City of Fort Collins
2003/2004 CLIMATE PROTECTION STATUS REPORT

November 2005

Prepared by

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City of Fort Collins

TABLE OF CONTENTS

LIST OF ACRONYMS

AFV	alternative fueled vehicle
BTU	British Thermal Unit
CACP	Clean Air Climate Protection software developed by ICLEI and STAPPA/ALAPCO
CO^2	carbon dioxide
CO_2e	carbon dioxide equivalent (methane is converted to CO_2e)
CCP	Cities for Climate Protection
CH_4	methane
CIP	capitol improvement projects
CMAQ	Congestion Mitigation & Air Quality
CNG	compressed natural gas
CSU	Colorado State University
DOE	Department of Energy
DSM	demand side management (energy conservation)
EEP	Electric Efficiency Program
EIS	environmental impact statement
EMT	(City of Fort Collins) Energy Management Team
EPA	Environmental Protection Agency
ESCO	energy services company
EVSAG	(City of Fort Collins) Economic Vitality and Sustainability Action Group
F	degrees Fahrenheit
GGE	gallon of gas equivalent
GHG	greenhouse gases
HVAC	heating ventilation air conditioning system
IAC	Industrial Assessment Center
ICLEI	International Council for Local Environmental Initiatives
ICMA	International City/County Management Association
IPCC	Intergovernmental Panel on Climate Change
kWh	kilowatt hour
LAP	Fort Collins Local Action Plan to Reduce Greenhouse Gas Emissions
LED	light emitting diode
LEED	Leadership in Energy and Environmental Design (U.S. Green Building Council program)
LUTRAQ	Land Use, Transportation, and Air Quality
MMBTU	Million British Thermal Units
MSW	Municipal Solid Waste
NCCC	Northern Colorado Clean Cities
NRD	City of Fort Collins Natural Resources department
NSR	New Source Review (part of the City's Development Review process)
OEMC	(Governor's) Office of Energy Management and Conservation
P2	Pollution Prevention
PRPA	Platte River Power Authority
PSD	Poudre School District
REC	renewable energy certificate
RFP	request for proposal
RMCO	Rocky Mountain Climate Organization
TAFS	Transportation Alternatives Feasibility Study
TDM	Transportation Demand Management
ULEV	ultra low emission vehicles
VMT	vehicle miles traveled
ZEV	zero emission vehicles
ZILCH	Zero Interest Loans for Conservation Help

Executive Summary

Background

In 1997, Fort Collins joined over 300 cities (now over 650) in the international Cities for Climate Protection Campaign. In doing so, the City made a commitment to conduct a greenhouse gas inventory for the baseline year of 1990, set a greenhouse gas reduction target, and develop a plan for meeting the target. A Staff Technical Team and a Citizen Advisory Committee spent over 18 months developing a climate protection plan for the city.

In 1999, Fort Collins City Council adopted the Fort Collins Local Action Plan to Reduce Greenhouse Gas Emissions (LAP). The City's greenhouse gas reduction target was established as "30 percent reduction below predicted worst-case 2010 levels." The City Council also called for formation of an Energy Management Team to facilitate implementation of the LAP, and preparation of a biennial report to evaluate the City's progress on greenhouse gas reduction efforts and to recommend future climate protection actions.

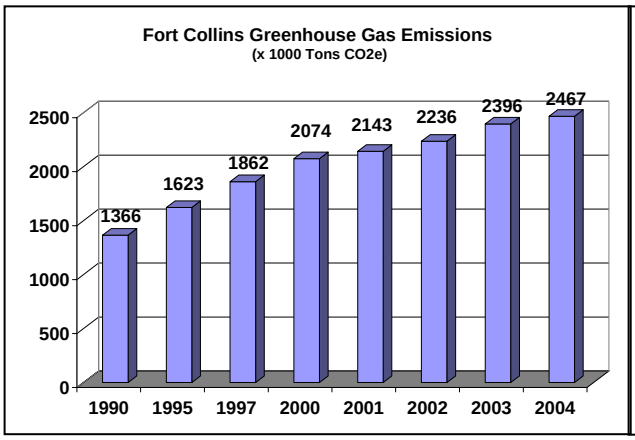
The first biennial report was completed in April 2001. It showed that Fort Collins' residents, businesses and the City government together avoided an estimated 190,000 tons of carbon dioxide equivalent (CO_2e) in the year 2000 alone. The second biennial report covered the years 2001 and 2002 and estimated that nearly 237,000 tons of CO_2e were avoided in Fort Collins in 2001, based on all measures that could be quantified in that year. Quantifiable climate protection activities reduced citywide emissions by 10% in the year 2001.

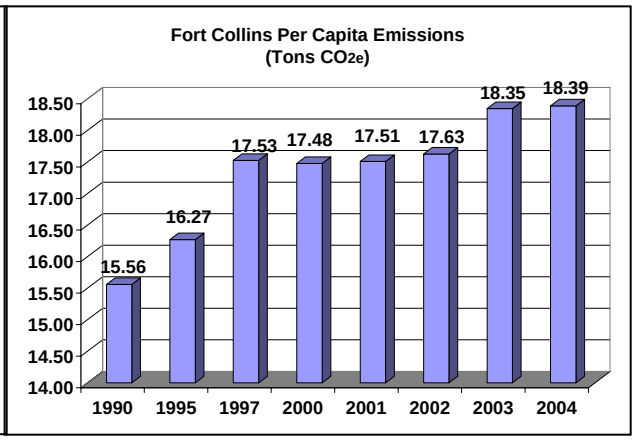
This report is the third biennial "Climate Protection Status Report" that the Energy Management Team has prepared for the City Manager. It quantifies greenhouse gas (GHG) emissions levels for 2003 and 2004. It also quantifies the benefit of greenhouse gas mitigation activities by businesses, citizens, and municipal government in 2003 and 2004, and provides recommendations for future actions.

Greenhouse Gas Emissions Level

Greenhouse gas emissions across the city rose from 1.36 million tons of CO_2e in 1990 to 2.47 million tons in 2004, an 81% increase. During the same time, population increased by 53%.

(Per capita graph updated 11/16/05)



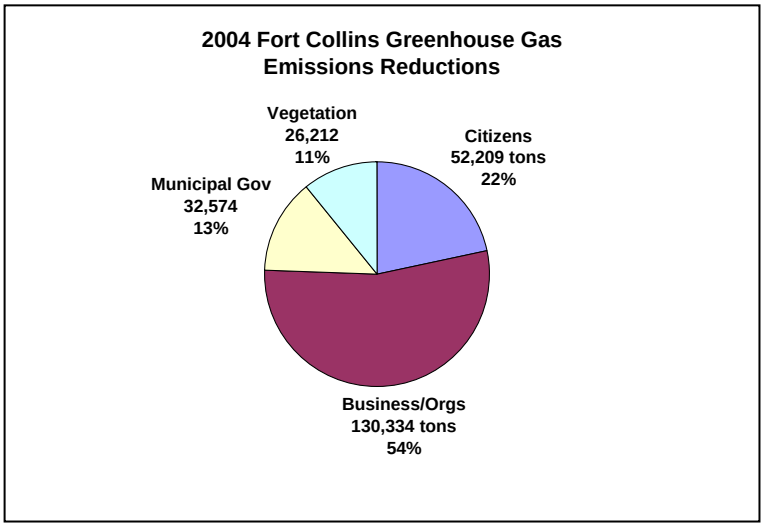


The Status…...

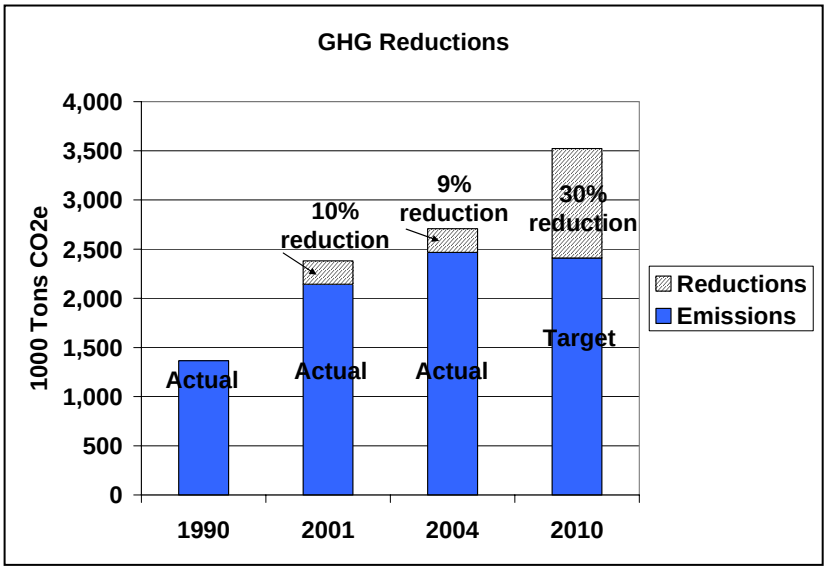
It is estimated that over 241,000 tons of CO_2e were avoided in Fort Collins in 2004, based on all measures that could be quantified in that year. The majority of reductions (64%) came from businesses and organizations through participation in Climate Wise, recycling, purchasing wind power, energy conservation, and trip reduction. Individual citizens were responsible for 22% of the reductions by recycling, purchasing wind power, and participating in Fort Collins Utility rebate programs. The City government achieved 14% of the citywide reductions through efficiencies in the electricity distribution system, methane flaring at the wastewater treatment plant and the purchase of wind energy.

Fort Collins GHG Reduction Summary

	Tons CO_2e avoided in 2003	Tons CO_2e avoided in 2004
Citywide	186,000	213,000
Municipal	33,000	28,000
Total	**219,000**	**241,000**



Quantifiable climate protection activities have reduced citywide emissions by 9% in the year 2004. Citywide emissions would have been 2.71 million tons instead of 2.47 million tons in the absence of actions to reduce emissions. This is a one percent decrease below the 10% reduction achieved in 2001.[1]



[1] This decrease was caused primarily by a lower greenhouse gas factor for avoided electricity use ("marginal" factor). Starting in 2003, Platte River Power Authority estimated that the regional marginal generation fuel source was primarily natural gas. Natural gas turbines are more costly to operate, but emit less carbon dioxide per kilowatt hour of electricity generated. Hence, energy conservation measures have a lower greenhouse gas benefit (by over half) than they did in years 2002 and prior. (For comparison purposes, if the marginal electricity emissions factor had remained at the 2002 level, citywide greenhouse gas reduction activities would sum up to 297,000 tons of CO2e avoided, or 11% reduction of citywide emissions.) See Appendix A for more details.

The tables below summarize greenhouse gas (GHG) reduction efforts of residents and businesses (citywide) and of the City government (municipal). Recycling activities continue to account for the largest share of measurable GHG reductions. This is partly because benefits are estimated not only from emissions avoided by not land-filling materials, but also from avoided upstream emissions associated with manufacturing new products.

Citywide GHG Reduction Measures

Citywide Quantifiable Measures	Tons CO_2e reduced in 2003	Tons CO_2e reduced in 2004
GENERAL		
Climate Wise for businesses[1]	73,1295	94,746
General Total	**73,129**	**94,746**
ENERGY		
1997 City Energy Code	8,495	9,488
CSU's Industrial Assessment Center	1,133	1,001
Wind Power Program[1]	5,990	8,276
Rate Based Wind Energy	0	6,329
Electric Efficiency Program	807	1,666
Integrated Design Assistance Program	342	621
Cooling Rebate Program	177	291
Refrigerator Recycling Program	0	1,710
Clothes Washer Rebate	69	173
Conservation Kit Program	0	65
ZILCH ('90 - '04)	439	450
Energy Total	**17,452**	**30,071**
TRANSPORTATION		
TDM Programs, including VAN GO[1]	1,203	1,677
Transportation Total	**1,203**	**1,677**
SOLID WASTE		
Business Recycling[1]	54,079	65,094
Residential Recycling	44,844	42,776
Larimer County Wood Waste Diversion	930	3,510
Solid Waste Total	**99,854**	**111,379**
VEGETATION		
CO_2 Sequestration by trees	26,212	26,212
Increase citywide tree planting	76	132
Vegetation Total	**26,288**	**26,344**
CITYWIDE TOTAL	**186,440**	**214,282**

1 Each line shows full benefit of program. Double-counted benefits (i.e. overlapping benefits between Climate Wise partners, Business Recycling, Wind Program, TDM Programs) removed from "Citywide Total."

Municipal Government GHG Reduction Activities

Municipal Quantifiable Measures	Tons CO2 reduced in 2003	Tons CO2 reduced in 2004
ENERGY		
FC Electricity Distribution	15,958	13,780
City Wind Energy	853	887
Replace Traffic Signals with LEDs	708	732
Sustainable Design for City Buildings	181	181
Lighting Upgrades – City Buildings: 90-01	275	293
Converting to Variable Freq. Drives	20	20

Chillers	48	48
Energy Total	**18,043**	**15,941**
TRANSPORTATION		
City Employee Alt Modes	184	197
Alternative Fuels - City Fleet vehicles	113	69
Hybrid Vehicles - City Fleet vehicles	3	3
Parks Satellite Shop	5	6
Transportation Total	**304**	**276**
SOLID WASTE		
Methane Flaring and Heat Recovery	14,425	12,057
City gov recycling	565	582
Solid Waste Total	**14,989**	**12,639**
PURCHASING/ADMINISTRATION		
SIRE Electronic Document Archive	13	6
Electronic Document Archive & Distribution	1	1
Purchasing Total	**14**	**7**
MUNICIPAL TOTAL	**33,169**	**28,863**

2003/ 2004 Climate Protection Highlights

January 2003

- The City Manager approved Fort Collins' participation in EPA's Energy Star program. Fort Collins becomes the first city in Colorado to participate as a "Regional Program Implementer".
- Starting in 2003, vendors were able to register and submit bids electronically to the City's Purchasing Department.

February 2003

- An Environmental Program Series seminar on hydrogen was presented at the Senior Center on February 18th. Over 300 citizens attended.

March 2003

- City Council adopted Fort Collins Electric Energy Supply Policy, becoming the first entity in Colorado to set renewable energy production goals. Greenhouse gas reduction was cited as one justification for the policy. The policy set three goals:
    - 10% reduction in per capita energy use by 2012
    - 10% reduction in peak demand use by 2012
    - 2% renewable energy by 2004 and 15% renewable energy by 2017

  Achieving these goals will help the City meet over 10% of its 2010 GHG reduction target.

September 2003

- The *Climate Wise* voluntary business program received the National Pollution Prevention Roundtable's prestigious MVP2 award.

January 2004

- The compressed natural gas (CNG) fuel station at Transfort became operational, delivering 3.5 gallons CNG/hour. This station can fuel up to seven CNG busses.

May 2004

- Fort Collins Utilities launches the Refrigerator and Freezer Recycling Program.

June 2004

- Fort Collins Utilities announced reduction of Wind Program cost from 2.5 cents per kilowatt-hour to 1 cent per kilowatt-hour.

July 2004

- Magazines, junk mail and catalogues (#7 paper mix) was added to residential curbside recycling programs in Fort Collins.
- The City of Fort Collins became one of seven charter members of the Rocky Mountain Climate Organization, a broad coalition of mainstream interests formed to spread the word about what climate change can do to us here and what we can do about it. (See http://rockymountainclimate.org)

August 2004

- City Council adopted new residential building codes that will require more energy efficient homes starting in 2005.
- Fort Collins Utilities launched the Business Environmental Program Series.
- Fort Collins Utilities increased Electric Efficiency Program commercial incentives by over 40% to $500 per kilowatt.

September 2004

- Mayor Martinez participated as an invited speaker representing Fort Collins' leadership in sustainability and greenhouse gas reduction at a "Sustainable Development" conference in Eugene, OR.
- The City's internal Purchasing Policies were updated in the Administrative Policies document to further support sustainable purchasing.
- The City's Executive Lead Team adopted a sustainability policy and approved the *Fort Collins Action Plan for Sustainability* for municipal operations.

October 2004

- Fort Collins Utilities' Wind Power Program accepted DOE's Wind PIONEER Award for the program's leadership, success, and quality. This is the sixth award Fort Collins' Wind Program has received since its inception.

Fall 2004

- Operations Services updated the Building Design Manual to call for increased building performance and energy efficiency in new municipal buildings.

December 2004

- The Water Treatment Facility successfully lowered its natural gas use 30% from 2002 levels by implementing energy conservation procedures.
- The City Energy Management Team's subcommittee on Energy Efficiency Financing prepared two recommendations:
    - Fill an Energy Manager position within the City government.

- Hire an Energy Services Company (ESCO) to implement an energy performance contact for City facilities. Initial rough projections suggested the City could save ~ $140,000/year by investing ± $1.3 million in upgrades to existing facilities, for an eight year average payback.

Future Actions

The Energy Management Team recommends implementation of the following actions between 2005 – 2007 to reduce greenhouse gas emissions in accordance with the City's *Local Action Plan to Reduce Greenhouse Gas Emissions* (LAP) and with existing City policies and priorities.

Climate Protection Measures recommended for implementation in 2005-2007

Measure Name	In Original LAP?	Current Status	Recommended Future Action
GENERAL			
Sustainability Action Plan	N	Policy & Plan completed	Implement the targets to the extent possible under the 2006/2007 budget. Increase collaboration with Energy Management Team, City Economic Advisor, and EVSAG.
Climate Wise	Y	On-going	Implement tiered participation and recognition levels, increase pollution prevention focus.
Hydrogen Pilot	N	On-going	Develop regional partnerships and promote pilot production of fueling infrastructure and prototype fleet vehicles, including hydrogen and a hydrogen-CNG blend.
Green Building & Sustainable Design	Y	Not Started	Convene stakeholder group, conduct outreach, consider GB incentives through development review and land use code.
Explore GHG Registry Alternatives	N	Not Started	The City could realize the benefits of more rigorous quantification and take a leadership role.
TRANSPORTATION			
VMT Goal	Y	On-going	Continue LUTRAQ programs; fund and implement TDM programs.
Mason Street	N	Started	Complete 3.5 mile bike/ped segment from Prospect to Fossil Creek.
CNG Fueling Station	N	Started	Increase CNG busses in City fleet.
100% BioDiesel for City Vehicles	N	Planned	Provide B20 (20% biodiesel, 80% regular diesel) for all City diesel vehicles starting in 2005 (Start with 25% B20 in 2004).
Support "Plug-In Hybrid Vehicle" campaign	N	Not Started	Seek official support for a growing campaign to prompt hybrid vehicle manufacturers to increase battery capacity which would significantly increase life-cycle cost savings and environmental benefits.
ENERGY			
Electric Energy Supply Policy - DSM Programs	N	Started	Continue and expand Demand Side Management (DSM) Programs.

