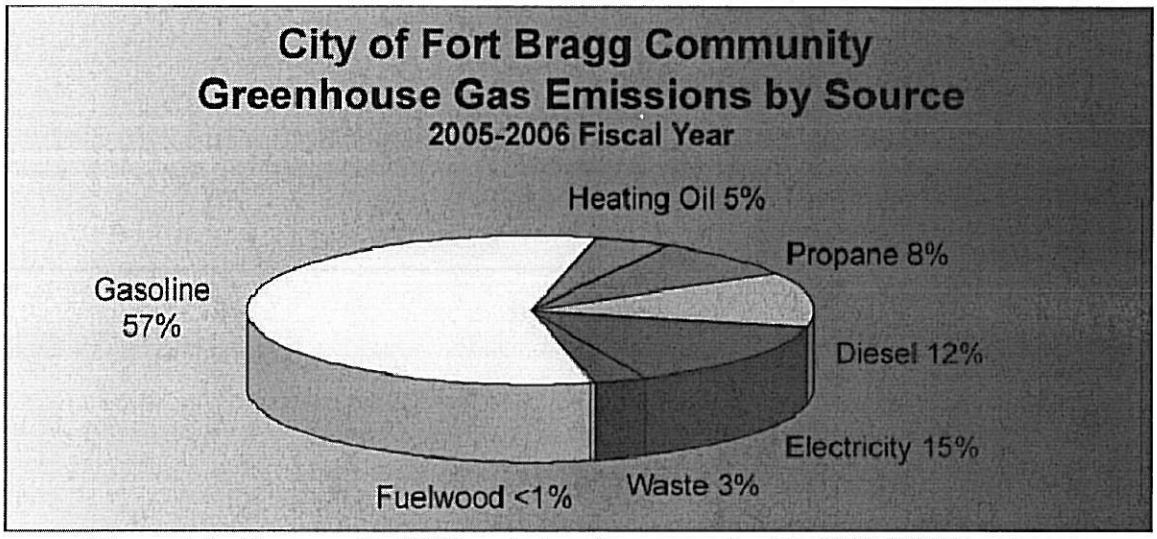


Figure 4.4: Community GHG emissions by source for the 2005-2006 fiscal year.

4.2.3. Community Generated Air Pollutants

In the fiscal year '05-'06 the City of Fort Bragg generated roughly 84,000 lbs of particulate matter smaller than 10mm (PM10), 94,000 lbs of sulfur dioxide, 630,000 lbs of volatile organic compounds (VOC), 813,500 lbs of nitrous oxide (NO_x), and nearly 6,000,000 lbs. of carbon monoxide (CO). The transportation sector is responsible for roughly 70 percent of all community CAPs—claiming 95 percent of

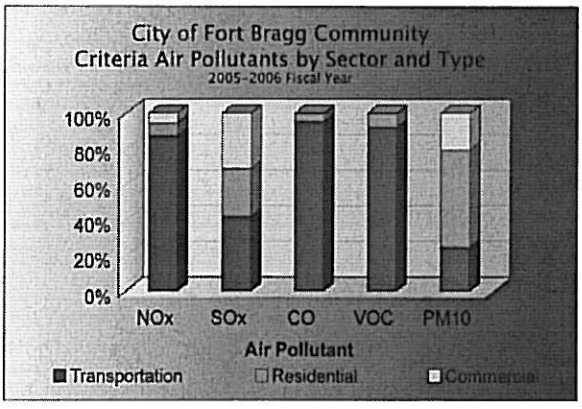


Figure 4.5: City of Fort Bragg community CAPs by sector and type

the CO, 91 percent of the VOC, 87 percent of the NOx, and over 40 percent of SOx. The overwhelming majority of these air pollutants can be attributed to the combustion of gasoline and diesel.

4.2.4. Residential Sector Results

The residential sector generated about 21,300 TCO_2E, representing over 15 percent of community generated GHG emissions. In 2005-2006 there were approximately 2,840 households in the Fort Bragg. Each household produced an average of approximately 7.5 $MTCO_2E$ and consumed 105 MMBtu of energy. The national GHG emission average is 12.5 $MTCO_2E$ per household, or 21% of total fossil-fuel derived emissions[10].

On a per capita basis, the residential sector in Fort Bragg is substantially <u>below</u> the national average in household GHG emissions.

Within the residential sector, energy is consumed for space and water heating,

Despite fuelwood being a small contributor of greenhouse gas emissions it does produce enormous amounts of particulate matter—fuelwood only generated .002 percent of total community greenhouse gas emissions and merely .02 percent of total community energy, yet **fuel wood generated over 40 percent of PM10** (particulate matter smaller than 10 mm).

4.2.5. Commercial Sector Results

The commercial sector consists of office buildings retail outlets, institutions (the hospital, schools, the college, etc.) and government facilities. Approximately 3120 people were employed in the commercial sector in the City of Fort Bragg in the year 2006[11]. Commercial operations occupied nearly 2 million square feet of facility space during the same period[12]. The commercial sector generated 17,583 $MTCO_2E$, representing 13 percent of community generated GHG emissions. The commercial sector produces 17 percent of the total national fossil fuel derived emissions or 4.1 $MTCO_2E$ per capita[13]. The average commercial business in Fort Bragg produced 5.6 $MTCO_2E$ per employee, 0.01 $MTCO_2E$ per square foot of facility space or 2.54 $MTCO_2E$ per capita, which is slightly lower than the national average.

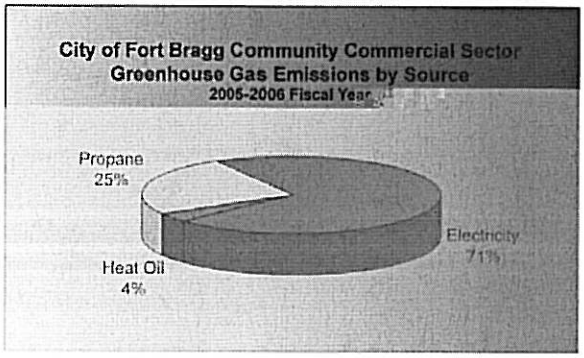


Figure 4.7: Commercial sector greenhouse gas emissions by source for the 2005-2006 fiscal year.

GHG emissions from the commercial sector originated from three sources: electricity, propane, and heating oil. Electricity produced the most emissions (71 percent), followed by propane (25 percent), and heating oil (4 percent).

Table 4.4: Commercial Sector: Base 2005-2006 Fiscal Year Energy Use, CAP & GHG Emissions by Fuel Type

Fuel Type	Total Energy (MMBtu)	NO_x (lbs.)	SO_x (lbs.)	CO (lbs.)	VOC (lbs.)	PM_{10} (lbs.)	GHGs ($MTCO_2E$)
Electricity	122,377	32,465	22,113	20,201	2,260	16,844	**12,493**
Propane	67,047	10,259	0	1,392	366	293	**4,402**
Heating Oil	9,167	2,432	7,574	491	83	289	**687**
Total	**17,583**	**45,155**	**29,688**	**22,085**	**2,709**	**17,427**	**198,591**

[11] Commercial Employees was derived from projections in the General Plan (Nov. 2004) provided by Spatial Insights Corporation, June, 2000.
[12] Floor Area= 1,556,735 square feet + (1,415 hotel rooms X 250 square feet) = 1,910,485 square feet
[13] Source: EPA National GHG Inventory.

4.2.6. Transportation Sector Results

The transportation sector generated more GHG emissions than all the other sectors combined. Overall, the transportation sector produced 95,866 $MTCO_2E$, representing about 70 percent of all community GHG emissions. Eighty-three percent of transportation sector emissions were generated from the combustion of gasoline, while the remaining 17 percent originate from the combustion of diesel.

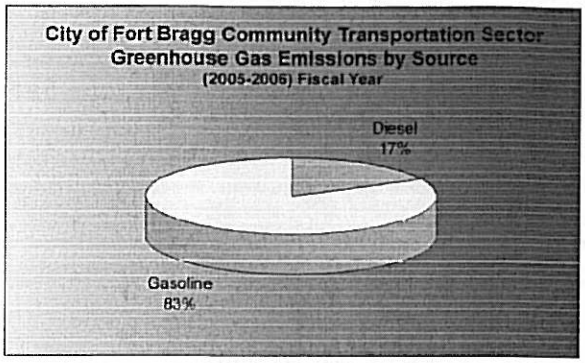


Figure 4.8: Transportation sector greenhouse gas emissions by source for the 2005-2006 fiscal year.

This sector includes privately and publicly owned passenger vehicles, transport trucks, public transit vehicles, and all other on-road vehicles associate with personal, commercial, industrial, and government activities.

Table 4.5: Transportation Sector: Base 2005-2006 Fiscal Year Energy Use, CAP & GHG Emissions by Fuel Type.

Fuel Type	Total Energy (MMBtu)	NO_x (lbs.)	SO_x (lbs.)	CO (lbs.)	VOC (lbs.)	PM_{10} (lbs.)	GHGs ($MTCO_2E$)
Gasoline	1,020,558	468,907	28,531	5,404,700	552,563	10,444	**79,180**
Diesel	211,907	238,482	10,209	190,842	25,872	9,699	**16,685**
Total	**1,232,465**	**707,389**	**38,740**	**5,595,541**	**578,435**	**20,143**	**95,865**

4.2.7. Solid Waste Sector Results

In 2006 the waste sector generated 4,086 $MTCO_2E$, representing three percent of all community GHG emissions. This means that each person living in Fort Bragg generates roughly one-half of a $MTCO_2E$ of waste related emission a year. GHG and CAP emissions resulting from the transportation of solid waste fro residences and businesses to disposal are not included in this sector; they fall under the transportation sector of the community inventory.

Waste produced within the City of Fort Bragg is sent to a transfer station before it is hauled to the Redwood Landfill in Novato, California. Redwood Landfill is a managed landfill with no methane capture capacity. The landfill does, however, flare (ignite) the methane. Since methane is 23[14] times more potent than CO_2 as a GHG, combusting it reduces its global warming potential by 23 times.[15] Methane flaring significantly reduces GHG

[14] Source: International Panel on Climate Change, Third Assessment Report, 2002.

[15] Methane (CH_4) is not only the primary constituent of natural gas, but is generally the product of anaerobic decomposition that takes place in landfills and primary wastewater treatment. On a per unit basis, methane has approximately 20 times the greenhouse impact of carbon dioxide (CO_2). This enhances the importance of proper operation of landfills and wastewater treatment plants. Methane from landfills and wastewater

production associated with solid waste generation. Furthermore, since a fraction of the carbon found in solid waste is never released, but remains sequestered in the landfill, landfills can act as carbon sinks. The negative values found in Table 4.6 are the result of carbon sequestration in the landfill, combined with the impact of methane flaring.

