INTRODUCTION

Consensus Grows . . . Climate Change is Real

The Earth's climate is changing. The United Nations Intergovernmental Panel on Climate Change (IPCC), a group of over 2000 leading scientists and technical experts from 130 countries around the world have said,

> "We are certain of the following….Emissions resulting from human activities are substantially increasing the atmospheric concentrations of greenhouse gases: CO2, methane, CFC's, and nitrous oxide. These increases will enhance the greenhouse effect, resulting on average in an additional warming of the Earth's surface." -- IPCC, 1990.

This change is likely to have negative impacts on both the local and global environment with consequences for human health. A 1990 U.S. EPA Science Advisory Board report identifies global climate change as one of the highest environmental risks, higher even than toxics and pesticides.

More recently, in January of 1999, the American Geophysical Union (AGU), one of our nation's leading science professional societies, reaffirmed the findings of their previous assessments—that greenhouse gases are increasing in the atmosphere, impacts could be highly disruptive to society, and there is a compelling basis for public concern. More importantly, the AGU report warns that scientific uncertainty over the details of climate change does not justify inaction by policy makers.

Many large U.S. companies now acknowledge the very real threat of global warming and argue that some kind of early response is appropriate. American Electric Power Company's Vice President for Environmental Affairs says, "It is no longer possible to say there is not a problem." Consequently they are working with the Nature Conservancy to conserve 5 million forested acres in Bolivia because trees are so effective at scrubbing CO2 from the air. Both British Petroleum and Royal Dutch Shell plan to reduce their greenhouse gas emissions 10% below 1990 levels within the next decade. Dupont intends to reduce emissions 40% domestically and 50% globally from 1990 by 2000. Mobile Corporation also feels climate change abatement activities are justified.

> "People should not confuse our opposition to the Kyoto Protocol with a lack of willingness to take action. I've said the concern about climate change is legitimate……..Responsible companies should take actions which, within the framework of good economic sense, reduce greenhouse emissions."
> **-- Mobil Corporation's Chairman and Chief Executive Officer Lou Noto, October 1998.**

"Climate science is provisional and perhaps always will be….. There are large areas of uncertainty – about cause and effect and about the consequences. But it would be unwise and potentially dangerous to ignore mounting concern. That's why I've argued consistently…that we need to take precautionary action now."
--John Brown, CEO
British Petroleum
Corporation

Our City Taking Responsibility

The City of Fort Collins prides itself as a city that cares about people and the planet. As a responsible environmental steward, there are many good reasons for Fort Collins to strive to reduce greenhouse gases:

- cities are major sources of greenhouse gases, and it is only fair for each city to do its part to reduce emissions,
- the opportunity to demonstrate leadership,
- another important context for decision-making, and
- further support existing community goals.

Our City Council realized that local actions taken to reduce greenhouse gas emissions and increase energy efficiency provide many local benefits: decreasing air pollution, creating jobs, reducing energy expenditures and saving money for the City government, its businesses and its citizens.

Consequently, on July 1, 1997, our City Council committed Fort Collins, its government, businesses, and residents to reducing the emissions of greenhouse gases. By passing *Council Resolution 97-97* (see Appendix A), the City of Fort Collins joined a family of more than 300 cities and counties around the world in the Cities for Climate Protection Campaign. Under the guidance of the International Council for Local Environmental Initiatives (ICLEI), these cities, who are collectively responsible for an estimated five to ten percent of the world's total greenhouse gases, have dedicated themselves to the reduction of greenhouse gas emissions. This Local Action Plan documents OUR citywide commitment to reducing these emissions.

The Beauty of this Plan

The strength of this plan rests in its citywide call to action. All sectors of our population share the responsibility to reduce greenhouse gas emissions. Similarly, all sectors of our population realize the benefits of reducing these emissions. It is a plan of community goal-setting and it outlines the commitments necessary to achieve greenhouse gas reduction goals.

It is also a plan born of coordination. For over a year, the City of Fort Collins Natural Resources Department has coordinated discussions between City Staff, a Citizen Advisory Committee, local businesses, civic organizations and the public on the issues of global warming and greenhouse gas reductions. Collectively, we have striven to develop an energy audit and

residential woodburning), in order to reduce the impact of the Fort Collins community on global warming.

emissions forecast using reasonable and defensible numbers. We have sought to identify cost-effective measures to reduce greenhouse gases, often going to considerable lengths to develop sound estimates when data was not readily available.

We have struggled with question of what

City Policy ENV.1.23-Global Climate. The City will employ strategies to increase energy efficiency and the use of renewable energy sources (except

kind of reduction target the City should implement and our community would embrace. Throughout the rest of this document, we will explain the process used to develop recommendations, and provide details on recommended actions.

Fort Collins Citizen Advisory Committee Mission Statement:
"To identify and recommend cost-effective, environmentally beneficial measures to reduce Fort Collins' greenhouse gas emissions."

Plan Development

Two committees were formed to review the energy audit and forecast and to oversee the development of the greenhouse gas reduction plan. An interdepartmental staff team with representatives from ten City departments was formed, along with a Citizen Advisory Committee having representatives from Council Boards, local businesses, an environmental group, and technical experts.