Electric Energy Supply Policy - Renewable Energy	Y	Started	Continue to increase renewable energy purchases in collaboration with Platte River Power Authority.
City of Fort Collins Energy Performance Contract	N	Started	Release RFP to select an Energy Performance Contactor, audit City buildings and implement upgrades.
City of Fort Collins Energy Manager	Y	Started	Authorize Energy Manager role in the City; centralize control and records for energy management; develop incentives for departmental energy savings.
City Building Heating/Cooling Policy	N	Not Started	Propose policies to increase energy efficiency (i.e. heating/cooling policies, etc.).
City Gov. Sustainable Design and Operation	Y	Started	Construct all new City buildings to meet at least LEED Silver rating, including Azatlan Center and Police building; develop minimum criteria for electricity/natural gas efficiency.
Ped. Traffic Signal Retrofit	Y	Planned	Upgrade pedestrian signals to LED.
Support Efforts to Achieve High-Performing New Homes	N	On-going	Build consumer awareness and market demand for high performance new homes.
Improve Existing Home Performance	N	Started	Implement "Home Performance with Energy Star" program to train contractors to diagnose and solve residential home energy problems.
Commercial Building Code Update	N	Not Started	The City will assess the 2006 International Building Code (addresses commercial buildings) for possible adoption into local code.
Peak Oil – Awareness Raising	N	Not started	Raise awareness of peak oil issues and implications for Fort Collins.
Waste			
Solid Waste Reduction Strategic Plan	Y	Started	Develop a strategic plan that identifies the best methods to achieve the City's 50% waste diversion goal by 2010.
Recycling Technology Changes	Y	Started	Consider "Single Stream" recycling including paper/fiberboard, paper, and commingled (may increase recycling volumes by 20%).
Recycling Ordinance Amendment	Y	Scheduled 12/05	Amend City ordinance to require trash haulers to pick up cardboard and paperboard along with other recyclables at curbside.
Explore Community Composting	Y	On-going	Continue efforts to expand community composting options.
Resource Recovery Farm	N	Started	Explore the feasibility of using the former Resource Recovery Farm as a location for an "eco industrial" park.
Vegetation			
Increase lifespan of City-owned trees	Y	On-going	Plant appropriate species in appropriate locations. Focus resources on the care and maintenance of existing City-owned trees.
Quantify carbon sequestration in City-owned natural areas	N	Not Started	Partner with CSU or other scientists to quantify carbon sequestration in City natural areas.

Evaluate City landscaping and irrigation requirements	N	Not Started	Evaluate City code requirements for landscaping and irrigation to enhance appropriate water conservation and/or increase irrigation efficiency.
Purchasing/ City Admin			
Promote Environmentally Preferable Products	Y	On-going	Promote environmentally preferable purchasing within City departments.
Electronic Documents	N	Started	Expand the number and types of documents that are archived electronically.
Strengthen City vehicle purchasing criteria	N	Started	Ensure life-cycling costing for vehicle purchases; consider pollution emissions.
Education			
Climate Change staffing	Y	On-going	Maintain existing staffing levels (expand if possible).
Climate Change Education and Outreach	Y	On-going	Partner with others (ICLEI, RMCO, Canary Initiative, CSU) to increase public education on climate change.
Energy Awareness Raising for City Employees	Y	Not Started	Explore simple ways to provide energy saving tips to employees (IT, FortShorts, GroupWise pop-ups, video check-out).

Members of the Energy Management Team individually identified between 3-5 of the measures listed above as high priority for the Team's focus for implementation, based on:

- items included in the City Manager's 2006/2007 recommended budget,
- progress to date on implementation of measures identified in the LAP and Status Reports,
- qualitative greenhouse gas reduction potential of measures, and
- current understanding of department, service area, and City objectives and priorities.

The following four measures emerged as top priorities to receive special focus and support from the Energy Management Team in 2006 and 2007:

- Conduct Energy Performance Contract for City of Fort Collins Municipal Buildings
- Authorize Energy Manager Role for City of Fort Collins Municipal Operations
- Implement Electric Energy Supply Policy-DSM & Renewable Energy Programs
- Climate Change Education and Outreach.

I. Status of Climate Change Science……the need for climate protection continues

December 2004 – 2004 Fourth Warmest Year on Record

The year 2004 was the fourth-hottest on record, extending a trend since 1990 that has registered the 10 warmest years, according to a U.N. weather agency. 2004 was also the most expensive for the insurance industry in coping worldwide with hurricanes, typhoons and other weather-related natural disasters, according to new figures released by U.N. environmental officials. Statistics showed that natural disasters across the world in the first 10 months of the year cost the insurance industry just over $35 billion, up from $16 billion in 2003. Munich Re, one of the world's biggest insurance companies, said the United States tallied the highest losses with more than $26 billion, but that small developing nations such as the Caribbean islands of Grenada and the Cayman Islands were also hit hard.

November 2004 - Arctic is Warming Quickly, Researchers Report

The Arctic is warming nearly twice as rapidly as the rest of the globe, according to the final report of the Arctic Climate Impact Assessment, a four-year study conducted by an international team of 300 scientists. In Alaska, Western Canada, and Eastern Russia, average winter temperatures have increased as much as 3 to 4^0C (4 to 7^0F) in the past 50 years. Snow cover extent has declined by about 10 percent during the past 30 years, and permafrost has warmed by up to 2^0C (3.6^0 F) in recent decades. The average extent of sea-ice has declined by 15-20 percent over the past 30 years.

"The Arctic is experiencing some of the most rapid and severe climate change on Earth," said Robert Corell, chair of the assessment. "The impacts of climate change on the region and the globe are projected to increase substantially in the years to come." The assessment's findings and projections were released on November 8, 2004, and are available at http://www.amap.no/acia/.

October 2003 – Pentagon Report Warns of Extreme Security Risk from Abrupt Global Warming

Climate change over the next 20 years could result in a global catastrophe costing millions of lives in wars and natural disasters, according to a report commissioned by the Pentagon. The document predicts that abrupt climate change could bring the planet to the edge of anarchy as countries develop a nuclear threat to defend and secure dwindling food, water and energy supplies. The threat to global stability vastly eclipses that of terrorism, said the few experts privy to the report contents. Disruption and conflict will be endemic features of life, concluded the Pentagon analysis. Once again, warfare would define human life. Climate change should be elevated beyond a scientific debate to a U. S. national security concern, said the authors, Peter Schwartz, CIA consultant and former head of planning at Royal Dutch/Shell Group, and Doug Randall of the California-based Global Business Network.

September 2004 - Study Questions Accuracy of Reconstructions of Past Climate

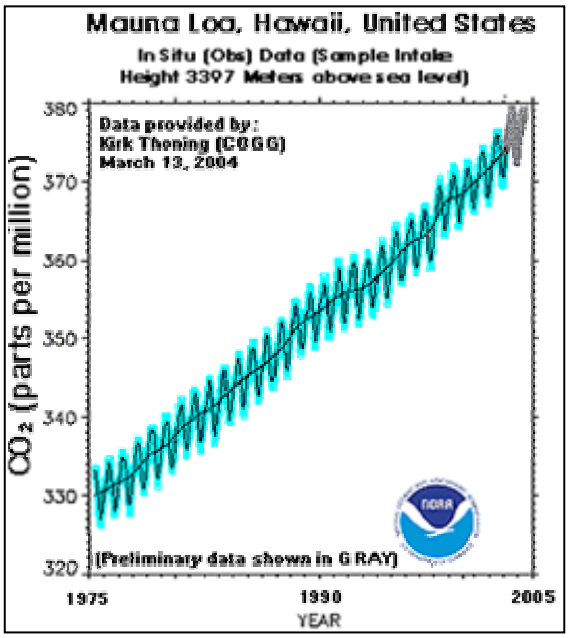
The Northern Hemisphere's climate during the past 1,000 years may have been much more variable than suggested by recent analyses of tree-rings, ice cores, and other indirect sources of data on past temperatures. The German researchers found good agreement for the past 100 years

or so, but large disparities over longer timescales. The new findings, published in the September 30, 2004 *Science Express*, raise the possibility that the current warming trend may not be as unusual or unprecedented as previously thought, and that the climate's natural variability may be greater than most recent studies have assumed. However, the authors emphasized that their results do not challenge conclusions that rising concentrations of greenhouse gases have contributed to the warming of the 20th century.

March 2004 - Carbon Dioxide Growth Rate Increases

The rate of increase of carbon dioxide in the atmosphere accelerated in the past two years, according to scientists with the National Oceanic and Atmospheric Administration (NOAA). However, the researchers cautioned that it is still too early to tell whether the growth rate is picking up on a long-term basis.

During 2003, the gas's concentration rose by approximately 2.4 parts per million (ppm), compared with an average rate of 1.8 ppm per year over the past decade. The growth rate for 2002 was 2.6 ppm/year.



Daily average CO2 concentrations measured at Mauna Loa. *NOAA, Climate Monitoring& Diagnostic Laboratory*

January 2004 – 2003 Second Warmest Year on Record

NOAA reported that data collected from weather and climate stations, satellites, ships, buoys and floats indicate that the 2003 average global temperature ranked as second warmest on record, tied with 2002 but cooler than the record warm year of 1998. The 10 warmest years have all occurred since 1990.

December 2003 - Researchers See "No Doubt" of Human Influence on Climate

Two leading atmospheric scientists said there is "no doubt" that human activities are changing the composition of the atmosphere, and that increases in greenhouse gas concentrations are the dominant cause of modern climate change. In a review article in the December 5, 2003 issue of *Science* (vol. 302, pp. 1719-1723), Thomas Karl of the National Climatic Data Center and Kevin Trenberth of the National Center for Atmospheric Research concluded that, in the absence of new policies to mitigate climate change, "substantial future climate change is guaranteed." Karl and Trenberth reported that the world is 90% likely to warm by 3.1° to 8.9°F by the end of this century. The authors' conclusions are based on existing, published studies. Karl and Trenberth noted that while there is "considerable uncertainty" about the rate, magnitude, and duration of future climate change, the human influence on climate will eventually become "overwhelmingly large" compared with natural changes. "We are venturing into the unknown with climate," they wrote, "and its associated impacts could be quite disruptive.

II. Fort Collins Greenhouse Gas Emissions for 2003 and 2004

In 2004, Fort Collins generated approximately 2,467,000 tons of carbon dioxide equivalent (CO_2e[2]). By comparison, 1,366,000 tons of CO_2e were generated in 1990, the baseline year against which Fort Collins' climate protection efforts are measured.[3] Data sources are discussed in Appendix A.

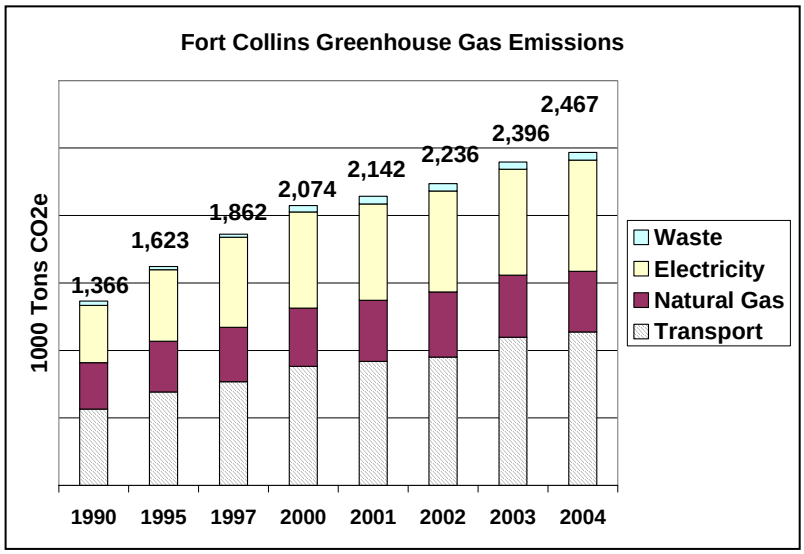


Figure 1. Fort Collins GHG Emissions, 1990 - 2004

Table 1. Fort Collins GHG Emissions (Tons CO_2e)

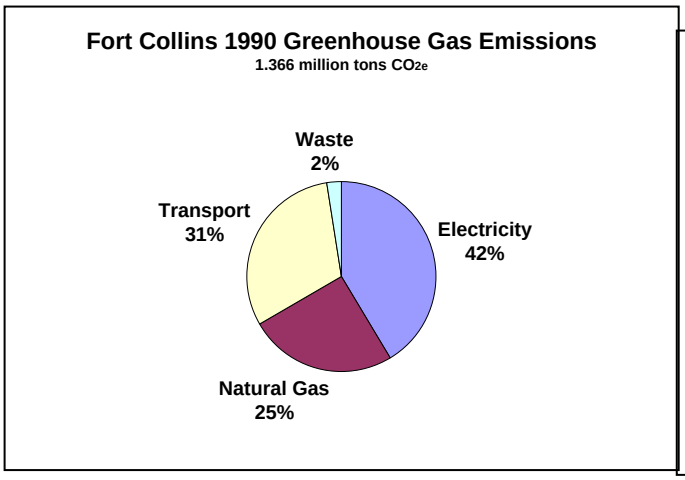
	1990	1995	1997	2000	2001	2002	2003	2004
Electricity	565,690	692,623	768,889	882,196	919,073	950,992	1,097,537	1,136,651
Natrl Gas	344,267	374,859	403,110	431,454	452,144	481,900	459,920	449,517
Transport	423,277	530,287	667,082	711,971	714,090	749,463	784,836	824,631
Waste	32,391	24,800	22,500	48,098	57,410	53,446	53,375	56,056
TOTAL	**1,365,625**	**1,622,569**	**1,861,581**	**2,073,719**	**2,142,717**	**2,235,801**	**2,395,668**	**2,466,855**
Population	87,758	99,726	106,223	118,652	122,377	126,848	130,566	134,128
Per Capita	15.56	16.27	17.53	17.48	17.51	17.63	18.35	18.39

(Table 1 updated 11/16/05)

Figures 2 and 3 on the next page compare 1990 and 2004 greenhouse gas emissions, by source. The electricity sector contribution grew from 42% in 1990 to 47% in 2004, while the natural gas percentage dropped from 25 % to 18% of citywide GHG emissions for the same period. The relative increase in electricity generation's contribution to emissions may be at least partially accounted for by the fact that less hydroelectric power is used now as part of the electricity generation mix than in 1990, leading to higher average emissions per kWh generated. The transportation sector increased slightly in relative contribution of total GHG emissions from 1990 to 2004.

[2] CO_2e = Carbon dioxide equivalent. Since methane is 21 times more potent a greenhouse gas than carbon dioxide, the relative global warming potential of CO_2 = 1 and of methane = 21. When methane and carbon dioxide emissions are summed, they are referred to as CO_2e, indicating methane has been converted to CO_2 equivalent.

[3] In May 2003, the Fort Collins greenhouse gas (GHG) emission analyses for 1990, 1995, 1997, and 2000 were updated to reflect new EPA emission factors for municipal solid waste (MSW) incorporated in the CCP software in Fall 2002. Revised MSW emission factors reduce the MSW GHG emissions to practically zero because they take account of carbon sequestered in landfills. See Appendix A for more detail.



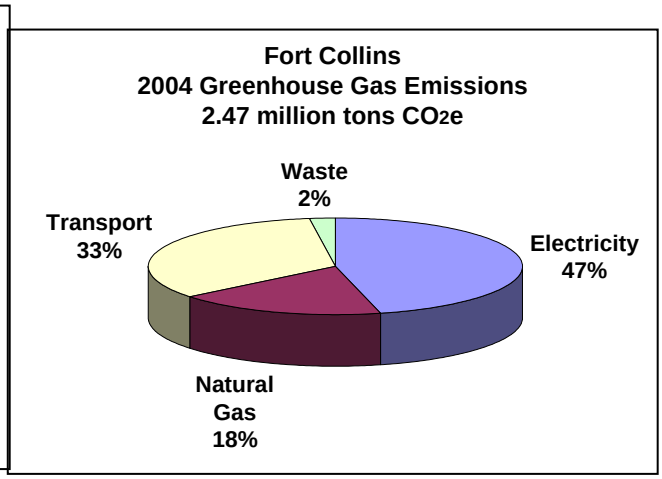
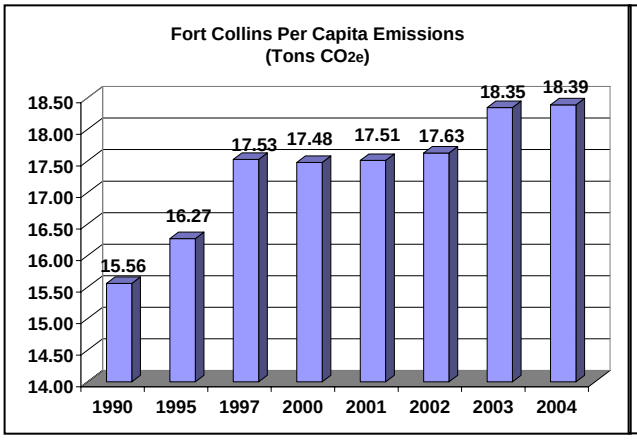


Figure 2. 1990 GHG Emissions

Figure 3. 2004 GHG Emissions

Figure 4 below illustrates that 2003 and 2004 per capita emissions are higher than any previous years. Figure 5 shows a comparison of 2004 actual emissions versus 2004 projected emissions estimated in 1998. Electricity and natural gas usage exceeded projections, while transportation did not grow as rapidly as the worst-case 7% annual VMT growth rate used to forecast 2004 transportation emissions. Emissions associated with municipal solid waste (MSW) also did not grow at projected rates.