In Table 4.6, certain waste streams including plant debris, wood and textiles have negative GHG emissions and other waste streams including paper products and food waste have positive emissions. This is because paper products and food waste decompose more readily than the other waste streams. The 'other' waste stream represents inorganic waste and therefore does not decompose and cause emissions.

Waste Type	Materials	GHGs ($MTCO_2E$)
Municipal Solid Waste	Paper Products	3,235
	Food Waste	1,033
	Plant Debris	(113)
	Wood/Textiles	(68)
Total		**4,086**

Table 4.6: Waste Sector: GHG Emission by material type

4.3. Community Analysis Forecast

The CACP software allows users to estimate future GHG emissions that will be generated if no further reduction measures are implemented in the community. In 2006 the community produced 138,824 $MTCO_2E$. In a "business as usual" scenario emissions are projected to increase 21 percent, or to 167,714 $MTCO_2E$, by the year 2025. This projection is based off an annual increase of one percent in energy and fuel use, number of households, number of businesses, commercial floor space, and waste.

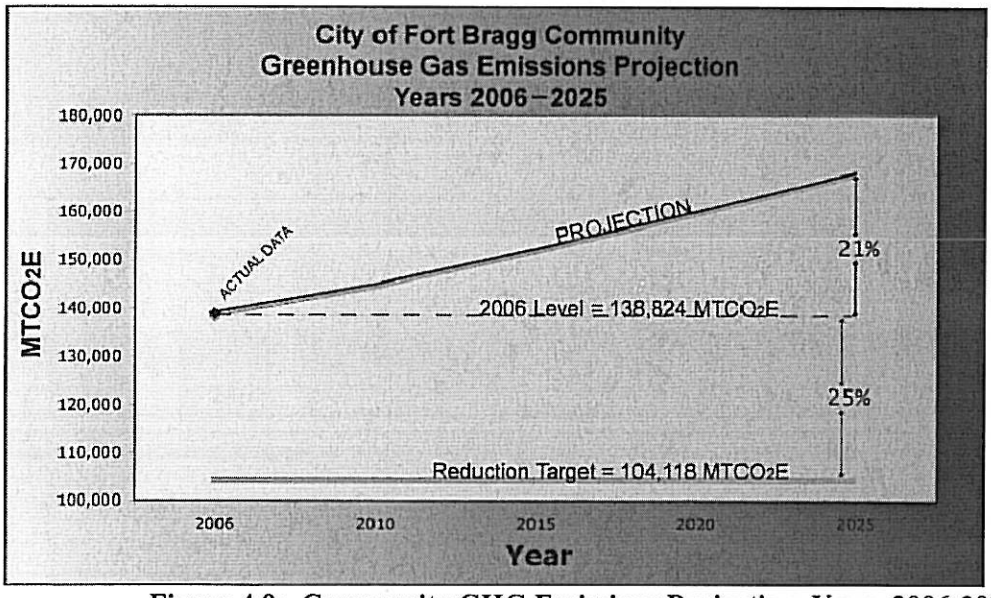


Figure 4.9: Community GHG Emissions Projection, Years 2006-2025.

treatment plants is generally captured and flared, converting it to CO_2. If the methane is instead used as a fuel, it can displace an alternative fuel source and offset the CO_2 generation associated with the fuel.

5. Next Steps

5.1. Milestone II: Setting an Emission Reduction Target

The establishment of this community emissions baseline and projection prepare the City to complete the next step by setting an emissions reduction goal. An emmissions reduction goal will allow the City to develop a reasonable policy and programmatic response to reduce our contribution to global Green House Gasses. A well developed emissions reduction goal should possess the following qualities:

- **Ambitious**—showcase Fort Bragg as an emerging sustainable city.
- **Attainable**—set a goal that is achievable; consider what other cities have achieved.

Potential GHG Emissions Reduction Targets:
City Council may consider the following as potential targets to set a reasonable and obtainable goal of emissions reductions for the City and the Community.

1. **25% by 2025**
   25 percent below 2006 levels by the year 2025 equates to lowering emissions about **1.47** percent per year for the next 17 years.

2. **20%by 2020**
   20 percent below 2006 levels by the year 2020 equates to lowering emissions about **1.67** percent per year for the next 12 years.

3. **15%by 2015**
   15 percent below 2006 levels by the year 2015 equates to lowering emissions about **2.14** percent per year for the next 7 years.

4. **10% by 2010**
   10 percent below 2006 levels by the year 2010 equates to lowering emissions about **5** percent per year for the next 2 years.

When choosing amongst these emission reduction targets, some issues to consider include:

1. The State has accepted the following reduction targets:
   - 25% below 1990 levels by 2020
   - 80% below 1990 levels by 2050
2. Setting a goal that is too distant can be dangerous because implementation may be put off.
3. Cities can typically reduce first year emissions by as much as five percent by pursuing the "low hanging fruit" while the next 5 percent may take years.
4. Setting intermittent goals is a good way to monitor progress and stay on track.

5.2. Milestone III: Develop an Action Plan

After determining an agreed upon reduction target the City of Fort Bragg will develop a cohesive Action Plan based on the information revealed in this study. Development of an action plan will likely be a multi-step process that includes: 1) research of activities undertaken by other communities; 2) prioritization of GHG emission reduction actions by City Council and the community; 3) identification of costs and benefits associated with technological and behavior changes to reduce GHG emissions; 4) selection of policies and programs; and 5) development of an implementation and education program for GHG emission reduction for City employees, businesses and community residents.

5.2.1. Research Phase

The first step to developing an action plan is to research measures, policies and programs already developed by other communities. Efforts that were successful and seem applicable to Fort Bragg will be formulated into a master list. Staff has already completed some research in this regard. The table below outlines many of the activities undertaken by other communities to reduce their production of GHGs.

Table 5.1
ICLEI Suggested Emissions Reduction Measures

HIGHLIGHTED MEASURES = ALREADY IMPLEMENTED

Building-Related Energy

Municipal Building Energy Efficiency & Conservation

- Conduct an energy audit of municipal facilities
- Implement an energy tracking and management system
- Implement green or reflective roofing
- Improve water pumping energy efficiency
- Install a central irrigation control system
- Install ENERGY STAR appliances
- Install ENERGY STAR copiers
- Install ENERGY STAR monitors
- Install ENERGY STAR printers
- Install ENERGY STAR water coolers
- Install energy-efficient exit sign lighting
- Install low-flow toilets
- Install occupancy sen

Community Building Energy Efficiency & Conservation

- Implement tidal power project
- Adopt strict residential or commercial energy code requirements
- Community education (e.g., energy efficiency challenge, green business program)
- Community energy efficiency rebate program
- Distribute free CFL bulbs and/or fixtures to community members
- Implement a low-income weatherization program
- Implement district heating and cooling
- Implement time-of-use or peak demand energy pricing
- Install energy-efficient cogeneration power production facilities
- Install solar water heating at community swimming pool
- Launch an "energy efficiency challenge" campaign for community residents
- Offer a halogen torchiere lamp exchange to community members
- Offer an LED Christmas light trade-in to community members
- Promote energy conservation through campaigns targeted separately at residents and businesses
- Promote green building practices through a local ordinance or green building program
- Promote participation in a local green business program
- Promote the purchase of ENERGY STAR appliances and office equipment
- Promote water conservation through conservation ordinances
- Promote water conservation through technological means (eg. distribution of conservation devices to community)
- Remove or replace woodstoves and fireplaces with EPA rated woodstoves

Outdoor Lighting

- Install energy-efficient traffic lights
- Install energy-efficient street lights (e.g., high pressure sodium)
- Decrease average daily time street lights are on

Renewable Energy

- Purchase green electricity from solar, geothermal, wind or hydroelectric sources
- Purchase green tags / renewable energy certificates
- Install solar panels on municipal facilities
- Promote community clean energy use through green power purchasing or on-site renewable technologies
- Offer incentives to foster solar PV installations in the community
- Implement a form of community choice aggregation
- Install solar water heating at community swimming pool

Transportation

Vehicle Fuel Efficiency

- Limit idling of municipal or community vehicles
- Parking and restricted lane incentives for LEVs (low emitting vehicles) and hybrids
- Promote community purchases of compact and hybrid vehicles
- Limit idling of local transit buses and school buses
- Purchase fuel efficient (e.g., hybrid) and/or smaller fleet vehicles
- Retire old and under-used vehicles
- Utilize fuel-efficient vehicles (e.g., scooters) for parking enforcement

Alternative Fuels

- Alternative fuels (e.g., local fueling stations, incentives)
- Enforce electric vehicle recharging facilities in new large parking facilities
- Initiate a community biodiesel purchasing coop or fueling station
- Alternative Fuels (e.g., biodiesel, ethanol, CNG)
- Utilize biodiesel in municipal fleet
- Utilize compressed natural gas in municipal fleet
- Utilize electric vehicles in municipal fleet

Trip Reduction / Transportation Demand Management

- Allow bikes on trains/busses
- Improve bicycle transit (e.g., synch bicycle trails with transit, bike lanes, storage facilities)
- Develop park and ride facilities
- Public transit education & campaigns (e.g., car-free promotion days, guides to transit use)
- Encourage community car-sharing
- Encourage local buses and taxis to convert to alternative fuels by subsidizing fuel conversion equipment costs
- Encourage telecommuting by community by offering services online or on the phone at reduced rates compared to in-person visits
- Expand local or regional bus service in range and / or frequency
- Implement bus rapid transit or shuttle programs
- Install new light rail systems
- Institute a "safe routes to school" program
- Pedestrian Traffic (e.g., slow street traffic, improve sidewalks and safety, pedestrian-only areas)
- Promote car-pooling, telecommuting and the use of mass-transit by community members
- Provide free bicycles for public use
- Provide high school students with complementary bus tickets
- Encourage car-pooling or van-pooling by municipal employees
- Encourage telecommuting by municipal employees
- Encourage use of mass-transit by municipal employees
- Implement a police on bicycles program
- Provide free bicycle loans for municipal staff use

Other Transportation-Related Measures

- Financing (e.g., local transit impact development fees, gas tax)
- Improve traffic signal synchronization
- Promotion/informative campaign on 'How to Get Around'
- Road Management (e.g., congestion pricing, synchronize traffic lights, restricted lanes)

Recycling & Waste

- Energy from waste (e.g., landfill methane recovery, energy from waste/biofuels)
- Establish system for reuse or recycling of construction and demolition materials
- Establish / expand recycling programs in the community
- Implement solid waste reduction program through creation of reuse facilities /programs
- Waste diversion (e.g., recycling, organics and yard debris collection, demolition standards)
- Establish / expand recycling programs in municipal facilities
- Implement environmentally preferable purchasing program recycled paper, etc (energy efficient appliances are ignored here)
- Install an anaerobic digester at the wastewater treatment facility
- Ban plastic bags in stores
- Bring your own bag campaign
- Compost wastewater sludge

Land Use

- Foster downtown neighborhood development
- Institute growth boundaries, ordinances or programs to limit suburban sprawl
- Institute programs to preserve open space
- Plant trees for energy savings
- Target new development to brown field sites
- Transit-oriented / downtown development (e.g., transit-oriented development plans, growth boundaries, zoning)
- Urban heat island mitigation (e.g., reflective surfaces, shade trees)

5.2.2. Creation of a Master List of Potential Strategies and Policies to Reduce GHGs

As a review of the above list indicates, potential measures can be both broad and creative. In some cases the City has already adopted measures that are successfully being implemented to reduce GHGs, these measures will also be rolled into the final strategy. This may also be a good time to reassess the effectiveness of already implemented measures.

