City of Arcata

International Council on Local Environmental Initiatives

Cities for Climate Protection Campaign

Community Greenhouse Gas Reduction Plan

Prepared by:
The City of Arcata
736 F Street
Arcata, Ca. 95521
707.822.8184
www.arcatacityhall.org

Participants:

- The City of Arcata Energy Committee
- City of Arcata Environmental Services Department

August 2006

Table of Contents

EXECUTIVE SUMMARY

A strong majority of the world's scientists have concluded that humans are changing the global climate primarily through the use of fossil fuels. This has serious consequences for all life on earth. In response, the City of Arcata has joined an international effort to reduce greenhouse gas emissions and has committed to decrease locally generated greenhouse gas emissions by 20% below year 2000 levels by the year 2010. To meet this goal, the City has developed a Community Greenhouse Gas Reduction Plan. The plan focuses on six action areas: energy efficiency, renewable energy, sustainable transportation, waste and consumption reduction, carbon sequestration and other methods, and cross-cutting approaches.

In addition to reducing greenhouse gas emissions it is expected that the implementation of this plan will offer many other community benefits. These include: energy cost savings with subsequent benefits to the local economy, cleaner air, less reliance on fossil fuels and imported energy sources, and a move toward a more sustainable energy economy. Implementation of this plan will also serve to fulfill numerous objectives that are stated in the Arcata General Plan: 2020, Policy RC-8, Energy Resources Management.

The Community Greenhouse Gas Reduction Plan was developed by the City of Arcata Energy Committee with support from the City of Arcata Environmental Services Department. A public forum was held to present the plan to the community and to gather public input. Public comment on the plan has also been received at the regular monthly meetings of the Energy Committee and via written submissions. The public comment has been reviewed and incorporated into the plan as appropriate.

Successful implementation of the plan will require strong community-wide participation. We hope that the community response is enthusiastic. By doing our part here in our small rural community we can help bring about the global change that will be necessary to avert the serious anticipated impacts of global climate change.

In 2008, the Plan will be amended to project out to the year 2020. Additional implementation measures will be listed to achieve further Greenhouse Gas reductions

I. SUMMARY OF RECOMMENDATIONS

As part of the City of Arcata Community Greenhouse Gas Reduction Plan, we recommend the following greenhouse gas reduction measures in each of six program areas. The details and further recommendations can be found in Section V of this document.

A. Energy Efficiency

- Encourage Energy Efficient Buildings and Retrofit of Older Houses.
- Decrease Community Water Usage.
- Improve Energy Efficiency in City Operations.
- Encourage Energy Efficiency Policies at All Levels.
- Encourage Personal Energy Conservation in Residences, Businesses and City Operations.

B. Renewable Energy

- Encourage utility scale transitions to renewable energy.
- Conduct education and outreach.
- Adopt policies to encourage renewable energy.
- Install renewable energy systems on city facilities.
- Consider a locally-or regionally-owned green utility.
- Require “solar ready” buildings.
- Offer low interest loans for solar energy systems to participants in the First Time Home Buyers program.
- Examine the potential for wind energy and promote where feasible and compatible.

C. Sustainable Transportation

- Incorporate Energy and Climate Policy into the City’s Transportation Plan and encourage policies at all levels for efficient and non-polluting transportation.
- Improve Bicycle infrastructure.
- Improve Pedestrian infrastructure (sidewalks, paths, and walkways).
- Improve Mass Transit Infrastructure.
- Educate to discourage driving and create incentives to lessen driving.
- Support local sustainable transportation efforts.
- Green the City Fleet.
- Promote “smart growth” policies and preserve rail rights-of-way where appropriate.

D. Waste and Consumption Reduction

- Confirm an overall Waste/ Consumption Reduction Strategy, including the 3R’s – Reduce, Reuse, Recycle, with the goal of achieving zero waste.
- Continue to educate the public about the benefits of waste reduction.
- Adopt incentives that encourage waste reduction.
- Strengthen recycling programs, purchasing policies, and employee education.
- Join with other agencies and entities to implement waste reduction programs.

E. Carbon Sequestration and Other Methods

- Continue to manage the Community and Jacoby Creek Forests to enhance carbon sequestration.
- Utilize biogas from the City’s wastewater treatment plant.
- Encourage policies for carbon sequestration at all levels.

F. Cross-Cutting Approaches

- Develop a City-wide Green Building promotional campaign.
- Develop a City-wide collaborative effort between the City, Humboldt State University and College of the Redwoods.
- Promote economic development that encourages businesses that employ sustainable energy practices.
- Work with regional groups, such as Redwood Coast Energy Authority, to promote programs that will serve to reduce greenhouse gas emissions.

II. INTRODUCTION

The City of Arcata has developed a Greenhouse Gas Reduction Plan to reduce locally generated greenhouse gas emissions. Carbon dioxide, methane, nitrous oxide, and other heat trapping gases naturally occur within the earth's atmosphere. *Greenhouse gas emissions* are releases, significantly beyond natural levels, of one or more of these gases. These emissions occur as a result of certain human activities (e.g. the burning of fossil fuels and deforestation), which ultimately lead to measurable changes in the global climate.

As a benefit, this plan may also help residents, businesses, and city government achieve energy cost savings (and thereby keep energy dollars in the local economy), promote cleaner air, rely less on fossil fuels and imported energy sources, and thus move us toward a more sustainable energy economy. This Greenhouse Gas Reduction Plan will also fulfill certain objectives outlined in the Arcata General Plan: 2020. These objectives include:

- reduce the net emissions of greenhouse gases from Arcata
- reduce other negative impacts of energy production and use, including risks from nuclear power, air emissions, fuel spills, and wildlife and habitat destruction
- reduce energy costs to the City and its residents
- increase the percent of energy purchases from sources within our region
- increase the City's and nation's energy security
- reduce our vulnerability to changes in energy availability and price
- increase public awareness of energy issues
- encourage an energy conservation ethic; and
- monitor the cost and effectiveness of Arcata's actions so we and others can learn from them. (Arcata General Plan: 2020, Policy RC-8, Energy Resources Management.)

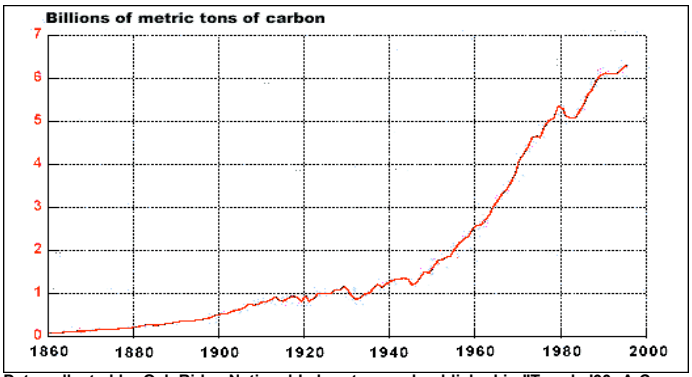
Implementing the suggested measures will require strong community-wide participation. It is our hope that this Greenhouse Gas Reduction Plan represents a giant step forward towards the above objectives; and that it will help our community act to avert the anticipated impacts of global warming.

III. BACKGROUND

A strong majority of the world's scientists have concluded that humans are changing the global climate primarily through use of fossil fuel, as shown in Figure 1. *(Intergovernmental Panel on Climate Change, 2000).* This has serious consequences for all life on earth. Anticipated impacts include: an overall warming of the earth's climate, melting of ice and snow-pack, rising sea levels, increased frequency and intensity of storms, shifting ecological zones, spread of plant disease and mosquito-born illnesses, and related impacts to agricultural, social, and economic systems.

The scientific community also recognizes that fossil fuel use needs to be reduced 60 to 80 percent from current levels in order to stabilize atmospheric concentrations of carbon dioxide, the major greenhouse gas. Yet in the United States, and globally, carbon dioxide emissions are increasing. The Kyoto Protocol's target of a 5 percent reduction in industrial countries' carbon dioxide emissions below 1990 levels is a step in the right direction. The government of the United States, however, has chosen not to join the Kyoto Protocol. Therefore, in the United States, local governments must take the lead to stem the tide of global climate change that humans have set in motion.

Figure 1.



Data collected by Oak Ridge National Laboratory and published in "Trends '93: A Compendium of Data on Global Change" shows an overall increase in global carbon dioxide emissions from fossil fuels. (Graph courtesy of World Resources Institute)

IV. THE CITIES FOR CLIMATE PROTECTION CAMPAIGN

In August of 2000, the City of Arcata joined the International Council on Local Environmental Initiatives (ICLEI) Cities for Climate Protection (CCP) campaign. The CCP campaign is a global coalition of local governments working to reduce greenhouse gases at the community level. As a part of this campaign, the City has voluntarily committed to complete the following "milestones":

A. Conduct a baseline emissions inventory and forecast of emissions growth.
B. Set an emissions reduction target.
C. Develop an action plan to meet the emissions reduction target.
D. Implement the action plan
E. Monitor and verify progress and results.

To date, the City has completed Milestones number One and Two. The Greenhouse Gas Reduction Plan represents the completion of Milestone Three. Implementation and monitoring will meet the last two milestones, Four and Five.

A. Completion of Milestone One: Community Greenhouse Gas Inventory

In October 2001, the City completed the Community Greenhouse Gas Inventory (main body of report included in Appendix A, full report available from City of Arcata Environmental Services Department). Community data such as population, energy and fuel use, and vehicle travel patterns were entered into special computer software[1].

The Inventory estimated that approximately 45 percent of the emissions coming from the entire Arcata community are generated in the transportation sector. The commercial sector generated 26 percent, the industrial sector 14 percent, and the residential sector an additional 14 percent. These findings are summarized in Fig. 2 and Table 1. The City of Arcata's local government operations generate only 1 percent of the total emissions tonnage of the entire Arcata community. Emissions from local government operations, referred to as City of Arcata Corporate emissions, are broken down in Fig. 3 and Table 2.

Figure 2.
Community Greenhouse Gas Emissions by Sector in 2000 in Equivalent CO2 (%)

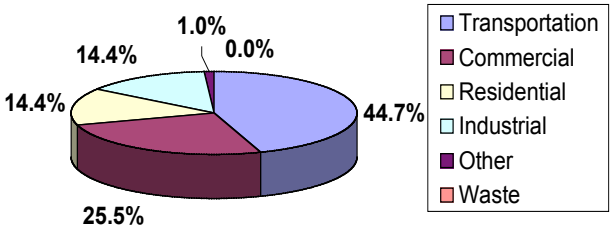


Table 1. Community Greenhouse Gas Emissions 2000 Base Year Sector Summary by eCO2 and Energy

Potential Sources	Equiv CO2 (tons)	Energy (million Btu)
Transportation	111,239	1,292,795
Commercial	63,494	600,337
Residential	35,874	572,077
Industrial	35,736	559,478
Other	2,471	0
Waste	-4,268	0
Subtotal	**244,546**	**3,024,688**
Measures		
Arcata Forest	-9844	0
TOTAL	**234,703**	**3,024,688**

[1] This software was developed for the ICLEI's CCP campaign by Torrie Smith and Associates. This software generated detailed reports, identifying the sources and estimated quantities of locally generated greenhouse gas emissions (expressed as tons of carbon dioxide equivalent, called "eCO2"), for the base year of 2000. The software allows for a community-wide analysis, as well as a detailed analysis of local government operations, which are included in the community-wide analysis. Reduction measures can also be included in the software analysis. The detailed inventory methodology and results are available in the Community Greenhouse Gas Inventory, 2001, through City offices.

Figure 3.

City of Arcata Corporate Greenhouse Gas Emissions in 2000 in Equivalent CO2 (%)

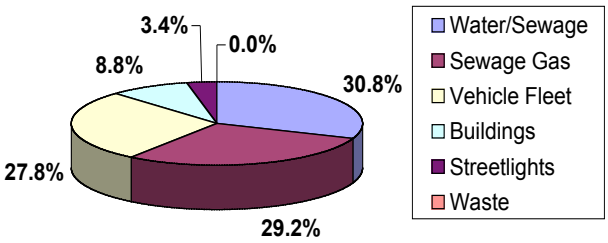


Table 2. City of Arcata Corporate Greenhouse Gas Emissions 2000
Base Year Activity Summary by eCO2 and Energy

Potential Sources	Equiv CO2 (tons)	Energy (million Btu)
Water/Sewage	644	6,108
Wastewater (Methane Gas)	611	0
Vehicle Fleet	582	6,707
Buildings	184	3,335
Streetlights	71	1,329
Waste	-28	0
Subtotal	**2,064**	**17,479**
Measures	0	0
TOTAL	**2,064**	**17,479**

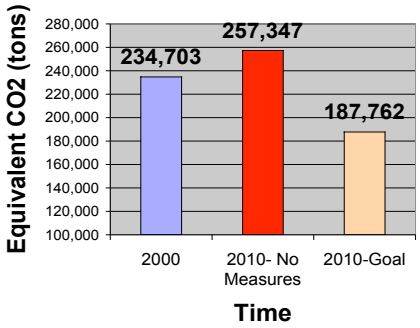
Note that the Arcata Forest and the Waste sectors in Tables 1 and 2 show negative emissions of greenhouse gases. This is because the sustainable management of the Arcata Community Forest and the recycling of paper and wood products serve to sequester carbon. One of the large-scale processes that influence the cycling of carbon is the uptake or release of carbon from forests. When trees are cleared for agriculture or other activities, carbon is released. In contrast, when forests are planted and allowed to continue growing, they absorb atmospheric CO2 and store it in the form of cellulose and other materials. When the rate of uptake exceeds the rate of release, carbon is said to be sequestered. (US EPA, Greenhouse Gas Emissions from Management of Selected Materials in Municipal Solid Waste, July 2002).

The Arcata Community Forest acts as a carbon sink because the growth of immature trees exceeds the effects of timber removal. Similarly, when paper and wood products are recycled or source reduced, trees that would otherwise be harvested are left standing. In the short term, this reduction in harvesting results in a larger quantity of carbon remaining sequestered.

B. Completion of Milestone Two: Set an Emissions Reduction Target

After completing the Inventory, the City chose Reduction Goals to be achieved by the year 2010. The City has established a reduction goal of 20 percent below year 2000 levels of greenhouse gas emissions by the year 2010. The computer software estimated emissions to be produced in 2010 in Arcata if no new reduction measures are taken. Figure 4 shows the greenhouse gas emissions for 2000 and the projected emissions for 2010 with and without the reductions.

Figure 4.
Arcata Community Greenhouse Gas Emissions in Equivalent CO2 (tons)



C. Milestone Three: Arcata's Greenhouse Gas Reduction Plan

The City next developed this draft Community Greenhouse Gas Reduction Plan, with input from the City's Energy Committee, staff, and the community, to achieve the stated reduction goals by 2010. Plan development included: 1) a research phase, which looked at other community plans and actions, 2) the creation of a master list of possible measures, 3) detailed ranking of measures based on certain criteria, and 4) final selection of measures to be included in the Plan. The ranking was based on the following criteria:

- greenhouse gas reduction potential
- cost feasibility
- other feasibility issues
- other costs or benefits associated with the measure

A complete list of all the measures that were considered and how they were ranked is included in Appendix B. Section V of this document outlines the measures that were selected for inclusion in the Plan. A brief description of each measure is given.

Once the draft Community Greenhouse Gas Reduction Plan was developed it was made available through the City's website and through the Environmental Services Department. A public forum was held to present the draft plan to the community and to solicit public input. Public input was also received at the regular monthly meetings of the Energy Committee and via written submissions to the Environmental Services Department. All public input was reviewed and incorporated into the plan as appropriate.

D. Milestone Four: Implementation Plan

The measures that have been selected for Arcata's Greenhouse Gas Reduction Plan are too numerous to be implemented all at once. Instead, a small number of key measures have been chosen for implementation in the first year or two (see Appendix D). Once these measures have been acted upon, then the Plan will be revisited and a second set of measures will be chosen for implementation. This process will be repeated on an annual basis (June of each year) until the City's greenhouse gas reduction goals are met.

During each implementation cycle, certain measures will be chosen and implementation plans will be developed for each measure. These implementation plans will be developed, with public input, by the City's Energy Committee and City staff, and will define: 1) what is to be done, 2) how it is to be accomplished, 3) who is responsible for what, 4) where the necessary resources will come from, and 5) when it will be accomplished by.

In the year 2000, the City of Arcata established the Energy Committee and joined the ICLEI Cities for Climate Protection campaign. Since that time the City has implemented a number of greenhouse gas reduction measures. Appendix C provides a list of greenhouse gas reduction measures that the City of Arcata has already implemented. Appendix D provides a brief, near-term implementation plan that lists the next set of greenhouse gas reduction measures the City will work to implement.

E. Milestone Five: Monitoring and Evaluation

Once measures are implemented, efforts must be employed to track their progress in reducing greenhouse gas emissions. City staff will perform this work. Staff will use the ICLEI/CCP greenhouse gas reduction software and will follow the methods recommended by ICLEI/CCP for tracking greenhouse gas reductions. The next Community Greenhouse Gas Inventory for the City of Arcata will be completed no later than 2010.