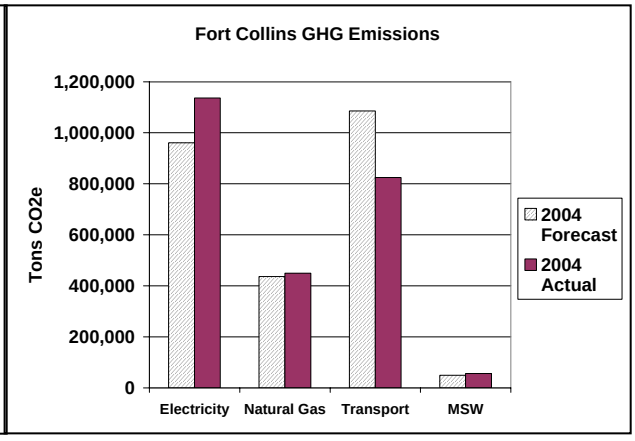


Figure 4. Per Capita Emissions (updated 11/16/05)

Figure 5. Actual vs. Projected 2004 Emissions

III. City of Fort Collins Municipal Greenhouse Gas Emissions

The emissions inventory for the City of Fort Collins municipal activities includes buildings, streetlights, water treatment processes, fleet fuel consumption, and waste generation.

Buildings

Information on electricity consumption from all City facilities and natural gas consumption from all major City buildings was provided by Utilities and Operations Services.

Table 2. Building Energy Use

Year	Electricity (kWh)	Natural Gas (ccf)	Total Square Foot	MMBTU/Sq Ft	Tons CO_2
1990	7,396,196	541,920	510,592	0.1577	8,806
2002	11,988,603	626,658	744,144	0.1415	12,691
2003	17,575,327[1]	734,284		134,893 mmbtu	19,128
2004	17,974,755[1]	757,128		138,587 mmbtu	19,908

[1] kWh includes all metered uses except lighting, water and wastewater treatment, not just major buildings.

Lighting (Streetlights and Traffic Signals)

Table 3. Lighting Energy Use (data provided by Fort Collins Utilities)

What	Year	kWh
Streetlights	1990	5,920,661
Streetlights	1995	6,598,489
Streetlights	1999	7,251,946
Streetlights	2001	7,634,000
Streetlights	2002	7,860,000
Streetlights	2003	7,985,609
Streetlights	2004	8,055,928
Traffic Signals	1990	1,577,714
Traffic Signals	1995	2,117,602
Traffic Signals	1999	2,406,112
Traffic Signals	2001	2,191,000
Traffic Signals	2002	206,000*
Traffic Signals	2003	866,137
Traffic Signals	2004	894,325

* Reflects benefit of conversion to LED traffic signals

Water and Wastewater Treatment

Table 4. Water Treatment Energy Use (data from Fort Collins Utilities)

What	Year	Electricity (kWh)	Natural Gas (ccf)
Water Treatment	1990	2,414,990	82,188
Water Treatment	1995	3,404,585	85,156
Water Treatment	1999	3,538,852	67,684
Water Treatment	2002	4,409,000	200,120
Water Treatment	2003	4,139,829	162,370
Water Treatment	2004	4,022,216	139,944

Table 5. Wastewater Treatment Energy Use (data from Fort Collins Utilities)

What	Year	Electricity (kWh)	Natural Gas (ccf)
Wastewater	1990	9,523,280	105,067
Wastewater	1995*	13,604,848	54,752
Wastewater	1999	13,444,800	63,158
Wastewater	2002	14,366,000	64,070
Wastewater	2003	14,273,040	81,446**
Wastewater	2004	13,996,480	80,489

* Wastewater plant #1 was down for 1995 due to construction; 1994 numbers were used.
** Added the natural gas consumption from the East Mulberry plant for the first time.

Fleets

Table 6. Fleets Energy Use (data provided by Fleet Services)

Year	Unleaded Gasoline (gal)	Diesel (gal)	Propane (GGE)	CNG (GGE)
1990	201,488	97,181	13,035	
1995	187,544	80,115	45,875	
1999	446,106	419,834	113,768	1,192
2001	495,767	458,778	80,018	1,235
2002	651,933	564,589	59,007	1,446
2003	523,041	448,844	36,747	1,370
2004	512,982	437,315	23,048	1,322

Solid Waste

CO_{2e} emissions from municipal waste were estimated with the CACP software (2003).

Table 7. Municipal Waste Estimates

	1990	1995	1999	2002	2003	2004
Waste removed (full) yd3		21,416	24,540			
Waste removed (3/4 full) yd3	12,950	16,062	18,405	23,209		
# City employees	1,003	1,244	1,308			
Per capita yd3	12.9	12.9	18.8			
Tons (If ¾ full) @ 300#/yd3	1,943	2,409	2,761	3,481	3481	3,430
Tons CO_2 e	232	287	329	415	415	409

Figures 6 and 7 on the next page show municipal GHG emissions in 1990 and 2004. Municipal GHG emissions have doubled over the past 14 years. In 1990, municipal GHG emissions represented 2.03% of citywide emissions. By 2004, the municipal proportion rose slightly to 2.27%.

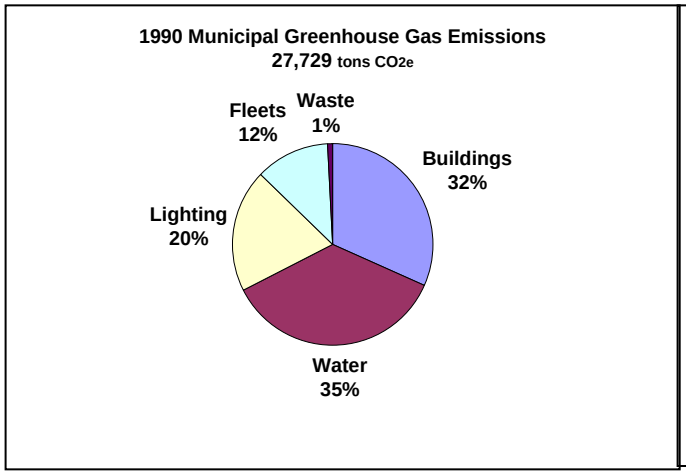


Figure 6. 1990 Municipal GHG Emissions

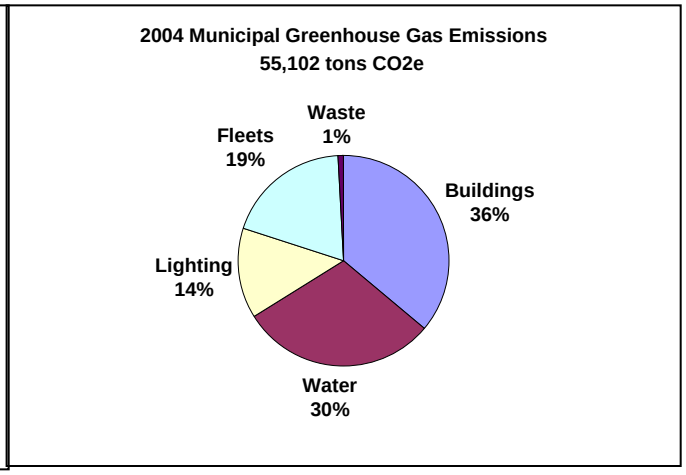


Figure 7. 2004 Municipal GHG Emissions

Table 8. Municipal GHG Emission Comparisons (Tons CO_2e)

Year	Buildings	Water	Lighting	Fleets	Waste	TOTAL
1990	8,806	9,894	5,475	3,323	232	**27,730**
2002	12,691	15,369	5,890	13,860	415	**48,225**
2004	19,908	16,571	7,543	10,670	409	**55,102**

IV. Status of Climate Protection Efforts

Tables 9, 10 and 11 summarize the greenhouse gas (GHG) reduction benefit of all measures the City was able to quantify for the years 2003 and 2004. In total, 243,000 tons of CO_2e were reduced during the year 2004. Total 2004 emissions would have been 2.71 million tons instead of 2.47 million tons in the absence of actions to reduce emissions. Quantifiable climate protection activities reduced citywide emissions by 9% in the year 2004.

Table 9. GHG Reduction Summary

	Tons CO_2e avoided in 2003	Tons CO_2e avoided in 2004
Citywide	186,000	213,000 (88%)
Municipal	33,000	28,000 (12%)
Total	**219,000**	**241,000**

Table 10. Citywide GHG Reduction Measures

Citywide Quantifiable Measures	Tons CO_2e reduced in 2003	Tons CO_2e reduced in 2004
GENERAL		
Climate Wise for businesses[1]	73,1295	94,746
General Total	**73,129**	**94,746**
ENERGY		
1997 City Energy Code	8,495	9,488
CSU's Industrial Assessment Center	1,133	1,001
Wind Power Program[1]	5,990	8,276
Rate Based Wind Energy	0	6,329
Electric Efficiency Program	807	1,666
Integrated Design Assistance Program	342	621
Cooling Rebate Program	177	291
Refrigerator Recycling Program	0	1,710
Clothes Washer Rebate	69	173
Conservation Kit Program	0	65
ZILCH ('90 - '04)	439	450
Energy Total	**17,452**	**30,071**
TRANSPORTATION		
TDM Programs, including VAN GO[1]	1,203	1,677
Transportation Total	**1,203**	**1,677**
SOLID WASTE		
Business Recycling[1]	54,079	65,094
Residential Recycling	44,844	42,776
Larimer County Wood Waste Diversion	930	3,510
Solid Waste Total	**99,854**	**111,379**
VEGETATION		
CO_2 Sequestration by trees	26,212	26,212
Increase citywide tree planting	76	132
Vegetation Total	**26,288**	**26,344**
CITYWIDE TOTAL	**186,034**	**213,347**

2 Each line shows full benefit of program. Double-counted benefits (i.e. overlapping benefits between Climate Wise partners, Business Recycling, and Wind Program, TDM Programs) removed from "Citywide Total."

Table 11. Municipal Government GHG Reduction Activities

Municipal Quantifiable Measures	Tons CO2 reduced in 2003	Tons CO2 reduced in 2004
ENERGY		
FC Electricity Distribution	15,958	13,780
City Wind Energy	853	887
Replace Traffic Signals with LEDs	708	732
Sustainable Design for City Buildings	181	181
Lighting Upgrades – City Buildings: 90-01	275	293
Converting to Variable Freq. Drives	20	20
Chillers	48	48
Energy Total	**18,043**	**15,941**
TRANSPORTATION		
City Employee Alt Modes	184	197
Alternative Fuels - City Fleet vehicles	113	69
Hybrid Vehicles - City Fleet vehicles	3	3
Parks Satellite Shop	5	6
Transportation Total	**304**	**276**
SOLID WASTE		
Methane Flaring and Heat Recovery	14,425	12,057
City gov recycling	565	582
Solid Waste Total	**14,989**	**12,639**
PURCHASING/ADMINISTRATION		
SIRE Electronic Document Archive	13	6
Electronic Document Archive & Distribution	1	1
Purchasing Total	**14**	**7**
MUNICIPAL TOTAL	**33,169**	**27,794**

The measures identified above are described in greater detail in the rest of this report. There are numerous other municipal and private activities and programs that have not been quantified that also contribute to reducing the citywide carbon dioxide emissions. Some of these non-quantified measures are also mentioned in subsequent sections of the report.

Figure 8 shows the distribution of measures. The majority of reductions (64%) came from businesses and organizations from participating in Climate Wise, recycling, purchasing wind power, energy conservation, and trip reduction. Individual citizens were responsible for 22% of the reductions by recycling, purchasing wind power, and participating in Fort Collins Utility rebate programs. The City government achieved 14% of the reductions through efficiencies in the electricity distribution system, methane flaring at the wastewater treatment plant and the purchase of wind energy.

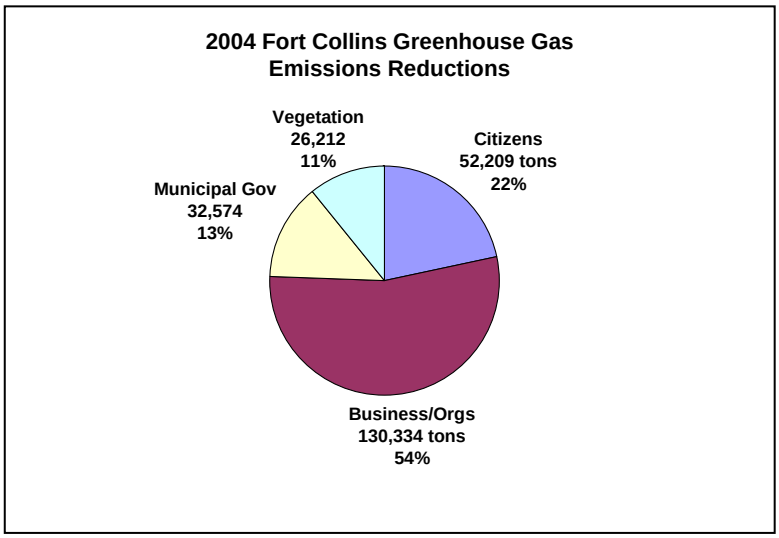


Figure 8. Distribution of GHG Reduction Measures

The additional benefits of air pollution reduction from the energy conservation measures are conservatively estimated in Table 12 below. These "co-benefits" are calculated using the CACP software based upon reductions of 55,592 MWH and 48,650 therms from the non-Climate Wise energy efficiency measures reported above.

Table 12. 2004 Air Pollution Benefits from Energy Efficiency Measures

	Nitrogen Oxides Reduced	Carbon Monoxide Reduced	VOCs Reduced	Particulate Matter Reduced
	27.5 tons	11.4 tons	1.2 tons	103 pounds

GENERAL

♦ Climate Wise for Businesses

2003-2004 Status In 2000, the City of Fort Collins initiated a voluntary greenhouse gas reduction program targeting businesses in the industrial and commercial sectors. The program is a local adaptation of the former federal Climate Wise program and works directly with the Fort Collins business community to achieve a number of important environmental quality goals: air and water pollution prevention, solid waste reduction, energy conservation, and travel demand reduction. Supported by grant funding from the International Council for Local Environmental Initiatives, and the Colorado Pollution Prevention Advisory Board, the Climate Wise program included 29 local business partners at the end of 2004.

The basic goals of the Climate Wise program for the City are:

- Encourage local business to reduce their GHG emissions and their impact on the environment.
- Create a strong (friendly) relationship between local business community and the City.
- Assist in the implementation of a variety of City environmental programs for local businesses.
- Educate partners' employees about climate change.
- Encourage community responsibility.
- Help achieve the GHG reduction goal in Fort Collins' Local Action Plan.

During 2003 and 2004, the Climate Wise project team conducted assessments at eight new partner facilities: Value Plastics, Marriott, USDA, Whole Foods, JAX Outdoor, WaterPik Technologies, Merit Electric, and Wild Oats Market. The team continued to work with existing partners to quantify GHG reduction projects and fine-tune partners' action plans.

The Climate Wise program continues to surpass expectations, both in the number of businesses participating and the amount of greenhouse gas emission reductions. The City has also provided recognition, partner networking meetings, partner trainings, and educational materials.

The following is a list of the 29 Fort Collins Climate Wise partners at the end of 2004:

Austin's and Moot House Restaurants
Advanced Energy
Agilent Technologies
Anheuser Busch
Ben and Jerry's
Celestica Colorado
Colorado State University
Coloradoan Newspaper
Dakocytomation
Foothills Fashion Mall
Fort Collins Health Club
Fort Collins Marriott
Hewlett Packard
JAX Outdoor
Lafarge Corporation
Merit Electric
New Belgium Brewing Inc.
Odell Brewing Company
Platte River Power Authority
Poudre School District R-1
Poudre Valley Hospital
RETEC Group
US Post Office
USDA
Value Plastics
Water Pik Technologies
Whole Foods
Wild Oats
Xcel Energy

2004 actions have been quantified for most of the partners, resulting in avoidance of over 94,700 tons of CO_2e, surpassing the 2010 reduction goal of 93,360 tons! Figure 9 illustrates aggregate partner savings, by category. "Other" refers to direct GHG reduction reports that are not categorized.

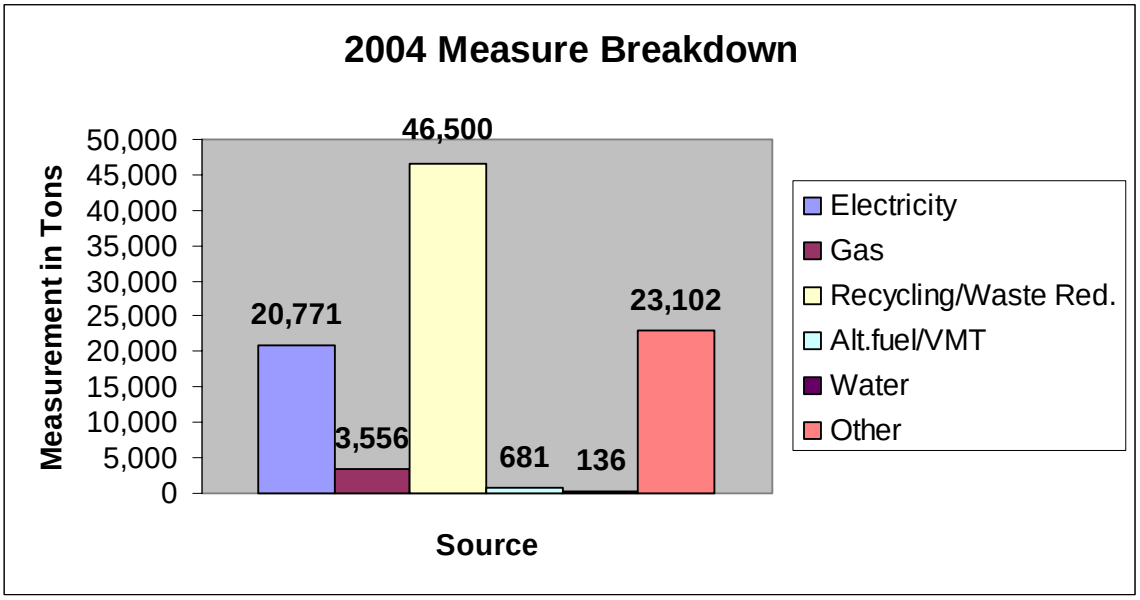


Figure 9. Aggregate Climate Wise partner GHG Avoidance

2005 and Beyond In 2005, the program goal is to recruit five additional businesses. Several companies have already expressed interest. In addition, the Climate Wise team is planning to lead the program in a new direction by establishing various levels of participation for Climate Wise partners. Establishing different participation levels will allow the Climate Wise program to recognize the business partners that are doing the most to reduce Fort Collins' GHG emissions as well as give the businesses goals to achieve. The annual recognition event in 2007 will be used as the forum to highlight business progress and present the new levels achieved throughout the year.