5.2.3. Selection of Policies and Programs

Preferred policies and programs to reduce green house gas emissions should be selected through a community-based planning exercise that empowers and educates residents, business owners and City staff to take ownership of efforts to reduce GHGs. In addition the preferred polices and programs should be based on the following criteria:

- GHG reduction potential
- Cost
- Other feasibility issues
- Benefits associated with the measure

5.2.4. Development of GHG Emission Reduction Strategy

Selected policies and programs will be rolled into a draft of the Fort Bragg Greenhouse Gas Reduction Action Plan. The Action Plan will be made available to the public for review through the City's website and at City Hall. A public forum will also be held to present the draft plan to the community ant to solicit input. Public input may also be received through regularly scheduled meetings, written submissions, or through the development of a task force/committee. All public input should be reviewed and incorporated into the plan as appropriate.

5.3. Milestone IV: Implementation Plan

Measures that are selected for the Fort Bragg Greenhouse Gas Reduction Action Plan are likely to be too numerous and/or expensive to implement all at once. Instead, a small contingent of key measures should be chosen for implementation in the first year or two. Once these measures have been implemented, the Plan can be revisited and a second set of measures chosen for implementation. This process will be repeated on an annual basis until the City's GHG and CAP goals are met.

The implementation plan will include:

- What is to be done.
- How it is to be accomplished.
- Who is responsible for what.
- Where the resources will come from.
- When it will be accomplished by.

5.4. Milestone V: Monitoring and Evaluation

As measures are implemented, efforts must be employed to track their progress in reducing GHG and CAP emissions. City staff will perform this work and will use the CACP

software, following the methods recommended by the ICLEI/CCP for tracking reductions of GHG and CAP emissions. A Community Greenhouse Gas and Criteria Air Pollutant Emissions Inventory should be completed in five year increments starting in the year 2010.

6. Appendix A: List of Acronyms

Btu – British Thermal Units; a standard unit of measure equivalent to the quantity of heat required to raise the temperature of 1 pound of water by 1 degree Fahrenheit at the temperature at which water has its greatest density (approximately 39 degrees Fahrenheit).

CACP – Clean Air Climate Protection; the software used by ICLEI to calculate GHG emissions.

CAP – criteria air pollutant, a category of air pollutants including: nitrogen oxides (NOx) sulfur oxides (SOx), carbon monoxide (CO), particulate matter (PM), and volatile organic compounds (VOC), which have adverse effects on human health.

CCP – Cities for Climate Protection; a program developed by ICLEI – Local Governments for Sustainability to help local governments reduce GHG emissions from their operations and communities.

GHGs – greenhouse gases, primarily consisting of: carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O).

ICLEI – Local Governments of Sustainability (formerly the International Council for Local Environmental Initiatives).

kWh – kilowatt hours; a unit commonly used to measure electricity. Equivalent to 1000 Watts.

MMBtu – Millions of British Thermal Units.

MTCO$_2$E – Metric Tonne of Carbon Dioxide Equivalent.

VMT – Vehicle miles traveled; a measure of the total distance traveled within a community. This is used to estimate fuel consumption and GHG emissions.

7. Appendix B: Vehicle Fleet List

City of Fort Bragg Government Vehicle Fleet List

Yellow vehicles are soon to be taken out of service.
Off Road equipment driven on the street
Gasoline Battery Hybrid vehicle
Low greenhouse gas vehicle.
Motorcycle

Diesel Built prior to 1995
Diesel Built after 1995
GASOLINE POWERED
Propane Powered
>10 Years Old

	Dept.	UNIT NO.	Make	Yr.	Model	ENGINE SIZE LITERS / # CYCL.	FUEL TYPE	Air Pollution*	GHG Emissions*	MPG*
					CITY HALL FLEET					
1	CITY HALL	CH 716	TOYOTA	2004	PRIUS	1.5 L 4 CYCL	GAS			46
2	CITY HALL	CH 715	CHEV.	93	CAPRICE	5.7 L V8	GAS	N/A		17
3	CITY HALL	CH 705	CHEV.	93	CAPRICE	5.7 L V8	GAS	N/A		17
4	CITY HALL	CH713	CHEV.	93	CAPRICE	5.7 L V8	GAS	N/A		17
4										
					POLICE DEPT. FLEET					
1	POLICE	PD 701	FORD	96	CRN VIC.	4.6 L V8	GAS	N/A		18
2	POLICE	PD 702	FORD	96	CRN VIC.	4.6 L V8	GAS	N/A		18
3	POLICE	PD 704	CHEV.	93	CAPRICE	5.7 L V8	GAS	N/A		15
4	POLICE	PD 721	FORD	2003	CRN VIC.	4.6 L V8	GAS	N/A		18
5	POLICE	PD 722	FORD	2001	CRN VIC.	4.6 L V8	GAS			18
6	POLICE	PD 723	FORD	2002	CRN VIC.	4.6 L V8	GAS			18
7	POLICE	PD 724	FORD	2002	CRN VIC.	4.6 L V8	GAS			18
8	POLICE	PD 725	FORD	2003	CRN VIC.	4.6 L V8	GAS			18
9	POLICE	PD 726	FORD	2001	CRN VIC.	4.6 L V8	GAS			18
10	POLICE	PD 728	FORD	2001	CRN VIC.	4.6 L V8	GAS			18
11	POLICE	PD 729	FORD	2003	CRN VIC.	4.6 L V8	GAS			18
12	POLICE	PD 730	DODGE	2006	MAGNUM	3.5 L V6	GAS			20
13	POLICE	PD 731	FORD	2005	CRN VIC.	4.6 L V8	GAS			19
14	POLICE	PD 732	FORD	2005	CRN VIC.	4.6 L V8	GAS			19
15	POLICE	PD 733	FORD	2005	CRN VIC.	4.6 L V8	GAS			19
16	POLICE	PD 734	FORD	2005	CRN VIC.	4.6 L V8	GAS			19
17	POLICE	PD 735	FORD	2005	CRN VIC.	4.6 L V8	GAS			19
18	POLICE	PD 736	FORD	2005	CRN VIC.	4.6 L V8	GAS			
19	POLICE	PD 738	KAWASAKI	1997	KZ1000	1000 CC	GAS	N/A	N/A	N/A
20	POLICE	PD 739	KAWASAKI	1994	KZ1000	1000 CC	GAS	N/A	N/A	N/A
21	POLICE	PD 740	KAWASAKI	1994	KZ1000	1000 CC	GAS	N/A	N/A	N/A
22	POLICE	PD 741	DODGE	2006	CHARGER	3.5 L V6	GAS			20
23	POLICE	PD 742	SUZUKI	2005	DR650SE	650 CC	GAS	N/A	N/A	N/A
24	POLICE	PD 767	JEEP	91	CHEROKEE	4.0L INLINE 6	GAS	N/A		15
24										

PUBLIC WORKS FLEET										
1	PUBLIC WORKS	PW 1	CHEV.	2000	3500 Flatbed	5.7 L V8	GAS	N/A		12
2	PUBLIC WORKS	PW 2	GMC	1997	1500 Flatbed	4.3L V6	GAS	N/A		16
3	PUBLIC WORKS	PW 3	Dodge	2001	1500 P/U	5.2 L V8	GAS			14
4	PUBLIC WORKS	PW 5	FORD	2006	F-250	5.4 L V8	GAS	N/A	N/A	N/A
5	PUBLIC WORKS	PW 9	JOHN DEERE	77	670 GRADER	6.9L INLINE 6	DIESEL	N/A	N/A	N/A
6	PUBLIC WORKS	PW 11	CATAPILLAR	2005	420D	INLINE 4	DIESEL	N/A	N/A	N/A
7	PUBLIC WORKS	PW 12	PETERBUILT	96	DUMP TRUCK	INLINE 6	DIESEL	N/A	N/A	N/A
8	PUBLIC WORKS	PW13	GMC	90	DUMP TRUCK	3208 V8	DIESEL	N/A	N/A	N/A
9	PUBLIC WORKS	PW 15	TMC	86	FORKLIFT	4 CYC	PROPANE	N/A	N/A	N/A
10	PUBLIC WORKS	PW 16	FORD	2005	F-150	5.4 L V8	GAS			15
11	PUBLIC WORKS	PW 20	TYNCO	2004	SWEEPER	4.7L INLINE 6	DIESEL	N/A	N/A	N/A
12	PUBLIC WORKS	PW 23	DODGE	89	D100	5.2 L V8	GAS	N/A		12
13	PUBLIC WORKS	PW 25	CHEV.	94	WT/10	4.3L V6	GAS	N/A		17
14	PUBLIC WORKS	PW 26	CHEV.	94	WT/10	4.3L V6	GAS	N/A		17
15	PUBLIC WORKS	PW 27	GMC	91	3500HD	7.4 L V8	GAS	N/A		10
16	PUBLIC WORKS	PW 29	DODGE	97	DAKOTA	3.9L V6	GAS	N/A		16
17	PUBLIC WORKS	PW 45	FORD	73	SEWER TRK.	5.9 L V8	GAS	N/A	N/A	N/A
18	PUBLIC WORKS	PW 46	STERLING	2001	CAMEL	INLINE 6	DIESEL	N/A	N/A	N/A
19	PUBLIC WORKS	PW 727	CHEV.	1990	G20 VAN	5.7 L V8	GAS	N/A		15
20	PUBLIC WORKS	E1 21	FORD	2006	ESCAPE	2.3L 4 CYC	GAS			29
21	WASTE WATER	WWT 8	JOHN DEERE	85	BACHOE	4 CYC	DIESEL	N/A	N/A	N/A
22	WASTE WATER	WWT 28	FORD	90	F-150	4.9L INLINE 6	GAS	N/A		15
23	WASTE WATER	WWT 4	Dodge	2002	1500 P/U	4.7 L V8	GAS			15
24	WASTE WATER	WWT 30	NISSIAN	2007	FONTIER	2.5 L 4 CYC.	GAS			21
25	WASTE WATER	WWT 31	NISSIAN	2007	FONTIER	2.5 L 4 CYC.	GAS			21
26	WATER	WT 1	Dodge	2005	1500 Xtra CAB	4.7 L V8	GAS			14
27	WATER	WT 19	CHEV.	2000	SILVERADO	4.8 L V8	GAS	N/A		16
27										