V. DETAILS OF ARCATA'S GREENHOUSE GAS REDUCTION PLAN (MILESTONE THREE)

This section of the report describes the measures that have been chosen to reduce locally generated greenhouse gas emissions. The selected measures are grouped into six program areas, including five major areas of emission reduction, plus a sixth approach which cuts across several of the five areas. The six program areas are:

A. Energy Efficiency
B. Renewable Energy
C. Sustainable Transportation
D. Sustainable Consumption and Waste
E. Carbon sequestration and other Methods
F. Cross-Cutting Approaches

A. Energy Efficiency

Fossil fuels (coal, oil, natural gas, and propane) are the main "culprits" in emitting greenhouse gases. They are also the primary energy sources for space heating, water heating, and electricity generation in the United States. Measures that conserve energy or reduce electricity and gas use will thus reduce greenhouse gas emissions. They also reduce energy costs, and can be highly cost-effective. Methods that the City can take to reduce energy use are:

1. Encourage Energy Efficient Buildings, Building Construction, and Retrofit

Homes, businesses and industries have significant impacts on energy consumption. According to the US Green Building Council, building construction and use accounts for 65 percent of electricity consumption and 30 percent of greenhouse gas emissions. Making structures more energy efficient will help reduce greenhouse gas emissions. Efficient design and materials also result in substantial energy savings.

Recommend that the City:

a) Develop land use regulations and building codes designed to encourage energy efficiency. Areas in which policy can promote energy efficiency in commercial or residential buildings include heating systems, lighting, insulation, building materials, and landscaping, among others.
b) Encourage documented energy audits to improve building energy efficiency prior to building sale.
c) Develop codes and regulations for new developments to minimize increase in community net energy use.
d) Modify the City's land use and development guidelines to include energy efficiency standards in the design review process.
e) Encourage commercial building guidelines to reach beyond CA Title 24 Building Energy Code.
f) Encourage co-generation projects on commercial & industrial facilities.
g) Give awards for the most energy efficient buildings.
h) Streamline permitting and provide incentives for energy efficient building construction.
i) Require energy audits to be performed when residential and commercial buildings are sold and that information regarding the opportunities for energy efficiency improvements be presented to the buyer.
j) Work with local lenders to promote energy efficient mortgages. Require that energy efficient mortgage information be presented to all buyers of commercial and residential properties at the time mortgages are secured.

2. Decrease Community Water Usage

Household water use in the United States is over 70 gallons per person per day. Energy is required to pump and process water. Much is wasted through leaks, inefficient fixtures, and inefficient habits. Water conservation will result in less greenhouse gas emissions, by decreasing the energy required to pump and process water.

Recommend that the City:

a) Conduct City-sponsored education to reduce the amount of water wasted in industrial processes, homes, and landscaping.
b) Strengthen land use and development guidelines for new buildings and retrofits. The permitting process for developers and contractors can include clear parameters for integrating water conservation infrastructure and technologies, including low-flush toilets and low-flow showerheads.
c) Increase water storage capacity to allow for off-peak pumping of water.

3. Improve Energy Efficiency in City Operations

The City has already begun to lead by example. Through the integration of energy conservation and efficiency into municipal buildings and day-to-day operations, the City can become a showcase for community energy efficiency, while also reducing its costs. City buildings should go beyond energy efficiency regulatory standards set forth for commercial and residential buildings.

Arcata is at the forefront of California cities recognizing the urgency and the advantages of integrating energy efficiency into city policy and community pursuits. Arcata should also urge regional, state, and national decisionmakers to embrace energy efficiency as a guiding policy force.

Recommend that the City:

a) Continue to implement lighting efficiency upgrades, such as replacing incandescent lighting.
b) Continue to use energy audits to identify needed insulation and heating systems retrofits.
c) Develop purchasing policies that require purchase of energy-efficient products with an Energy Star rating, where available. (NOTE: City staff should research industrial appliances for Energy Star ratings as well.)
d) Initiate in-service training for City staff.
e) Require that any buildings purchased in whole or in part with City funds meet the following energy efficiency requirements: 1) newly constructed commercial buildings must meet U.S. Green Building Council LEED™ criteria, 2) newly constructed residential buildings must meet the U.S. Environmental Protection Agency's ENERGY STAR® New Homes Program, 3) all newly constructed buildings incorporate passive solar design features (such as daylighting and passive solar heating), where feasible, and 4) existing buildings must be retrofitted to meet the current requirements of California's Title 24 Building Energy Code.

4. Encourage Energy Efficiency Policies at All Levels

Recommend that the City:

a) Direct letter writing by City officials to encourage regional, state and national policies to boost energy efficiency.
b) Partner with local organizations on energy-related projects; and
c) Develop relationships with other cities that are integrating energy efficiency in their municipal plans.

5. Encourage Personal Energy Conservation in Residences, Businesses and City Operations

Energy conservation may mean adjusting personal behavior and living patterns so that less energy is required for daily needs. For example, turning down the thermostat a few degrees, or putting on another layer of clothing, are examples of this kind of energy conservation. Using compact fluorescent instead of incandescent lighting is another example.

Recommend that the City:

a) Promote education and outreach. A well-informed citizenry will take positive action. Educational activities and outreach at local events, schools, and businesses, will increase community awareness of energy efficiency and conservation services, policies, products, rebates, and incentive programs.

b) Encourage efficiency practices. For example, office equipment such as computers, faxes, and printers, left on all day, every day, waste energy when not in use. Save energy in offices by replacing obsolete equipment with power-saving models. Through education and outreach the City can also encourage equipment vendors to sell more energy-efficient equipment.
c) Incorporate an Energy Star appliance requirement into contract specifications where possible.

B. Renewable Energy

One of the ways to reduce greenhouse gas emissions is to replace fossil fuels with cleaner energy sources such as solar and wind energy. This can take place at the utility scale and at the individual home or business. At the utility scale, wind farms and solar electric power plans can generate electricity, to be sold to consumers as "green electricity." Locally, home and business owners can install renewable energy systems such as rooftop solar panels. Municipal buildings should also transition to renewable energy, thus reducing the City's emissions and moving the City toward energy resources less subject to price volatility and political instability.

Recommend that the City promote renewable energy via the following activities:

1. Encourage utility scale transitions to renewable energy. Educate citizens about "green electricity" purchasing options. (NOTE: Although California consumers cannot currently choose to purchase "green power," this option will likely be available in the future.) The City should also choose to purchase "green electricity" when this option becomes available.

2. Conduct education and outreach. Inform residents about options and incentives for installing and utilizing renewable energy such as rooftop solar.

3. Adopt policies to encourage renewable energy. The City's Land Use Code revision contains policies that promote the use of solar energy. Incentives for promoting renewable energy should also be considered. City help should be offered to those wishing to access state and federal incentive programs.

4. Install renewable energy systems on city facilities. The City should install renewable energy systems where possible on City facilities. (NOTE that the City is installing a 10-kilowatt solar electric system on City Hall.)

5. Consider a locally- or regionally-owned green utility, perhaps in coordination with the RCEA or regional approaches. Consider implementing the Community Choice Aggregation (CCA) model as a means of aggregating the city's electricity loads and purchasing renewable electricity to meet the city's electricity needs. (Note: CCA would serve all electricity users in the City, including residents, businesses and municipal facilities, except those who choose to "opt out").

6. Solar ready buildings. Require that, where feasible, all new buildings be constructed to allow for the easy, cost-effective installation of future solar energy systems. "Solar ready" features should include: proper solar orientation (south facing roof area sloped at 20° to 55° from the horizontal), clear access on the south sloped roof (no chimneys, heating vents, plumbing vents, etc.), electrical conduit installed for solar electric system wiring, plumbing installed for solar hot water system, and space provided for a solar hot water storage tank.

7. Low interest loans. Provide low interest loans for residential solar energy systems in conjunction with the City's First Time Home Buyers Program.

8. Wind energy. Work with Humboldt State University to assess the potential for wind energy in the City of Arcata. Promote the development of wind energy systems where feasible and compatible with zoning regulations.

9. Retrofit Wood Stoves. Develop a woodstove retrofit program to bring woodstoves up to EPA omission/efficiency standards.

C. Sustainable Transportation

The transportation sector (autos, public transport, trains, airplanes, etc) is one of the largest sources nationally of greenhouse gas emissions. Likewise, in Arcata, vehicular travel is the largest source. Reduced automobile travel, more efficient vehicles and cleaner transportation fuels would help to reduce Arcata's greenhouse gas emissions. The City should support cleaner and alternative transportation to lower emissions and energy costs, to create energy independence, and to improve citizen health.

Recommend promotion of sustainable transportation via the following seven measures:

1. Incorporate Energy and Climate Policy into the City's Transportation Plan and Encourage Policies at all Levels for Efficient and Non-Polluting Transportation. Policies that address the importance of energy efficiency and lower emissions should be added to the City Transportation Plan to ensure a wide range of measures to reduce emissions.

2. Improve Bicycle Infrastructure. Create more bike lanes on existing roads and make bridges and intersections more bicycle-friendly. Bicycle parking should be easily accessible, plentiful, and protected from rain where possible.

3. Improve Pedestrian Infrastructure (sidewalks, paths, and walkways). Sidewalks need to be wide enough so people can walk comfortably side by side and be able to pass others. Walkways need to be well marked, accessible and continuous, so that walkers can safely share the roadways with cyclists and autos.

4. Improve Mass Transit Infrastructure. Bus stops and bus lanes should be convenient and efficient. Bus stops should be clearly marked, and frequently used stops should have a covered shelter for people to stay dry while waiting. Purchase more energy-efficient transit buses that run on less fuel. Consider also increasing service, more effective hours, and serving unserved arteries. Schedule and coordinate with the Transit Authorities.

5. Educate to Discourage Driving and Create Incentives to Lessen Driving. For both health and environmental reasons, the City should promote walking, bicycling, taking public transportation, ride sharing, alternatively fueled vehicles, and telecommuting. Create programs that encourage and reward walking, cycling or taking public transit. Consider disincentives including parking fees, traffic taming and gas taxes.

6. Support Local Sustainable Transportation Efforts. The City should support programs and efforts such as the Arcata Library Bike Program, the Bike-to-Work-Day and the Car-Free Day, which promote sustainable transportation.

7. Green the City Fleet. Use fuels or energy sources which emit fewer greenhouse gases, such as electricity or natural gas. Create a purchasing policy for acquiring new City vehicles that are more fuel efficient such as hybrids. The City should purchase a variety of vehicles, such as bicycles, electric bicycles, small electric vehicles, and energy efficient automobiles, and should institute policies that require that the most energy-efficient vehicle be used for each City purpose.

8. Smart Growth. The City should promote "smart growth" development strategies. These include: compact, mixed-use development, higher density development, and infill. The City should consider relaxing parking space requirements in new developments.

9. Rail Right-of-Way. The City should preserve existing rail rights-of-way where appropriate and should encourage the development of existing rail rights-of-way as "rails-to and with-trails."

D. Waste and Consumption Reduction

Energy is used to produce and package consumer goods. Methane, a potent greenhouse gas, is produced when organic material breaks down in landfills. Good planning should consider industrial

ecology, and should examine local, regional, and global uses and flows of materials and energy in products and processes. Efforts should be made to reduce environmental burdens throughout product life cycle. Measures that reduce waste in consumption, and encourage recycling and reuse in purchasing will also reduce greenhouse gas emissions.

Recommend that the City:

1. The City should continue to support policies at all levels for waste and consumption reduction with a goal of zero waste.

2. Expand education to the public about the benefits of waste reduction, via informational materials, organized events and workshops, including backyard composting workshops, office paper recycling programs, and organized brush drop-off programs.

3. Continue to promote incentives that encourage waste reduction, such as city-subsidized recycling and free composting bins.

4. Strengthen recycling programs, purchasing policies, and employee education, to reduce the amount of city waste produced.

5. Partner with other agencies and entities, such as the Humboldt Waste Management Authority, to implement waste reduction programs and develop other beneficial programs. The City does not landfill locally, but ships all of its solid waste to an out-of-state facility. The City should begin regional efforts to ensure that proper landfill gas collection practices are being observed at the landfill and that cogeneration is used where possible. Efforts should be made to reduce the carbon emissions from transportation to the site. Efforts should also be made to pursue regional waste reduction programs.

E. Carbon Sequestration and Other Methods

Vegetation, trees, and healthy soil remove and store, or "sequester," carbon dioxide from the atmosphere. Thus, an increase in carbon sequestration capacity can reduce greenhouse gas emissions. Measures that reduce greenhouse gas emissions through strategies other than energy efficiency, renewable energy, transportation, or waste reduction, are also included in this section.

Recommend that the City:

1. Continue to Sustainably Manage the Community Forest to increase timber inventory and biomass over time. Currently the Forest Plan allows for harvest of one-half the annual growth increment, thus, accrual of carbon occurs over time. Thirty five percent of the Community and Jacoby Creek Forests are set aside in reserve that will allow for old growth conditions and increased carbon storage to occur as well. Adding additional area to the ACF and JCF will likely increase carbon sequestration potential as the City Management Policy calls for growing long-rotations of 120+ years. The City should, in its Open Space policies, promote the carbon sequestration benefits of increased vegetation and continue to expand riparian forests along urban streams.

2. Utilize Biogas. The City's wastewater treatment plant (WWTP) has a cogeneration[2] system that was designed to utilize biogas[3]. It was built over twenty years ago, but was shut down due to operational problems. Currently much of the City's biogas is used to meet heating loads at the WWTP. However, not all of the biogas is utilized, and the excess is flared to convert it to carbon

[2] Cogeneration refers to the production of electricity and useful heat from a common fuel source. For example, when fuel is burned in an internal combustion engine generator to produce electricity, the waste heat can be captured and utilized.

[3] Biogas is produced as a by-product of the wastewater treatment process. It consists of approximately 60% methane (natural gas), and therefore can be used as a fuel source.

dioxide rather than release methane directly to the atmosphere.[4] It is possible that the flared biogas could also be used as a fuel source. In order to determine if this is a viable option, metering equipment would need to be installed to measure how much biogas is currently being flared. The City could then determine whether it makes sense to capture the excess biogas for use as a fuel.

3. Encourage policies at all levels for carbon sequestration. The City can bring pressure to bear on state and national forest regulators to better manage logging practices by reducing non-sustainable timber harvesting, and promoting reforestation.

F. Cross-Cutting Approaches

Many strategies for reducing greenhouse gas emissions involve several of the above areas. Measures and strategies that involve two or more of the categories discussed above are listed in this section. Regardless of the strategy chosen, these cross-cutting approaches should consider involving tactics of education, outreach, training and promotion; adopting municipal codes, affecting changes in City operations such as purchasing and best practices, engaging in regional partnerships such as the Redwood Coast Energy Authority; and influencing regional, state and national policies.

Recommend that the City:

1. Develop a city-wide Green Building promotional campaign, which might involve educating city staff and policy makers about best practices, preparation and provision of checklists and specification guidelines for contractors, amending purchasing protocols, preparing a website, and offering opportunities for in-service and professional training. It should involve several City departments, including Public Works (for City buildings and infrastructure); Community Development; and Building and Planning (for construction permits and long-range planning). Detailed aspects of the Energy Efficiency, Renewable Energy, Waste Reduction, and other sections discussed above would then be utilized where appropriate for the entire Green Building Program.

2. Develop a city-wide collaborative effort between the City and the University in greenhouse gas reduction, as well as those of the regional authority, and other state and regional efforts. Such a crosscutting effort might adopt any number of the recommendations found in the first five sections.

3. Support green economic growth. The City should promote economic development policies that encourage businesses that employ sustainable energy practices. This could include: businesses that co-locate to make use of each others waste products (such as waste heat or waste materials), businesses that employ cogeneration, distributed generation or district heating technologies, and businesses that are furthering the research, development, promotion and sale of sustainable energy products, technologies, and services.

4. Develop regional educational programs, incentive programs, and partnerships, as appropriate. The City should work with regional groups, like the Redwood Coast Energy Authority, to promote energy efficiency, renewable energy, sustainable transportation, waste reduction, and other programs that will serve to reduce greenhouse gas emissions in our community.

---

[4] Methane (CH4) 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, so it can be inferred that reduction or carbon sequestration of one unit of methane from any source is equivalent to the reduction or carbon sequestration of 20 units of carbon dioxide. This enhances the importance of proper operation of landfills and wastewater treatment plants. Methane from landfills and wastewater treatment plants is generally captured and flared, converting it to carbon dioxide. 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 other fuel.