♦ Hydrogen Task Force

2003-2005 Status In early 2001, the City Manager convened a Hydrogen Task Force with representatives from relevant City advisory boards and staff departments to evaluate the City's potential role in promoting the use of hydrogen energy. The Task Force submitted a report with recommendations in August 2001. As a result of recommendations, City Council passed a resolution in March 2002 establishing a policy to implement hydrogen-related projects within the city. The City is now involved with several hydrogen-related projects, including the Transfort Alternative Fueling Station, a 5 kW demonstration fuel cell and the Frontline Bioenergy project at the former Resource Recovery Farm.

Transfort Alternative Fueling Station When completed, the station will provide fueling of compressed natural gas (CNG), Hythane® (a mixture of natural gas and hydrogen), and pure hydrogen. The CNG portion of the station is complete. The Hythane/Hydrogen portion is waiting on delivery of an electrolyzer (a device using electricity to produce hydrogen from water), which is currently in production. Delivery of the electrolyzer is expected in early 2006.

The Hythane/Hydrogen portion of the station is being supported with a grant from the Colorado Governor's Office of Energy Management and Conservation (OEMC). When completed, this will be the first hydrogen fueling station in Colorado and one of only a handful in the U.S.

Plug Power Fuel Cell OEMC provided a 5 kilowatt hydrogen fuel cell to Fort Collins Utilities in September 2005, manufactured by Plug Power, to the City. This will be portable and can be used at various events to promote awareness of hydrogen technologies. Eventually hydrogen to operate the fuel cell can be provided by the fueling station.

Frontline Bioenergy During 2005, Frontline BioEnergy conducted research at the Resource Recovery Farm related to processes that would enable production of hydrogen from biomass feedstocks, such as wood waste from the municipal forest.

♦ City of Fort Collins Action Plan for Sustainability

2003-2004 Status During 2004, an interdepartmental team worked to develop a sustainability action plan, focusing on municipal operations. The process involved first identifying existing sustainability actions, successes, and opportunities. Following that, the team evaluated a variety of potential goal areas using sustainability and other relevant criteria. Nine goal areas were identified as top priority, and specific targets were established with measurable objectives and timeframes. Several targets identified in the Plan would contribute directly to municipal greenhouse gas reductions.

In September 2004, the City's Executive Lead Team adopted the Action Plan for Sustainability and its policy:

> *The City of Fort Collins will serve as a community leader in sustainability by conducting daily operations through balanced stewardship of human, financial, and environmental resources for present and future generations.*

An interdepartmental team was established to begin implementation of the Plan in 2005.

2005 and Beyond Portions of the Action Plan for Sustainability will be implemented, to the extent possible under the 2006/2007 budget approved by City Council.

ENERGY

♦ 1996 City Energy Code

2003 – 2004 Status A comprehensive study was conducted by the City to evaluate the City's 1996 residential energy code, provide benchmark data about new home design, construction and performance, and to learn more about residential air conditioning practices and impacts. Results were published in 2002. The study yielded a wealth of information about both problems and opportunities in new housing. City staff presented study findings to many audiences and developed consumer information materials about new home choices. The 2004 update to the residential energy code was designed to address issues revealed in the New Home Study.

GHG benefit from the City 1996 energy code is based on study results indicating that homes built under the code realize a 16% reduction in natural gas consumption, on average, when compared with homes built prior to the code change.

2005 and Beyond In August 2004, City Council approved new residential, mechanical, gas and energy codes that significantly improved energy efficiency of residential construction. New building code revisions were aimed at strengthening the concept that homes are more like a single complex system of many highly interrelated components. Builders can comply with the new code by using an Energy Star rating or a set of prescriptions regarding R-18 walls, low e-windows, reduced duct leakage, and increased efficiency of heating and cooling units to improve energy efficiency. The new code will save home-owners on energy costs and is estimated to save 1-1.5 tons of greenhouse gas emissions/home/year. The codes became effective on January 1, 2005.

♦ Green Building

2003-2004 Status Work advances on some fronts to promote green building in Fort Collins, although a citywide Green Building program has not yet been developed and implemented. The 2004 update to the residential energy code will require specific changes intended to address issues revealed in the New Home Study. The new residential code will go into effect in 2005 and will result in more energy-efficient homes being constructed. The Utilities Design Assistance Program promotes integrated design and sustainable building practices. The Economic Vitality and Sustainability Action Group, convened by City Council in 2004, evaluated approaches to enhance the community's economic sustainability. A July 2004 report recommends that the City "promote green business and building programs", and "build partnership between green building and non-profits to achieve affordable housing goals".

2005 and Beyond In addition to ongoing Design Assistance programs and other support offered to the commercial building sector by Fort Collins Utilities, the Natural Resources Department requested a small amount of funding to capitalize on rapidly growing community and builder interest in green building and sustainable design practices. Specific actions include the formation of a stakeholder group, implementation of a small outreach program to promote sustainable design, and development of incentives in the development review and/or building permit process to encourage sustainable design.

♦ CSU's Industrial Assessment Center (IAC)

2003 – 2004 Status Since inception, the IAC has performed assessments at 25 Fort Collins businesses. It is estimated that approximately 145 energy efficiency projects have been implemented in Fort Collins between 1990 and 2000. These projects have resulted in the avoidance of over 1,000 tons of $CO_{2/}$year in 2004. No new assessments were conducted at local businesses in 2003 or 2004.

♦ Fort Collins Electric Energy Supply Policy

2003-2004 Status Fort Collins' City Council adopted a new Electric Energy Supply Policy in March 2003. One of the primary objectives of the policy is to reduce the environmental impact of electricity generation through conservation, energy efficiency, load management and the increased use of renewable energy. The policy includes the following specific targets for energy conservation and renewable energy:

- Reduce per capita electric consumption 10% from the baseline of 2002, by the year 2012. The 10% per capita consumption reduction target will reduce overall electric consumption approximately 16% by 2012.
- Work with Platte River Power Authority to increase the City's percentage of renewable energy to 2% by the end of 2004, and to 15% by the year 2017.

Both targets support the LAP efforts to reduce citywide carbon dioxide emissions. The per capita energy goal combined with the renewable energy goal is projected to account for up to 12% of the City's 1.1 million tons CO_2 reduction goal in 2010. Many of the renewable energy and demand side management (DSM) measures discussed below are the direct result of the Electric Energy Supply Policy.

♦ Fort Collins Utilities Wind Power Program

2003-2004 Status In May 1998, Fort Collins Utilities was the first utility in Colorado and among the first in the nation to deliver clean, renewable wind energy for residents and businesses. Volunteer wind pioneer customers (from the pilot program) paid a $0.02 per kWh premium for wind generated from turbines located at Medicine Bow, WY. In April 2001, voluntary wind customers began paying a price premium of $0.025 per kWh, as a pass through cost from Platte River Power Authority for wind power from Medicine Bow was added.

With the adoption of Fort Collins Electric Energy Supply Policy in March 2003, City Council established goals to achieve 2% renewable energy by 2004 and 15% renewable energy by 2017. A 1% fee was added to all electric utility customer bills to help pay for renewable energy. Starting in 2004, PRPA offered a new renewable energy tariff based on "Renewable Energy Certificates" (RECs) to supplement the wind energy being generated at Medicine Bow. The REC wind energy for 2004 and 2005 comes from the Pleasant Valley Wind facility in southwest Wyoming. As a result of the lower cost REC-based equivalent wind energy purchases, the blended wind power cost for 2004 was $0.01 per kWh. This represents a 60% decrease in the cost of wind energy for customers. The 1 cent price became effective starting June 1, 2004 and will be valid through the end of 2005. This represents a 60% decrease in the cost of wind energy for customers and led to an increase in voluntary wind subscribers.

In 2004, Colorado State University campus housing residents joined the wind program. Students and staff from CSU developed a program whereby dormitory and apartment students can purchase wind power on a voluntary and individual basis. 187 dorm rooms and apartments have signed up for the program, purchasing 370,000 kWh of wind power. New Belgium Brewing continues to power all its facilities with wind energy and the City of Fort Collins continues to

purchase one wind turbine's worth of wind energy to partially power City buildings. Utilities was able to restructure the long-term contracts for New Belgium Brewing Company and the City of Fort Collins to allow them to purchase wind power at the new price.

By the end of 2004, the Wind Power Program had over 1,100 residential and 70 commercial subscribers. This represents a 15% increase in the number of customers after the price decrease in June. In addition to voluntary wind subscriptions, Fort Collins Utilities purchased additional wind energy (over 13,607 MWh) from PRPA. This is referred to as rate-based wind.

In all, the amount of renewable energy purchased under the Wind Power Program increased by over 270% from 2003 to 2004. The combination of rate-based wind purchases and voluntary wind subscriptions enabled the City to exceed the Electric Energy Supply Policy 2004 goal for renewable energy, with 2.3% of total energy coming from wind resources. This resulted in a total over more than 14,500 tons CO2e avoided in 2004.

2005 and Beyond The Wind Power Program remains strong in 2005 as rate-based wind purchases continue and the wind price premium remains low at $0.01/kWh. Construction began in late 2004 to install a 2.5 megawatt Clipper wind turbine at the Medicine Bow wind farm. This turbine will be one of the largest land-based wind machines installed in the United States. Fort Collins Utilities have agreed to purchase the output of the turbine at the 2.4 cent per kWh premium. The annual production of the Clipper turbine is estimated at 7,500 megawatt-hours, and will boost Fort Collins' wind energy portfolio by 25%.

♦ Energy Efficiency in the Commercial Sector

Utilities Integrated Design Assistance Program
The Integrated Design Assistance Program (IDAP) provides technical support, expertise and financial support to help customers design and build high performance commercial buildings. Through the Design Assistance program, Utilities helps to fund incremental increases in design costs related to energy analysis, daylighting, and commissioning. Completed projects include Value Plastics, Harmony Library, the new city office building at 215 N. Mason, Pioneer Charter School and three new schools for Poudre School District (PSD). Collectively these efforts result in 621 tons CO2e avoided.

Electric Load Profiles for Large Commercial and Industrial Customers
Hourly electric demand profiles are provided on-line upon request to customers in the larger rates classes (GS-50 and GS-750). The Utilities' goals for these key accounts are to provide customer service, customer education, identification of costly energy use patterns and control problems, and identification of energy-saving and peak-demand-limiting opportunities. Data are collected from the meters on a nightly basis, providing updated energy usage data the next day.

Non-residential Building Energy Assessments
Utilities staff periodically conduct commercial building assessments to identify energy problems and opportunities. Some assessments are performed in conjunction with other programs; others are related to customer requests. This assessment activity varies widely from year to year.

Customer-driven audits over the past couple of years include local churches, restaurants, apartment buildings and offices.

Table 13 below summarizes the services provided by Fort Collins Utilities to reduce energy consumption in the commercial sector.

Table 13. 2004 Commercial Energy Efficiency Programs

Demand Side Management	Description	Milestones
Electric Efficiency Program	$500 per kilowatt incentives for projects that reduce summer peak demand	Utilities portion new 2004
Cooling Rebate Program	$150 to $300 rebates or $90 per ton for high efficiency air conditioners	Ongoing
Design Assistance Program	Funding and expertise for integrated design of new buildings	Ongoing
HotShot for C&I customers	Radio frequency signal for customer control of coincident peak demand	Ongoing
Education and Awareness	**Description**	**Milestones**
The Power to Save	Energy efficiency and conservation promotional campaign	New for 2004
Business Environmental Program Series	Educational programs on energy and environmental topics	New for 2004
Utilities website	Information on energy efficiency opportunities and DSM programs.	New for 2004
Keep Current	Electronic newsletter, web information resource and "ask and expert" tool	New for 2004
Commercial Accounts Luncheon	November luncheon to highlight DSM programs and services, and forum for customer input	New for 2004
Electri-Connect	Provides online access to interval electric data for large commercial and industrial customers	Ongoing

♦ Electric Efficiency Program (EEP)

2003-2004 Status The EEP program is conducted in collaboration with Platte River Power Authority. Fort Collins commercial customers are eligible for $500 per kW of summer demand savings. $350 per kW comes from PRPA and $150 from Fort Collins Utilities. In 2004, the program cumulatively reduced 3,581 MWh of electricity and 1,666 tons CO2e.

2005 and Beyond An electric energy based incentive component was added to the EEP in summer 2005. Incentives are based on annual kilowatt-hour savings. Technical assistance is also offered to commercial customers to help identify, quantify and complete custom projects that take advantage of the EEP program incentives. Consultants are used on an as-needed basis.

♦ Refrigerator and Freezer Recycling

2003-2004 Status The City of Fort Collins Utilities offers a Refrigerator and Freezer Recycling program that provides a $35 rebate and free in-home pick up of old refrigerators or freezers for electric customers and ensures the appliances are comprehensively recycled. The program is operated by Jaco Environmental, with oversight and management by Fort Collins Utilities.

During 2004, the program's first year, 699 rebates were issued resulting in 819 MWh saved and 1,017 tons of CO_2e avoided. Approximately 30% of the CO_2e savings resulted from the environmentally appropriate destruction of CFC-11 foam used to insulate the appliances.

♦ Clothes Washer Rebate

2003-2004 Status The City of Fort Collins Utilities Cloths Washer Rebate program offered citizens a $50 rebate for the purchase of an Energy Star clothes washer. In 2003 and 2004, the program cumulatively reduced 372 MWh of electricity and 173 tons CO2e.

♦ Conservation Kit

2003-2004 Status In 2004, the City of Fort Collins Utilities distributed 3,000 free energy and water conservation kits to citizens. The kits contained a compact fluorescent light bulb and water efficient showerhead. Energy efficiency savings are estimated to be 140 MWh of electricity and 65 tons CO_2e avoided.

♦ Cooling Rebate Program

2003-2004 Status Platte River Power Authority introduced the Cooling Rebate program in 2002 to reduce the growth of summer peak energy demand. The Cooling Rebate Pilot Program rewards customers who upgrade to high efficiency central air conditioners and heat pumps. Residential air conditioners and heat pumps with a 12 SEER (Seasonal Energy Efficiency Ratio) rating or higher receive $200 and those with a 13 SEER rating or higher receive $250. Commercial customers receive a rebate of $90 per ton of cooling capacity for air conditioner and heat pumps exceeding minimum efficiency. In 2003 and 2004, the program cumulatively reduced 626 MWh of electricity and 291 tons CO2e.

Platte River Power Authority offered this rebate program in 2005. However, the program structure will likely change in 2006 because of increases to federal minimum air conditioning standards.

♦ Zero Interest Loans for Conservation Help (ZILCH)

2003-2004 Status Fort Collins Utilities offers zero interest loans (ZILCH program) for residential energy efficiency upgrades. Most efficiency projects are required to show a 10-year payback before a zero interest loan is offered. In 2003 and 2004, a total of seven residential energy efficiency projects were completed using Utilities' ZILCH loans. This brings the total annual CO_2 reductions resulting from ZILCH projects to 450 tons in 2004.

♦ Increase Energy Efficiency Training for Builders

2003-2004 Status The City hosted a training for builders in November 2004 on the City's new residential building code. The training included a section on the new energy code requirements.

2005 and Beyond In 2005, another builder training was offered on the new residential building code. This training provided increased focus on the energy portions of the code. Semi-annual trainings are planned on an on-going basis.

♦ Lobby for Mandatory Renewable Energy in Utility Deregulation

2003-2004 Status Since deregulation is not imminent in Colorado, no efforts were undertaken by the City to promote mandatory renewables at the state level.

♦ Fort Collins Electricity Distribution System Improvements

Status: Fort Collins has made substantial investments to keep its distribution losses low, even as population growth necessitates system expansion. Fort Collins' entire system uses oversized conductors to reduce normal operating losses and to provide enough system capacity to allow backfeeds in the event of system failures. The methodology used here compares Fort Collins' distribution system losses against a national average of 5.0%, taking credit for "reductions" when losses are lower than the national average. The cumulative effects of these improvements since 1990 accounted for savings of 16,346 MWh in 2004 The corresponding CO_2 reduction was 13,780 tons. Since 1990, these activities have saved over 213,900 tons of CO_2.

♦ Reduce City Building Energy Use 15% per sq. ft. below 1990 levels

2003-2004 Status The City has made significant progress toward meeting its goal to reduce City building energy consumption by 15% per square foot below 1990 levels. In 2004, City building energy consumption per square foot was 14.8% lower than 1990 consumption levels. This analysis considers only the 39 major City buildings, and it includes both electricity and natural gas consumption. It does not include water treatment or waste water treatment facilities. This improvement is probably due to the combined benefit of constructing new energy efficient buildings as well as implementing upgrades at existing buildings.

Table 14. Comparison of Major City Building Energy Use, per Square Foot.

Year	MMBTU	Square Footage	MMBTU/Sq Foot	Percent Improvement
1990	80,512	510,592	0.1577	Na
2002	105,326	744,144	0.1415	10.27 %
2004	103,352	769,441	0.1343	14.84%
2010 GOAL			**0.1341**	

Several actions were identified in the City's original Local Action Plan to Reduce Greenhouse Gas Emissions (1999) that will continue to help achieve this goal. The status of these actions is discussed below.

♦ Evaluate Advantages of City Energy Manager and Financing Alternatives

2003-2004 Status Items were included in the 2003/2004 City Manager's work plan calling for staff to evaluate the potential benefits of an energy manager position and to evaluate financing alternatives to increase energy efficiency at City facilities. An interdepartmental committee was formed to explore alternatives such as lease-purchase, performance contractor, etc. to achieve increased energy efficiency in City facilities and to investigate the advantages of establishing a City Energy Manager. This committee met for several months and developed the following recommendations.

(1) The City should begin the process of entering into an energy performance contract.

The Committee's preliminary analysis indicates there are $1.3 million (± 20%) in energy efficiency projects awaiting implementation in City facilities, with an average 8-year payback. The cost of delay is high. Upon learning more about energy performance contracting, the Committee recommends that the City develop an RFP for a performance contractor in 2005, select an Energy Services Company (ESCO), and have them conduct a comprehensive audit of City Facilities. Once the ESCO is selected, the City's only financial requirement is to encumber funds ($50-100K) to pay for the energy audit in the event the City later backed away from the performance contract.

(2) The City should fill an Energy Manager position. Energy managers can typically reduce an organization's energy costs by 5-15%. In 2003, the City spent $1.3 million on electricity, natural gas, water, sewer, and stormwater for the majority of City facilities. A 10% reduction in costs would more than pay for the position.