FIRE DEPT. FLEET										
1	FIRE DEPT.	8370	International	1996	Pumper		DIESEL	N/A	N/A	N/A
2	FIRE DEPT.	8390	Kenworth	2005	Tanker		DIESEL	N/A	N/A	N/A
3	FIRE DEPT.	8300	Ford	2003	First Response		DIESEL	N/A	N/A	N/A
4	FIRE DEPT.	8340	Ford	1996	Service		GAS	N/A	N/A	N/A
5	FIRE DEPT.	8360	Ferrara	2002	Pumper		DIESEL	N/A	N/A	N/A
6	FIRE DEPT.	8331	F-350	1997	Rescue		DIESEL	N/A	N/A	N/A
7	FIRE DEPT.	8395	Pierce	1979	Aerial		DIESEL	N/A	N/A	N/A
8	FIRE DEPT.	8330	GMC	1983	Mini-Pumper		GAS	N/A	N/A	N/A
9	FIRE DEPT.	8381	Ford	1984	Pumper		GAS	N/A	N/A	N/A
10	FIRE DEPT.	8391	IHC	1997	Tanker		DIESEL	N/A	N/A	N/A
11	FIRE DEPT.	8350	Mack	1951	Hose Wagon		DIESEL	N/A	N/A	N/A
12	FIRE DEPT.	8385	Ford	1989	Pumper		GAS	N/A	N/A	N/A
13	FIRE DEPT.	N/A	Chevy	1955	Pumper		DIESEL	N/A	N/A	N/A
14	FIRE DEPT.	N/A	Amer. La France	1926	Antique		GAS	N/A	N/A	N/A
15	FIRE DEPT.	8320	Ford	1996	Prevention		GAS	N/A	N/A	N/A
16	FIRE DEPT.	N/A	Westates	2000	Pumper		DIESEL	N/A	N/A	N/A
16										

71 Total Vehicles/Equipment

* All Air Pollution, Greenhous Gas Emissions, and MPG ratings are based on data provided by the US EPA. Available at http://www.fueleconomy.gov/feg/sas.htm

Data was provided by Superintendent of Public Works, Mikael A. Cimolino.

8. Appendix C: Employee Commuter Survey

City of Fort Bragg Employee Commuting Survey

INFORMED CONSENT: The City of Fort Bragg is interested in gathering information about its employees practices of commuting to work. This survey

City of San Diego

Greenhouse Gas Emission Inventory

	City of San Diego Community		City of San Diego Operations	
Year	**1990**	**2004**	**1990**	**2004**
Population	1, 110,600	1,291,700	Employees: 10,200	Employees: 12,200
Avg. weekday VMT	28,200,800	38,362,000		
	GHG tons per year	**GHG tons per year**	**GHG tons per year**	**GHG tons per year**
Waste	742,100	122,100	57,100	26,500
Trans	6,127,300	7,864,800	28,200	7,900
Energy	Res 1,781,200 Com 1,431,100 Ind 1,576,700 TOTAL 4,789,000	Res 2,577,700 Com 2,972,000 Ind 1,610,200 TOTAL 7,159,800	Bldgs 39,500 St. Lights 11,200 Water/sewage 42,000 TOTAL 92,600	Bldgs 95,800 St. Lights 12,000 Water/sewage 18,600 TOTAL 125,300
Total CO2	11,658,400	15,146,700	177,900	159,700
15% reduction goal		9,909,300		151,200
CO2 Reduction for Target		30% INCREASE 5,115,300 Tons remaining		10% REDUCTION 8,500 Tons remaining

Overview

The data for "Community" includes the City's operations, which is also broken out separately. As is commonly the case, the municipal operations accounts for less than 2% of the community's greenhouse gas emissions (GHG) for 1990.

Analysis of Community Data

Snapshot: Difference between 1990 and 2004

Population -	16% increase
Overall GHG emissions-	30% increase
Vehicle Miles Traveled-	36% increase
Transportation-	28% increase
Residential Energy-	45% increase

Percentage from each sector:	1990	2004
Waste-	6%	1%
Transportation-	53%	52%
Energy-	41%	47%

The 30% increase in GHG emissions in the community is not surprising based on the 16% population growth and the daily vehicle miles traveled (VMT) increase of 36%. The transportation sector contributes approximately 52% of the community's total GHG. Per capita fuel use increased about 10%.

The GHG from energy use has increased in all three sectors: residential, commercial and industrial. The residential sector has increased nearly 45%, the commercial sector increased by nearly 108%, and the industrial sector has had the lowest increase with only 2%. Per capita energy use increased about 25%.

The reduction in GHG emissions generated from solid waste is due to the methane recovery programs that the City began in the mid-1990. Through a public-private partnership adopted in 1997 by City ordinance, Minnesota Methane, LLC and NEO Corporation have a collaborative responsibility to extract methane from the landfill and convert it to energy. The methane recovery is approximately 80% of the total methane available in the landfill.

Analysis of City Operations Data

Snapshot: Difference between 1990 and 2004

Employees-	20% increase
Overall GHG emissions-	10% DECREASE
Transportation-	72% DECREASE
Energy (buildings)-	142% increase

Percentage from each sector:	1990	2004
Waste-	32%	17%
Transportation-	16%	5%
Energy-	52%	78%

City operations have reduced GHG emissions by 10% below 1990 levels. This decrease has occurred even in light of a 20% increase in the number of City employees between 1990 and 2004. As the data illustrates, the most significant GHG decrease is due to methane recovery at the landfills and the sewage treatment plant. It is important to note that methane has more than 23X the GHG potential as Carbon.

Even though the energy used per square foot for lightening and HVAC-systems has significantly decreased, the number of buildings in use for City administration and operations has increased. Additionally, the energy-intensity of each office due to computers, printers, and other technical equipment requiring electricity was greater in 2004 than it was in 1990. The consequence is that GHG associated with energy in buildings is 142% more. Not reflected in those numbers are improvements that came online after 2004, such as solar installations at City sites and other technologies that successfully reduce the amount of energy taken from the grid.

GHG associated with the City's fleet has decreased 72% between 1990 and 2004. In the early 1990, all of the City's medium duty vehicles were gasoline powered, including vehicles between 14,000 gross vehicle weight (GVW) and 33,000 GVW. Additionally, chassis selection in the medium duty range was limited. For this reason, larger trucks than necessary were frequently purchased because there were no alternatives. This resulted in lower fuel economy and greater fuel emissions. Beginning in mid-1990, truck manufacturers introduced several new

chassis selections that made it easier to match the correct size truck to the minimum payload requirement, and the City's Vehicle Fleet Operations made a concerted effort to purchase "right-sized" trucks. The second contributing factor for GHG reductions was Fleet Operations' requirement that all medium duty truck replacements be powered by more fuel-efficient diesel engines instead of gasoline. The City continues to research and use cleaner technologies. An example is the conversion of refuse collection packers from diesel to a duel-fuel system using liquefied natural gas and diesel. The air pollution reduction from each converted refuse collection packer was equivalent to taking 100 cars off the road. Even with these reductions, more can be done to reduce our reliance on petroleum products to meet environmental, financial and national security objectives.

For further questions, you may contact Linda Giannelli Pratt at LPratt@sandiego.gov or call 858-492-5088.

# # # # # #

THE CITY OF SAN DIEGO

Mayor
Jerry Sanders

Council
District 1: *Council President* Scott Peters
District 2: *Councilmember* Kevin Faulconer
District 3: *Councilmember* Toni Atkins
District 4: *Council President Pro Tem* Tony Young
District 5: *Councilmember* Brian Maienschein
District 6: *Councilmember* Donna Frye
District 7: *Councilmember* Jim Madaffer
District 8: *Councilmember* Ben Hueso

City Attorney
Michael Aguirre

Environmental Services Department
Elmer L. Heap, Jr. *Director*
Chris Gonaver, *Assistant Director*

City of San Diego Environmental Services Department staff:
Linda Giannelli Pratt, *Chief, Office of Environmental Protection and Sustainability (OEPS)*
Thomas Arnold, *Associate Analyst, OEPS*
Juan Magdaraog, *Technical Assistant, OEPS*
L.M. Brown, *Technical Assistant, OEPS*

ENVIRONMENTAL SERVICES DEPARTMENT

This program is funded by the California utility ratepayers under the auspices of the California Public Utilities Commission.

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Sincere appreciation is extended to the members of the Climate Protection Action Plan Ad Hoc Advisory Committee, who volunteered their time and energy to advance recommendations for reducing greenhouse gas emissions.

Scott Anders, *San Diego Regional Energy Office*
Ryan Bell, *ICLEI*
Dr. Dan Cayan, *Scripps Institute of Oceanography*
Nancy Hughes, *Community Forest Initiative*
Alan Hurt, *United States Navy*
Mike Lewis, *Regional Transportation Center*
Greg Newhouse, *Miramar Community College*
Dr. Walter Oechel, *San Diego State University*
John Ruggieri, *Project Design Consultants*
Fred Speece, *Tetra Tech EM, Inc.*
Irene Stillings, *San Diego Regional Energy Office*
Dr. Mark Thiemens, *University of California at San Diego*

Executive Summary for the Climate Protection Action Plan

Global Warming is real. As Kurt M. Cuffey, a professor of geography at UC Berkeley, wrote in the *San Francisco Chronicle:* "Mounting evidence has forced an end to any serious scientific debate on whether humans are causing global warming... There is now no reasonable doubt that atmospheric pollution is causing global warming, and this warming is strong enough to have serious consequences in the next century."

The City of San Diego is taking a leadership position in the pursuit against climate change. In 2002, the San Diego City Council unanimously approved the San Diego Sustainable Community Program. Actions of the Program include:

- Participation in the Cities for Climate Protection (CCP) program coordinated through the International Council of Local Environmental Initiatives (ICLEI);
- Establishment of a 15% GHG reduction goal set for 2010; and
- Direction to use the recommendations of a scientific *Ad Hoc* Advisory Committee as a means to improve the GHG Emission Reduction Action Plan within the City organization and to identify additional community actions.