Appendix A:
Community Greenhouse Gas Inventory and Forecast

The City of Arcata

International Council on Local Environmental Initiatives
Cities for Climate Protection Campaign

Community Greenhouse Gas Inventory and Forecast

Prepared for:
The City of Arcata

Prepared by:

Kathy Jack, Energy Program Specialist
Environmental Services Department
City of Arcata

August 2002

Acknowledgements

This report was made possible with the assistance of several people from the community and the cooperation of other partners in Arcata's effort to reduce greenhouse gas emissions. Staff would like to thank the following people for their patience and assistance:

Mark Andre, City of Arcata Deputy Director of Environmental Services

Anita Alexander, North Coast Labor Market Consultant for the California Development Department

Doby Class, City of Arcata Deputy Director of Public Works

Robert Cherry, PG&E representative

Don Cordell, Manager of the Dry Creek Landfill, Medford Oregon

Hillary Hodges, City of Arcata Planner

Debra Hopkins, Humboldt State University Physical Services

Dan Ihara, Executive Director of the Center for Environmental Economic Development

Brian Kang, City of Arcata GIS Specialist

Gerald Kindsfather, Humboldt County Waste Manager

Gary Markegard, Farm Advisor, University of California Cooperative Extension

Juli Neander, Resource Specialist for the City of Arcata

Carol Rische, Humboldt Bay Municipal Water District

Jay Tarvin, Humboldt Bay Municipal Water District

Bob Torzynski, North Coast Air Quality Management District

Stephen Tyler, Director of Environmental Services

George Wright, Plant Operations for Humboldt State University

Special thanks go to

Arcata City Council Member Connie Stewart, for pioneering this work in Arcata, and for the many hours spent reviewing this document.

City of Arcata Energy Committee, for their work in reviewing this document and in creating a plan to reduce local greenhouse gas emissions.

Sean Kinghorn, Natural Resources Planning and Interpretation Graduate Student at Humboldt State University, and National Wildlife Federation Fellow with the Center for Environmental Economic Development, for several hours of number crunching and for sharing data he gathered for the City fleet, HSU energy use, and community propane use.

Special thanks also goes to the City of Arcata Energy Committee, for their work in reviewing this document and in creating a plan to reduce local greenhouse gas emissions.

Melissa Royael, **Ryan Bell** and other **ICLEI** staff for their endless support!

Table of Contents

Copies are available at the City of Arcata Environmental Services Department

Introduction

Background

By Dan Ihara, PhD.

A consensus of the world's scientists have concluded that humans are changing the global climate primarily through our use of fossil fuel (Intergovernmental Panel on Climate Change, 2000). This has serious consequences for all life on earth.

The scientific community also recognizes that fossil fuel use needs to be reduced 60 –80% from current levels in order to stabilize atmospheric concentrations of carbon dioxide, the major greenhouse gas. Yet in the United States, and globally, carbon dioxide emissions are increasing. The Kyoto Protocol's target of a 5% reduction in industrial countries' carbon dioxide emissions below 1990 levels is a step in the right direction. The government of the United States, however, has chosen not to join with the other nations of the world in trying to solve this global problem. Because the U.S. has forsaken its planetary responsibilities, it has fallen on local governments, especially in the United States, to take the lead to stem the tide of global climate change that humans have set in motion.

ICLEI's Cities for Climate Protection Campaign

In August of 2000, the City of Arcata adopted a proclamation (**Appendix IV**) supporting the International Council on Local Environmental Initiatives' (ICLEI) Cities for Climate Protection (CCP) campaign. The CCP campaign is a global effort to reduce greenhouse gases, at the community level. As a part of the City's participation in the CCP campaign, the city has voluntarily committed to complete the following "milestones":

1) Conduct a baseline emissions inventory and forecast of emissions growth.
2) Set an emissions reduction target.
3) Develop an action plan to meet the emissions reduction target.
4) Implement the action plan.
5) Monitor and verify progress and results.

7 by '07

With this same proclamation, the City of Arcata voluntarily committed to reduce community greenhouse gas emissions to 7% below 1990 levels by 2007. The U.S. Environmental Protection Agency has estimated that U.S. greenhouse gas emissions have increased by 11% from 1990 to 2000. Based on this estimation, the community of Arcata would need to reduce greenhouse gas emissions by approximately 18% below 2000 levels by 2007, to achieve the "7 by '07" goal.

Reduction Goal

In line with the City Council's "7 by '07" proclamation, and consistent with other community greenhouse gas inventories which have set reduction targets for 2010, the City of Arcata seeks to reduce locally generated greenhouse gas emissions by 20% below 2000 levels, by the year 2010.

Purpose

The purpose of the inventory is to present a clear picture of how our community uses energy and to highlight those activities and sectors producing the most greenhouse gases. This will allow the City to better target our greenhouse gas reduction activities. Because greenhouse gas emissions are largely associated with energy use, this tool will also help the City to target energy conservation activities.

Methodology

Overview

The CCP methodology allows communities to systematically track energy and waste related activities in the community, and to calculate the relative quantities of greenhouse gases produced by each activity and sector. The methodology performs two assessments: a communitywide assessment (including local government activities) and a separate inventory of local government facilities and activities. This information can then be used to target appropriate areas for effective reduction of greenhouse gases.

The methodology also allows a community to calculate projected greenhouse gas emissions, which would be produced in the future if the community were to implement no emissions reduction measures. This could be considered the "business as usual" scenario.

The baseline greenhouse gas emissions inventory for 2000, along with the "business as usual" projection for 2010, will guide the City in setting a course to reach the reduction goal of 20% below 2000 levels by 2010.

CCP Software

ICLEI contracted with Torrie Smith & Associates, to create a software package incorporating the CCP methodology. The software calculates the equivalent carbon dioxide emissions (eCO_2) resulting from all energy and waste inputs. The emissions coefficients and methodology employed by the CCP software is consistent with National and International inventory standards established by the International Panel on Climate Change(*1996 Revised IPCC Guidelines for the Preparation of National Inventories)* and the U.S. Voluntary Greenhouse Gas Reporting Guidelines (EIA form1605). **Appendix III** includes an overview of the methodology employed by the CCP software for emissions calculations.

The City of Arcata has used the CCP software to conduct our Community Greenhouse Gas Inventory, and "business as usual" Forecast into the year 2010. We will continue to employ the CCP software to track our emissions and emission reducing measures, over time.

Application

The community wide analysis performed by the software includes an electrical and heat- fuel emissions analysis for the residential, commercial, and industrial sectors; a transportation emissions analysis; and a waste emissions analysis. The local government inventory, referred to as the "corporate" analysis in the software, takes a more detailed inventory of electrical, heat, and other fuel related emissions, as well as waste emissions for local government activities.

All software analyses required the input of information from a variety of sectors and sources. Most data collected for the baseline inventory is from the calendar year 2000. Some data, however, is from the fiscal year 2000- 2001. When data was not available for 2000 or 2000-2001, the most representative data was used and adjusted to reflect time.

Rather than describe the methodology and assumptions made for each sector and activity here, the data sources and calculations (including assumptions) are described in detail (in chart format) in **Appendix II** .

Inventory Results

Summary

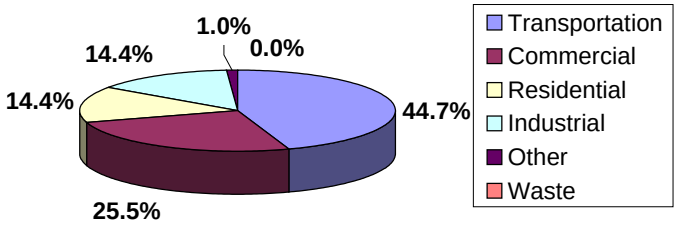
Community

In the base year 2000, the community of Arcata generated approximately **234,703 tons** of CO2 equivalent emissions. As **Table 1** exhibits, the transportation sector produced the largest portion of greenhouse gases and was also the largest energy consumer, followed by the commercial, residential, and industrial sectors, and other miscellaneous sources. The details of each sectors greenhouse gas generation and energy consumption are listed by source and quantity in the reports section (**Appendix I**). The waste sector is usually a significant contributor of the greenhouse gas methane. However, due to the excellent methane recovery rate at the landfill, the waste sector end up serving as a greenhouse gas "sink." This process is further described in **Appendix III**. The total greenhouse gases reported here include the carbon "sequestration" capacity of the Arcata Community Forest (detailed in **Appendix II**).

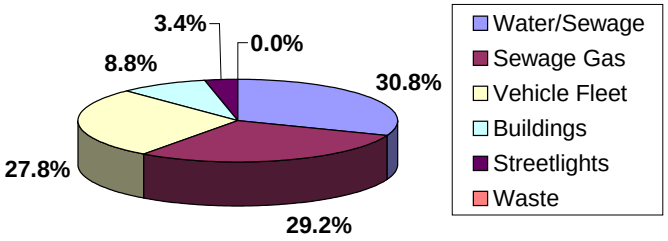
Table 1. Arcata Community Greenhouse Gas Emissions 2000
Base Year Sector Summary by eCO2 and Energy

Potential Sources	Equiv CO2 (tons)	Energy (million Btu)
Transportation	111,239	1,292,795
Commercial	63,494	600,337
Residential	35,874	572,077
Industrial	35,736	559,478
Other	2,471	0
Waste	-4,268	0
Subtotal	**244,546**	**3,024,688**
Measures		
Arcata Forest	-9844	0
TOTAL	**234,703**	**3,024,688**

Community Greenhouse Gas Emissions by Sector in 2000 in Equivalent CO2 (%)



City of Arcata Corporate Greenhouse Gas Emissions in 2000 in Equivalent CO2 (%)



Corporate

In the base year of 2000, the City of Arcata "Corporate" local government generated **2,064 tons** of eCO2 emissions. The City's "sustainable" management of the Community Forest is considered a community measure, rather than a corporate measure, because carbon is sequestered from the entire region. Large energy savings and greenhouse gas emission reduction opportunities remain within City operations, and the City is committed to reducing City energy consumption and greenhouse gas emissions. A detailed breakdown of City energy consumption and greenhouse gas emissions by activity are also included in the reports section (**Appendix I**).

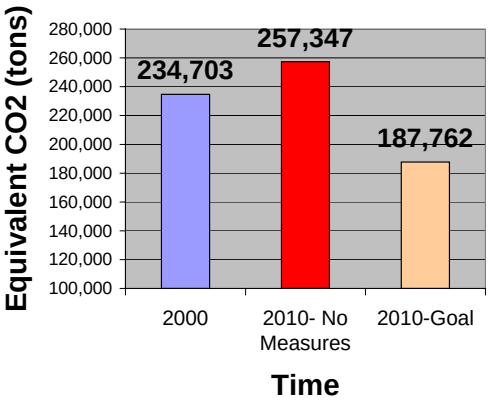
Table 2. City of Arcata Corporate Greenhouse Gas Emissions 2000
Base Year Activity Summary by eCO2 and Energy

Potential Sources	Equiv CO2 (tons)	Energy (million Btu)
Water/Sewage	644	6,108
Wastewater (Methane Gas)	611	0
Vehicle Fleet	582	6,707
Buildings	184	3,335
Streetlights	71	1,329
Waste	-28	0
Subtotal	**2,064**	**17,479**
Measures	0	0
TOTAL	**2,064**	**17,479**

Projection to Target Year 2010

The City of Arcata has voluntarily committed to reducing locally generated greenhouse gases by 10% below 1990 levels, or an estimated 20% below 2000 levels by 2010. Based on inventory results, this would mean a 20 % reduction from **234,703 tons**. The Community of Arcata's target for the year 2010 is **187,762 tons** of CO2 equivalent. The CCP software allows users to estimate future greenhouse gas emissions that will be generated if no further reduction measures are implemented in the community. Using growth rates estimated by planners for the various sectors of Arcata (see **Appendix II**), greenhouse gas emissions were estimated for Arcata in 2010 (our target year), given no emissions reduction activities. To achieve a 46,941 ton reduction from 2000 levels, the Community will need to make a 69,585 ton reduction, through measures, from the business as usual scenario. A detailed breakdown of the "no measure" scenario for 2010, is also included in the reports section (**Appendix I**).

Arcata Community Greenhouse Gas Emissions in Equivalent CO2 (tons)



Arcata Community Greenhouse Gas Emissions in Equivalent CO2 (tons)

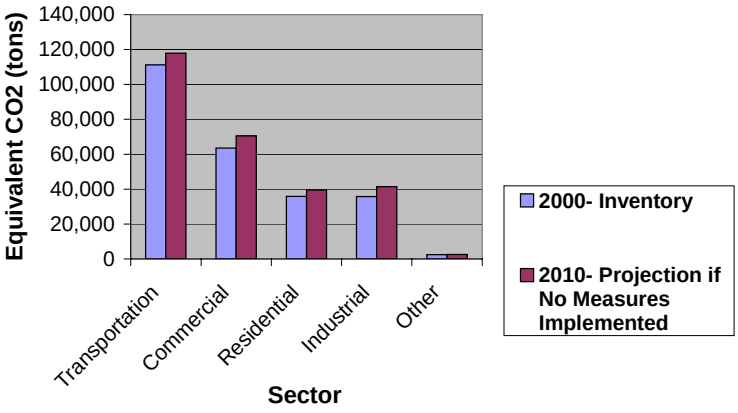


Table 3. Arcata Community Greenhouse Gas Emissions 2010 Target Year "No Measures" Sector Summary by eCO2 and Energy

Potential Sources	Equiv CO2 (tons)	Energy (million Btu)
Transportation	117,913	1,370,363
Commercial	70,479	666,375
Residential	39,462	629,285
Industrial	41,454	648,994
Other	2,578	0
Waste	-4,695	0
Subtotal	**267,191**	**3,315,017**
Measures		
Arcata Forest	-9844	0
TOTAL	**257,347**	**3,315,017**

Software Reports

The software reports are included as **Appendix I**. These reports are produced by the CCP software, and encompass the detailed reporting of emissions sources, including reference notes, for the community and corporate inventories and the 2010 "no measures" projection. The detailed reports are followed by summary reports, which indicate greenhouse gas estimates by sector and source.

Emissions Reduction Action Plan

The next step in reducing local emissions of greenhouse gases is to develop a cohesive plan, based on the information revealed from this study. Several initiatives have taken place since the baseline inventory year.

The City has developed an Energy Program that promotes "clean and secure energy resources for Arcata through conservation and generation (see www.arcatacityhall.org)." The scope of this program includes working to "reduce the net emissions of greenhouse gases from Arcata (General Plan 2020 Policy RC-8)." Further activities to reduce local GHG emissions, will be promoted through the City Energy Program.

The City has joined the International Council on Local Environmental Initiatives' Cities for Climate Protection Campaign, and City staff and the Arcata Energy Committee are working with ICLEI to develop a local Emissions Reduction Action Plan.

The City is working with the Humboldt Energy Task Force to promote conservation and renewable energy use in the area. The Arcata City Council has set a goal that 25% of the City fleet be alternative fueled vehicles by 2005, and 50% by 2010.

The City Wastewater treatment plant is no longer directly venting methane, but is combusting the methane to heat the digester. Excess methane is also combusted, reducing its potency as a greenhouse gas. The City is investigating the use of micro-turbines to utilize digester excess methane for electrical production.

The City is also participating with ICLEI and the USEPA to reduce local greenhouse gases associated with organic waste (see **Appendix V**), although as estimated by the CCP software, this sector represents a "negative" source of greenhouse gases for the area. With the next phase of greenhouse gas reduction "planning", the City will focus on those activities producing the largest quantities of greenhouse gases community-wide, and in municipal facilities.

Community Greenhouse Gas Emissions in 2000
Base Year Detailed Report

	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (million Btu)
Residential			
PG&E customers			
Electricity	17,407	7.1	105,537
Natural Gas	16,991	6.9	275,300
LPG	7	0.0	98
Fuelwood (Air Dry)	1,469	0.6	191,143
Subtotal PG&E customers See Appendix I. pp: iv,vi, vii,viii.	35,874	14.7	572,077
Subtotal Residential	35,874	14.7	572,077
Commercial			
Corporate (City)			
Electricity	665	0.3	4,033
Natural Gas	232	0.1	3,758
LPG	1	0.0	20
Green Electricity	0	0.0	2,961
Subtotal Corporate (City) See Appendix I. pp: vii, xi,xiii, xvii,xviii,vii.	899	0.4	10,772
HSU			
Electricity	5,979	2.4	36,249
Natural Gas	7,010	2.9	113,571
LPG	61	0.0	834
Green Electricity	0	0.0	9,062
Subtotal HSU See Appendix I. pp: ix,xi,xii.	13,049	5.3	159,717
HSU Water Pumping			
Electricity	51	0.0	307
Subtotal HSU Water Pumping See Appendix I. p x.	51	0.0	307
PG&E Customers			
Electricity	36,247	14.8	219,766
Natural Gas	12,761	5.2	206,762
LPG	7	0.0	98
Subtotal PG&E Customers See Appendix I. pp: vii, xi,xii.	49,015	20.0	426,627
Water Pumping- non HSU			
Electricity	481	0.2	2,915
Subtotal Water Pumping- non HSU See Appendix I. p x.	481	0.2	2,915
Subtotal Commercial	63,494	26.0	600,337
Industrial			
PG&E customers			
Electricity	26,500	10.8	160,668
Natural Gas	7,042	2.9	114,093
LPG	7	0.0	98
Fuelwood (Air Dry)	2,187	0.9	284,619
Subtotal PG&E customers See Appendix I. pp: vi, vii, viii, xi, xii.	35,736	14.6	559,478
Subtotal Industrial	35,736	14.6	559,478

Community Greenhouse Gas Emissions in 2000
Base Year Detailed Report (cont.)