Three options were identified for filling the position. (1) Poudre School District has proposed an intergovernmental agreement whereby the City would contract for a PSD employee's services as a part-time City Energy Manager. This would not require a new FTE allocation (the energy manager would remain a PSD full-time employee), and would allow the City to pilot the Energy Manager position using a regional expert with demonstrated success. (2) An Energy Manager could be provided as part of the energy performance contract. (3) An Energy Manager could be reassigned from existing staff.

Critical success factors for the above recommendations include upper management support and increased centralization of energy management responsibilities.

2005 and Byyond The City will prepare an RFP to select an Energy Service Company (ESCO). The ESCO will conduct audits of major City facilities and then propose a package of efficiency upgrades that they can guarantee. The City and the ESCO will negotiate a contract that balances risk and return-on-investment, and the ESCO will implement the upgrades.

♦ Sustainable Design Criteria for New City Buildings

2003-2004 Status An update to the City Building Design Standards Manual by Operations Services contains guidance that all new City Buildings should meet Leadership in Energy and Environmental Design (LEED) Silver criteria. This goal is now articulated in City bid

specifications for new buildings. In addition, this goal is reiterated in the City's Action Plan for Sustainability.

2005 and Beyond Major City building in the planning stages now (i.e. North Side Azatlan Center and Police Services) will submit Design/Build RFP's that contain the stated objective of achieving at least LEED Silver standards. Because the LEED system offers flexibility in how the standard can be met, the City will consider developing minimum standards for energy efficiency within the LEED system.

♦ Wind Power for City Facilities

2003-2004 Status Since July 2000, the City of Fort Collins has purchased wind energy from one 660 kW turbine to cover a portion of its own municipal electricity needs. The energy costs are prorated among the City's own electric accounts based on energy usage.

♦ Replace Incandescent Traffic Signals with LEDs

2003-2004 Status Retrofitting traffic signals to light-emitting diodes (LEDs) was originally rated as the City's highest priority greenhouse gas reduction measure, receiving the # 1 rating from both the Staff Technical Team and the Citizen Advisory Committee that developed the City's Local Action Plan (LAP). The major retrofit effort occurred in 2001, when 160 intersections were retrofitted, except for *Yellows* and the *Walk* and *Don't Walk* signals. In 2002, Traffic Operations took the initiative to meter the savings at each intersection. Since then, the City has installed all new traffic signals as LEDs. By 2004, the use of LED traffic signals had reduced traffic signal electricity consumption by over 1.57 million kWh/year, resulting in over 730 tons CO_2e not released each year.

2005 and Beyond A project to upgrade all pedestrian signals to LEDs is included in the City Manager's 2006/2007 recommended budget.

♦ Lighting Upgrades in City Buildings (1993 – 2004)

2003-2004 Status Numerous lighting projects have been implemented in City buildings since the early 1990's. In March 2001, induction lighting was installed in the City parking garage at Mountain Avenue and Remington Street. In addition to using lower wattage induction lighting, Utilities Design Assistance program optimized placement of the light, the interior of the garage was painted white, and daylighting controls were installed. These efforts increased the light levels by a factor of 3 to 5 while keeping energy use the same and improving visibility. In 2004, lighting was upgraded at the EPIC Ice Area and in the pool area. By 2004, total annual savings for lighting projects quantified to date since 1993 totaled 293 tons of CO_2e. Many more lighting upgrades have been implemented since 1990, such as replacement of EXIT signs with LEDs in buildings, but the installations have not been documented well enough to calculate CO_2 benefits.

♦ City Government Converting to Variable Frequency Drives (1990 – 2004)

2003-2004 Status The City recognizes the benefit of replacing variable frequency drives with more energy efficient models once they burn out. Since 1990, variable frequency drives have been upgraded at Police Services, the public library, Mulberry Pool, and EPIC for a total annual energy savings of over 42,500 kWh and an annual avoidance of over 20 tons of CO_2e.

♦ City Government Chillers

2003-2004 Status One chiller was removed from EPIC in 2004, so now both ice rinks are operating on the chiller that was installed in 2002 for the new ice rink. Energy savings were realized after the chiller was removed. Cumulative benefits from other chiller upgrades in past years resulted in 48 tons CO_2 avoided in 2004.

♦ Energy Efficiency and "Power Shaving" at the Wastewater Treatment Plant

2003-2004 Status The Wastewater Treatment Plant requires that high efficiency motors and pumps be installed whenever a pump or motor is added or replaced. Power factor capacitors are required on every motor 5 HP or above in size, which also saves energy. These purchasing requirements have been in place since the late 1980's.

The Wastewater Treatment plant has also been "power-shaving" for the several years. Operators track the coincident peak demand on PRPA's website and manually shut down high-energy equipment when peaks are predicted to occur. This reduces total electric demand during the most critical periods, and also saves the plant thousands of dollars each month in demand charges. In 2004, a system was installed to automatically shut off equipment (by computer) during predicted peak periods.

♦ Energy Efficiency at the Water Treatment Facility

2003-2004 Status In 2003, the Fort Collins Water Treatment Facility implemented several energy optimization procedures to reduce consumption of natural gas and resulting expenses. Procedures consisted of the following items:

* Installation of new thermostats on gas furnaces in the treatment trains and filter areas.
* Installation of thermostat guards to prevent set-points from being changed.
* Set thermostats at 48 degrees in all areas other than offices.
* Reduce the boiler loop temperature in the administrative area from 180 to 160 degrees.
* Installation of seals on the outside doors.
* Shut down some exhaust fans and air handlers in two treatment trains during the winter months.
* Use temperature recorders to check areas for temperatures being too low or high.
* Continue to evaluate systems for more savings.

These successful efforts have resulted in a 30% reduction in natural gas consumption, and a 9.8% cost savings from 2002 to 2004.

TRANSPORTATION

♦ VMT Goal: VMT not to exceed population growth rates

2003-2004 Status *City Plan* (1996) included an aggressive goal, to reduce the VMT growth rate so it would not exceed the population growth rate. *The City Plan Monitoring Project: 2001 Indicators Report* found that between 1995 and 2000, vehicle mile traveled (VMT) growth rates (4.9%/year) did exceed population growth rates (3.4%/year). Exceedance of this trigger initiated a review process, which was undertaken as a part of a full *City Plan* update.

When City Council updated *City Plan* (2004), however, they recognized that the previous goal of bringing the VMT growth rate down to the level of population growth rate was unrealistic in the short term. Therefore, the Council changed the VMT policy goal to read:

> Policy T-91. The City will continually strive to reduce the growth rate in VMT by implementing a VMT reduction program that strives to meet or exceed the performance of similar programs in comparable cities.

The City continues to implement the following policies, plans, programs, and regional participation that each contribute to the goal of reducing VMT growth, and, taken together, constitute the City's overall VMT reduction program:

- The City and surrounding Larimer County employ a Growth Management Area Boundary to contain urban land uses
- *City Plan* includes a Structure Plan which incorporates the activity center concept in its districts (downtown, mixed-use, employment, campus, etc.) so that internal trip capture within districts reduces automobile use
- *City Plan* calls for compact, higher-density development patterns
- Sub-area Plans address multi-modal transportation at the neighborhood scale
- *City Plan* is implemented through zoning and development regulations and site-design standards
- Level of Service standards have been developed for transit, walking, and cycling as well as for vehicle traffic
- Major developments must do a transportation impact study, and must demonstrate there are adequate multi-modal transportation facilities to support the development (adequate public facilities policy)
- Arterial-street construction standards include provision of sidewalks, bikeways, and transit facilities in a "standard cross-section"
- The City has adopted a Transportation Master Plan and separate modal plans including the Transit Development Plan, Bicycle Plan, and Pedestrian Plan
- The City's SmartTrips Program does marketing to encourage use of alternative modes, e.g., transit, carpool, vanpool, walk-to-school, outreach to large employers, etc.
- The Downtown Parking Plan emphasizes a pedestrian-oriented Downtown, encouraging "park once and walk" and long-term parking on the perimeter.
- The City's Capital Improvement Program includes funding for both alternative modes and streets.

- The City invests in the creation of affordable housing, partly to enhance the jobs/housing balance and to reduce intra-regional commuting.
- City policy calls for the use of price mechanisms to reduce VMT growth, although this policy has not been implemented.
- Monitoring of VMT and alternative mode trends is done through the biennial City Plan Monitoring Project.
- In addition, the City participates in regional efforts to reduce VMT growth though the North Front Range Metropolitan Planning Organization.

The City convened an interdisciplinary staff team in 2000 to develop a comprehensive VMT-reduction program. With participation from eight city departments in two service areas, the LUTRAQ Team's (**L**and-**U**se-**T**ransportation-**A**ir-**Q**uality) current mission is to foster integrated solutions to land use, transportation, and air quality problems. The Team has the responsibility and authority to advance interdisciplinary problems and opportunities to the City's Growth Management Lead Team for action. Although the team has been largely inactive due to the demands of the *City Plan* update process, staff liaisons from each program area (transportation, land use, and air quality) meet regularly to bring forward agenda items for the full Team to consider.

2005 and Beyond In 2005-06, the LUTRAQ Team will study "best practices" in reducing VMT growth rates. Because the City is tasked with meeting or exceeding the VMT reduction efforts of comparable cities, a consultant will be hired to review what the most effective cities are doing, and to recommend actions that will bring Fort Collins in line with best practices.

♦ Mason Street Project

2003-2004 Status In October 2000, the Fort Collins City Council approved the overall Master Plan for the Mason Street Transportation Corridor (MSTC). The MSTC was envisioned as a five mile, N-S multi-modal corridor that would provide Bus Rapid Transit service and bike and pedestrian facilities, enhance citizen mobility, and implement critical components of the City's Structure and Transportation plans. During 2001, the City submitted an initial application to the Federal Transit Administration (FTA) "New Starts Program" to fund the costs associated with the Bus Rapid Transit component of the project. In 2002, work began on the Preliminary Engineering and Environmental Assessment Phases of the FTA New Starts application process. However, a citizen tax to secure matching funding for this project was defeated at the ballot in November 2002 and again in April 2003. Consequently, the Bus Rapid Transit component and MSTC improvements north of Horsetooth Road will not be constructed in the near future.

2005 and Beyond The City plans to move ahead with the construction of the bike and pedestrian trail portion along a 3.5 mile segment between Prospect Road and Fossil Creek Trail, south of Harmony. This segment of the corridor is funded through the Colorado Department of Transportation and the 1997 "Building Community Choices" tax initiative. It is anticipated that construction of this segment will be completed in 2005/2006, offering a convenient N-S route for cyclists and pedestrians.

♦ Transportation Demand Management Program

2003-2004 Status In 2003 and 2004, SmartTrips™ programs helped more than 250 businesses, schools and organizations make a difference in how their employees and students travel. Those participants reduced more than 6 million miles of vehicle travel, taking more than 860,000 trips off Fort Collins roads. They prevented 344,309 pounds of carbon monoxide from polluting the air.

The SmartTrips™ office is a free resource to businesses and residents. It offers programs and assistance for bicycling, walking, carpooling, vanpooling and teleworking. Business outreach, a key component of SmartTrips™ services, gives businesses tools to help relieve parking issues, decrease stress and increase productivity among employees, reduce overhead, improve employee retention and recruitment, and even helps them find ways to qualify for transportation tax benefits. One example of such a tool is the carpool matching assistance, which provides access to a database more than 10,000 people. It's helped Colorado State University, where they've seen an increase in carpool parking requests. Discount bus passes offered by SmartTrips™, coupled with temporary meter permits from CSU, also offer students, faculty and staff more flexibility.

SmartTrips™ programs offer a better life to Fort Collins' residents by giving them choices in how they travel. No matter what the choice, these transportation options allow people to relax, stay fit, save money and be productive. By making good transportation choices, Fort Collins residents cut down on the number of vehicles on the roads, easing traffic congestion and reducing air pollution.

Participation in SmartTrips™ programs has been growing steadily. The SmartTrips™ program has averaged a 25 percent increase every year in its success rate. In 2004, SmartTrips™ programs showed a 40 percent increase in results. These programs have earned numerous awards and have contributed toward the Fort Collins' community being honored as a Bicycle Friendly Community by the League of American Bicyclists.

2005 and Beyond The City of Fort Collins SmartTrips™ program will tighten its focus for 2006 and 2007. Employer outreach efforts will continue to pay a key role in these efforts, with more emphasis on carpooling, vanpooling and the SchoolPool program. In addition, SmartTrips™ staff has identified three key areas of town where formation of a transportation management association (TMA) would be beneficial. TMAs help businesses in neighboring locations with similar issues organize to resolve their transportation needs and offer employee benefits. Upcoming years will see SmartTrips™ providing assessments for viability of TMA formation and helping business districts set them up. Improvements also are in the works for the carpool database, with better links to the region-wide network. More schools are joining the SchoolPool program, with all but the mountain-area elementary schools participating in 2005. Ongoing goals of increasing awareness and continuing to take trips off the road will be strengthened in future programs.

♦ Alternative Fueled City Fleet Vehicles

2003-2004 Status In 2004, the City's alternative fueled vehicles used 23,048 gallons of gas equivalent (GGE) of propane and 1,322 GGE of compressed natural gas (CNG). This emitted 69 fewer tons of CO_2 than if the same number of gallons of gasoline were used.

2005 and Beyond The City will investigate the feasibility of strengthening its' purchasing requirements for vehicles by considering fuel economy via life-cycle costing and pollution emissions when selecting vehicles for purchase.

♦ ULEV/ZEV Vehicles for City Fleet

2003-2004 Status The City has adopted a goal that by 2008, 75% of all City light-duty vehicles will meet 1998 Ultra Low Emission Vehicle (ULEV) standards. By 2004, the City had seven hybrid/electric vehicles (Toyota Prius and Honda Civic). Over three tons of CO_2e were avoided in 2004, based on the increased fuel efficiency of the hybrids when compared to a comparable non-hybrid fleet vehicle.

♦ Parks Satellite Shops

2003-2004 Status The City Parks Division has developed a long-range plan. One segment addresses satellite maintenance shops, which have the potential to substantially reduce both personnel hours and vehicle miles in driving to work sites. In 2002, the Division opened the first satellite maintenance operation at a rented facility north of City Hall. This site allows maintenance crews close proximity to the many maintenance responsibilities in the Civic Center area of town. The second location is a larger shop and storage area in Fossil Creek Park, which opened in August 2003 and allows maintenance activities to be staged out of there for parks in the south end of town. These shops are estimated to save a minimum of 5,000 miles annually.

2005 and Beyond A third shop will be located at Southwest Park, to be developed about 2007. Further projections include a community park development in the northern part of the city in 10 to 15 years. Three years ago, City Council approved an increase in the parkland fee, a portion of which will go toward funding these future maintenance buildings.

♦ Clean Cities Program

2003-2004 Status Northern Colorado Clean Cities (NCCC, formerly Weld, Larimer, Rocky Mountain National Park Clean Cities) is a nonprofit coalition with approximately 25 dues-paying members or "stakeholders." The group was established in 1996 with the signing of a memorandum of understanding (MOU) by the members. The City of Fort Collins was a founding member and continues to participate. The MOU is focused on increasing the number of alternative fuel vehicles and fuels (AFVs) in our area. These stakeholders represent a variety of businesses and organizations that are all interested in using and promoting AFVs to increase fuel diversity and reduce petroleum use in the transportation sector, in the interests of better military, civil, and economic security and cleaner air.

NCCC holds quarterly meetings, semi-annual events, and provides information to business fleets, individuals, the media, and others in the Larimer and Weld County area. The coalition is connected to the U.S. Department of Energy (DOE) Clean Cities program (website at www.eere.energy.gov/cleancities/), which provides technical and information assistance, and grant opportunities. Clean Cities has a broad range of information at its national website, including an "Alternative Fuel Station Locator" link.

2005 and Beyond NCCC is supported in part through annual DOE grants that are managed by the Governor's Office of Energy Management and Conservation. In Colorado, OEMC works with two other Clean Cities coalitions, one in Denver and one in Colorado Springs. NCCC received a modest DOE State Energy Program grant for October 2005- October 2007 and was awarded a stipend from General Motors for exceptional work on alternative fuels in 2005. The coalition's annual budget has averaging $15,000 over the past 3 years, and it relies heavily on local member dues and event sponsorships to continue its work. In 2005, major planned events include "It All Adds Up to Cleaner Air: Fuel Economy and Alternative Fuels" planned for Earth Day 2005, and a Diesel Strategies event that is planned for October 2005 in Greeley.

The NCCC Coordinator is Robin Newbrey, who can be reached at (970) 689-4845 or CleanCities@riesberg.com.

♦ Fort Collins-Denver Commuter Rail

2003-2004 Status The North Front Range Transportation Alternatives Feasibility Study (TAFS) was a Major Investment Study sponsored by four public agencies. In April 2000, a Vision Plan was released, identifying a strong need for transportation improvements. By 2020, the area's population is predicted to increase by 43% and employment by 36%. One of the five key recommendations of the Vision Plan is a rail alignment focused in the I-25 right-of-way. This is envisioned as a single-track alignment with passing tracks where needed, using self-propelled Diesel Multiple Unit "regional rail" commuter rail technology, with branches to Greeley and Fort Collins. The total cost is estimated at $652 million.

In 2004, the Colorado Department of Transportation initiated the North I-25 Environmental Impact Statement (EIS) project. This study will build on the findings of the previously completed TAFS and is the next step in planning for transportation improvements along the I-25 corridor. The study will look at several options for the corridor including highway options (high occupancy vehicle lanes, express toll/high occupancy toll lanes, intercity bus service, general purpose lanes), and rail options (bus rapid transit, high speed rail, light rail, commuter rail). It will consider possible routes and station locations for passenger rail from Denver Union Station to Fort Collins and/or Greeley and points between. The final EIS is anticipated in 2007.

SOLID WASTE

♦ Fort Collins Waste Reduction Goals (Divert 35% by 2004, 50% by 2010)

2003-2004 Status In November, 1999 the City Council adopted a policy for diverting solid waste from landfill disposal with a goal of 35% by the year 2004, and 50% by the year 2010. To follow up on previous years' data, a community-wide survey of recycling in Fort Collins was conducted in 2004. Results varied due to the range of data sources that were available to use, but suggested that the community's waste stream diversion rate falls around 25%. These results may be attributed to dedicated efforts at recycling, composting, and other waste reduction activities by both residents and business interests.

The City's waste diversion rate can be pegged even higher - at 41% - when calculations include asphalt and cement recycling, a large amount of which occurs in Fort Collins (over 100,000 tons in 2004). Because the 1999 resolution was not specific about how to quantify waste diversion, it is not clear whether it would be appropriate to include asphalt and concrete in the calculation. This is a question that the City intends to revisit as part of a comprehensive planning project in 2005 (see below).