Investing in actions and institutionalizing policies to battle global warming by reducing greenhouse gas (GHG) emissions have collateral benefits for San Diego: economic vitality; public health and safety; natural resource protection; and infrastructure stability. Just as importantly, the City of San Diego's leadership may catalyze significant reductions of GHG emissions by others in the region. Regardless of national policies on global climate change, each town, city, and region can choose to do what is feasible. The collective impact of these actions can make a substantial difference.

Consequences of Climate Change

The impacts of climate change and global warming are felt worldwide. Policy development for the City of San Diego must take into account international, national, and state impacts and concerns while considering how to proceed on a local level. The

following characteristics of the San Diego region affect its vulnerability to climate change:

- increasing population
- urban sprawl
- 52 miles of shoreline
- reliance on imported energy and water
- vulnerable economic sectors—agriculture and tourism

The relationship of these factors to increasing GHG emissions is the ever-growing imbalance of "sinks" and "sources" of CO_2 emissions. By 2030, the San Diego-Tijuana region's population is expected to soar to 8 million, which is almost double the 2003 population. San Diego's growth may outstrip current infrastructure planning, financing capabilities, and available land, especially if the pattern of sprawl continues. Sprawling development consumes otherwise natural land, is less energy-efficient, and contributes to the "urban heat island effect." Urban heat island is caused by the removal of vegetation and an increase in urbanization, and can lead to increased temperatures, changes in weather patterns, and air-quality problems, especially with ground-level ozone.

Along much of California's coast, sea level already is rising by 3–8 inches per century. Sea level is likely to rise by another 13–19 inches by 2100. Sea level rise could lead to flooding of low-lying property, loss of coastal wetlands, erosion of beaches, and decreased longevity of low-lying roads, causeways, and bridges. In addition, sea level rise could increase the vulnerability of coastal areas to storms and associated flooding.

Currently the San Diego Region meets its regional water demands through costly and distant imported sources, which account for more than 95% of the regional water supply. Approximately 50% of San Diego's fresh water is used for non-drinking purposes such as landscape irrigation, commercial enterprise, and industrial processing. Given this heavy dependence on imported water, it is not surprising that almost 60% of the energy used by the City of San Diego goes for pumping water and sewage. As San Diego's population continues to grow, its energy needs will increase accordingly. As with water, San Diego depends on imported power, which is generated primarily from out of state, including hydroelectric plants in Northern California and the Pacific Northwest. Disruptions in

water supplies and changes in the snow pack due to global warming could affect the availability of hydroelectric power, forcing San Diego to look to other sources.

The economic effects of global warming in San Diego could threaten some of our most important industries, in particular tourism and agriculture. Dramatic sea-level rises may threaten the San Diego coastline, a major tourist draw. Weather disturbances or water shortages caused by global warming could disrupt water supplies, cause variations in crop quality and yield, or destroy crops. Climate change can also alter the abundance and distribution of pests and pathogens, as well as affect the opportunities for sequestration. Higher temperatures could result in increased electricity demand for cooling, adding to troposphere ozone and pollution. Global warming also has public health effects that are associated most closely with ground-level ozone pollution. The level of ozone pollution found in the San Diego region exceeds the State air pollution requirements. Ozone is formed when emissions such as car exhaust reacts with heat. More specifically, it is the volatile organic compounds (VOC) and nitrogen oxides (NOX) in the emissions that are converted into ozone in the presence of sunlight. Increases in overall temperatures and number of hot days in the region, due to global warming, and increases in car exhaust will result in even higher levels of ozone production. Children and those who are employed in outdoor occupations or who exercise heavily outdoors, experience substantially greater exposures to ozone than the rest of the population, because they are exposed during peak ozone periods. Research indicated that the previous air pollution standard was not sufficiently protective of human health. Therefore, at its April 28, 2005, public hearing, the California Air Resources Board approved amendments to sections 70100, 70100.1, and 70200, title 17, California Code of Regulations (CCR), which established a new 8-hour-average standard for ozone at 0.070 parts per million (ppm) and retained the existing 1-hour-average standard for ozone of 0.09 ppm.

Action Plan Development

The development of the *Climate Protection Action Plan* describes what San Diego can do to achieve target greenhouse gas reduction. As part of the CCP campaign, member cities have committed to:

- inventory their emissions of greenhouse gases;
- set reduction targets;
- develop comprehensive strategies to meet these targets;
- implement these emissions reduction actions; and
- measure the results.

The criteria set by the CCP campaign have been used to define the scope and presentation of the Climate Protection Action Plan. The Plan also includes recommendations provided by the *Ad Hoc* Advisory Committee and City staff. By implementing these recommendations the City could directly address the following challenges:

- Mitigation for State and Federal Ozone Standards non-attainment, with associated health benefits ; and
- Enhanced economic prosperity, specifically related to the tourism and agricultural sectors.

Creating an action plan for combating climate change requires four basic steps:

1) Understand the current situation
2) Establish a future goal
3) Develop actions to achieve that goal
4) Devise indicators to measure progress towards the goal

The first step in developing the Climate Protection Action Plan was to conduct a baseline inventory of greenhouse gas emissions to understand the current situation. A 15% reduction target, relative to 1990, was then set as a future goal. Driven by the

recommendations provided by the *Ad Hoc* Advisory Committee, a specific set of actions to reduce GHG emissions in San Diego has been developed and is the basis of the Climate Protection Action Plan. The indicators included in the San Diego Sustainable Community Program measure progress of emissions reduction. Additional indicators may be necessary to fully measure GHG emission trends.

On January 29, 2002, the San Diego City Council unanimously approved the San Diego Sustainable Community Program. Actions identified include:

1. Participation in the Cities for Climate Protection (CCP) program coordinated through the International Council of Local Environmental Initiatives (ICLEI);
2. Establishment of a 15% GHG reduction goal set for 2010, using 1990 as a baseline; and
3. Direction to use the recommendations of a scientific Ad Hoc Advisory Committee as a means to improve the GHG Emission Reduction Action Plan within the City organization and to identify additional community actions.

This report includes many of the recommendations provided by the Ad Hoc Advisory Committee and City staff. By implementing these recommendations the City could directly address the following challenges:

- Mitigation for State and Federal Ozone Standards non-attainment, with associated health benefits ; and
- Enhanced economic prosperity, specifically related to the tourism and agricultural sectors.

San Diego Communitywide Greenhouse Gas Emissions Inventory

The emissions inventory identifies and classifies major sources and quantities of GHG emissions being produced by City residents, businesses, and municipal operations. The City of San Diego is responsible for about 15.5 million tons of greenhouse gas emissions per year, based on 1990 emissions levels. Of this, only 0.2 million tons is the result of the City government's operations. The majority is generated from the community as a whole. As shown in Table 1, by taking no action to curb these current emissions levels, these this would increase to 22.5 million tons per year by 2010. By adopting a goal of 15% reduction of baseline levels, the City hopes to reduce emissions to 13.2 million tons per year by 2010.

Table 1. San Diego Communitywide Greenhouse Gas Emissions Overview

Milestone	Total Tons of GHG per year
1990 Baseline	15,547,000
2010 "No Action" Projection (Status Quo)	22,517,000
2010 CCP Projection (Goal)	13,215,000
Difference Between Status Quo and Goal	9,302,000
Reduction Achieved from 1990-2003	3,814,000*
Remaining Reduction Needed by 2010	5,488,000

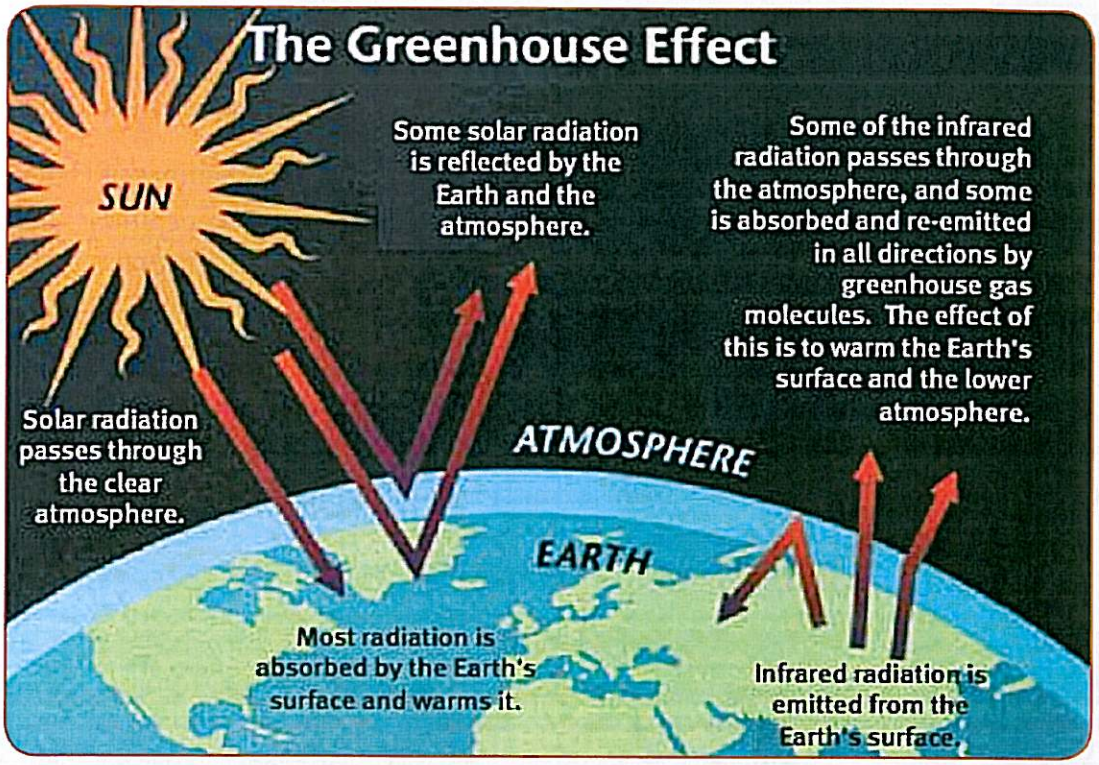
*The cumulative reductions from 1990-2003 have eliminated the listed tonnage of GHG and thus can be assumed to prevent this same amount from accumulating on a per year basis going forward.