Transportation			
Road Transportation			
Gasoline	99,149	40.5	1,142,510
Diesel	8,868	3.6	101,705
LPG	1,491	0.6	20,540
CNG	1,731	0.7	28,041
Subtotal Road Transportation See Appendix I. p xiv.	111,239	45.5	1,292,795
Subtotal Transportation	111,239	45.5	1,292,795
Waste			
Dry Creek Landfill- Ashland,OR			
Paper Products	-2,339	-1.0	
Food Waste	82	0.0	
Plant Debris	-934	-0.4	
Wood/Textiles	-1,077	-0.4	
Subtotal Dry Creek Landfill- Ashland,OR See Appendix I. p xv. See "Other" for emissions associated with the transportation of solid waste to Oregon.	-4,268	-1.7	
Subtotal Waste	-4,268	-1.7	
Other			
Cattle Methane			
Methane	1,396	0.6	
Subtotal Cattle Methane See Appendix I, p xxiii.	1,396	0.6	
Sewage Gas/Methane Released			
Carbon Dioxide	611	0.2	
Subtotal Sewage Gas/Methane Released See Appendix I. p xxii.	611	0.2	
Transportation of Solid Waste			
Carbon Dioxide	464	0.2	
Subtotal Transportation of Solid Waste See Appendix I. p xxi.	464	0.2	
Subtotal Other	2,471	1.0	
Total	244,546	100.0	3,024,688

This report has been generated for Arcata, California with software created by Torrie Smith Associates for the Cities for Climate Protection Campaign of The International Council for Local Environmental Initiatives.

Community Greenhouse Gas Emissions in 2000 Base Year Report by Source

	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (million Btu)
Electricity	87,329	35.7	529475
Natural Gas	44,036	18.0	713,484
CNG	1,731	0.7	28,041
Gasoline	99,149	40.5	1,142,510
Diesel	8,868	3.6	101,705
LPG	1,575	0.6	21,689
Fuelwood (Air Dry)	3,656	1.5	475,762
Green Electricity	0	0.0	12,023
Paper Products	-2,339	-1.0	
Food Waste	82	0.0	
Plant Debris	-934	-0.4	
Wood/Textiles	-1,077	-0.4	
Carbon Dioxide	1,075	0.4	
Methane	1,396	0.6	
Total	244,546	100.0	3,024,688

Fuel costs include Buildings, Vehicle Fleet, Streetlights and Water/Sewage sectors only.
This report has been generated for Arcata, California with software created by Torrie Smith Associates for the Cities for Climate Protection Campaign of The International Council for Local Environmental Initiatives.

Community Greenhouse Gas Emissions in 2000 Base Year Report by Sector and Source

	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (million Btu)
Residential Sector			
Electricity	17,407	7.1	105,537
Natural Gas	16,991	6.9	275,300
LPG	7	0.0	98
Fuelwood (Air Dry)	1,469	0.6	191,143
Subtotal	35,874	14.7	572,077
Commercial Sector			
Electricity	43,422	17.8	263,270
Natural Gas	20,003	8.2	324,092
LPG	69	0.0	953
Green Electricity	0	0.0	12,023
Subtotal	63,494	26.0	600,337
Industrial Sector			
Electricity	26,500	10.8	160,668
Natural Gas	7,042	2.9	114,093
LPG	7	0.0	98
Fuelwood (Air Dry)	2,187	0.9	284,619
Subtotal	35,736	14.6	559,478
Transportation Sector			
CNG	1,731	0.7	28,041
Gasoline	99,149	40.5	1,142,510
Diesel	8,868	3.6	101,705
LPG	1,491	0.6	20,540
Subtotal	111,239	45.5	1,292,795
Waste Sector			
Paper Products	-2,339	-1.0	
Food Waste	82	0.0	
Plant Debris	-934	-0.4	
Wood/Textiles	-1,077	-0.4	
Subtotal	-4,268	-1.7	
Other Sector			
Carbon Dioxide	1,075	0.4	
Methane	1,396	0.6	
Subtotal	2,471	1.0	
Total			
	244,672	100.0	3,025,029

This report has been generated for Arcata, California with software created by Torrie Smith Associates for the Cities for Climate Protection Campaign of The International Council for Local Environmental Initiatives.

10/15/2002

Corporate Greenhouse Gas Emissions in 2000 Base Year Detailed Report

	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (million Btu)	Cost ($)
Buildings				
Buildings, Rollup 85 & 81(pt)				
Electricity	72	3.5	439	12,142
Natural Gas	110	5.3	1,785	8,828
LPG	1	.1	20	352
Green Electricity	0	0.0	1,090	29,056
Subtotal Buildings, Rollup 85 & 81(pt)	184	8.9	3,335	50,378
See Appendix I. pp: xiii, xvi-xvii, xviii,vii.				
Subtotal Buildings	184	8.9	3,335	50,378
Vehicle Fleet				
City Transit				
Gasoline	5	0.2	57	693
Diesel	216	10.5	2,480	26,619
CNG	0	0.0	0	0
Subtotal City Transit	221	10.7	2,537	27,312
See Appendix I. p xix.				
Vehicle Fleet				
Gasoline	259	12.5	2,981	36,297
Diesel	98	4.8	1,127	12,098
CNG	4	0.2	62	644
Subtotal Vehicle Fleet	361	16.0	4,170	49,039
See Appendix I. p xix.				
Subtotal Vehicle Fleet	582	17.5	6,707	76,352
Streetlights				
Park Lighting, from Rollup 81				
Electricity	9	0.4	52	1,529
Green Electricity	0	0.0	121	3,434
Subtotal Park Lighting, from Rollup 81	9	04	173	4,963
Streetlighting is Rollup 81 from ABAG accounts. We have also included 94% of Rollup 41 (Parks), which is park lighting. See Appendix I. pp: xvi-xvii.				
Streetlighting, Rollup 41				
Electricity	62	3.0	376	8,335
Green Electricity	0	0.0	779	16,218
Subtotal Streetlighting, Rollup 41	62	3.0	1,156	24,553
See Appendix I. pp xvi-xvii.				
Subtotal Streetlights	71	3.4	1,329	29,516
Water/Sewage				
City Sewage & Water Treatment				
Electricity	522	25.3	3164	88,317
Natural Gas	122	5.9	1,974	7,304
Green Electricity	0	0.0	970	25,463
Subtotal City Sewage & Water Treatment	644	31.2	6,108	121,084
The City of Arcata does not operate a water supply plant. We are supplied by the Humboldt Bay Municipal Water District. Figures for energy expenditure associated with water supply are in the comunity analysis. See Appendix I. pp: xvi-xvii. The estimated methane "released" in the form of sewage gas, is included under "other".				
Subtotal Water/Sewage	644	31.2	6,108	121,084

[redacted] Greenhouse Gas Emissions in [redacted] Base Year Detailed Report (cont.)

	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (million Btu)	Cost ($)
Waste				
City Facilities				
Paper Products	-20	-1.0		0
Food Waste	0	0.0		0
Plant Debris	-4	-0.2		0
Wood/Textiles	-4	-0.2		0
Subtotal City Facilities See Appendix I. p xxi.	-28	-1.3		0
Subtotal Waste	-28	-1.3		0
Other				
Sewage gas				
Carbon Dioxide	611	29.6		
Subtotal Sewage gas See Appendix I. p xxii.	611	29.6		
Subtotal Other	611	29.6		
Total	2,064	100.0	17,479	277,330

This report has been generated for Arcata, California with software created by Torrie Smith Associates for the Cities for Climate Protection Campaign of The International Council for Local Environmental Initiatives.

[redacted] Greenhouse Gas Emissions in [redacted] Base Year Report by Source

	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (million Btu)	Cost ($)
Electricity	665	32.5	4,003	110,324
Natural Gas	232	11.2	3,758	16,132
CNG	4	0.2	62	644
Gasoline	264	12.8	3,038	36,990
Diesel	315	15.2	3,607	38,717
LPG	1	.1	20	352
Green Electricity	0	0.0	2,961	74,170
Paper Products	-20	-1.0	0	
Food Waste	0	0.0	0	
Plant Debris	-4	-0.2	0	
Wood/Textiles	-4	-0.2	0	
Carbon Dioxide	611	29.6	0	
Total	2,064	100.0	17,479	277,330

Fuel costs include Buildings, Vehicle Fleet, Streetlights and Water/Sewage sectors only.
This report has been generated for Arcata, California with software created by Torrie Smith Associates for the Cities for Climate Protection Campaign of The International Council for Local Environmental Initiatives

10/15/2002

Corporate Greenhouse Gas Emissions in 2000
Base Year Report by Sector and Source

	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (million Btu)	Cost ($)
Buildings Sector				
Electricity	72	3.5	439	12,142
Natural Gas	110	5.3	1,785	8,828
LPG	1	.1	20	352
Green Electricity	0	0.0	1,090	29,056
Subtotal	184	8.9	3,335	50,378
Vehicle Fleet Sector				
CNG	4	0.2	62	644
Gasoline	264	12.8	3,038	36,990
Diesel	315	152	3,607	38,717
Subtotal	582	28.2	6,707	76,352
Streetlights Sector				
Electricity	71	3.4	429	9,864
Green Electricity	0	0.0	900	19652
Subtotal	71	3.4	1,329	29,516
Water/Sewage Sector				
Electricity	522	25.3	3,164	88,317
Natural Gas	122	59	1,974	7,304
Green Electricity	0	0.0	970	25,463
Subtotal	644	31.2	6,108	121,084
Waste Sector				
Paper Products	-20	-1.0	0	
Food Waste	0	0.0	0	
Plant Debris	-4	-0.2	0	
Wood/Textiles	-4	-0.2	0	
Subtotal	-28	-1.3	0	
Other Sector				
Carbon Dioxide	611	29.6		
Subtotal	611	29.6		
Total				
	2,064	100.0	17,479	277,330

This report has been generated for Arcata, California with software created by Torrie Smith Associates for the Cities for Climate Protection Campaign of The International Council for Local Environmental Initiatives.

10/15/2002

[redacted] Greenhouse Gas Emissions in [redacted] Base Year Indicators Report

	Equiv CO_2 (tons)	Energy (million Btu)	Cost ($)
Buildings			
Buildings, Rollup 85 & 81(pt)			
Per floor area (1000 sq. ft.)	2.2	40.0	604.1
Per occupant	.8	15.4	232.2
Sector Average			
Per floor area (1000 sq. ft.)	2.2	40.0	604.1
Per occupant	.8	15.4	232.2
Vehicle Fleet			
City Transit			
Per vehicle kilometre	0.0	0.0	0.3
Vehicle Fleet			
Per vehicle kilometre	0.0	0.0	0.1
Sector Average			
Per vehicle kilometre	0.0	0.0	0.1
Waste			
City Facilities			
Per employee	-0.1		0.0
Sector Average			
Per employee	-0.1		0.0

This report has been generated for Arcata, California with software created by Torrie Smith Associates for the Cities for Climate Protection Campaign of The International Council for Local Environmental Initiatives.

Community Greenhouse Gas Emissions in 2010 Target Year Detailed Report

	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (million Btu)
Residential			
PG&E customers			
Electricity	19,147	7.2	116,091
Natural Gas	18,690	7.0	302,829
LPG	8	0.0	108
Fuelwood (Air Dry)	1,616	0.6	210,257
Subtotal PG&E customers	39,462	14.8	629,285
Growth factors (see Appendix I, p v) were applied to baseline year data.			
Subtotal Residential	39,462	14.8	629,285
Commercial			
Corporate (City)			
Electricity	738	0.3	4,476
Natural Gas	257	0.1	4,172
LPG	2	0.0	22
Green Electricity	0	0.0	3,286
Subtotal Corporate (City)	997	0.4	11,957
Growth factors (see Appendix I, p v) were applied to baseline year data.			
HSU			
Electricity	6,636	2.5	40,237
Natural Gas	7,781	2.9	126,063
LPG	67	0.0	926
Green Electricity	0	0.0	10,059
Subtotal HSU	14,484	5.4	177,285
Growth factors (see Appendix I, p v) were applied to baseline year data.			
HSU Water Pumping			
Electricity	56	0.0	341
Subtotal HSU Water Pumping	56	0.0	341
Growth factors (see Appendix I, p v) were applied to baseline year data.			
PG&E Customers			
Electricity	40,234	15.1	243,941
Natural Gas	14,165	5.3	229,506
LPG	8	0.0	109
Subtotal PG&E Customers	54,407	20.4	473,556
Growth factors (see Appendix I, p v) were applied to baseline year data.			
Water Pumping- non HSU			
Electricity	534	0.2	3,236
Subtotal Water Pumping- non HSU	534	0.2	3,236
Growth factors (see Appendix I, p v) were applied to baseline year data.			
Subtotal Commercial	70,479	26.4	666,375
Industrial			
PG&E customers			
Electricity	30,740	11.5	186,375
Natural Gas	8,168	3.1	132,347
LPG	8	0.0	114
Fuelwood (Air Dry)	2,537	0.9	330,159
Subtotal PG&E customers	41,454	15.5	648,994
Growth factors (see Appendix I, p v) were applied to baseline year data.			
Subtotal Industrial	41,454	15.5	648,994

10/15/2002

Community Greenhouse Gas Emissions in 2010
Target Year Detailed Report

	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (million Btu)
Transportation			
Road Transportation			
Gasoline	105,098	39.3	1,211,060
Diesel	9,400	3.5	107,807
LPG	1,581	0.6	21,772
CNG	1,835	0.7	29,723
Subtotal Road Transportation	117,913	44.1	1,370,363
Growth factors (see Appendix I, p v) were applied to baseline year data.			
Subtotal Transportation	117,913	44.1	1,370,363
Waste			
Dry Creek Landfill- Ashland,OR			
Paper Products	-2,572	-1.0	
Food Waste	90	0.0	
Plant Debris	-1,028	-0.4	
Wood/Textiles	-1,185	-0.4	
Subtotal Dry Creek Landfill- Ashland,OR	-4,695	-1.8	
Growth factors (see Appendix I, p v) were applied to baseline year data.			
Subtotal Waste	-4,695	-1.8	
Other			
Cattle Methane			
Methane	1,396	0.5	
Subtotal Cattle Methane	1,396	0.5	
Growth factors (see Appendix I, p v) were applied to baseline year data for transportation of waste, and for methane generated at the wastewater treatment facility. No growth factor was applied to cattle generated methane.			
Sewage Gas/Methane Released			
Carbon Dioxide	672	0.3	
Subtotal Sewage Gas/Methane Released	672	0.3	
Growth factors (see Appendix I, p v) were applied to baseline year data.			
Transportation of Solid Waste			
Carbon Dioxide	510	0.2	
Subtotal Transportation of Solid Waste	510	0.2	
Growth factors (see Appendix I, p v) were applied to baseline year data.			
Subtotal Other	2,578	1.0	
Total	267,191	100.0	3,315,071

This report has been generated for Arcata, California with software created by Torrie Smith Associates for the Cities for Climate Protection Campaign of The International Council for Local Environmental Initiatives.

10/15/2002

Community Greenhouse Gas Emissions in 2010 Target Year Report by Source

	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (million Btu)
Electricity	98,086	36.7	594,696
Natural Gas	49,062	18.4	794,918
CNG	1,835	0.7	29,723
Gasoline	105,098	39.3	1,211,060
Diesel	9,400	3.5	107,807
LPG	1,674	0.6	23,052
Fuelwood (Air Dry)	4,153	1.6	540,415
Green Electricity	0	0.0	13,345
Paper Products	-2,572	-1.0	
Food Waste	90	0.0	
Plant Debris	-1,028	-0.4	
Wood/Textiles	-1,185	-0.4	
Carbon Dioxide	1,182	0.4	
Methane	1,396	0.5	
Total	267,191	100.0	3,315,017

Fuel costs include Buildings, Vehicle Fleet, Streetlights and Water/Sewage sectors only.
This report has been generated for Arcata, California with software created by Torric Smith Associates for the Cities for Climate Protection Campaign of The International Council for Local Environmental Initiatives.

10/15/2002

Community Greenhouse Gas Emissions in 2010 Target Year Report by Sector and Source

	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (million Btu)
Residential Sector			
Electricity	19,147	7.2	116,091
Natural Gas	18,690	7.0	302,829
LPG	8	0.0	108
Fuelwood (Air Dry)	1,616	0.6	210,257
Subtotal	39,462	14.8	629,285
Commercial Sector			
Electricity	48,199	18.0	292,230
Natural Gas	22,203	8.3	359,742
LPG	77	0.0	1,057
Green Electricity	0	0.0	13,345
Subtotal	70,6479	26.4	666, 375
Industrial Sector			
Electricity	30,740	11.5	186,375
Natural Gas	8,168	3.1	132,348
LPG	8	0.0	114
Fuelwood (Air Dry)	2,537	0.9	330,159
Subtotal	41,454	15.5	648,995
Transportation Sector			
CNG	1,835	0.7	29,723
Gasoline	105,098	39.3	1,211,060
Diesel	9,400	3.5	107,807
LPG	1,581	0.6	21,772
Subtotal	117,913	44.1	1,370,363

This report has been generated for Arcata, California with software created by Torrie Smith Associates for the Cities for Climate Protection Campaign of The International Council for Local Environmental Initiatives.