In keeping with the Natural Resource Department's ongoing work plans and projects, a variety of special collection activities were held by the City in 2003-04 to promote recycling and waste diversion. The annual leaf collection program (which was transformed into an on-line "leaf exchange" service) and Christmas tree recycling continued to be popular. Education and outreach projects included production of a bi-annual "Recyclone Times" tabloid, booths at community fairs, brochures, cable T.V. projects, and extensive information on the City's webpage (www.fcgov.com/recycling).

For the fourth year, the City helped sponsor a computer "round up" event in 2004 for obsolete electronic equipment. On a yearly average, 73,250 pounds of e-waste were collected annually from an average of 720 participating citizens.

2005 and Beyond In 2005, the City will conduct several new comprehensive planning projects, including a set-out survey of residential recycling participation. Consulting work will be engaged to help the community develop a five-year Strategic Plan for solid waste reduction that identifies how to accomplish the goal of diverting 50% of Fort Collins' waste from landfill disposal by 2010.

♦ Business Recycling

2003-2004 Status GHG reductions from recycling activities carried out by independent businesses are estimated at 65,000 tons of CO2e for the year 2004.

As part of the City's Climate Wise program, staff from the Solid Waste Reduction program met with numerous individual business partners and recruits in 2003-04 to provide on-site advice and recommendations about how to reduce their waste stream. For one Climate Wise partner, Wild

Oats Market, the City provided extensive assistance for designing and building a new public recycling drop-off facility in the store's parking lot.

Another partner, New Belgium Brewing Company, collaborated on a pilot project to collect brown glass from six restaurants in the Old Town area. The City obtained a grant from the Glass Packaging Institute that was used to buy special polycarts with decals for collecting the brown glass. After making beer deliveries to participating bars and restaurants, New Belgium's truck drivers then collected the glass and returned it to the brewery, where it was put into a roll-off container for transport to Rocky Mountain Bottle Company in Golden. Based on the initial positive results, the collection route was expanded to include more restaurants, and the pilot was extended for another year.

The City sponsored a series of Environmental Business Outreach programs on a variety of topics, which included a special session for local grocers to explore organic waste composting. Another targeted group was the construction industry, in attempts to reduce the amount of construction and demolition (C&D) debris that gets sent to landfills. The City convened a "focus group" that included representatives of the remodeling industry, the Homebuilders Association, and Habitat for Humanity to discuss ways to stimulate recycling. The group helped identify barriers and opportunities for the City to work on, such as promoting de-construction as opposed to demolition when urban redevelopment occurs in Fort Collins.

2005 and Beyond Outreach to the business community will continue to be a high priority for the City. Climate Wise projects will continue to be supported, including the Brown Bottle Recycling Program with New Belgium Brewing Company. Efforts for increasing the diversion of C&D will be incorporated into City work plans. Detailed evaluations of business recycling will be conducted on a regular basis to monitor progress. Additionally, Staff will work closely with the Residential Hall/Facilities departments to support on-campus efforts by Colorado State University's Recycling Committee.

♦ Residential Recycling

2003-2004 Status In 2003-04, the City calculated that nearly 29,000 tons of materials were recycled in the residential curbside program and at the City's drop-off site (the site also allows use by commercial visitors). Commodities included over 12,500 tons of mixed paper, 7,500 tons of commingled bottles and cans, and 8,900 tons of cardboard and paperboard. Collectively, citizens' recycling activities equate to nearly 43,000 tons CO2e reduced in the year 2004.

Fort Collins will continue to look for opportunities to add more commodities to the curbside recycling program based on changes to Larimer County Recycling Center's processing capabilities. During 2004, the contract for operating the Center was put out for bid and ultimately awarded to Recycle America Alliance, which plans to retrofit the County facility as a "single-stream" processor. The City will look closely at the options this change will offer in the near future, including the possible addition of cardboard and paperboard to curbside recycling.

♦ Expanded Recycling Options

Rivendell
2003-2004 Status The City-run drop-off facility, opened in 2002 on the grounds of Rivendell School, is one of two full-service recycling centers in Fort Collins (the other is operated by Larimer County, co-located with the landfill). Rivendell's central location at East Prospect and Riverside, plus the hours of operation (seven days/week during daylight hours) have proved to be convenient and as more and more people learn about it, the volumes have grown. Fort Collins now collects between 130 and 160 tons per month of material for recycling at Rivendell. In 2004, the use of the Rivendell Recycling Center was expanded to allow businesses to take their recyclables, in addition to residential patrons. Use of the facility by both residential and commercial grew considerably, with a commensurate increase in volumes; 1,371 tons of material collected in 2003 and 1,590 tons in 2004.

2005 and Beyond The City will continue to operate the Rivendell facility, collecting a paper mix (which combines magazines, office paper, newspaper, and other grades), cardboard and paperboard, and commingled bottles and cans. Additional commodities may be considered for collection and recycling in the future, based on citizens' demands.

Increase Multifamily Recycling
2003-2004 Status As a result of increased outreach that was conducted for multifamily residents (special educational materials, free recycling "tote baskets, " etc.), several large housing complexes (Provincetown Apartments and Park Lane Tower condominiums) initiated recycling collection programs for tenants.

The City's Land Use Code was amended in 2004 with a new recycling requirement. Now, all new multifamily and commercial development in Fort Collins must be built with enough additional space in trash enclosure areas to accommodate recycling for tenants. In the future, multifamily complexes will not have the space limitations that currently deter some apartment managers from subscribing to recycling collection services.

Expand Organics Recycling
2003-2004 Status Efforts to improve composting opportunities for citizens continued to be a challenging area in 2003-04, although some progress occurred. In Colorado, a new Rocky Mountain Organics Council was formed to provide technical support to the emerging compost industry. As a water conservation measure, the City adopted a soil amendment requirement to the Land Use Code requiring compost to be applied by developers for new homes in Fort Collins.

A white paper written by a City consultant listed ideas for diverting more of the organic material that goes to landfills for disposal. One recommendation was to motivate grocers in Fort Collins to separate their vegetable waste, using a model provided by the newly opened Whole Foods grocery store in Fort Collins. A business outreach presentation was held to share information with other grocers about Whole Foods' system of back-hauling (via the same trucks that delivered produce to the store) to a commercial composter in Denver. The organics are

transported in shrink-wrapped, palletized wax boxes and then ground up, box and all, to be used in making compost.

Researchers at Colorado State University upgraded a composting facility at Foothills Campus as a pilot project for handling animal by-products from a bio-digester, including deer that have been tested for Chronic Wasting Disease. The by-product is then introduced into a hot-compost pile capable of destroying cellular molecules. Because considerable amounts of soiled animal bedding material are also used in the process, the University was able to increase the campus' waste diversion to nearly 60%.

A lease arrangement was made at a City property (the Resource Recovery Farm) to allow a research firm called Frontline BioEnergy to rent space for developing technology that converts organic material such as tree limbs into hydrogen fuel. In this research phase, the Forestry Department will deliver wood waste from its pruning activities for feedstock, starting in 2005.

♦ Update Recycling Regulations

2003-2004 Status Starting in August, 2003, a new range of paper goods was added to Fort Collins' curbside recycling program for residents. In addition to newspaper, citizens were enabled to start recycling magazines, junk mail, catalogues, and office paper. The same additions were made to the City's and the County's drop-off sites.

During 2004, an amendment was made to the City's 1996 pay-as-you-throw ordinance to clarify that trash haulers must also provide residents in Homeowner Association accounts with trash service that reflect variable rates. Since the number of homes located in HOA's represents at least 20% of Fort Collins' households, this means that significantly more people will be able to avail themselves of the opportunity to save money on their trash bill by producing less garbage and finding ways to recycle, compost, and re-use materials.

♦ Solid Waste Data Collection

2003-2004 Status A consulting firm was hired in late 2004 to update the City's waste diversion data. SERA, Inc. conducted a survey of 36 of the largest businesses in Fort Collins. The results, combined with information that the City receives from trash haulers indicated that the community's waste diversion rate reaches 41%, if asphalt recycling is included. Excluding asphalt, waste diversion averages 25%.

♦ Methane Flaring and Heat Recovery at the Wastewater Treatment Plant

2003-2004 Status The City's main wastewater treatment plant currently uses a significant amount of the ethane (CH_4) produced from wastewater treatment processes to power boilers located at the facility. The boilers are used to keep the digesters at the proper temperature and to heat a number of buildings on the wastewater treatment site. Unused gas is flared off, emitting carbon dioxide but eliminating potent methane emissions. In 2001, a fourth anaerobic digester was built at the Drake Water Reclamation facility and a third boiler was added to the system. The total system now includes four digesters with gas storage lids and three boilers. Total gas

production has not increased, but methane consumption has dropped, due to the higher efficiency of the new boiler. This process of using the heat energy generated by methane combustion for power generation and flaring off the remaining gas is estimated to avoid nearly 12,000 tons of CO2e/year in 2004.

♦ Larimer County Wood Waste Diversion

2003-2004 Status In 2000, Larimer County implemented a pilot Wood Waste Diversion Project to explore the feasibility of collecting of wood for possible fuel at the nearby cement plant. During this project, the County segregated wood waste loads brought to the landfill. Sources included wood from forest thinning, downed branches from the urban forest caused by early season snowstorms, and some construction and demolition debris. Even though it was determined that wood would not be burned as fuel at the cement plant, the County continued this program. In 2004, over 13,000 cubic yards of wood waste were segregated from the landfill, ground up, and recycled for use as lands capping materials. This avoided an estimated 3,510 tons of CO_2e emissions from the landfill in 2004.

♦ Landfill Gas to Energy

2003-2004 Status Emissions from the Larimer County landfill are not expected to exceed the EPA's threshold level of 50 MG (megagrams) of non-methane organic compounds (NMOC) for another 10-15 years, according to new measurements made at the landfill. In 2004, Tier II testing was redone at the landfill using a revised methodology. This process determined that the MNOC emission are ~ 11 mg/year. If NMOC emissions grow at an expected rate, it is not likely that a collection system will be required for 10-15 years.

♦ City Employee Recycling Program

2003-2004 Status The City has operated a successful internal recycling program since the early 1980's. Employees are encouraged to recycle catalogues, magazines, blueprints, phone books, junk mail, office paper, cardboard, and aluminum, steel, glass, and plastic containers. Each employee is responsible for depositing recycled material into special collection containers centrally located in each building. The City contracts with a private vendor for recycling collection pick-up. Each department or building is charged a monthly fee based on the frequency of pick-up service. Table 15 shows recent greenhouse gas benefits from the internal City recycling program.

Table 15. Internal City Recycling Program

	1998	1999	2000	2001	2002	2003	2004
Tons Recycled Materials	70	75	90	115	125	118	122
Tons CO_2 reduced	342	366	433	553	602	565	582

VEGETATION

♦ Increase Tree Planting Citywide

2003-2004 Status

Tree Plantings In 2003, the City planted 617 trees on City property. In 2004, the number rose to 1,068. It is estimated that there are ten times more trees planted citywide by citizens and businesses than are planted by the City government in Fort Collins. Therefore, in 2004, it is estimated that 2,000 trees were planted citywide, and 132 tons of CO_2 were sequestered as a result.

Research In November 2003, a report was published on a comprehensive cost:benefit analysis of Fort Collins' municipal trees. This research was a collaborative effort by the USDA Forest Service, the Center for Urban Forest Research, and the City of Fort Collins. ("Benefit-Cost Analysis of Fort Collins' Municipal Forest", 2003. McPherson, G., et. al.) The report concludes that the 31,000 park and street trees in Fort Collins provide substantial environmental and economic benefits for taxpayers. For every $1 invested in tree management, residents receive $2.18 in benefits. The net cost benefits are presented below.

Energy savings:	$ 112,045
Carbon dioxide reduction:	$ 43,686
Air Quality improvement:	$ 18,472
Stormwater:	$ 403,597
Property value:	$1,596,247
TOTAL BENEFITS:	$2,147,047

Work has continued on the Community Carbon Credit project, which is being conducted by a CSU Ph.D. student to determine the viability of including community trees in established carbon trading markets (i.e. is a community forest a cost-effective method for sequestering and storing carbon, and is it a practical investment?). Publication of the results is expected in late 2005.

2005 and Beyond Public education about trees, their important role in our community, and how to nurture and protect them will remain an important part of the Forestry Department's activities in the future. Programs such as Arbor Day, "Save Our Shade" educational workshops, and the High Plains Landscape Workshop will continue. Insect and disease management will use a proactive approach to promote the health and vigor of trees and minimize the need for direct chemical applications. Proactive management is important because Dutch Elm disease and Ips spruce beetle are considered epidemics in Fort Collins. The Forestry Department will also continue to provide review of landscaping plans via the development review process.

PURCHASING/ CITY ADMINISTRATION

♦ Purchasing's Electronic Document Archive and Distribution

2003-2004 Status In 2002, Purchasing began to scan in copies of RFPs and contracts for archive purposes, instead of requesting three printed copies. During 2003 and 2004, more City departments began using Procurement cards, rather than the paper-intensive "Mini-Order" system. These efforts collectively prevented using 120 reams of office paper, which equates to avoiding 1 ton of CO_2 emissions in 2004.

The City Purchasing Department updated a Sustainable Purchasing Policy in September 2004. The policy calls for evaluating products and services that have a reduced impact on human health and the environment where practicable, while maintaining fiscal responsibility. This includes examining life-cycle costs of products, minimizing packaging, avoiding chlorinated solvents, and using at least 30% recycled content paper.

♦ SIRE Electronic Document Archive

2003-2004 Status Like many organizations, Fort Collins has looked to electronic document management technology as a means to control and effectively manage the explosive growth of electronic documents. Over the past three years, the City has implemented an enterprise electronic document management system called SIRE (Store Index Retrieve Exchange) and achieved reasonable success. The benefits of this system are far-reaching, and include ensuring that the organization can continues to function in the event of a disaster and the ability to protect its business and legal interests. SIRE enables the organization to share documents throughout City departments, anticipate customers' needs by making public records more available (i.e., over the Internet), and reduce the need for mass duplication and physical storage of documents. As of December 2003, over 800,00 pages of documents were archived, and by 2004, nearly 300,000 more pages were archived. GHG benefits are calculated based on the reduced need to manufacture paper.

CLIMATE CHANGE EDUCATION AND OUTREACH

♦ Climate Education and Outreach Efforts

2003-2004 Status

Climate Staffing

2003/2004 saw no changes in staffing level for climate protection work from 2002 levels. Fort Collins Utilities provided funding to support 0.5 FTE to work on business outreach and climate protection activities for two years (mid 2002 to mid 2004). Community Planning and Environmental Services, Natural Resources Department provided 0.5 FTE for the technical support of the Climate Wise program. The Climate Wise program received a $20,453 grant from the CDPHE Community-Based Air Program for 2003-2004. This funding covered technical consultants and partially coved Climate Wise partner events.

Numerous City staff supported climate protection by serving on the interdepartmental Energy Management Team. This Team was convened by the City Manager to oversee implementation of the City's Local Action Plan to Reduce Greenhouse Gas Emissions. The Team met quarterly throughout 2003/2004.

Public Education and Outreach
The Climate Change educational display was placed in City offices periodically during 2003/2004 and the Climate Protection Web page was maintained. Climate Change was the theme of the Clean Air Team's booth at the fall 2003 Rocky Mountain Sustainability Living Fair.

Environmental Business Outreach
Work continued to distribute the Environmental Business Outreach brochure to local businesses. The brochure highlighted the various existing City environmental programs that are available to the business community. Many of these programs (wind power, waste reduction, alternative modes, etc) would result in the reduction of GHG emissions.

Climate Wise Partner Recognition
In early 2003, the Climate Wise annual recognition event was combined with the recruitment event in order to use resources more efficiently. The event included the current Wind Program participants. The event was held at the Northern Hotel, a new Wind Program participant. The annual recognition and recruitment event was also televised and featured on Showcase Fort Collins for a month on Cable 27.

Environmental Business Series
The City's Climate Wise voluntary business program was featured at the November 2004 Environmental Business Series Program.

SUMMARY OF 2003/2004 PRIORITY MEASURES

The status of the measures specifically recommended for priority implementation in 2001/2002 is summarized in Table 16 below.

Table 16. Climate Protection Measures recommended for priority implementation in 2003-2004

Measure Name	Recommended Action	Status
GENERAL		
Sustainability Management System	Develop and Implement a Sustainability Management System for the City.	Policy approved by City Executive lead Team- 9/04, City Team convened and work began 12/04, implementation stalled 4/05 with staffing departures
Climate Wise	Seek more partners, grant funding; develop tiered participation levels.	$20, 453 grant from CDPHE in 03/04, 8 new partners added
Hydrogen Pilot	Develop regional partnerships and promote pilot production of fueling infrastructure and prototype fleet vehicles.	Support FrontLine Bioenergy to research hydrogen from biomass feedstocks at Resource Recovery Farm

Residential Green Building Program	Evaluate the potential for a residential green building program following completion of the 2003 city building code update.	FC Utilities raised consumer awareness and demand for high performing new homes.
TRANSPORTATION		
VMT Goal	Continue LUTRAQ programs; Fund and implement TDM programs.	SmartTrips program sees 40% increase in VMT reduction
Mason Street	Construct 3.5 mile bike/ped segment from Prospect to Fossil Creek.	Plans for construction underway
CNG Fueling Station	Construct a compressed natural gas fueling station for City CNG vehicles.	Construction underway
ENERGY		
Electric Energy Supply Policy	Develop and implement Demand Side Management and Renewable Energy Strategic Plans.	2004 Utilities report shows success in DSM and renewable energy
Financing Options for City Energy Efficiency	Explore alternatives such as lease-purchase, performance contractor, etc. to achieve increased energy efficiency in City facilities.	Recommendation for Energy Performance Contract for City facilities
City Energy Manager	Investigate advantages of establishing a City Energy Manager position.	Recommendation to create an Energy Manager position
City Gov. Sustainable Design and Operation	Implement the Sustainable Design Guidelines developed by Operation Services. Adopt standards for sustainable construction and operation of all City facilities.	City Building Design Standards Manual and Action Plan for Sustainability call for LEED-Silver in new City buildings
Residential Building Code Update	Incorporate specific recommendations to improve new home energy efficiency that resulted from the 2002 New Home Study into the 2003 update of Fort Collins Residential Building Code.	Code updated in 2004 to increase new home energy efficiency
Pedestrian Traffic Signal Retrofit	Provide matching funding for PRPA "Kash for Kilowatts" program to retrofit ped signals with LEDs.	Request to retrofit ped signals included in 2006/2007 budget
New Home Task Force	Implement recommendations of Task Force.	"What to Look for in A New Home" brochure developed to aid home buyers; City participates in regional group that grew out of New Home Stakeholder Group
ENERGY STAR®	Continue the City and Utilities coordination with ENERGY STAR® initiatives.	Citizen outreach through various DSM programs
WASTE		
Expand Recycling Drop-off Options	Continue to work with the County to increase citizens recycling opportunities at both County and City drop-off locations.	Rivendell was opened to small businesses.
Recycling Regulations	Require haulers to collect #7 paper mix; Fix loopholes in the Pay-As-You -Throw ordinance.	Recyclable paper mix expanded, PAYT loophole closed.