The following series lay out three important contentions:

1. Table 2 - The GHG projection in 2010 resulting from no action taken to curb emissions;

2. Table 3 - The GHG emission reductions due to City of San Diego actions implemented between 1990 and 2003; and

3. Figure 1 - 2010 City of San Diego Community Forecast GHG Emissions by Sector



- The greenhouse effect makes the earth warmer by trapping heat in the atmosphere.
- It is called the greenhouse effect because like the glass roof of a greenhouse, the atmosphere keeps most of the heat from the sun from going back into space. This is similar to what happens in a greenhouse.
- This is a good thing because without the greenhouse effect, the earth would not be warm enough for humans to live.
- But, if the greenhouse effect becomes stronger, it could make the earth warmer than usual. Even a little extra warming may cause problems for humans, plants, and animals.

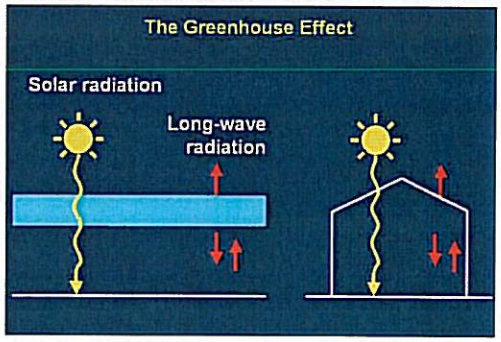


Table 2 shows 1990 baseline and projected 2010 emissions data, as divided into three sectors: Energy, Waste, and Transportation. Table 3 reflects the sector reductions from actions taken by the community from 1990-2003. Actions taken in the waste sector, including the capture of methane gas from solid waste landfills and sewage treatment plants, combined with recycling programs, have resulted in a significant portion of the decrease in overall GHG emissions, as shown in Table 3. Actions taken thus far to incorporate energy efficiency and alternative renewable energy have been impressive, but have contributed much less to the overall reduction goal. The transportation sector remains a significant source of GHG emissions and has had the lowest GHG reductions to date. Thus, the community could stand to benefit greatly from any major reductions in this sector.

Table 2. Community Greenhouse GasGHG Emissions 1990 Baseline and 2010 "No Action" Projection

Source	1990 Baseline % of Total	1990 Baseline Tons/Yr GHG	2010 "No Action" Projection % of Total	2010 "No Action" Projection Tons/Yr GHG
Energy	29%	4,507,000*	43%	9,749,000
Transportation	51%	7,892,000**	40%	8,951,000
Waste	20%	3,148,000***	17%	3,817,000
Totals		**15,547,000**		**22,517,000**

*based on SDG&E data for total consumption of electricity and natural gas within the City limits

**based on SANDAG historical data, with the City having 49% of VMT in the San Diego region

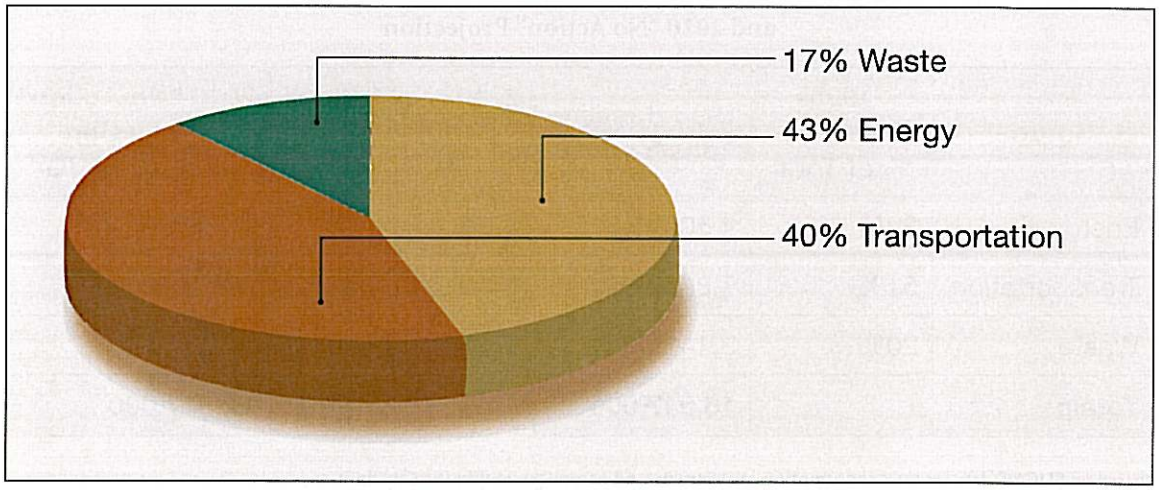
***includes emissions from waste already in landfills some closed, which will diminish over time

The City of San Diego can do more as an organization through policies and practices to reduce the volume of GHG emissions. However, if the largest one-hundred companies in San Diego put forward the same level of commitment, actively working to reduce the GHG emissions associated with their energy, water, and transportation operations, we would be much closer to reaching the 2010 target for the community. With that in mind, the contribution of every individual in the community to reduce energy use and fuel consumption is the final factor that translates the 15% goal into a reality.

Table 3. Community Greenhouse GasGHG Reductions Resulting from 1990-2003 Actions

Source	13-year Cumulative Tons Reduced
Energy	127,000
Transportation	56,000
Waste	3,631,000
Total	**3,814,000**

Figure 1. 2010 City of San Diego Community Forecast GHG Emissions by Sector



Summary of Recommendations Emissions Reduction Actions

The following is a summary of actions needed to achieve the 15% reduction goal, incorporating the recommendations put forth by the City Manager's Climate Protection Ad Hoc Advisory Committee.

Transportation

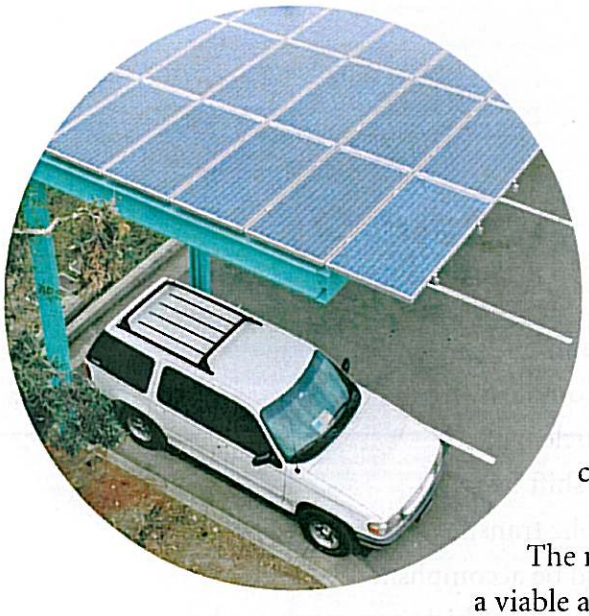
The major ways to reduce transportation sector GHG emissions are by reducing fuel consumption and by traveling in vehicles with lower emissions. A common solution for reducing fuel use is to reduce vehicle trips. Reducing trips can be done by encouraging a shift from daily driving to alternative modes such as public transit, ridesharing, bicycling and walking. This would be accomplished through improved services and financial incentives. Vehicle emissions can be reduced by switching to more fuel-efficient or cleaner-fueled vehicles, and by downsizing fleets. The City shall consider the following:

Develop and adopt the *Community Fuel Reduction and Transportation Efficiency Policy* so that:

- City Departments will develop and implement a plan to reduce gasoline fuel consumption in each of 4 light duty vehicle categories by no less than 5%, relative to fleet size, by 2008 (using 2005 as a baseline); and
- The City will provide an information campaign and incentives to encourage the use of vehicles that meet or exceed the Super Ultra Low Emission Vehicle (SULEV) rating.

Energy Efficiency and Renewable Energy

Reducing energy consumption decreases the greenhouse gas emissions associated with the burning of fossil fuels required for energy production. Rebate incentives on certain products can encourage consumers to purchase more energy efficient products that lower energy use and provide long-term cost benefits. Education and outreach programs need to broaden general public and business awareness on energy efficiency practices. Other methods to increase energy efficiency include providing technical assistance and energy management services such as



energy audits and design assistance for residential, commercial and municipal buildings. Resolution R-298412 (R-2004-227), 50-Megawatt Renewable Energy Goal, establishes the goal for adding 50-Megawatts of renewable energy for City operations by 2013. Track and report compliance with Resolution on a quarterly basis.

The market for renewable energy products is increasingly a viable alternative to fossil-fuel derived energy. Initially higher capital costs should be balanced against long term greenhouse gas reduction and lifetime cost savings. Increasing the amount of renewable energy helps to stabilize energy availability, reduce environmental and fiscal costs associated with importing electricity from outside the region, and reduce dependence on foreign oil. The City shall consider the following:

- Implement the 50-Megawatt Renewable Energy Goal, which establishes the goal for adding 50-Megawatts of renewable energy for City operations by 2013.
- Continue to use methane as an energy source from inactive and closed landfills.
- Annually Review and Revise Existing Policies

400-02	Biosolids Beneficial Use
400-11	Action Plan for Implementation of Water Conservation Techniques
900-02	Energy Conservation and Management
900-14	Sustainable Building
900-18	Purchase of Energy Efficient Products

Waste

The City's solid waste disposal efforts revolve around waste diversion from the Miramar Landfill. This includes a variety of programs that include recycling, household hazardous waste collection, and composting. It is preferable to choose products that have minimal packaging to reduce input into the waste stream ("source reduction") or products and packaging that are recyclable or are produced from a significant percentage of post-consumer recycled materials. Expand household recycling and green waste collection, as well as identify new opportunities with local businesses and institutions for recycling and composting. Continue associated outreach and education to encourage full utilization of these services. The City shall consider the following:

- Implement the ***Construction and Demolition Debris (C&D) Diversion Deposit Ordinance***;
- Continue to use methane as an energy source from inactive and closed landfills
- Consider bolder incentives to expand waste minimization efforts:
    - Develop and adopt a construction and demolition recycling ordinance;
    - Develop and adopt a commercial paper recycling ordinance;
    - Develop and adopt a multiple family recycling ordinance.
- Environmentally Preferably Purchasing Policy being implemented on a pilot basis, effective July 1, 2005.

Urban Heat Island

An urban heat island (UHI) is a metropolitan area which is significantly warmer than its surroundings. It is the result of an abundance of dark, hard surfaces in urban areas, which may include roads, sidewalks, parking lots, and roofs. These large collections of dark materials absorb heat from the sun, creating warmer areas. A decrease in vegetation to provide shade and cool the air compounds the heating effect. As a result, ground-level ozone concentrations increase because of the chemical reaction between car exhaust and heat—the more heat, the more ozone is produced. This problem is linked with health risks, and is the reason San Diego is not in compliance with State air pollution requirements. Planting shade trees, use of alternative materials for roads and roofing, and general land use design can help to combat urban heat island effect. The City shall consider the following:

- Develop and Adopt Urban Heat Island Mitigation Policy
- Continue to support the Community Forest Advisory Board and Community Forest Initiative

  Adopting the Mayor's goal of planting 5,000 shade trees per year on public property for twenty years would contribute to the mitigation of urban heating, however, more studies are needed to access the specific reductions needed.