10/15/2002

Community Greenhouse Gas Emissions in 2010
Target Year Report by Sector and Source

	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (million Btu)
Waste Sector			
Paper Products	-2,572	-1.0	
Food Waste	90	0.0	
Plant Debris	-1,028	-0.4	
Wood/Textiles	-1,185	-0.4	
Subtotal	-4,695	-1.8	
Other Sector			
Carbon Dioxide	1,182	0.4	
Methane	1,396	0.5	
Subtotal	2,578	1.0	
Total			
	267,330	100.0	3,315,017

This report has been generated for Arcata, California with software created by Torrie Smith Associates for the Cities for Climate Protection Campaign of The International Council for Local Environmental Initiatives.

BASELINE COMMUNITY ANALYSIS DATA AND CALCULATIONS INDEX

Appendix II
Data and Calculations

		Data Source	Page
INDUSTRIAL	**One Record**		
Baseline	Industrial Establishments	Anita Alexander, North Coast Labor Market Consultant	xi
	Industrial Employees	Anita Alexander, North Coast Labor Market Consultant	xi
	Floor Area	Brian Kang, City of Arcata GIS Specialist	xii
Fuel Type	ELECTRICITY	PG&E	vi
	NATURAL GAS	PG&E	vi
	FUELWOOD	North Coast Air Quality Resources Board	viii

TRANSPORTATION

Arcata Traffic Model Draft Development Report , Fehr and Peers Associates, Inc, 1997, in Draft Program EIR for the Arcata General Plan: 2020 and Local Coastal Land Use Plan , November 1998. xiv

Doby Class, City of Arcata Deputy Director of Public Works.

WASTE:

1990 City of Arcata Waste Generation Study by the Matrix Management Group xv

Gerald Kensfather, Humboldt County Waste Manager

Don Cordell, Manager of the Dry Creek Landfill, Medford Oregon

OTHER

Transportation of Solid Waste xxi

Sewage Gas xxii

Cattle methane xxiii

MEASURES

Arcata Community Forest xxiv

BASELINE CORPORATE (CITY FACILITIES AND OPERATIONS) ANALYSIS DATA AND CALCULATIONS INDEX

INTIAL INPUT DATA

GROWTH INCREASES PER SECTOR (EXPRESSED AS A PERCENTAGE)

DATA SOURCE: Draft Program EIR for the Arcata General Plan: 2020 and Local Coastal Land Use (Draft EIR).
US Census Bureau. http://factfinder.census.gov
Anita Alexander, North Coast Labor Market Consultant
California Integrated Waste Management Board (CIWMB)

ORIGINAL DATA:

Residential

Arcata **Population** 2000 (US Census)	Arcata Population 1997 (Draft EIR p.2-2)	Arcata Projected Population 2020 (Draft EIR p. 2-2)
[redacted]	16,400	[redacted]

Households

Arcata **Households** (US Census)	Arcata Estimated Existing Residential Units (Draft EIR p.3-22)	Arcata Projected Residential Units 2020 (Draft EIR p.3-22)
7051	[redacted]	[redacted]

Commercial

From Draft EIR p.3-14. Table 3-6

	Existing Jobs 1997	Projected Jobs 2020
Retail	2,481	3171
Service	3180	3775
Total:	[redacted]	[redacted]

From Anita Alexander, North Coast Labor Market Consultant (see)

2000 Commercial Employment in Arcata
8000

Industrial

From Draft EIR. p.3-14. Table 3-6

	Existing Jobs 1997	Projected Jobs 2020
Production	[redacted]	[redacted]

From Anita Alexander, North Coast Labor Market Consultant (see)

2000 Industrial Employment in Arcata
2950

Transportation

From Arcata Traffic Model Draft Development Report, Fehr and Peers Associates, Inc, 1997 in Draft EIR . p. 4-8., Table 4-3.

Current Total Peak VMT	Projected Total Peak VMT 2020
56,254	63,329

Waste

Tons produced in Arcata in 2000:
12,181 (see **xv**)

ADJUSTMENTS/ INTERPRETATIONS OF DATA:

The projected growth (expressed as % increase) for each sector was taken from the Draft EIR, for 2020, and cut in half to *estimate* growth for 2010.

There are discrepancies between the data we used for baseline numbers for each sector, and the data we used to calculate projected increases per sector. The most accurate numbers available were used for baseline figures. These numbers were sometimes drawn from the Drat EIR, but were often drawn from other sources. Data from the Draft EIR were primarily used to calculate projected increases per sector. These calculated growth amounts were then applied to the baseline figures for each sector.

The residential baseline figure of 16651 was used to calculate projected increase (by percentage) in residential sector.
To estimate increase in waste generation, by 2010, the current waste per person (in tons) was calculated. This number was then multiplied by the projected population for 2010.

The figures used for rate projections are highlighted in blue.
The figures used for baseline numbers are in boldface .

CALCULATIONS/ FINAL DATA:

Residential
Current Residential 16,651x=20,000= 1.20= 20% increase from 2000 to 2020. 20/2= **10%** increase by 2010.

Household
Current Household 8200x=9800=1.195= 20% increase from 2000 to 2020. 20/2= **10%** increase by 2010.

Commercial
5661(combined retail and service) x=6946=1.227= 22.7% increase from 2000 to 2020 = 22.7/2= **11.35%** increase by 2010.

Industrial
Current Production 4779x=6269= 1.3117= 31% increase from 2000 to 2020 = 31/2=**15.58%** increase by 2010.

Transportation
Current Total Peak VMT 56,254x=63,329= 1.125= 12.5% increase from 2000 to 2020= **6.25%** increase by 2010.

Waste
12,183 tons/ 16, 651 people= .73 tons/person in 2000.
16,651 x 1.10= 18,316 people in 2010 x .73 tons/person= 13,370.7 tons in 2010. 12,183x=13371=1.097=**10%** increase.

	Projected increase by 2020 (Draft EIR)	**Projected increase by 2010**
Residential	20%	**10%**
Households	20%	**10%**
Commercial	22.7%	**11%**
Industrial	31%	**16%**
Transportation	12.5%	**6 %**
Waste	NA	**10%**

ELECTRICITY and NATURAL GAS, PG&E Customers

DATA SOURCE: PG&E

ORIGINAL DATA:

Classification	*kWh*	*Therms*	*# of Customers*
Agricultural	6,212,901	656,852	83
Commercial	71,546,118	2,297,360	1206
Industrial	46,093,457	610,839	113
Unknown	4,990,368	150,558	478
Residential	34,358,187	3,058,883	7744

From PG&E. e-mailed data

ADJUSTMENTS/ INTERPRETATIONS OF DATA:
PG&E data was provided by PG&E Representative Robert Cherry 707-445-5627. PG&E gave electrical Usage in KWh and Natural Gas Usage in therms for 2000, for the entire zip code of 95521. This data was adjusted to account for the area of 95521 that extends beyond Arcata. The PG&E sectors also were adjusted to fit CCP software sectors.

Sectors
PG&E Data was given for agricultural, commercial, industrial, residential, and unknown. We put agriculture in with industrial.

Adjustment for Zip Code Discrepancy
PG&E lists 7,744 residential accounts in 95521. This is 693 (9.8%) more than residences listed in census data for 2000. This adjustment factor of 10% was applied to all numbers. Several commercial and industrial establishments have more than one account, so the residential discrepancy, was decidedly more accurate. Thus, all sector totals were reduced by 10%.

CALCULATIONS/ FINAL DATA:
Residential
34,358,187 - 10%= 30,922,368.3 Kwh
3,058,883 - 10% = 2,752,994.7 therms

Commercial
71,546,118 — 10% =64,391,506.2 Kwh
2,297,360 — 10% =2,067,624 therms

Industrial
46,093, 457 + 6,212, 901 = 52,306,358 — 10% = 47,075,722.2 Kwh
656,852 + 610,839 = 1,267,691 — 10% =1,140,921.9 therms

The **Unknown** energy category was not included. This exclusion may be balanced by the fact that energy usage of several agriculture & industry accounts in 95521, not within City limits, are included in the report. A portion of this **Unknown** number may be included at a later date.

LPG

DATA SOURCE: Amerigas Corp.

ORIGINAL DATA:
Total Amerigas LPG sales for Arcata area, not including the City government or HSU, in 2000:
3201 gallons

Total Amerigas LPG sales for City of Arcata for 2000.
220 gallons

Price per gallon:
$1.60

ADJUSTMENTS/ INTERPRETATIONS OF DATA:

The original total number of LPG sold in Arcata in 2000, was divided by three, to estimate numbers for residential, commercial, and industrial sectors.

CALCULATIONS/ FINAL DATA:
3201/ 3= **1067 gallons** for each sector (residential, commercial (non-HSU and non-City), industrial).

FUELWOOD DATA

DATA SOURCE: North Coast Air Quality Management District.
Bob Torzynski, 707-443-3093.
Information given by Telephone.

US Census Bureau. County Census data http://quickfacts.census.gov/qfd/states/06/06023.html

ORIGINAL DATA:
Humboldt County 1991 (90 data) 68,388 tons/yr of wood = 34,194 cords in 1990
LP = 1,459 tons of wood (2000)

County Census data http://quickfacts.census.gov/qfd/states/06/06023.html
Humboldt County Population 2000: 126,518
Population, percent change, 1990 to 2000 6.2%

http://www.arcatacityhall.org/profile.htlm
Humboldt County Population 1990: 119,118

Humboldt County population

1990	2000
119,118	126,518

ADJUSTMENTS/ INTERPRETATIONS OF DATA:
Residential
County residential estimates were adjusted for time (10 years from 1990 to 2000) and for assumed discrepancies between Arcata and Humboldt county numbers.

The 1990 data was adjusted to represent 2000, by applying the county residential growth rate for the time period (6.2% increase), to the fuelwood consumption.

The percentage of county represented by Arcata residents was multiplied by the fuelwood consumption calculated for 2000.

Industrial
Any industrial establishment burning wood for fuel, is required to report this use to the NCAQB. The only Arcata industrial facility on file for the baseline year (or any year after) is Louisiana Pacific.
The residential conversion of 2 tons wood/cord was used (From NCAQMD).

NCAQMD presumed that Arcata would have slightly less wood fuel consumption per capita, than the county average.

CALCULATIONS/ FINAL DATA:
Residential
34,194 cords in 1990 x (.062) = 2120.028 + 34194 = 36,314.028 cords in 2000 for Humboldt county
16,651Arcata residents/126518 Humboldt county residents = .13 (or 13%)
36314.028 cords x (.13)= **4,721 cords** of wood fuel used by Arcata residents in 2000.

Industrial
14,059 tons/ 2= **7,029.5 cords** in 2000.

HSU ENERGY

DATA SOURCE: George Wright, **HSU Plant Operations**

ORIGINAL DATA:
ELECTRICITY PURCHASED
Enron:
13,276,300 kWh

ELECTRICITY PRODUCED (Cogeneration)
1,033,052 KWh

NATURAL GAS PURCHASED
Contract with State Supplier
For cogen:
167,810 therms
For other uses:
967,897 therms.
TOTAL: 1,135,707 therms

LPG
9063 US gallons

ADJUSTMENTS/ INTERPRETATIONS OF DATA:
HSU s electricity was purchased from ENRON on 2000. According to HSU, Enron had a separate green mix constituting 20% of the electricity provided to HSU. This green mix was separate from any green in the regular mix, which constituted 80% of the electricity provided to HSU.

Also, a portion of the natural gas purchased powers the cogen. ICLEI staff recommend that natural gas being used to power the cogen., be counted in natural gas purchased/used. Therefore, the emissions from cogen. electrical/heat production are accounted for in natural gas purchased/used.

CALCULATIONS/ FINAL DATA:
Enron
13,276,300 kWh x 20% = **2,655,260** KWh Green
13,276,300 kWh - **2,655,260** KWh Green =**10,621,040** KWh Ungreen

Callfornia Mix
10,621,040 KWh

Green
2,655,260 KWh

Natural Gas (not for co-gen)
967,897 therms
For cogen:
\+ **167,810** therms
TOTAL: 1,135,707 therms

NOTES:
HSU electricity and natural gas figures are from the fiscal year 2000-2001. Propane is from 1999-2000.

ELECTRICITY ASSOCIATED WITH WATER PUMPING

DATA SOURCE: Humboldt Bay Municipal Water District
Jay Tarvin 443-5018, jtarvin@hbmwd.com.
Carol Rieche, Director of HBMWD

ORIGINAL DATA: From Jay Tarvin:

Start Date	End Date	Arcata Water Use (MG)	Arcata Usage as % of total municipal usage	Share of Power Use (kWh)	Share of Power Cost
########	1/21/2000	73.9	24.3%	86,376	$ 4,689
1/21/2000	2/22/2000	61.7	23.9%	85,112	$ 4,621
2/22/2000	3/22/2000	64.3	23.2%	82,442	$ 4,476
3/22/2000	4/22/2000	67.0	23.9%	85,081	$ 4,619
4/20/2000	5/19/2000	76.8	23.3%	82,800	$ 4,495
5/19/2000	6/21/2000	82.4	22.1%	78,595	$ 4,267
6/21/2000	7/21/2000	86.7	20.7%	73,881	$ 4,011
7/21/2000	8/21/2000	86.7	20.7%	73,848	$ 4,009
8/21/2000	9/20/2000	87.3	20.6%	73,321	$ 3,980
9/21/2000	########	79.3	21.4%	76,188	$ 4,136
10/19/00	11/17/00	78.4	23.0%	82,032	$ 4,453
11/17/00	12/19/00	57.5	20.9%	74,427	$ 4,040
	Totals -->	902.0		954,102	$ 51,796

Data sent to City Staff electronically, appeared as shown above.

HSU used 85 Million Gallons of water in 2000. HBMWD.

ADJUSTMENTS/ INTERPRETATIONS OF DATA:

Water is supplied to Arcata by the Humboldt Bay Municipal Water District.

According to Carol Rieche, Director of HBMWD, **water pumping** is responsible for 95% of the energy use involved with water supply. To calculate the amount of electricity associated with water pumping for the community, the KWh for water pumping only were used. Ms. Rieche also stated that HSU is the largest water user in Arcata, so an attempt was made to also identify the loads specific to HSU. A realistic estimate for KWh associated with HSU s water pumping was estimated by calculating the percentage of Arcata s water demand that comes from HSU. This percentage (9.4%) of the total Arcata KWh for water pumping was used to estimate the KWh due to HSU s water consumption.

CALCULATIONS/ FINAL DATA:

85 MG/ 902 MG= .094235033 or 9.4%
(.094235033)(954,102 KWh)= 89,909.83 KWh due to HSU water consumption.

	KWh	$	Totals- Million Gallons
Arcata	954,102	51,796	902
HSU	89,909.83	4880.9	85

COMMERCIAL AND INDUSTRIAL ESTABLISHMENTS AND EMPLOYEES

DATA SOURCE:
Anita Alexander, North Coast Labor Market Consultant
Labor Market Information Division of CA Development Department 1/23/02

ORIGINAL DATA:

To: City of Arcata
From: Anita Alexander, North Coast Labor Market Consultant
Labor Market Information Division of CA Employment Development Department

The data you requested on commercial and industrial employment in the City of Arcata follow:

3rd qtr 2000 employment in the industrial sector (which includes agriculture, construction, manufacturing and trucking) was **2950**. There are **160 establishments** in this sector.

3rd qtr 2000 employment in the commercial sector (which includes public utilities, wholesale trade, retail trade, finance, insurance and real estate, services and government) was **8000**; with **450 establishments**. HSU jobs were included.

e-mail to City Staff

ADJUSTMENTS/ INTERPRETATIONS OF DATA:
Ms. Alexander assembled the data provided by the State into categories to fit CCP software (see explanation above.)
Ms. Alexander s data were used for totals for all commercial and industrial sectors.
For community breakdowns in the commercial sector of the community analysis, HSU and the City were subtracted from total establishments, and their respective employees were subtracted from total employees:

CALCULATIONS/ FINAL DATA:
The data was used as provided by Ms. Alexander for totals.
For commercial Record breakdowns, the following calculations and data were used:

	Establishments	Employees
Commercial	450	8000
	- 1 (HSU)	- 1471 (HSU)
	-1 (City of Arcata)	- 217 (city of Arcata)
Total PG&E Customers Record	**448**	**6312**

HSU
DATA SOURCE:
Human Resources Department, HSU

ORIGINAL DATA:
Over the telephone: 4/02
Inlcudes part time and fulltime HSU employees for 3/31/2000: 1471

ADJUSTMENTS/ INTERPRETATIONS OF DATA:
None.
CALCULATIONS/ FINAL DATA:
None.

CITY OF ARCATA (CORPORATE)
DATA SOURCE:
City of Arcata Finance Department

ORIGINAL DATA:
The City had 217 Part and Full time Employees in 2000.

ADJUSTMENTS/ INTERPRETATIONS OF DATA:
None.
CALCULATIONS/ FINAL DATA:
None.