Multifamily Recycling	Increase recycling opportunities for multifamily residences.	Recycling programs initiated at several multifamily units. New City code requires recycling space at new multifamily units.
Expand Organics Recycling	Evaluate feasibility of new local measures for composting. Explore opportunities for pilot projects (biomass fueling for hydrogen generation, incorporation of brewery sludge into compost) .	FrontLine BioEnergy leases the Resource Recovery farm to research hydrogen creation from biomass (wood waste)
Data Collection	Conduct waste diversion survey of businesses and residents; dumpster dive to characterize municipal waste.	2004 survey of large businesses recycling shows city diverts 41% of waste (including asphalt recycling)
VEGETATION		
Urban Forest Cost:Benefit Analysis	Complete study	Study completed in 2003
Increase lifespan of City-owned trees	Focus resources on the care and maintenance of existing City-owned trees.	Focus on tree maintenance continued
PURCHASING		
Promote Environmentally Preferable Products	Research and promote environmentally preferable products for City purchasing.	Sustainable purchasing policy updated in 2004
Electronic Documents	Expand the number and types of documents that are archived electronically.	SIRE electronic archive system expands significantly in 2003/2004
EDUCATION		
Climate Change staffing	Obtain secure funding for climate education and technical assessment staffing	1.0 FTE dedicated to Climate Wise, supplemental grant funding obtained
Climate Change Education/Outreach	Focus general outreach on energy efficient appliances	Utilities DSM programs (Washer Rebate, Cooling Rebate, Refrig Rebate) focus on appliances
Energy Training for City Employees	Conduct "Energy for Everyone" training for all City employees	Training on Building and Transportation energy given to two City departments
Environmental Business Outreach	Continue to deliver information about City environmental programs to new and targeted businesses	City environmental programs promoted thru brochure distribution, Chamber presentations and Climate Wise

V. FUTURE ACTIONS

The Energy Management Team recommends implementation of the following actions during 2005 – 2007 to reduce greenhouse gas emissions in accordance with the City's *Local Action Plan to Reduce Greenhouse Gas Emissions* (LAP) and with existing City policies and priorities. When developing these recommendations, the Energy Management Team qualitatively considered the following factors:

- items included in the City Manager's 2006/2007 recommended budget
- progress to date on implementation of measures identified in the LAP and Status Reports,
- greenhouse gas reduction potential of measures,
- current understanding of department, service area, and City objectives and priorities.

A more detailed discussion of these measures follows Table 17 below.

Table 17. Climate Protection Measures recommended for implementation in 2005-2007.

Measure Name	In Original LAP?	Current Status	Recommended Future Action
GENERAL			
Sustainability Action Plan	N	Policy & Plan completed	Implement the targets to the extent possible under the 2006/2007 budget. Increase collaboration with Energy Management Team, City Economic Advisor, and EVSAG.
Climate Wise	Y	On-going	Implement tiered participation and recognition levels, increase pollution prevention focus.
Hydrogen Pilot	N	On-going	Develop regional partnerships and promote pilot production of fueling infrastructure and prototype fleet vehicles, including hydrogen and a hydrogen-CNG blend.
Green Building & Sustainable Design	Y	Not Started	Convene stakeholder group, conduct outreach, consider GB incentives through development review and land use code.
Explore GHG Registry Alternatives	N	Not Started	The City could realize the benefits of more rigorous quantification and take a leadership role.
TRANSPORTATION			
VMT Goal	Y	On-going	Continue LUTRAQ programs; fund and implement TDM programs.
Mason Street	N	Started	Complete 3.5 mile bike/ped segment from Prospect to Fossil Creek.
CNG Fueling Station	N	Started	Increase CNG busses in City fleet.
100% BioDiesel for City Vehicles	N	Planned	Provide B20 (20% biodiesel, 80% regular diesel) for all City diesel vehicles starting in 2005 (Start with 25% B20 in 2004).
Support "Plug-In Hybrid Vehicle" campaign	N	Not Started	Seek official support for a growing campaign to prompt hybrid vehicle manufacturers to increase battery capacity which would significantly increase life-cycle cost savings and environmental benefits.

ENERGY			
Electric Energy Supply Policy - DSM Programs	N	Started	Continue and expand Demand Side Management (DSM Programs.
Electric Energy Supply Policy - Renewable Energy	Y	Started	Continue to increase renewable energy purchases in collaboration with Platte River Power Authority.
City of Fort Collins Energy Performance Contract	N	Started	Release RFP to select an Energy Performance Contactor, audit City buildings and implement upgrades.
City of Fort Collins Energy Manager	Y	Started	Authorize Energy Manager role in the City; centralize control and records for energy management; develop incentives for departmental energy savings.
City Building Heating/Cooling Policy	N	Not Started	Propose policies to increase energy efficiency (i.e. heating/cooling policies, etc.).
City Gov. Sustainable Design and Operation	Y	Started	Construct all new City buildings to meet at least LEED Silver rating, including Azatlan Center and Police building; develop minimum criteria for electricity/natural gas efficiency.
Ped. Traffic Signal Retrofit	Y	Planned	Upgrade pedestrian signals to LED.
Support Efforts to Achieve High-Performing New Homes	N	On-going	Build consumer awareness and market demand for high performance new homes.
Improve Existing Home Performance	N	Started	Implement “Home Performance with Energy Star” program to train contractors to diagnose and solve residential home energy problems.
Commercial Building Code Update	N	Not Started	The City will assess the 2006 International Building Code (addresses commercial buildings) for possible adoption into local code.
Peak Oil – Awareness Raising	N	Not started	Raise awareness of peak oil issues and implications for Fort Collins.
Waste			
Solid Waste Reduction Strategic Plan	Y (50% Diversion goal)	Started	Develop a strategic plan that identifies the best methods to achieve the City’s 50% waste diversion goal by 2010.
Recycling Technology Changes	Y (50% Diversion goal)	Started	Consider “Single Stream” recycling including paper/fiberboard, paper, and commingled (may increase recycling volumes by 20%).
Recycling Ordinance Amendment	Y (50% Diversion goal)	Scheduled 12/05	Amend City ordinance to require trash haulers to pick up cardboard and paperboard along with other recyclables at curbside.
Explore Community Composting	Y (50% Diversion goal)	On-going	Continue efforts to expand community composting options.
Resource Recovery Farm	N	Started	Explore the feasibility of using the former Resource Recovery Farm as a location for an “eco industrial” park.

Vegetation			
Increase lifespan of City-owned trees	Y	On-going	Plant appropriate species in appropriate locations. Focus resources on the care and maintenance of existing City-owned trees.
Quantify carbon sequestration in City-owned natural areas	N	Not Started	Partner with CSU or other scientists to quantify carbon sequestration in City natural areas.
Evaluate City landscaping and irrigation requirements	N	Not Started	Evaluate City code requirements for landscaping and irrigation to enhance appropriate water conservation and/or increase irrigation efficiency.
Purchasing/ City Admin			
Promote Environmentally Preferable Products	Y	On-going	Promote environmentally preferable purchasing within City departments.
Electronic Documents	N	Started	Expand the number and types of documents that are archived electronically.
Strengthen City vehicle purchasing criteria	N	Started	Ensure life-cycling costing for vehicle purchases; consider pollution emissions.
Education			
Climate Change staffing	Y	On-going	Maintain existing staffing levels (expand if possible).
Climate Change Education and Outreach	Y	On-going	Partner with others (ICLEI, RMCO, Canary Initiative, CSU) to increase public education on climate change.
Energy Awareness Raising for City Employees	Y	Not Started	Explore simple ways to provide energy saving tips to employees (IT, FortShorts, GroupWise pop-ups, video check-out).

General

- Action Plan for Sustainability - Implement targets established in the City's Action Plan for Sustainability to the extent feasible under the adopted 2006/2007 budget. Report on progress. Quantify greenhouse gas emissions associated with target achievement. Increase collaboration between Sustainability Implementation Team, Energy Management Team, and EVSAG.

- Climate Wise – Continue outreach efforts to secure more Climate Wise business partners and maintain close relationships with existing partners to ensure implementation, monitoring, and reporting of actions identified in their Action Plans. Implement a new tiered participation format that will recognize partners achieving the greatest reductions and raise the incentive for other partners to increase their participation levels. Add work to promote other pollution prevention activities for partner businesses.

- Hydrogen Pilot – Develop regional partnerships and promote pilot production of fueling infrastructure and prototype fleet vehicles for hydrogen and hydrogen-CNG fuel blends.

- Green Building & Sustainable Design – Provide a new focal point to capitalize on rapidly growing community and builder interest in green building and sustainable design practices.

Form a Green Building stakeholder group, implement a small outreach program to promote sustainable design, and consider incentives in the development review and/or building permit process to encourage sustainable design.

- Explore Alternative Greenhouse Gas Registries – Along 2005 with a recommendation that the City should not participate in the Chicago Climate Exchange, the Energy Management Team recommended that the City explore alternative registry systems such as the California Climate Action registry, joined by PRPA in 2005. Benefits would include more rigorous quantification and leadership opportunities.

Transportation Emissions

- VMT Goal - LUTRAQ - Recognizing that greenhouse gas emissions from the transportation sector are predicted to rise more quickly than emissions in any other sector, and that congestion reduction is a high priority for the City, the Energy Management Team recommends that projects and programs proposed by the interdepartmental LUTRAQ Team be funded and implemented. It is recommend that the results of the VMT Best Management Practices study planned for completion in 2006 be considered in the 2008/2009 City budget development.

- VMT Goal - Transportation Demand Management (TDM) Activities – Recognizing that on-the-ground efforts to promote use of alternative modes and reduce citizen and employee VMT play a critical role in achieving citywide VMT and congestion reduction, it is important for the City TDM program to receive adequate funding to continue building commuter momentum regarding the use of alternative modes.

- Mason Street – The 3.5 mile segment of bike and pedestrian trail between Prospect Road and Fossil Creek Trail, south of Harmony will be completed in 2006, offering a convenient N-S route for cyclists and pedestrians.

- CNG Fueling Station – Increase CNG busses in the City fleet.

- 100% BioDiesel – Fuel all City diesel vehicles with B20, a blend of 20% biodiesel and 80% regular diesel fuel starting in 2006.

- Support "Plug-In Hybrid Vehicle" Campaign – Plug-In Hybrids (not currently available commercially) have more battery capacity than traditional hybrids and can make up to 40 mile commutes on all electric power, doubling the efficiency of the vehicle. The City of Austin is spearheading a campaign to unite communities in asking hybrid manufactures to manufacture plug-in hybrids. Seek elected official support to join this campaign.

Energy Emissions

Recognizing that greenhouse gas emissions from electricity and natural gas use in the residential and commercial sectors collectively account for 65% of the city's greenhouse gas emissions,

energy conservation remains an on-going priority. The Energy Management Team recommends focusing on the following measures in 2005-2007:

- Implement the City Electric Energy Supply Policy; DSM and Renewable Energy Continue to offer programs to help achieve the demand side management (DSM) and renewable energy goals of the policy.

- Energy Performance Contract Recent investigation into financing alternatives for increasing energy efficiency of existing City facilities led to the recommendation that the City should enter into an energy performance contract with an Energy Service Company..

- City Energy Manager for Municipal Operations Recent investigation into the benefits of an energy manager lead to the recommendation that the City should create an Energy Manager position. Experience has shown that an Energy Manager can reduce an organizations' energy use 5-15%. Centralize control and records for energy management. Develop incentives for department to save energy.

- City Building Heating/Cooling Policy – Follow the example of other organizations that have established boundaries on heating and cooling temperature levels in order to reduce energy consumption.

- City Government Sustainable Design and Operation Implement the sustainable design guidelines developed by Operations Services for construction and renovation of City facilities. The guidelines call for all new City facilities to achieve a silver level rating from the Leadership in Energy and Environmental Design (LEED) guidelines created by the US Green Building Council. Establish minimum energy efficiency criteria for electricity and natural gas.

- Pedestrian Signal Retrofit – Replace all pedestrian Walk and Don't Walk signals with LEDs thereby increasing energy efficiency and reducing maintenance costs.

- Support Efforts to Achieve High-Performing New Homes The City, in partnership with E-Star Colorado and other entities in the state, will continue efforts to improve performance in the new home sector through consumer awareness-building (presentations, handout materials, displays, tours, and a website, under the umbrella of "What to Look For in a New Home") and technical support to the building industry (e.g., sponsor "Super-Ratings" for select Fort Collins builders to assess current practice and help builders move from conventional to high-performance design and construction practices; offer training in design load calculation, equipment sizing, etc.)

- Improve Existing Home Performance E-Star Colorado's "Home Performance with Energy Star" program is developing an infrastructure of contractors who can diagnose and solve residential problems in the areas of energy efficiency, comfort, indoor air quality and building durability from a "whole-house" standpoint. These contractors are intended to serve as one-stop shopping options for customers. In 2005, a Phase II program pilot is training a

small number of northern Colorado contractors in preparation for public announcement of this service. FC Utilities and the City of Boulder funded this pilot and other supporting roles.

- Commercial Building Code Update The City will assess the 2006 International Building Code (addresses commercial buildings) for possible adoption into local code.

- Peak Oil Awareness Raising Experts predict that global oil demand will outpace supply sometime in the next 1-20 years. This could have serious implications for communities. Begin to raise awareness about this issue and its implication for the Fort Collins community.

Solid Waste Reduction

- Strategic Planning In 1999, the City Council adopted the goal of diverting 50% of Fort Collins' waste stream from landfill disposal by 2010. The city must be very strategic in its activities over the next five years in order to reach this ambitious level of waste diversion. In 2005, a Solid Waste Reduction Plan will be developed in which the best measures to pursue are identified, along with information about their costs of implementation and likely outcomes. Specific measures will be evaluated with assistance from consultants and community-wide public involvement, and then presented to the City Council in 2006.

- Recycling Technology Changes The materials reuse facility (MRF) in south Fort Collins, which is managed by Larimer County, will alter its processing system as a result of contract renegotiations. A new 10-year contract to operate the MRF was awarded to Recycle America Alliance (RAA), whose proposal is to remove all sorting equipment at the plant and to begin collecting combined materials in a "single stream." Starting in October 2005, Larimer County's MRF will therefore function as a transfer station for recyclables collected by local haulers and material will be transported in semi-truck loads to Denver to be sorted and baled.

  The significance of single-stream recycling is that it not only combines paper/fiber commodities with commingled bottles and cans in the same container, thus providing greater convenience for residents who wish to recycle. It also allows the opportunity for recyclers to set out their cardboard and paperboard (e.g., egg cartons and cereal boxes) in the Fort Collins curbside recycling program. The greater convenience, and the addition of more materials to the program, is projected to increase participation in recycling, as well as the volumes of recyclable materials collected from residential customers, possibly by as much as 20%.

- Recycling Ordinance Amendment In anticipation of public demand to recycle paperboard and cardboard in Fort Collins' curbside recycling program, the City anticipates that it will amend local trash hauling licensing requirements (Section 15-414 of the Municipal Code) in 2005. Private sector residential trash haulers will be required to collect paperboard and cardboard from their residential customers, along with the current list of materials that the City has designated for recycling (magazines, junk mail, newspaper, glass, plastics, aluminum, and steel cans).

- Explore Community Composting With only one commercial composting facility in the immediate geographic area, large amounts of the organic fraction of Fort Collins' waste stream are still sent to landfills for disposal. Citizens are eager to have more composting options, and expectations are high for the City to provide a public yardwaste drop-off site. An important goal in 2005-06 is to create some sort of breakthrough on this issue, which has challenged the City in terms of land use planning and budgeting constraints since it was first investigated in 1996.

- Resource Recovery Farm The feasibility of using a City-owned property as a location for an "eco industrial" park will continue to be explored in 2005-06. The 87-acre site on the east side of Fort Collins features several industrial sized buildings that may be used to help incubate a cluster of enterprises oriented to waste reduction and resource conservation. The City will research potential business start-ups and assist them with zoning and development processes as an incentive to attract tenants.

Vegetation

- Increase Lifespan of City-owned Trees – Focus resources on the care and maintenance of existing City-owned trees.

- Quantify carbon sequestration in City-managed natural areas – Seek assistance from CSU or other scientists to assess carbon sequestration potential in City-managed natural areas.

- Evaluate City landscaping and irrigation requirements – Evaluate City code and City guidelines that address landscaping and irrigation to enhance appropriate water conservation and/or increase irrigation efficiency.

Purchasing

- Environmentally Preferable Products - Research and promote environmentally preferable products for City purchasing.

- Electronic Documents - Expand the number and types of documents that are electronically archived, thus reducing paper use.

- Strengthen environmental criteria for City Vehicle Purchasing Ensure life-cycling costing for City vehicle purchases. Also consider pollution emissions as a purchasing factor.

Education

- Climate Change Staffing - Maintain or expand through grant funding staffing resources to support greenhouse gas reduction activities.

- Climate Change Education and Outreach – Partner with others (ICLEI, RMCO, CSU, Aspen's Canary Initiative?) to increase public awareness on climate change.

- Raise Energy Awareness for City Employees – The Energy Management Team will discuss simple ways to provide energy saving tips to employees (IT, FortShorts, GroupWise pop-up, video check-out) as well as alternatives to provide incentives to departments to conserve energy.