- Public Tree Protection Policy
- Annually Review and Revise Existing Policies

200-05	Planting of Trees on City Streets
200-09	Street Tree Plan-Central Business District
400-12	Implementation of Water Reclamation/Reuse
600-23	Open Space Preservation and Maintenance
600-39	Land Guidance

Environmentally Preferable Purchasing

- Develop and Adopt Environmentally Preferably Purchasing Policy

In an effort to address the social, environmental, and economic aspects of sustainability, this policy supports a "triple bottom line" approach. Just as financial accounting is an indicator of an organization's economic performance (i.e., the bottom line), the triple bottom line approach accounts for social and environmental performance, in addition to the economic. The broad goals of the triple bottom line include "a clean and productive environment which provides renewable resources and essential life support services; societies which allow everyone access to a good quality of life; and a vibrant economy which works with nature and society" (Centre for Human Ecology 1998).

- Annually Review and Revise Existing Policies

100-13	Procurement Limitations Adjustments Based on the Consumer Price Index
100-14	Procurement Policy: Recycled Products
900-14	Sustainable Building
900-18	Purchase of Energy Efficient Products

Implementing the Plan

Actions taken thus far will find us 5.5 million tons short of our stated GHG emissions goal for 2010. If we are to reach our reduction target it is imperative that over the next 1-3 years we act to:

- Accelerate and expand existing programs in all areas—transportation, energy efficiency, renewable energy, solid waste, and urban heat island.
- Develop the infrastructure to support new programs.
- Secure resources to implement actions.

- Set up tracking mechanisms and indicators to measure progress.
- Collaborate with other cities through ICLEI's Cities for Climate Protection program.
- Increase outreach and education activities (such as publishing brochures on "simple things you can do" for climate protection).
- Investigate emissions credit trading systems.
- Seek grant funding from sources such as the US Department of Energy, US Environmental Protection Agency (EPA), and California Energy Commission (CEC).
- Document and report progress to decision makers and to the public.

While confronting global warming may seem insurmountable, local and individual action can make a difference. It is imperative that San Diego, a city sensitive to climate change impacts, takes action now to slow its effects. This can only be accomplished by a clear understanding of why climate change is occurring; conscious actions by City leaders and citizens to reduce local sources that are contributing factors; and concerted efforts to increase awareness and encourage action locally and at the state, national, and international levels. Cost-effective solutions to reduce greenhouse gas emissions are available today. However, in order for these solutions to realize their potential, we must make climate protection a priority in our policies, budgets and investments, and personal and organizational actions.

For more information, contact Sustainability@sandiego.gov or visit our website at http://www.sandiego.gov/environmental-services/sustainable/respect.shtml

CITY OF
CHULA VISTA

2005 GREENHOUSE GAS EMISSIONS INVENTORY

Brendan Reed
Michael Meacham
Roman Partida-Lopez

SUMMARY

Since the early 1990s, Chula Vista has been engaged in multiple climate change forums including the United Nations Framework Convention on Climate Change and the Kyoto Protocol Conference. As a result of this initial involvement, the City was the first local government with fewer than 1 million residents to become a founding member of ICLEI – the International Council for Local Environmental Initiatives – and its Cities for Climate Protection campaign. Through the campaign, Chula Vista adopted and implemented a Carbon Dioxide (CO_2) Reduction Plan which assessed its 1990 greenhouse gas (GHG) emissions and outlined actions to decrease emissions by 20% by 2010.

The 2005 GHG Emissions Inventory is the first formal evaluation of the City's progress in reaching its emissions goals. The 2005 inventory indicates that Chula Vista's annual citywide GHG levels have increased by 35% since 1990 due primarily to residential growth. While this represents a significant challenge in reaching the City's 2010 community emissions goal, the City did make significant progress in reducing annual per capita emissions by 17% between the two inventory years and avoiding nearly 200,000 tons of GHG emissions annually. In addition, GHG emissions from municipal sources decreased by 18% mainly due to energy-efficient traffic signal retrofits.

To reach the community and municipal emission reduction targets outlined in the CO_2 Reduction Plan, the City must decrease annual emissions by at least 389,963 and 377 tons, respectively.

INTRODUCTION

The City of Chula Vista's Greenhouse Gas (GHG) Emissions Inventory for calendar year 2005 was compiled and calculated using the ICLEI Cities for Climate Protection protocol and its supporting software (Version 1.1). The protocol provides local governments with an opportunity to collect and analyze their community's GHG emissions in a cost-effective manner without third-party consultants to verify the data. The inventory provides the supporting data and tools for shaping policy and regulations that address the City's climate change goals. However, it should be noted that without the third party verification, required by the California Climate Action Registry, the protocol cannot be used to satisfy state-mandated emission caps or for carbon trading. The State is promoting carbon trading as a financial incentive to encourage entities to reduce emissions and to help California meet new GHG emission targets being established by the California Air Resources Board. Carbon reductions on the Chicago Climate Exchange (CCX) are currently trading at approximately $3.50 per metric ton.

The ICLEI Protocol separates emissions into two major analyses, community and municipal. The community analysis represents the quantity of GHG emissions produced throughout the entire City from both public and private sectors. The municipal analysis only represents

SANDAG, San Diego Gas & Electric and the Public Works Department (Table 1). In most cases, 2005 data was directly available from these sources. However, it was necessary to extrapolate 2005 data from 2004 values in some limited cases. Standard ICLEI software defaults were utilized for emission co-efficients, electricity resource mix, and waste type percentages.

Community Inventory

In 2005, community GHG emissions from Chula Vista totaled 960,639 tons eCO_2 (Table 2, Figure 1). The sector with the greatest amount of emissions (approximately 48%) was transportation or mobile sources (Figure 2). The residential sector was the second highest source producing about 28% of total community emissions from energy use, followed by the commercial (20%) and industrial (4%) sectors. Because of the high methane recovery rates at County landfills, the community did not have significant emissions from solid waste disposal.

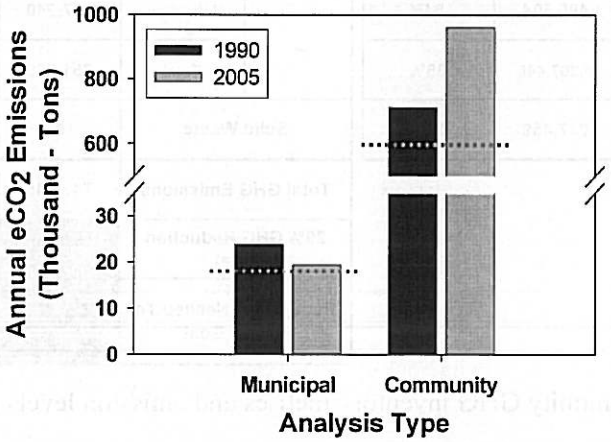


Figure 1: Total GHG emissions for 1990 and 2005 in community and municipal analyses. Dashed line represents 2010 reduction target.

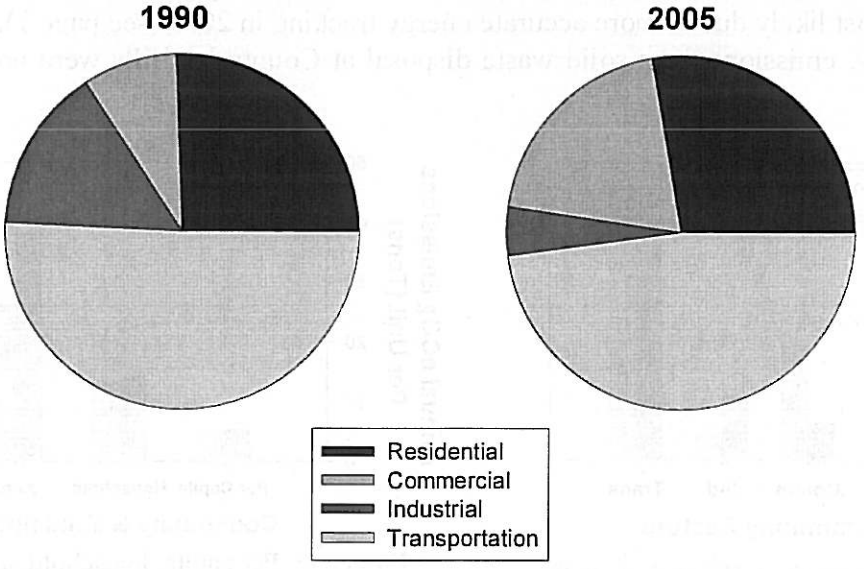


Figure 2: Sector contributions to community GHG emissions in 1990 and 2005.

Although there was an increase in total community emissions, the rate of GHG emissions per person, per household and per acre decreased (Figure 4). The per capita emissions rate was lowered 17% from 5.3 to 4.4 tons annually. Per household emissions were reduced 8% from 14.3 to 13.1 tons, while emissions per acre decreased 24% from 38.4 to 29.1 tons. Nonetheless, in order to achieve the City's 2010 GHG reduction target, annual community emissions would be required to be reduced by at least an additional 389,963 tons eCO_2.

Municipal Inventory

Chula Vista's 2005 municipal GHG emissions were 19,432 tons eCO_2 (Table 3, Figure 1). Similar to the community analysis, the majority of municipal emissions were from transportation sources representing 54% of total emissions (Figure 5). Energy use for building and outdoor lighting created 31% and 15% of total emissions, respectively. Emissions from sewage and solid waste operations were not significant in the 2005 municipal analysis.