FLOOR AREA

DATA SOURCE: Brian Kang, **City of Arcata GIS Specialist**
ORIGINAL DATA:

	[redacted]	[redacted]	[redacted]
1	Central Business District	850930.8	19.5
2	General Commercial	1225862.7	28.1
3	General Commercial Planned Development	363812.5	8.4
4	Heavy Industrial	3207206.7	73.6
5	Industrial Commercial	2887644.3	66.3
6	Industrial Commercial Planned Development	317252.4	7.3
7	Public Facility	4317386.5	99.1
8	Public Facility - Parks	208256.6	4.8
9	Public Facility Planned Development	314568.9	7.2
10	Thoroughfare Commercial	1100311.9	25.2
11	Thoroughfare Commercial Planned Development	62848.7	1.44

ADJUSTMENTS/ INTERPRETATIONS OF DATA:
The zone desriptions 1-3, and 7-11, were counted as commercial for the purposed of this inventory. Zone descriptions 4-6 were counted as Industrial for this study, giving the following totals for square footage:

Commercial	8,443,978.6 sq.ft.
Industrial	**6,412,103.4** sq. ft

This square footage comes from GIS footprint data. Therefore, this is single story area, and does not incorporate multiple stories. The vast majority of commercial and Industrial facilities in Arcata are single story. This number is a ballpark figure, on the conservative side.

To ascertain Commercial minus City government and HSU:
8,443,978.6 - 1,464,178 (HSU) - 81,800 (City)= **6,898,000.6 sq. ft.**

CALCULATIONS/ FINAL DATA:
The above data was used.

HSU
DATA SOURCE: Debra Hopkins, Senior Planner
Humboldt State University
Arcata, CA 95521
v: 707.826.4111 f: 707.826.5703, dah3@humboldt.edu

ORIGINAL DATA:

In response to your request for campus building square footages to be used in the City of Arcata's greenhouse gas inventory program:

Campus buildings (main campus only): 1,130,636 gross square feet
Housing, including dining & residence halls: 333,542 gross square feet

e-mail to City Staff from Debra Hopkins

Note: In the above information, the housing, dining, and res. halls component is not included in the total Campus building figure.

ADJUSTMENTS/ INTERPRETATIONS OF DATA:

The total HSU Main campus (including residence halls) square footage was used: **1,464,178 sq. ft.**

CALCULATIONS/ FINAL DATA:
The original data was used.

FLOOR AREA (Cont)
CORPORATE
DATA SOURCE: Dan Diemer, **City of Arcata**
Kim Watson, **City of Arcata Superintendent of Public Works**

ORIGINAL DATA:
Dan Diemer, **City of Arcata**
Square Footage of City Buildings

Facility	Approximate Square Footage
Community Center	21,000
D Street Neighborhood Center	5,700
Redwood Lodge	2,400
SH	1,000
City Hall	16,000
AMIC	1,600
Library	5,600
TC	2,000
Judo Hut	2,600
Park Maintenance	2,500
Machato Barn	3,000
Miscellaneous	2,000

Kim Watson, **City of Arcata Superintendent of Public Works**

Facility	Approximate Square Footage
Wastewater Treatment Facility	18,000

ADJUSTMENTS/ INTERPRETATIONS OF DATA:
Corporate Square Footage (rough estimations) provided by Dan Diemer and Kim Watson were compiled for a total.

CALCULATIONS/ FINAL DATA:
Total Corporate Square Footage (approx): **83,400 sq.ft.**

NOTE:
The square footage of City buildings includes many buildings that are rarely used.

TRANSPORTATION

DATA SOURCE: Fehr and Peers, Transportation Consultants, Arcata Traffic Model, Draft Model Development Report. December 10, 1997.
California Transportation Department (CalTrans)
Doby Class, **City of Arcata Deputy Director of Public Works**

ORIGINAL DATA:
Fehr and Pehrs

Total peak VMT	56,254

	IN	OUT
External-External Traffic Model (Through Traffic)	4731	4850

Doby Class
Miles for study area through traffic: **3 miles** (from Humboldt County Mi. 85.5 to Humboldt County Mi. 88.5)
Traffic count at the corner of 18th and H street, conducted midweek by Department of Public works.

9/27/2000

Time	%of daily traffic
1600	8.7%
1700	8.1%

9/28/00

Time	% of daily traffic
1600	7.2 %
1700	7.5 %

ADJUSTMENTS/ INTERPRETATIONS OF DATA:
Peak VMT (PVMT) data calculated for the City of Arcata by Fehr and Peers was used as the baseline data. PVMT data represents one peak afternoon hour daily. This VMT data included external-external traffic, or through traffic from highway 101. After discussions with ICLEI technical consultant, the decision was made to remove the external-external traffic from our VMT model. This process produces a VMT value, representative of traffic patterns that will be more easily impacted with community measures.

To remove through traffic from the VMT data, the average of the external-external traffic from the Fehr and Peers model was multiplied by the distance of the 101 corridor from Samoa boulevard to the Guintolli exit. This distance is actually slightly less than the study area, giving us a conservative number. Fehr and Peers, calculated peak hour VMT, which is estimated by them to be 8% of daily VMT. This figure was double checked with traffic count data collected from the Department of Public Works. Peak hour traffic does appear to be approximately 8% of daily traffic flow. The newly calculated PVMT number (minus through traffic)was adjusted to daily VMT, by dividing by 8%.

A 1 % increase in traffic per year (Doby Class) was assumed.

CALCULATIONS/ FINAL DATA:
traffic In out
(4731 + 4850)/ 2= 4790 cars x 3 miles = 14, 370 (1997) x .01 = 143.7 + 14,370= 14513.7 (1998) x .01= 145 + 14513.7= 14658.8 (1999) x .01= 146.588 + 14658.8 = 14,805.4(2000) Through traffic PVMT

56,254 PVMT (1997) x .01= 562.5 + 56254= 56816.5 (1998) x .01= 568.2 + 56816.5= 57384.7 (1999) x .01= 573.8 + 57384.7= 57,958.5 (2000) PVMT

57,958.5 (total PVMT) — **14,805.4** (through traffic)= **43,153 PVMT**

43,153/ .08 = 539,412.5 daily VMT

Following ICLEI s suggestion, Arcata s daily VMT was multiplied by 330 days to accounts for fluctuation in weekday versus weekend and holiday traffic.

539,412.5 x 330 days= 178,006,125 Annual VMT

WASTE

DATA SOURCE: California Integrated Waste Management Board (CIWMB). **www.ciwmb.ca.gov**
Waste Generation Study for the City of Arcata. 1990. Table 1-1. The Matrix Management Group.

Gerald Kensfather, **Humboldt County Waste General Manger**
Don Cordell, **Manger of Dry Creek Landfill, Medford Oregon**

ORIGINAL DATA:
CIWMB

City/County	Tons Exported in 2000	% Waste Exported to Total Waste Disposed	Tons of Total Waste Disposed
Humboldt	78,850	86%	91,430
Arcata	11,828	97%	12,183

GHG Producing Waste Stream Composition, by percentage, from City and State

	1990 City Data	1999 Statewide Data. CIWMB
Paper	29.9	30.2
Plant	10.2	10.2
Food	10.5	15.7
Wood, furniture, textiles.	11.6	7.0
SUB TOTAL	62.2 %	63.1%
OTHER	37.8%	36.9%

Don Cordell, **Manger of Dry Creek Landfill, Medford Oregon**
Methane Recovery Rate:

ADJUSTMENTS/ INTERPRETATIONS OF DATA:

Note: Both the City and the State waste stream composition studies, listed other sources of organics which were not included in the CCP software categories. The City included Tires and Rubber (2.0%), and manure (0%) in organic waste; the State included manure (.1%) in organic waste. Neither of these sources were include in the waste stream analysis, here.
Current state-wide data was compared with older Arcata data, to decide which might be more accurate. The waste stream composition was very similar, so the 1990 Arcata waste stream percentages were applied to current tonnage data.

CALCULATIONS/ FINAL DATA:
The 1990 City Data percentages were applied to the total waste disposed listed above.
Total=12, 183 tons.

Waste stream Composition	
29.9	Paper
10.2	Plant
10.5	Food
11.6	Wood, furniture, textiles.
62.2 %	SUB TOTAL
37.8%	OTHER

NOTES:
There is a closed landfill located in Arcata. The County Waste manager is not aware of the landfill opening date, or how much garbage was dumped there. The landfill was closed in 1978 or 1979. There is no methane recovery at the site.

CORPORATE (CITY) ELECTRICITY, GREEN AND UNGREEN

DATA SOURCE:
For All Facilities, except for AMIC and the Treatment Plant:
ABAG, Association of Bay Area Governments Electricity, Online Account Billing Detail Report Invoices from.

For AMIC and the Treatment Plant:
PG&E Audit for the City of Arcata, January 1999.

ORIGINAL DATA:
ABAG

	BUILDINGS Account Rollups: **75, 85, 91**		**STREET LIGHTS** Account Rollup: **41**		**PARKS** Account Rollup: **81**		**WATER/ SEWAGE** Account Rollups: **51, 64, 67**	
2000	**KWh**	**$**	**KWh**	**$**	**KWh**	**$**	**KWh**	**$**
JANUARY	30102	2439.30	31677	2581.57	5525	515.93	29614	2712.72
FEBRUARY	31412	2267.78	27995	2122.86	4716	449.87	28883	2790.45
MARCH	31380	2486.79	27960	2155.97	3933	355.46	27562	2423.28
APRIL	30306	2432.14	27929	1989.40	3682	368.77	29598	2801.08
MAY	2874	297.17	27728	2120.35	579	314.18	26662	2478.70
JUNE	30761	3279.79	27897	2146.60	2788	284.93	28753	2806.28
JULY	4870	111.17	27896	2148.73	762	110.53	11017	1169.71
AUGUST	86000	9126.01	459	64.34	14466	1262.91	58895	6082.09
SEPTEMBER	29917	4082.02	55245	4267.99	70	42.23	20327	2058.70
OCTOBER	76450	10400.34	28119	2270.09	9819	1072.46	73972	8246.33
NOVEMBER	44886	2438	27877	2227.75	3536	385.84	31664	2177.46
DECEMBER	46082	1520.93	27893	457.19	4109	116.51	35950	986.21
TOTALS	**445040**	**40881.44**	**338675**	**24552.84**	**53985**	**5279.62**	**402897**	**36733.01**

TOTAL ABAG KWh 2000: 1,240,597

PG&E 1999 Audit

Facility	**Account #**	**Annual KWh s**	**Annual Charges**	**Average KWh Charge**
Interpretive Center	TLF-23-32661	2736	$ 307	$ .11
Treatment Plant	TLF-23-33201	805,680	$ 65,530	$ .08

TOTAL PG&E KWh 2000: 808,416

ADJUSTMENTS/ INTERPRETATIONS OF DATA:

Energy expenditures listed in the above chart, do not include energy taxes, but do include distribution charges as included in totals for monthly ABAG and PG&E billing.

Rollup 81 has been divided between Buildings and Streetlights , based on the delineation between park buildings and park lighting by Dan Diemer, the City of Arcata s Parks Superintendent. Approximately 94% of the Parks Rollup KWh is from Park lighting, and approximately 6% is from Park Buildings. This estimate was calculated from typical monthly KWh usage divided into building accounts and park lighting accounts.

According to ABAG Representative, Jerry Lahr and Connie Stewart, City Council Member, our ABAG electricity ranged from 60-90% green during 2000. Our electricity was 60% green from January — September of 2000, and 90% green from October to December of 2000. PG&E electricity generally follows California coefficients already entered into CCP software.

CALCULATIONS/ FINAL DATA:

J----------O----------D
60% Green 90% Green

Parks * (81)	Total KWh	Total Cost	% Green	Green Kwh	Green Cost	Ungreen Kwh	Ungreen Cost
	53985	5279.62					
J-S	36521	3662.58	0.60	21912.6	2197.48	14608.4	1465.1
0-D	17464	1617.04	0.90	15717.6	1455.336	1746.40	161.70
			TOTAL	**37630.20**	**3652.82**	**16354.80**	**1626.80**
	Lights		x .94	35372.38	3433.65	15373.51	1529.19
	Buildings		x .06	2257.81	219.17	981.29	97.61

*Parks were divided into Buildings and Streetlights and added to those sections below.

Buildings (75, 85, 91)	Total KWh	TOTAL COST	% Green	Green Kwh	Green Cost	Ungreen Kwh	Ungreen Cost
	445040	40881.44					
J-S	277622	26522.17	0.60	166573.2	15913.30	111048.8	10608.87
0-D	167418	14359.27	0.90	150676.2	12923.34	16741.8	1435.93
			SUBTOTAL	317249.4	28836.64	127,790.6	12044.8
			+ Parks (81) blngs.	2257.81	219.17	981.29	97.61
			TOTAL	**319,507.21**	**29055.81**	**128,771.89**	**12142.41**

Streetlights (41)	Total KWh	TOTAL COST	% Green	Green Kwh	Green Cost	Ungreen Kwh	Ungreen Cost
	338675	24552.84					
J-S	254786	19597.81	0.60	152871.6	11758.69	101914.4	7839.12
0-D	83889	4955.03	0.90	75500.10	4459.53	8388.9	495.50
			SUBTOTAL	228371.7	16218.22	110303.3	8334.62
			+ Parks (81) lights	35372.38	3433.65	15373.51	1529.19
			TOTAL	**263,744.08**	**19651.87**	**125,676.81**	**9863.81**

Water / WW (51,64,67)	Total KWh	TOTAL COST	% Green	Green Kwh	Green Cost	Ungreen Kwh	Ungreen Cost
	402897	36733.01					
J-S	261311	2532.01	0.60	156786.6	15193.81	104524.4	10129.20
0-D	141586	11410	0.90	127427.4	10269	14158.6	1141
			SUBTOTAL	**284214**	**25462.81**	**118,683**	**11270.20**
			PG&E			**808,416**	**77107.20**
			TOTAL	**284,214**	**25,462.81**	**927,099**	**88,317.40**

TOTAL ELECTRICITY	GREEN kWh		UNGREEN kWh	
	867,465.29	**$74,170.49**	**1,181,547.70**	**$110,323.62**

CORPORATE (CITY) NATURAL GAS

DATA SOURCE:
PG&E Audit for the City of Arcata, January 1999.

ORIGINAL DATA:

	Annual Therms	Annual Charges	Average Therm Charge
Treatment Plant	19,738	$ 7,304	$0.37
TOTAL City	**37,584**	**$16,132**	**$0.43**

ADJUSTMENTS/ INTERPRETATIONS OF DATA:
The treatment plant was subtracted from the total City usage, and the two numbers were entered in the appropriate categories.

CALCULATIONS/ FINAL DATA:
37,584- 19,738 = 17,846 therms: buildings
19,738 therms: treatment plant (water/sewage)

$ 16,132- 7,304 = $8,828: buildings
$ 7,304: treatment plant (water/sewage)

CORPORATE FLEET

DATA SOURCE:
City of Arcata, Public Works Department

ORIGINAL DATA:

2000	Fuel	Gallons	Cost ($)	Miles
Vehicle Fleet	Diesel	9218.680	12,097.86	Total diesel & unleaded:
	Unleaded	23,723.946	36.297.05	437,408.9
	CNG (2 trucks)	-	-	2085
Mad River Transit	Diesel		26,619.33	86,154
	Unleaded		693.10	15,384

ADJUSTMENTS/ INTERPRETATIONS OF DATA:
To estimate gallons for diesel and unleaded fuel used by transit vehicles, cost per gallon for fleet vehicles were estimated and applied to transit vehicle costs.

To estimate mileage for diesel and unleaded fleet vehicles, a ratio of diesel gallons to unleaded gallons was calculated and applied to the total mileage. This method is a rough estimation, and does not accurately take differences in fuel efficiencies for diesel and unleaded vehicles.

CALCULATIONS/ FINAL DATA:
Fleet Diesel: $12,097.86/ 9218.680 gallons = $1.3123/gallon
Transit Diesel: $26,619.33/ $1.3123 per gallon = 20284 gallons
Fleet Unleaded: $36,297.05/ 23, 723.946 gallons = $1.529/gallon
Transit Unleaded: $ 693.10/ $1.529 per gallon = 453.30 gallons
9218.680 + 23,723.946 = 32,942.63 9218.680/ 32,942.63 = .2798
.2798 (437,408.9) = 122,387 miles 437,408.9- 122,387= 315,021.9 miles

2000	Fuel	Gallons	Cost ($)	Miles
Vehicle Fleet	Diesel	9218.680	12,097.86	122,387
	Unleaded	23,723.946	36,297	315,021.9
	CNG (2 trucks)	-	-	2085
Mad River Transit	Diesel	20284	26,619	86,154
	Unleaded	453	693	15,384

CORPORATE WASTE

DATA SOURCE:
No data was available for the City of Arcata s waste generation. ICLEI staff provided data from another community analysis, that may reflect the City of Arcata s waste stream. In their inventory, the City of Chicago references methodology and estimates provided by the following:

Guide to Resource Conservation and Cost Savings Opportunities for Office Buildings by Engineering Interface Limited in association with RIS Limited for the Ontario Ministry of the Environment, 1997, p 3.

ORIGINAL DATA:
The City of Chicago conducted a waste analysis, where they estimated the average lbs. of waste generated per employee, per year. This number was estimated by taking the total amount of waste generated (in lbs), and dividing by the total number of employees. They estimated for three waste generation scenarios: low , medium , and high . The low estimate was 520 pounds per employee, per year.