Members of the Energy Management Team individually identified between 3-5 of the measures listed above as high priority for the Team's focus for implementation, based on:

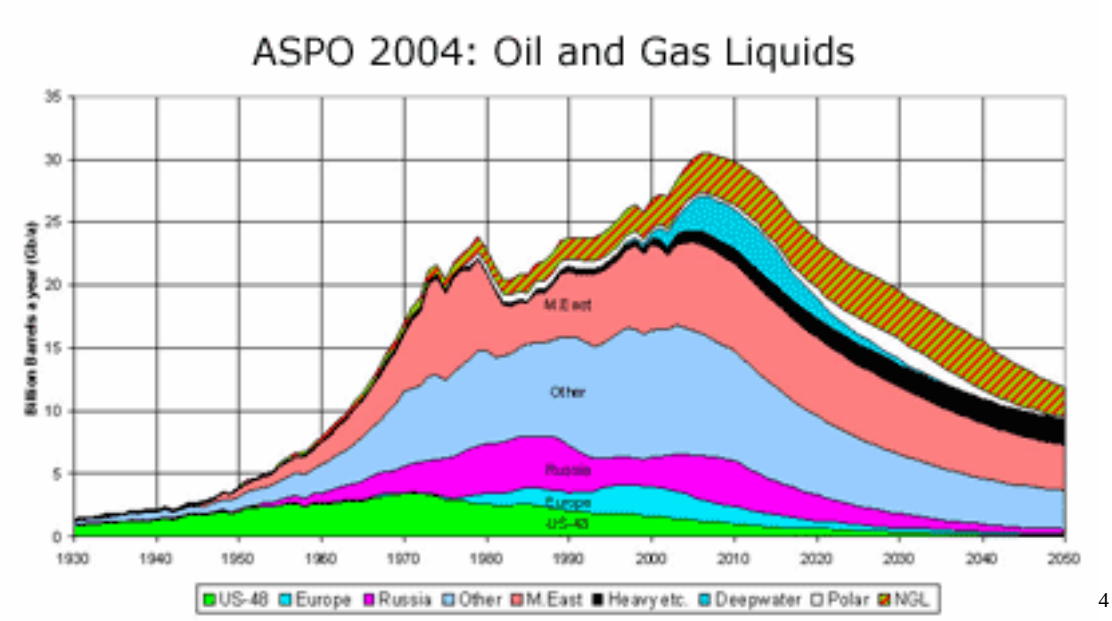
- items included in the City Manager's 2006/2007 recommended budget,
- progress to date on implementation of measures identified in the LAP and Status Reports,
- qualitative greenhouse gas reduction potential of measures, and
- current understanding of department, service area, and City objectives and priorities.

The following four measures emerged as top priorities to receive special focus and support from the Energy Management Team in 2006 and 2007:

- Conduct Energy Performance Contract for City of Fort Collins Municipal Buildings
- Authorize Energy Manager Role for City of Fort Collins Municipal Operations
- Implement Electric Energy Supply Policy-DSM & Renewable Energy Programs
- Climate Change Education and Outreach.

VI. ON THE HORIZON

Introduction
According to many analysts, the world is nearing the point at which world oil production can no longer be increased to meet rising demand. Production will begin to flatten and slowly enter into permanent decline (see Figure X below). This does not mean we are running out of oil, only the ability to extract it at increasing rates. This is the point at which about half of the world's oil has been consumed (the easy-to-extract half). This is coupled with steadily increasing demand, especially from China and India.



[4]

Figure X. World Liquid Oil and Gas Production

If real, this could have severe impacts on world, national, and local economies. Thus, the Energy Management Team considers it important for City of Fort Collins government, staff and citizens to become aware of this potentially disruptive trend.

Background
In 1956, M. King Hubbert, geologist for Shell, published a paper predicting that U.S. oil production would peak in 1970. At the time, he was widely ridiculed by his piers. However, history shows that the most oil the U.S. ever produced was in 1970. Production rates in the U.S. have been declining ever since, even with Alaska and Gulf of Mexico discoveries.

Most of the world's largest oil fields were discovered in the 1950's and 1960's. The world has depended on these giants for the bulk of our oil supply ever since. Over time the size of oil field discoveries has declined. Beginning in 1981, oil production exceeded the rate of discovery for

[4] http://www.energybulletin.net/image/ASPO2000Scenario.png

the first time.[5] Discoveries have never exceeded supplies since. Today the world consumes six barrels of oil for every barrel discovered.[6] Additionally, easy-to-extract oil is produced first, the remaining oil requires more energy to extract. This is the "Energy Returned on Energy Invested" (EROEI). When oil was first discovered, on average it took one barrel of oil to find, extract, and process 100 barrels of oil. Today that barrel of oil will produce about 3 in the US and 10 in Saudi Arabia.[7] When the ratio is 1:1, oil will no longer be economical to produce.

Current Scenario

The world consumed 83 million barrels of oil per day in 2004.[8] The United States consumes about 20.7 million barrels of oil per day.[9] For perspective, U.S. oil consumption is comparable to filling the average spring flows of the Poudre River through Fort Collins with oil or filling the volume of Horsetooth Reservoir six times per year with oil.

The U.S. currently imports 58% of it's oil.[10] Top oil importers to the US, Mexico, Canada, Saudi Arabia, Venezuela, and Nigeria account for over 50% of our imports.[11] Even though the U.S. represents less than 5% of the world's population[12], we import 26% of the world's oil exports[13]. The rapidly growing economies of China and India are competing for larger and larger shares of the world's oil. China is currently the second largest oil consumer, behind the US.

A number of books have recently been published that predict we are at or near world peak oil production. One of the latest, "Twilight in the Desert" by Matthew Simons predicts that Saudi Arabia is nearing their peak. Since most increased production has been predicted as coming from this region, the peak of Saudi oil means the peak of world oil.

Alternatives

If world oil production is really peaking, what are the alternatives? There is likely no one silver bullet, but an integration of efficiency and supply options. For example, new hybrid vehicles are 50-75% more fuel efficient than typical models in the same weight class. The concept of "plug-in" hybrids enhances the vehicle design so that hybrids can run solely on electricity for in-town distances, and a combination of gas and electricity for longer distances. This would mean that transportation fuel needs would partially shift from petroleum to electricity. Although electricity is generated domestically, the increased demand for electricity would increase the demand of the fuel sources of coal, natural gas and renewable energy.

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[5] Peak Oil – The Beginning of an End, Pat Murphy,Executive Director Community Service, Yellow Springs, OH 45387, www.communitysolution.org/ppts/PeakOil.ppt

[6] Ibid and http://www.guardian.co.uk/comment/story/0,3604,1233533,00.html , The Guardian, June 8, 2004.

[7] http://en.wikipedia.org/wiki/EROEI

[8] http://www.gravmag.com/oil.html

[9] http://www.eia.doe.gov/neic/quickfacts/quickoil.html

[10] http://www.eia.doe.gov/neic/quickfacts/quickoil.html

[11] http://www.eia.doe.gov/pub/oil_gas/petroleum/data_publications/company_level_imports/current/import.html

[12] http://www.census.gov/ipc/www/world.html

[13] http://www.iea.org/bookshop/add.aspx?id=144 , Page 11

Supply alternatives include the tar sands of Canada, oil shale, hydrogen, biomass-derived fuels (biodiesel, ethanol, methane), solar, and wind electricity. Drilling in environmentally sensitive areas such as the Artic National Wildlife Refuge (ANWR) is also being considered.

Tar sands and oil shale require large energy inputs to extract the oil. Projected production rates will slow the decline of conventional oil but are unlikely to have large impact. Biofuels also take large amounts of energy to produce, but typically are net positive in energy production. Various analyses show the energy output to input ratio of ethanol as 1:23 and higher.[14] Biomass often is grown with fossil-fuel-derived fertilizers. The development of renewable energy such as wind and solar is growing rapidly, but still provides only a very small portion of total energy production. Hydrogen is an energy carrier, so it takes energy to produce hydrogen. It is a means of storing intermittent renewable energy, but will require more energy production. Drilling in places such as ANWR can slow the oil production decline, but is insignificant compared to total consumption. The mean estimate of ANWR reserves is approximately 10 billion barrels.[15] Considering 21 million barrels/day of U.S. consumption, this represents a 1.3 year supply for the United States.

The answer for dealing with peak oil appears to be held in an integrated approach to efficiency, conservation, wise use of conventional energy sources and development of renewable energy.

Abiotic Oil and Other Perspectives

There is another perspective that discounts peak oil . Members of this camp largely believe that oil is not a "fossil" fuel, formed from decomposed biological matter, but is formed at high pressure and temperature deep in the earth. This perspective asserts that oil fields are actually replenished from very deep oil reservoirs. More information on this perspective can be found at http://www.museletter.com/archive/150b.html .

Whatever the source of the scarcity, the need for alternatives is still present. And as supplies diminish, the environmental impacts of extracting and processing oil are likely to grow.

Next Steps

The Energy Management Team (EMT) suggests that key decision makers in the City continue to educate themselves about peak oil issues and look at ways that impacts to the community and region can be mitigated. The EMT can continue to research this issue and provide input.

Other References

Association for the Study of Peak Oil (ASPO)
http://www.aspo-usa.com/Index.cfm
(Note Denver conference, November 10-11, 2005)

Are we running out of oil?
http://geopubs.wr.usgs.gov/open-file/of00-320/

[14] http://journeytoforever.org/ethanol_energy.html

[15] http://www.eia.doe.gov/pub/oil_gas/petroleum/analysis_publications/arctic_national_wildlife_refuge/html/execsummary.html

Arithmetic, Population and Energy – Al Bartlett
http://www.hawaii.gov/dbedt/ert/symposium/bartlett/bartlett.html

Simmons and Company, Inc.
http://www.simmonsco-intl.com/
(Note book, *Twilight in the Desert* and click on interview on E&ETV)

Financial Sense Newshour
http://www.financialsense.com/Experts/2005/Simmons.html

See June, 05 National Geographic

Association for the Study of Peak Oil and Gas
http://www.peakoil.net/

APPENDIX A

GREENHOUSE GAS EMISSIONS ANALYSIS

EMISSIONS FACTORS
and
DATA SOURCES

Background

Over time, emission factors used to calculate both Fort Collins' emissions inventory and the CO_2 benefit of measures have evolved. In 2003, all emissions inventories were updated to use the best emissions factors available at that time. The factors used are presented below.

Electricity

kWh x .003412 = MMBTU
MMBTU x 0.242 = 2003 Tons CO_2 for citywide emission inventory
MMBTU x 0.247 = 2004 Tons CO_2 for citywide emission inventory
MMBTU x 0.136** = Tons CO_2 for electricity reduction measures

History of the "Average" and "Marginal" Emissions factors used in this Status report:

Year	Average Factor (tons CO2/MMBtu)	Marginal Factor (tons CO2/MMBtu)
1990, 1995, 1997	0.214	0.334
2000, 2001, 2002	0.214	0.308
2003	0.242	0.136
2004	0.247	0.136

Average Emission Rate for City Resource Mix – the total emission and fuel use associated with all the resources that make up the cities' energy supply (hydro, coal, gas, and wind) divided by the cities' total annual energy usage. These figures represent the emission associated with the "average" kWh used within the city.
Marginal Emission Rate – the avoided emission and fuel use that would result from energy conservation or use or renewable energy. This figure is a function of the generating resource that happens to be "on the margin" each hour as the region-wide load on the electric system varies throughout the day and throughout the year

2005 Data from PRPA on Average Emissions Factors

PRPA Weighted Average Emissions Factor Trend

For Average Emissions

	Share of Platte River Resource Mix				Weighted average emissions factor	
	Coal	Gas	Hydro	Wind	lbs CO2 per MWh	tons CO2 per MMBtu
2003	73.0%	2.0%	24.0%	1.0%	1,652.6	0.242
2004	74.0%	3.0%	21.0%	2.0%	1,686.0	0.247

Natural Gas

MMBTU x 0.0616 = Tons CO_2 for citywide emission inventory and natural gas reduction measures

Transportation

Gasoline gallon x 0.125 = MMBTU x 0.79 = Tons CO_2
Diesel gallon x 0.139 = MMBTU x 0.81 = Tons CO_2
Propane gallon x 0.093 = MMBTU x 0.75 = Tons CO_2
CNG gallon x 0.1256 = MMBTU x 0.63 = Tons CO_2

Solid Waste Emissions Inventory (Tons MSW x factor = Tons CO_2e)

	Coeff
Paper & paper products	1.21035
Food waste	1.12964
Plant debris	(0.16136)
Wood, furniture, textiles	(0.24207)
All other waste	0.0

Source: CACP Software, June 2003

Recycling

Material	Factor
Cardboard	3.873
Glass	0.322
Aluminum	17.752
Steel	2.017
Plastic (avg HDPE/PET)	2.078
HDPE Plastic	1.977
PET plastic	2.179
Newspaper	3.428
Office Paper	6.779
Mixed Office Paper	5.084
Mixed General paper	3.711
Household Paper	3.51
Magazines	2.829
Phone Books	3.476
Text books	7.267
Fiberboard	1.698
General mixed paper	3.711
Wood	1.694
Mixed Recyclables	3.817

Source: CACP Software, June 2003

2003/2004 EMISSION AUDIT

ELECTRICITY

Data Source: Fort Collins Utilities, Ellen Switzer, Fort Collins Utilities, (970) 221-6714 (These data are not weather normalized.)

	2003	2004
Residential kWh	433,488,000	428,919,000
Commercial kWh	461,233,000	462,781,000
Industrial kWh	434,493,000	457,018,000

When calculating tons CO_2, the coefficient of 0.247 tons CO_2/ MMBtu was used, as requested by Platte River Power Authority. This emission factor takes into account the mix of sources for local electricity (Rawhide, hydro, and a small amount of wind energy) during 2003 and 2004.

NATURAL GAS

Data Source: Xcel Energy, Glenn Monroe, Xcel Energy, (303)294-2392; Glenn.monroe@xcelenergy.com

2003	CUST	ACTUAL SALES	NORMAL HDD	ACTUAL HDD	WEATHER NORMAL FACTOR	BASE LOAD	HEATING LOAD	WEATHER ADJ HEATING LOAD	NORMAL SALES
RESIDENTIAL	37,546	3,007,005	6238	5495	1.13521	781,821	2,225,184	2,526,051	3,307,872
COMMERCIAL	3,515	1,242,745				410,106	832,639	945,220	1,355,326
IND & TRANSPORT	238	2,803,036							2,803,036
TOTAL	41,299	7,052,786							7,466,234

2004 natural gas consumption data for Fort Collins was not available from Xcel because Xcel was in the process of converting from the Consumer Information System (CIS) to the Consumer Resource System (CRS), and reports for 2004 could not be generated. Therefore, residential, commercial, and industrial natural gas use was estimated based on average growth rates from 2002 and 2003, as illustrated in the tables below.

RESIDENTIAL	0.97738	factor
2000		
2001	3,462,886	actual therms
2002	3,391,426	actual therms
2003	3,307,872	actual therms
2004	**3,233,048**	**estimated therms**
COMMERCIAL	0.96174	factor
2000		
2001	1,465,260	actual therms
2002	1,432,503	actual therms
2003	1,355,326	actual therms
2004	**1,324,669**	**estimated therms**
INDUSTRIAL	1.07805	factor
2000		
2001	2,411,852	actual therms
2002	2,999,131	actual therms
2003	2,803,036	actual therms
2004	**2,739,631**	**estimated therms**

TRANSPORTATION

Fuel consumption, by fuel type, was calculated using the following steps:

1) Identify total Vehicle Miles Traveled (VMT).

   Annual VMT for 2003 = 1,171,500,000
   Annual VMT for 2004 = 1,230,900,000

   VMT estimates were prepared by the City's LUTRAQ Team, and are based on a 4.9^% annual VMT growth rate from the year 1995.

2) Apportion total VMT among the percentage of vehicle types in Fort Collins estimated by the Colorado Department of Public Health and Environment (CDPHE) for emissions modeling purposes.
3) Multiply the annual number of miles driven (by fuel type) by an estimated MPG to yield gallons fuel consumed

4) Apply emissions coefficients to convert from gallons of fuel to BTU's to CO_2.

Vehicle type	VMT percent	Avg MPG	Conversion factor	Conversion factor
Gasoline car	63.3	19.7	0.125 MMBtu/gallon	0.079 tons Co2/MMBtu
Gasoline light truck	28.9	14.3	0.125 MMBtu/gallon	0.079 tons Co2/MMBtu
Gasoline other truck	2.3	8.0	0.125 MMBtu/gallon	0.079 tons Co2/MMBtu
Diesel car	0.9	30.0	0.139 MMBtu/gallon	0.081 tons Co2/MMBtu
Diesel light truck	0.4	17.0	0.139 MMBtu/gallon	0.081 tons Co2/MMBtu
Diesel heavy duty	3.9	5.0	0.139 MMBtu/gallon	0.081 tons Co2/MMBtu

SOLID WASTE

In 2005 (for this report), the solid waste emissions inventories were calculated using different source data. Instead of using volume data from the Larimer County landfill, we used tonnages reported by Fort Collins trash haulers, as provided to the City of Fort Collins in annual data reports. This new data source provides tonnages that are more than twice as high as the tonnages provide by the old method. For example, the old method indicated that Fort Collins generated 80,233 tons of MSW in 2004, while the new method indicates Fort Collins generated 193,613 tons of MSW in 2004.

Data Source: Annual CY from Shirley Bruns, City of Fort Collins, (970) 221-6264.

	CY	CY	CY	CY	CY	750 #/cy	450 #/cy	
Year	Compact MSW (CY)	Comm Compacted MSW	Roll-off Compacted MSW	Roll-pff Loose MSW (CY)	Compact CY total	Tons Compact	Tons Loose	total tons
2000	262,771		71,769	180,805	334,540	125,453	40,681	**166,134**
2001	292,255		93,605	238,166	385,860	144,698	53,587	**198,285**
2002	300,982		87,419	173,120	388,401	145,650	38,952	**184,602**
2003	277,359		87,419	211,411	364,778	136,792	47,567	**184,359**
2004	120,812	182,692	86,669	206,873	392,177	147,066	46,546	**193,613**

The conversion from tons MSW to tons CO_2 was calculated by the CACP software (June 2003) using the following characterization of landfill waste.

	Percent of Waste
Material	**1997****
Paper	23.6
Food Waste	7.1
Plant Debris	13.4
Wood/Textiles	22.6
All Other	33.3
Total	100.0

** 1998 Larimer County Landfill Waste Characterization

Please contact Lucinda Smith at the City of Fort Collins, Community Planning and Environmental Services, Natural Resources Department (970) 224-6085 with any comments or questions about information contained in this Appendix.