CITY OF CHULA VISTA - MUNICIPAL ANALYSIS

Metrics				
		1990	2005	% Change
Employees		866	1,198	38%
Vehicle Fleet Fuel Use (Gallons or Equivalent)		478,344	1,102,819	131%
Energy Use (MMBtu)	Buildings	35,527	70,790	99%
	External Lights	147,100	27,780	-81%
	Sewage	7,122	257	-96%
	Total	189,749	98,827	-48%
Solid Waste (Tons)		5,400	6,603	22%

Annual Greenhouse Gas (GHG) Emissions (eCO_2 - Tons)				
		1990	2005	% Change
Per Employee		27.5	16.2	-41%
Vehicle Fleet		5,115	10,432	104%
Energy Use	Buildings	3,057	6,085	99%
	External Lights	14,923	2,888	-81%
	Sewage	723	27	-96%
	Total	18,703	9,000	-52%
Solid Waste		0	0	0%
Total GHG Emissions		23,818	19,432	-18%
20% GHG Reduction Goal			19,055	
Reductions Needed To Reach Goal			377	

Table 3: Summary of municipal GHG inventory metrics and emission levels for 1990 and 2005.

demand in new construction through "Smart Growth" land use and planning and voluntary energy efficiency programs. Despite successfully incorporating these "Smart Growth" measures into many new neighborhoods' design and construction, overall GHG emissions from the Chula Vista community increased from 1990 to 2005 in most sectors. Only industrial sector emissions were reduced during this time period. However, because commercial and industrial energy use could not be segregated in the 1990 inventory, their individual emission contributions had to be estimated. Therefore, reductions in industrial sector emissions are most likely due to more accurate energy consumption tracking in 2005. If commercial and industrial emission levels are combined in each inventory year, there was an overall 39% increase in emissions from the combined sectors between 1990 and 2005.

Emissions Reduction Focus	Measure #	Description	Status
Municipal	1	Purchase of Alternative Fuel Vehicles	Ongoing
	2	Green Power Purchases	Suspended/Ongoing
	3	Municipal Clean Fuel Demonstration Project	Ongoing
	5	Municipal Building Upgrades & Trip Reduction	Ongoing
	16	Traffic Signal & System Upgrades	Ongoing
	19	Municipal Life-Cycle Purchasing Standards	Ongoing
Community	4	Telecommuting & Telecenters	Closed
	6	Enhanced Pedestrian Connections to Transit	Ongoing
	7	Increased Housing Density Near Transit	Ongoing
	8	Site Design w/ Transit Orientation	Ongoing
	9	Increased Land Use Mix	Ongoing
	10	Green Power Public Education Program	Ongoing
	11	Site Design w/ Pedestrian/Bicycle Orientation	Ongoing
	12	Bicycle Integration w/ Transit & Employment	Ongoing
	13	Bicycle Lanes, Paths, & Routes	Ongoing
	14	Energy Efficient Landscaping	Ongoing
	15	Solar Pool Heating	Not Implemented
	17	Student Transit Subsidy	Not Implemented
	18	GreenStar - Energy Efficient Building Program	Ongoing
	20	Increased Employment Density Near Transit	Ongoing

Table 4: Current implementation status of the Chula Vista CO_2 Reduction Plan's 20 Actions.

From 1990 to 2005, the City experienced tremendous growth both in population and geography. Population increased by 80,000 new residents or 61%, and the number of households increased to 73,115 units. The City's land area also expanded by 78% with the incorporation of 13,037 additional acres. Despite this growth, there was significant progress at the community-level in reducing GHG emissions on a per capita, per household and per acre basis. It is estimated that if the City had not implemented the CO_2 Reduction Plan, 2005 emissions could have totaled over 1.1 million tons eCO_2 (192,000 tons or 20% above actual 2005 emissions).

Six measures under the CO_2 Reduction Plan were adopted to target emissions from municipal operations and facilities. Again, the measures were primarily focused on lowering fossil fuel use and improving energy-efficiency. The City also had the most direct control over implementing these measures through its policy requirements, program budget appropriations and capital

- Install energy-efficient streetlights (e.g., high pressure sodium, LED)
- Decrease daily operation time of streetlights

Renewable Energy

- Install solar panels on municipal facilities
- Promote or require community clean energy use through on-site renewable technologies
- Offer incentives to foster solar PV installations in the community
- Use Community Choice Aggregation to fund and promote the transition to renewable energy

TRANSPORTATION

Vehicle Fuel Efficiency

- Retire older, inefficient fuel vehicles
- Purchase fuel efficient (e.g., hybrid) and/or smaller fleet vehicles
- Utilize fuel-efficient vehicles (e.g., scooters) for parking enforcement
- Promote community purchases of compact and hybrid vehicles

Alternative Fuels

- Utilize biodiesel in municipal fleet and City contractor vehicles
- Utilize ethanol in municipal fleet and City contractor vehicles
- Utilize electric vehicles in municipal and City contractor fleets
- Utilize compressed natural gas in municipal and City contractor fleets
- Utilize hydrogen or fuel cell vehicles in municipal fleet
- Initiate a community biodiesel purchasing co-op or fueling station

Trip Reduction / Transportation Demand Management

- Encourage car-pooling or van-pooling by municipal employees and City contractors
- Encourage telecommuting by municipal employees and City contractors
- Encourage use of mass-transit by municipal employees and City contractors
- Promote car-pooling, telecommuting and the use of mass-transit by community members
- Provide high school students with complementary bus tickets
- Expand local or regional bus service in range and/or frequency
- Install new light rail systems
- Implement bus rapid transit programs
- Expand community bicycle infrastructure (e.g., dedicated bicycle lanes, additional bicycle parking spaces)
- Provide free bicycles for public use
- Institute a "safe routes to school" program

LAND USE

- Institute growth boundaries, ordinances or programs to limit suburban sprawl
- Target new development to brownfield sites
- Foster downtown neighborhood development
- Plant shade trees

August 13, 2007

Chico Sustainability Task Force
Ann Schwab, Chair
P.O. Box 3420
Chico, CA 95927

Dear Ms. Schwab,

On January 31, 2008 communities throughout the country will participate in Focus the Nation, by holding discussions centered on global warming solutions for America on campuses, places of worship, businesses and other venues.

Locally, California State University, Chico and Butte Community College will be working collaboratively to host several activities on the day of the Focus the Nation. They will be coordinating teams of faculty, college students and students in K-12 schools through the University to collaboratively engage in a nationwide, interdisciplinary discussion about clean energy solutions, linking students and citizens directly with our political leaders.

Each Focus the Nation team will invite local, state and federal political leaders and candidates for office to participate in a non-partisan, round-table discussion of global warming solutions. US Senators and members of congress, state representatives, mayors and city councilors, all will be receiving dozens of invitations to speak about global warming, from over a thousand institutions nation-wide.

We are seeking support from our local legislative bodies by way of endorsement of this non-partisan day of educational dialogue on solutions to global warming. In endorsing Focus the Nation, your organization commits to take reasonable steps to encourage your membership and the general public to support the Focus the Nation efforts. These efforts include, at a minimum, listing and linking to the Focus the nation site on your organization's web site and agree to be listed and linked on the endorsers page of the Focus the Nation web site: www.focusthenation.org/endorers.php.

I am enclosing a FAQ sheet on Focus the Nation and a copy of the Letter of Endorsement for your review. While there is no deadline for endorsement, we hope you will be able to make a commitment by mid-September. I am available to answer any questions you may have. Thank you for your consideration.

Sincerely,

Jillian Buckholz
Chair
Focus the Nation Steering Committee

8/21/07
DATE 8/21/07 AGENDA ____ COUNCIL ___
ADD. INFO ____ CM ___ ACM ___ CA ___
GSD ___ CSD ___ ISD ___ CLK X PLD ___
ENG ___ HR/RM ___ FIN.D ___ COP ___ FC ___
FILE ____ OTHER ____

FOCUS THE NATION

Global Warming Solutions for America

www.focusthenation.org

What is Focus the Nation?

Started by Eban Goodstein, an economics professor at Lewis & Clark College, Focus the Nation is a national day of action focused on global warming solutions for America through the connection of community and their government. Focus the Nation is coordinating teams of faculty and students at over a thousand colleges, universities and K-12 schools in the United States, to collaboratively engage in a nationwide, interdisciplinary discussion about "Global Warming Solutions for America". The intent is to focus the growing concern in the country about global warming, and to create a serious, sustained and truly national discussion about clean energy solutions, linking students and citizens directly with our political leaders.

Where is Focus the Nation?

California State University, Chico and Butte Community College will be working collaboratively to hosting several activities on the day of the Focus the Nation event. However, Chico State and Butte College are not the only organizations taking action. Several other campuses, K-12 schools, faith based organizations, businesses and civic organizations are participating in Focus the Nation to create national awareness about the issue of global warming and who to begin creating solutions to the current state of the environment.

When is Focus the Nation?

Focus the Nation will culminate January 31, 2008, in the form of national symposia held simultaneously at over a thousand campuses, places of worship, businesses, and other venues across the country. On that day, each Focus the Nation team will invite local, state and federal political leaders and candidates for office to participate in a non-partisan, round-table discussion of global warming solutions. US Senators and members of congress, state representatives, mayors and city councilors, all will be receiving dozens of invitations to speak about global warming, from over a thousand institutions nation-wide.

Why participate in Focus the Nation?

Students today face many important social, economic, and security issues. Global warming however, is unique, in that if we are to reduce the risk of large-scale, irreversible, world-wide damages, then ambitious—and potentially costly—policy solutions must be undertaken within a very compressed time frame. Failure to act soon increases the likelihood of a swing in global temperatures of Ice Age magnitude within our children's lifetimes, only in the opposite direction. We owe our young people a day of national, focused, non-partisan discussion of the decisions to be made in the next ten years, decisions that will profoundly affect their future, and indeed the future of all human generations to follow.

The second motivation for this project is to explore a new model of collaborative, interdisciplinary education, on a national scale. Focus the Nation will require campus-based teams of faculty and students to draw on campus expertise across the broad range of disciplines. Focus the Nation provides an exciting model opportunity to create, for one day, a true national community of scholarship bridging traditional disciplinary boundaries.

How does an organization get involved with Focus the Nation?

To be a part of Focus the Nation, simply follow this link (http://www.focusthenation.org/fullsignup.php) to participate. By signing up, you are committing to help organize an educational event about global warming solutions at your institution on (or around) January 31st, 2008. At this point, you do not need to know exact details for the event— by signing up, you are simply signaling your desire to help build Focus the Nation in your community. As colleges, universities, high schools, middle schools, faith organizations, businesses, and civic groups come together; we can launch a discussion far-reaching enough to change the future.

FOCUS
THE NATION

Letter of Endorsement

Global warming poses a serious threat to people and natural systems across the planet. Public and private policy decisions about global warming this decade will have impacts lasting for generations.

To focus the nation's attention on this crucial issue, [institution], in conjunction with colleges, universities, and high schools across the country, will organize a symposium about "Global Warming Solutions for America" on or around January 31 2008.

On that day, faculty are strongly encouraged to travel with their classes to attend scheduled programs about climate change or to discuss it with their own students. The symposium program committee will work with interested faculty to develop appropriate material for their classes, and to insure that diverse disciplines are represented in symposium panels and workshops.

Organization:

Representative:

Date:

Endorsing organizations will be listed and linked on the "Endorsers" page of the Focus the Nation web site: www.focusthenation.org.