This same document presented the waste stream composition for a typical office:

Paper:	54%
Newsprint:	2%
Cardboard:	10%
Yard waste:	9%
Food:	13%
Plastic:	8%
Metal:	2%
Glass:	2%

ADJUSTMENTS/ INTERPRETATIONS OF DATA:
Arcata s employees were assumed to be on the low side of waste generation. The City of Arcata has had a comprehensive and expanding facility recycling program, for over a decade. As such, we used the estimate of 520 lbs. of waste per employees per year.

The City conducted a major retrofit, during the baseline year of 2000, generating construction waste. Construction waste is not taken into account with the above estimations. However, it must be noted, that construction waste has a very low percentage of organics. Thus, for the purposes of this study, the construction waste figures are not necessary.

The waste stream breakdowns were entered in the appropriate software categories.

CALCULATIONS/ FINAL DATA:

(217 employees) x (520 lbs. of waste/ employees/ year) = 112,840 lbs waste/year.
1 ton= 2000 lbs.
112,840/2000= 56.42 tons/year.

TRANSPORATION OF SOLID WASTE **OTHER**

DATA SOURCE:
Waste Solutions, Trucking Company.
ICLEI.

ORIGINAL DATA:
Waste Solutions, Trucking Company.

24.1 tons of waste per trip from Arcata to Medford.

410 miles roundtrip from Arcata to Medford.

Estimated fuel efficiency: 5 mpg, diesel fuel.

ICLEI.

Emissions: 22.384 lbs. of CO_2 per gallon of diesel.

ADJUSTMENTS/ INTERPRETATIONS OF DATA:
The numbers of trips traveled by the Waste hauling company were estimated by dividing the known tonnage of waste hauled for 2000 by the estimated tonnage hauled per trip. Then, the miles traveled by the Waste hauling company were estimated by dividing the trips made by the round trip mileage between Arcata and the Medford landfill. This annual mileage was then divided by the fuel efficiency of 5 mpg for the trucks for total gallons used for waste transport in 2000. Then, the annual gallons were multiplied by the estimated emissions of CO_2 per diesel gallon.

CALCULATIONS/ FINAL DATA:
12,183 tons in 2000/ 24.1 tons per trip= 505.5 trips to Medford x 410 miles per trip = total 207,255 miles traveled.

207,255/ 5 mpg= 41,451 gallons. X 22.3842=

927,847.47 lbs. of CO_2 in 2000.

SEWAGE GAS **OTHER**

DATA SOURCE:
Dave Couch, **City of Arcata Water/Wastewater Operator**
ICLEI staff, from:
www.eia.doe.gov
Wisconsin Energy Bureau.
www.wifocusonenergy.com/renewable/wastewat.pdf

ORIGINAL DATA:
Dave Couch, **City of Arcata Water/Wastewater Operator**

2000	Volatile Solids destroyed (#)
January	18247
February	20957
March	22182
April	22112
May	18491
June	26088
July	25006
August	13825
September	28028
October	35366
November	36429
December	39564
TOTAL	306,295

Wisconsin Energy Bureau.
Madison Wisconsin Sewerage District estimated that 60% of their sewerage gas was methane.

ADJUSTMENTS/ INTERPRETATIONS OF DATA:
According to Dave Couch, the amount of sewage gas created by volatile solids destroyed by the sewage digester, can be estimated by multiplying total volatile solids by 15. Mr. Couch also estimates that roughly 50% of this gas is used to heat the digester, and roughly 50% is released to the atmosphere.

Madison Wisconsin Sewerage District estimated that 60% of their sewerage gas was methane. Therefore, 60% of the sewage gas released was reported as methane released, under Other.
Also, from ICLEI staff: 1 million cubic feet of methane= 443.5 tons eCO_2 (www.eia.doe.gov)

CALCULATIONS/ FINAL DATA:
306,295 x 15 = **4,594,425** cubic feet/gas created in 2000
50% x 4,594,425 cubic feet/gas = **2,297,212.5** cubic feet/gas released in 2000
2,297,212.5 cubic feet/gas used in 2000

2,297,212.5 (.6)= **1,378,327.5** Cubic feet of methane released.
1378327.5 /1million= 1.378 x 443.5= **611.28** tons eCO_2

CATTLE METHANE **OTHER**

DATA SOURCE:
Gary Markegard, **Farm Advisor, UC Davis**
EPA inventory of US Greenhouse Gas Emissions and Sinks: 1990-1999 Annex J.

ORIGINAL DATA:
Gary Markegard, **Farm Advisor, UC Davis**

270 animal units of Dairy Cattle

370 animal units of Beef Cattle

EPA inventory of US Greenhouse Gas Emissions and Sinks: 1990-1999 Annex J.

Dairy Cows-111 kg/methane/head/year
Beef Cows- 82 kg/methane/head/year

ADJUSTMENTS/ INTERPRETATIONS OF DATA:
An animal unit= 1000 lbs of cow. At various times of the year, there are many cows smaller than this. Also, at various times of the year, many cows are not pastured within city limts. The animal unit numbers were mutilplied by the beef and dairy cow coefficiecnts provided by ICLEI.

CALCULATIONS/ FINAL DATA:
270 Dairy cow units x 111 kg/methane/year= 29,970 kg methane/year
370 Beef cows units x 82 kg methane/head/year= 30,340 kg methane/year

29,970 + 30,340 = **60,310 kg methane/year**

ARCATA COMMUNITY FOREST **OTHER**
Sequestration of CO_2

DATA SOURCE:
Prichard, S.J., L.A. Wayburn, and M.A. White. 2000.
Modeling carbon storage in redwood forests with different
management scenarios.
http://nature.berkeley.edu/~jleblanc/WWW/Redwood/rdwd-Modeling.html

1999 Timber Management Plan, City of Arcata

ORIGINAL DATA:
Mark Andre, Deputy Director of Environmental Services, 1999 Timber Management Plan, City of Arcata

Community Forest Acres: 1150 acres (includes Jacoby Creek Acquisition)
Harvest rate: 50% of new growth in 65% of forest. (Harvest is not allowed in 35% of the forest area).
Average age of trees: Arcata Community Forest = 120 years. Jacoby Creek Forest: 90 years.

From Prichard, etal. 2000.
The following data represents the annual carbon storage (in metric tons of Carbon per hectare) for a coastal redwood forests (75% Redwood & 15% Doug-Fir), that has been harvested over time with a Stewardship Model (selectively harvested at 20 year intervals). The average age of trees in the stand were 60 years, at beginning of the study.

Time	Metric tons of live Carbon/ hectare/ year	Harvest Volume m3/hectare
10	347.2	
20	279.7	657.2
30	373.5	
40	368.1	870.0
50	454.9	
60	427.8	1126.1
70	508.4	
80	465.8	1413.4
90	542.4	
100	489.1	1722.6
110	569.0	
120	511.1	2053.1
130	576.5	
140	513.6	2391.8

ADJUSTMENTS/ INTERPRETATIONS OF DATA:
Prichard etal (2000), estimated the sequestration capacity, over time, of coastal Redwood Forests, being harvested with stewardship and industrial models. We used data from the stewardship model , to assess sequestration capacities from the Arcata Community Forest. The average age of trees in the Arcata Community Forest is 120 years. The average age of trees in the Jacoby Creek Forest is 90 years. Therefore, the average age of the two forests (100 years) was used to estimate annual carbon storage from Prichard s research. Given the average age of the study forest was 60 years at the beginning of the study, it was assumed that the average age of the forest would be 100 years after 40 study years.

To estimate annual growth , or carbon sequestration, in the forest, the change in biomass between two periods where no harvest took place was used. Harvest only took place every 20 years. There was no harvest between the study period of 40 and 50 years (when average age of study forest would approximate average age of Arcata Community Forest). The growth from decade to decade (for decades where the forest wasn t harvested) ranged from 59.8 metric tonnes of carbon per hectare per decade to 94 metric tonnes of carbon per hectare per decade for the study period, with **an average growth of 77.52 metric tones of carbon per hectare per decade**. The decade growth was divided by ten to estimate the average annual growth for non-harvest periods. The average annual growth during the study period, in non-harvest decades, was 7.752 metric tonnes of carbon per hectare. The growth during the study decade from 40 to 50 years, is 86.8 metric tonnes of carbon per hectare, or 8.68 metric tones of carbon per year. **The more conservative average of 7.752 metric tones of carbon per year will be used for our estimation.**

To include the impact of annual timber harvest upon carbon sequestration capacity, the annual harvest rate (50% of new growth) was subtracted from the estimated annual carbon growth rate (storage) for the harvest area. This amount of Carbon storage was added to the estimate for unharvested area.

Appendix II
Data and Calculations

CALCULATIONS/ FINAL DATA:
77.52 metric tC ha^{-1} per decade ÷ 10=7.752 metric tC ha^{-1}/ year growth.
7.752 metric tC ha^{-1}/ year ÷ 2.471 acres/ hectare= 3.13719 metric tC/ acre/year.
1150 acres x .65 (the acreage harvestable) = 747.5 acres in harvest area & 402.5 acres non-harvestable

747.5 acres x 3.13719 metric tC/ acre/year = 2345.04 metric tC/year growth in harvest area
2345.04 metric tC/year (amount of annual carbon growth) x .50 (amount of growth harvested annually)=
1172.52 metric tC/year sequestered in harvest area.

402.5 acres x 3.13719 metric tC/ acre/year = 1262.7 metric tC/year
1262.7 metric tC/year sequestered in non-harvest area.

1172.52 + 1262.7= **2435.22 metric tC/year sequestered in Community forest=**
2435.22 metric tC/year x 1.10231 short tons/ 1 metric tonne= 2684.367 short tons/ Carbon/ year sequestered =
2684.367 short tons Carbon/ year x 3.667 short tons of CO^2/ 1 short ton of Carbon = 9843.57 short tons of CO^2/ yr

9843.57 short tons of CO^2/ yr are sequestered by the Arcata Community Forest and Jacoby Creek Forest.

Appendix B:

Complete List of Measures That Were Considered for Inclusion in the City of Arcata's Greenhouse Gas Reduction Plan

Measure Group	Measure ID	Measure Name	Ongoing, Expanded, New	Total Score*
Energy Efficiency	**E1**	**Encourage Energy Conservation in Residences & Businesses (Behavior, Management, Small-Scale Retrofits)**	Expanded	15.6
	E1.1	Education/Outreach: Materials, Presentations, Events, PSA's Targeted at Residents, Businesses, Schools/Students & Community Groups	Expanded	13.8
	E1.1a	Promote existing eneregy efficiency programs	Expanded	14.8
	E1.1b	Energy Efficient appliances, powerstrips, office equipment compact fluorescents, water-heating blankets, weatherstripping, etc	Expanded	13.5
	E1.1b-1	Compact Fluorescent Program	New	14.5
	E1.1c	Load shifting.	Expanded	12.2
	E1.2	Energy Efficient Equipment Purchasing Policies	New	14.3
	E1.3	Incentives/ Rewards	New	13.2
	E1.3a	Reward/Acknowledge Businesses who achieve reductions	New	14.8
	E1.3b	Create a Fund for Energy Efficiency Upgrades	New	12.7
	E1.3b-1	Revolving loan fund for community investment in eneregy efficiency	New	12.2
	E1.3c	Aide to Low Income Households for Energy Efficiency Projects	Expanded	13.0
	E1.3d	Redwood Community Action Agency low income weatherization	Expanded	13.7
	E2	**Develop Energy Efficient Housing & Commercial Building Design/Stock (New and Existing Infrastructure)**	New	16.5
	E2.1	Develop/Promote Community Services to increase Energy Efficiency		14.4
	E2.1a	Promote Energy Audits for Residents and Businesses	New	15.5
	E2.2	Create Policy requiring Upgrades in New & Existing construction		14.3
	E2.2a	Include/Enforce Energy Efficiency in Building & Land Use Codes	Expanded	15.7
	E2.2a-1	Go "Beyond" Title 24 for new & retrofit construction	New	13.3
	E2.2b	Green Building Practices	New	15.3
	E2.2c	Mandate Solar Passive Design & Day Lighting in Construction of All New Buildings	New	16.2
	E2.2d	Require energy audits and efficiency upgrades at the time of building sale	New	12.8
	E2.3	Profesional Training	New	11.8
	E2.3a	Weatherization: training/ programs	Expanded	13.0
	E3	**Energy Efficiency in City Operations (seeE 6.2 also)**	Expanded	15.2
	E3.1	Retrofitting Municipal Buildings	Expanded	13.9
	E3.2	Standards for New Municipal Construction		14.5
	E3.2a	Green Building Standards for City Buildings	New	15.2
	E3.3	Efficiency in Street Lighting	Expanded	14.3
	E3.4	Load Management/ Energy Management	Expanded	14.0
	E3.5	Employee Training	Expanded	13.0
	E3.6	Purchasing Policy	New	14.5
	E3.7	Create Sustainable funding mechanism for Energy Efficient Upgrades	New	13.4
	E4	**Regional Partnerships/Collaboration**	Expanded	13.5
	E4a	District Heating & Cooling Systems	New	11.0
	E5	**Lobbying/Political Action for Energy Efficiency**		16.1
	E5a	Work to improve Local Representation/Accuracy in Title 24 criteria	Expanded	14.7

Measure Group	Measure ID	Measure Name	Ongoing, Expanded, New	Total Score*
	E6	**Community Water Conservation**	Expanded	15.4
	E6.1	Education Materials/Outreach	Expanded	11.8
	E6.2	City Retrofits	Expanded	13.2
	E6.3	Improved Stormwater Drainage	Expanded	10.1
	E6.3a	Encourage porous paving/sufaces	Expanded	10.0
Renewable Energy	**RE1**	**Encourage Purchase of RE (if possible).**	New	15.8
	RE1.1	Education/Outreach: Materials, PSA's, presentations, events	Expanded	11.9
	RE1.2	City purchase of renewable energy (if possible).	Renew	13.0
	RE2	**Encourage Installation of RE/Solar**	Expanded	15.1
	RE2.1	Education/Outreach: Materials, PSA's, presentations,events	Expanded	13.4
	RE2.1a	Promote exisiting programs	Expanded	13.3
	RE2.1b	Solar Works promotional program	Expanded	13.2
	RE2.1c	Professional Training	New	11.3
	RE2.1d	Resource library	Expanded	11.2
	RE2.1e	Cogeneration	New	12.2
	RE2.2	Promote renewable energy in Building and Land Use Codes	Expanded	15.0
	RE2.2a	Incentives, requirements, solar rights	Expanded	13.8
	RE2.2b	Active implementation of solar shade control act	Expanded	13.3
	RE2.3	Financial Incentives/Rebates to Solar Installers	Expanded	14.1
	RE2.3a	Promote exisiting programs	Expanded	14.8
	RE2.3b	Create a Renewable Energy Fund	New	12.3
	RE2.3b-1	Revolving loan fund for community investment in RE	New	12.7
	RE2.3c	Production Incentives for PV Installations	New	12.8
	RE2.3d	City involved with bulk purchase	New	11.7
	RE3	**Install Renewable Energy on City Facilities**	Expanded	14.8
	RE3.1	Physical Installations		14.1
	RE3.1a	Place solar electric systems on city facilities	Expanded	14.3
	RE3.1a-1	PV on City Hall	New	14.2
	RE3.1b	Solar Hot Water Systems in Municipal Buildings	New	12.5
	RE3.1c	Biogas use @ wastewater treatment facility	Expanded	13.5
	RE3.2	Create Funding Plan for renewable energy on City Facilities		12.9
	RE3.2a	Create a Renewable Energy Fund	New	10.1
	RE4	**Regional Partnerships/Efforts**	Expanded	14.0
	RE4a	Participate with Redwood Coast energy Authority (RCEA)	Expanded	13.3
	RE4a-1	Join Million Solar Roofs Campaign via RCEA	New	13.5
	RE4b	Promote Regional renewable energy Commerical Development	New	12.8
	RE4c	District Heating & Cooling Systems	New	11.0
	RE5	**Lobbying/Political Action for renewable energy**		13.7

Measure Group	Measure ID	Measure Name	Ongoing, Expanded, New	Total Score*
Transportation	**T1**	**Incorporate Energy/Climate Policy into City Transportation Plan**	Expanded	17.4
	T1.1	General	Expanded	13.8
	T1.1a	Spokes-of-the wheel design	New	11.8
	T1.1b	Infill	Ongoing	13.3
	T1.1c	Mixed-Use	Ongoing	13.5
	T1.1d	Change parking policies	Expanded	14.7
	T1.2	Improved Bicycle Infrasturcture	Expanded	15.9
	T1.2a	Bicycle Plan	Expanded	16.3
	T1.2b	Extend/Imporve bike lanes	Expanded	15.2
	T1.2b-1	Car-free paths	New	14.3
	T1.2b-2	Connected City/ Regional Lanes	Expanded	14.5
	T1.2b-2a	Bike Lanes between Eureka / Mckinleyville & Arcata	Expanded	15.3
	T1.2c	Bike lockers/bike stations/stands	Expanded	14.3
	T1.3	Improve Pedestrian Infrastructure	Expanded	14.6
	T1.3a	Pedestrian Master Plan	Ongoing	15.2
	T1.3b	Extend/Improve sidewalks & pedestrain safety	Expanded	13.8
	T1.3c	Widen sidewalks	Expanded	12.7
	T1.3d	Beautify pedestrian zones	Expanded	13.8
	T1.3e	Create Car-free zones	New	13.2
	T1.4	Improve Mass Transit Infrastructure	Expanded	15.5
	T1.4a	Use Public Parking Fees to Fund further subsidized public transit	Expanded	15.2
	T1.4b	Extend hours of service & frequency of buses to Arcata Outskirts	Expanded	16.0
	T1.4c	Cleaner fueled Transit	New	14.2
	T1.5	Improve Infrastructure for Alternative Fueled Vehicles	New	12.9
	T1.5a	Provide public renewable charging stations	New	11.8
	T1.5b	Collaborate Regionally .	Expanded	11.8
	T2	**Promotion/Educational Campaign to Discourage Driving:** Promote walking, bicycling, taking public transport, ridesharing, alternative fueled vehicles, telecommuniting.	Expanded	14.9
	T2.1	Support Existing Local Sustainable Transportation Efforts	New	16.2
	T2.2	Events: car free days/events, bike to work day	Expanded	13.5
	T2.3	Promote Car Sharing	New	14.3
	T2.3a	Carpool/ carshare programs	New	14.5
	T2.3b	Collaborate regionally in transport planning	Expanded	14.3
	T2.3c	Commuter Trip Reduction Program	New	14.2
	T3	**Incentives for People not to Drive/Disincentives for those who drive**	Expanded	14.6
	T3a	Parking incentives to drivers of AV's	Expanded	14.0
	T3b	Preferential parking	New	13.8
	T3c	Subsidize transit	Expanded	13.8
	T3d	Employees incentives to take transit, carpool, etc.	New	15.7
	T3e	Incentives to Businesses to reduce employee vehicle use	New	15.0
	T3f	Tax Businesses that utilize public parking for employees	New	14.2
	T3g	Incentives for carless people	New	13.7
	T3h	Finance Carpooling	New	12.2
	T3i	Rideshare Trust Fund:	New	12.7

Measure Group	Measure ID	Measure Name	Ongoing, Expanded, New	Total Score*
	T3j	Subsidize Arcata's Library Bike Program (shop space, employment)	Ongoing	13.0
	T3k	Encourage car insurance companies to offer pay by the mile	New	11.5
	T4	**City Fleet Greening**	Expanded	14.7
	T4.1	Policy of purchasing fuel efficient new vehicles/ alternative fuel vehicles	Expanded	15.7
	T4.2	Make modifications to city fleet	Expanded	14.4
	T4.2a	"Downsizing" the fleet	Expanded	14.7
	T4.2b	Retire old & underused vehicles	Expanded	15.3
	T4.2c	Efficient use of vehicles	Expanded	17.3
	T4.3	"Green" mass transit	New	14.6
	T4.4	City contracts with haulers,etc. specifiy alternative fuel vehicles	New	13.2
	T5	**City Employee Transportation Program**	Expanded	13.2
	T5.1	Infrastructure development		13.9
	T5.1a	Provide bike locker stations for City employees	New	13.0
	T5.1b	Car pooling network for city employees	New	14.8
	T5.2	Incentives		12.9
	T5.2a	Allocate library bikes to City employees	Ongoing	12.3
	T5.3	Education/Events		12.8
	T5.3a	Establish "Bike to work day" once a month: City employees	New	13.3
	T6	**Regional Partnerships/Collaboration**	Expanded	14.1
	T6a	Become a DOE Clean City's Partner	New	13.5
	T6b	Improve Regional Infrastructure for Cleaner vehicles	New	13.0
	T6c	Improve Regional Bicycle infrastructure	Expanded	14.0
	T7	**Lobbying/ Political Action for Efficien and Non-Polluting Transporation Options/Alternatives**	Expanded	16.2
	T7a	Lobby for alternative fuel vehicle legislation	Expanded	17.5
	T7b	Lobby for improved CAFÉ standards	Expanded	17.7
Waste/Consumption	**W1**	**Create Waste/ Consumption Reduction Strategy (R's)**	Expanded	13.9
	W1.2	Implement recommendations of City Waste Reduction Task Force	Expanded	13.4
	W2	**Include Waste Reduction in Community Building & Planning**	Expanded	13.6
	W2.1	Industrial Ecology (waste to use siting/planning)	New	14.9
	W2.2	Incorporate waste/consumtpion reduction in municpal codes.		15.6
	W3	**Education/Outreach:** Materials, events, training, etc. on R's, Composting, brush-drop	New	13.8
	W3a	Backyard Composting workshops	Expanded	13.2
	W3b	Office Paper Recycling	Expanded	13.7
	W4	**Incentives**	Expanded	13.2
	W4a	City Subsidized Recycling	Expanded	12.5

Measure Group	Measure ID	Measure Name	Ongoing, Expanded, New	Total Score*
	W4b	City provide free composting bins	Ongoing	11.8
	W5	**Municipal Waste Reduction**	Expanded	12.9
	W5.1	Recycling in City Facilities	Expanded	13.6
	W5.2	Purchasing Policies	New	14.8
	W5.3	Employee education	Expanded	13.4
	W6	**Regional Partnerships/Collaboration**		15.5
	W6a	Humboldt Waste Management Authority	Expanded	13.3
	W7	**Lobbying/Political Action for Waste/ Consumption Reduction**		14.0
Sequestration/Other	**O1**	**Sequestration**	Expanded	15.0
	O1.1	Community Forest	Ongoing	15.7
	O1.2	Urban Tree Planting	Expanded	15.5
	O1.2a	Create a Plan for in-town City Forestry/Planting	Expanded	14.8
	O2	**Methane Reduction**	Expanded	12.2
	O2a	Install biogas generator at wastewater treatment plant.	New	13.7
	O3	**Regional Partnerhips**		13.7
	O4	**Lobbying/Political Action for Carbon Sequestration**	Expanded	13.6
	O4a	Support Statewide Reforestation Efforts & Reduce Non-Sustainable Timber Harvest Plans	Expanded	14.8
Cross-Cutting	**M1**	**PR campaign/ 20 % challenge: Targeting all categories of GHG Emissions:** Residential, Commercial, Schools, Consumers, Churches & Community Groups, etc. Waste and consumption reduction, organics, carbon-neutral prurchasing, best practices, water efficiency	Expanded	15.7
	M1.1	Education events	Expanded	12.6
	M1.2	Develop materials	Expanded	10.6
	M1.3	Develop a thorough Business Outreach program	New	13.5
	M1.3a	Best practices strategies	Expanded	13.2
	M1.3b	Acknowledge Commercial Efforts to Reduce GHG	New	14.3
	M1.4	Climate/Energy Education in Schools	New	13.6
	M1.4a	Support "greening schools" programs	New	12.3
	M1.5	Create a city staff and policy makers education campaign	New	14.6
	M2	**Green Building**: Promote Sustainable Building	New	16.4
	M2.1	Municipal Green Building Policy-City-Wide	New	14.2
	M2.2	Municipal Green Building Policy-City Buildings	New	14.6
	M2.3	Professional Training	New	11.8
	M2.4	Development of Outreach Materials/ Guidelines	New	13.0

Measure Group	Measure ID	Measure Name	Ongoing, Expanded, New	Total Score*
	M3	**Incorporate Climate Strategies into Municipal Codes (See following sections for specific recommendations)**	Expanded	16.4
	M3a	Building Codes	New	15.0
	M3b	Land Use Codes	Expanded	15.0
	M3c	Commercial standards for resource reduction	Expanded	14.7
	M3d	Design/Project review process that promotes Climate Concerns	Expanded	15.0
	M4	**City Operations Strategy (See following sections for specific recommendations)**	Expanded	14.8
	M4.1	Purchasing Policies	Expanded	13.2
	M4.1a	Equipment	Expanded	14.5
	M4.1b	City purchase of carbon offsets	New	10.5
	M4.2	Best practices strategies	Expanded	13.1
	M5	**Regional Partnerships**	Expanded	14.9
	M5.1	Create Partnerships with Other Communities	Expanded	12.1
	M5.2	International Council for Local Environmental Initiatives	Ongoing	13.7
	M5.3	Encourage/Support HSU GHG reduction initiatives	New	15.6
	M5.4	Redwood Coast Energy Authority	Ongoing	15.4
	M5.5	Humboldt county Organization of Governments	Expanded	13.1
	M5.6	Humboldt Waste Management Authority	Expanded	13.1
	M6	**Lobbying/Political Action for Greenhouse Gas Reduction (specific recommendations under each topic)**	Expanded	14.4

* Maximum total score = 20. Higher score indicates the measure is more desirable.

Appendix C:
List of Greenhouse Gas Reduction Measures the City of Arcata has Already Implemented

A. Energy Efficiency

Energy audits for City facilities

Energy-efficiency retrofits for City facilities

City Hall
- 10 kW PV System
- 2 kW PV Expansion
- Relamped al interior lights to T8 Lamps w/ Low Ballast Factor Electronic Ballasts
- Converted Interior/Exterior Incandescent Fixtures to HPS or Fluorescent Fixtures
- Replaced EXIT Signs w/ LED Fixtures
- Installed all Programmable Thermostats

D St. Center
- Relamped al interior lights to T8 Lamps w/ Low Ballast Factor Electronic Ballasts
- Converted Interior/Exterior Incandescent Fixtures to HPS or Fluorescent Fixtures
- Replaced EXIT Signs w/ LED Fixtures
- Installed all Programmable Thermostats

Judo Hut
- Relamped all interior lights to T8 Lamps w/ Low Ballst Factor Electronic Ballasts
- Converted Interior/Exterior Incandescent Fixtures to HPS or Fluorescent Fixtures
- Replaced EXIT Signs w/ LED Fixtures
- Installed all Programmable Thermostats

Corp Yard
- Installed all Programmable Thermostats

Redwood Lodge/Lounge
- Converted Interior/Exterior Incandescent Fixtures to HPS or Fluorescent Fixtures
- Replaced EXIT Signs w/ LED Fixtures
- Installed all Programmable Thermostats

Service Center
- Replaced EXIT Signs w/ LED Fixtures

Private development projects that involved City sponsorship on affordable housing grants

--Solar electric and solar hot water systems on Windsong low-income housing
--Solar hot water systems on the Courtyard apartments
--Energy efficiency measures in City funded low-income housing

Co-sponsorship of energy efficiency workshop in Arcata with RCEA

B. Renewable Energy

Solar electric promotion and education
The City and the Humboldt Energy Task Force conducted a public forum in 2002 and produced an informational booklet called "Solar Works" to help promote rooftop solar electric systems. This document is now available from the City of Arcata Environmental Services Department. An updated version of this document is available from the Redwood Coast Energy Authority

12 KW Rooftop solar electric system on City Hall with educational display

C. Sustainable Transportation

Greening of the City fleet
The City has purchased or leased the following energy-efficient or alternative fueled vehicles for it's fleet: (3) Toyota Prius gasoline/electric hybrid vehicles, (1) Honda gasoline/electric hybrid vehicle, (3) compressed natural gas pick-ups with a slow-fill, natural gas fueling station, (4) GEMS electric vehicles for meter readers and the wastewater treatment plant, (4) Nissan HyperMini electric vehicles for parking meter readers, and biodiesel fuel is used in the street paving machine.

City-sponsored electric vehicle charging station to be installed downtown

Bike/Ped Master Plan

Land Use Code update
"Smart growth" planning policies (infill, work/live, spokes of wheel, bike/ped friendly, etc.)

D. Waste and Consumption Reduction

Waste reduction/diversion of 51% since 1990. Continued efforts to reach zero waste by recycling, waste reduction and reuse. City recently passed Environronmentally responsible purchasing ordinance.

E. Sequestration and Other Methods

Community forest management
Management Plan emphasizing carbon sequestration by growing trees on extended rotations, designating reserves and adding forest acres that could otherwise be developed.

Riparian forest establishment
Established more that 100 acres of new riparian forest along creeks and bottom lands

Salt Marsh Project
The McDaniel Slough Marsh Restoration Project expects to sequester additional carbon on a 240-acre site. Estimates are in progress.

Urban Forestry Program
Active program to expand planting of trees in the urban landscape including parks, the plaza, roadside greenways etc.

F. Cross-Cutting Approaches

Energy committee input to the new Land Use Code

Energy committee input to the Design Review Commissions Design Review Manual

Established relationship with the Redwood Coast Energy Authority

Education and outreach events (GHG public forum, sustainable energy fair, other local fairs)

Appendix D:
Near-term Implementation Plan for Arcata's Community Greenhouse Gas Reduction Plan

Implementation Measure	Responsible Party	Time Frame	Program Area(s)
Green Building Program "Green building" is a holistic approach to designing and constructing buildings that emphasizes quality construction, energy efficiency, resource conservation, good indoor air quality, and livable communities. The City will research what other communities are doing to promote green building and will work toward adoption of a local green building program. Key steps in this effort will include the following: 1. Form a green building team (with potential members from the Energy Committee, Design Review Commission, Planning Commission, and City staff from the Environmental Services Department and the Building Department), 2. Identify key stakeholders 3. Educate key stakeholders 4. Assess and leverage existing resources 5. Distribute educational materials 6. Adopt established green building guidelines as an official reference guide 7. Organize green building educational program for professionals and homeowners 8. Remove barriers to and develop incentives for green building 9. Develop a green building award program	Energy Committee (lead), Design Review Commission, Planning Commission, City staff	Steps 1-6 in 2006-2007, Steps 7-9 in 2007, on-going program	Energy Efficiency, Renewable Energy, Waste and Consumption Reduction
Time-of-Sale Program The time-of-sale program will establish a voluntary, pilot program that will offer energy audits at the time-of-sale of residential properties and will provide audit information, energy efficiency upgrade opportunities, and financing options to prospective buyers. Key steps in this effort will include: 1. Form a time-of-sale team (members from Energy Committee, RCEA, City staff) 2. Identify key stakeholders (e.g. realtors, lenders, energy professionals) 3. Develop a plan for the time-of-sale pilot program (involve key stakeholders) 4. Develop promotional/educational materials 5. Educate key stakeholders and broader community 6. Adopt a City resolution in support of the time-of-sale program 7. Engage an energy auditor for the pilot program 8. Promote and implement the time-of-sale program 9. Monitor the program and evaluate its effectiveness	Energy Committee (lead), Redwood Coast Energy Authority (RCEA), City staff	Pilot program 2006-2008 on-going program	Energy Efficiency

Appendix D:
Near-term Implementation Plan for Arcata's Community Greenhouse Gas Reduction Plan

Implementation Measure	Responsible Party	Time Frame	Program Area(s)
Solar Roof Program Participate in efforts to promote the installation of rooftop solar energy systems. Activities may include: 1. Establish a City goal for the number of new solar energy installations 2. Adopt a resolution in support of rooftop solar energy systems 3. Develop/compile educational literature promoting the installation of solar energy systems 4. Provide promotional information to homeowners and builders 5. Add promotional information to the City's solar electric display at City Hall 6. Develop incentives for solar energy system installations 7. Sponsor educational workshops promoting solar energy	Energy Committee, City staff	2006-2007 development, on-going program	Renewable Energy
City Report on Energy Consumption Prepare an annual report detailing energy usage in all City facilities and operations. Use this information as an educational tool and to track the City's energy efficiency efforts. Tasks for this effort will include: 1. Develop an energy consumption report format 2. Develop a process for compiling the necessary information and preparing the report 3. Collect data and prepare the report 4. Publicize the report	Energy Committee, City staff	2006 development, on-going program	Energy Efficiency, Renewable Energy, Sustainable Transportation
Alternative Fuel Vehicles Continue to obtain alternative fuel vehicles for Arcata's vehicle fleet where possible. This will include hybrid-electric vehicles and electric vehicles. Near-term efforts will especially focus on electric vehicle replacements for the City's parking enforcement fleet. Efforts may generally be expanded to promote the use of electric vehicles and other alternative fuel vehicles in the community.	Energy Committee, City staff	Parking enforcement vehicles in 2006, on-going program	Sustainable Transportation
Energy Ordinance for City Funded Projects Establish an ordinance establishing energy efficiency standards for all City funded projects. Tasks will include: 1. Research various energy efficiency standards 2. Develop an energy efficiency standard that meets the goals stated in General Plan 2020 3. Adopt energy efficiency standard 4. Enforce the energy efficiency standard	Energy Committee, City staff	2006 development, on-going program	Energy Efficiency, Renewable Energy

Appendix D:
Near-term Implementation Plan for Arcata's Community Greenhouse Gas Reduction Plan

Implementation Measure	Responsible Party	Time Frame	Program Area(s)
Improve Arcata's Energy Program Website Improve and update the City's Energy Program website. Keep the information current. Add information about current activities in the City's Energy Program. Provide energy information resources.	Energy Committee, City staff	2006 development, on-going program	Cross-cutting
Coordinate with Local Energy Groups Coordinate our activities with those of other local energy groups, especially RCEA. Attend other energy group meetings, invite their members to our meetings, or otherwise keep informed about their activities and leverage our efforts to better meet each groups needs.	Energy Committee	on-going	Cross-cutting

Note: This implementation plan will be reviewed annually in June. Accomplishments will be noted and new implementation measures will be brought forward as appropriate.