After completing efforts to identify and quantify the greenhouse gas reduction benefit of existing actions, the Staff Technical Team and Citizen Advisory Committee developed a list of potential new actions to reduce greenhouse gases. A variety of approaches were used to develop a list of measures for consideration, including brain-storming, talking with various professionals and experts, discussion with Council advisory boards, and soliciting public input through open houses and the Internet.

Appendix C lists the range of measures that were initially identified for consideration. Information was compiled, to the extent possible, on the costs and impacts of the measures under consideration. Based on available information about the technical, economic, and political/social aspects of the measures, a final list of measures was developed that was considered acceptable to the Staff Team and Citizen Committee. These recommended measures are identified as "New" or "Pending" and are discussed in more detail later in this document.

The Greenhouse Effect

The earth's temperature is determined by the level of greenhouse gases in the atmosphere. As sunlight passes through our atmosphere, the incoming solar radiation is re-radiated from the earth's surface as heat energy. Greenhouse gases like carbon dioxide, methane, nitrous oxide, chlorofluorocarbons, and water vapor trap some of this reradiated energy. This trapped heat energy warms the earth, much as the glass of a greenhouse traps reradiated energy from sunlight and thereby warms the interior of the structure, as illustrated in Figure 1. The temperature at the Earth's surface is about 60^0 F warmer than it would be without

the greenhouse effect.

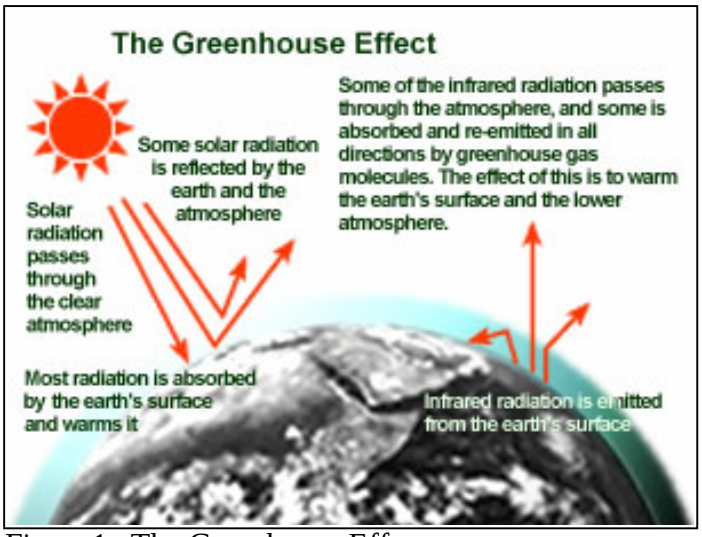


Figure 1. The Greenhouse Effect
(Source: www.epa.gov/globalwarming/climate)

The greenhouse effect keeps the temperature at the Earth's surface about 60^0 F warmer than it would be without the greenhouse effect, making it habitable for plants and animals. However, the build-up of excess greenhouse gases makes the atmosphere hold in too much heat.

Global Warming

While greenhouse gases play a vital role in maintaining the necessary conditions for life on Earth, the rapidly increasing concentrations of these gases are causing a rise in global temperature – Global Warming. Carbon dioxide is responsible for almost half of the greenhouse gases causing the global warming trend. CFC's and methane comprise around an additional 20%.

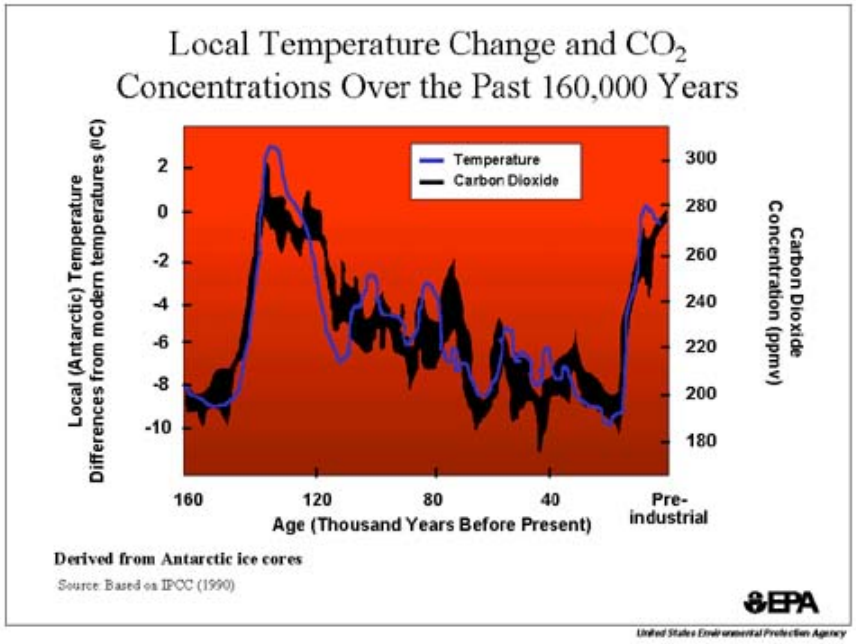
Greenhouse gases are increasing by four major human activities:

1) **Combustion of fossil fuels.** Carbon dioxide is produced when gasoline is burned for driving, and when coal and natural gas are burned to heat and light our homes and businesses.
2) **Deforestation** – When vegetation is cleared, burned, or left to decay carbon dioxide is released into the atmosphere. Vegetation also absorbs carbon dioxide. Once the vegetation is gone, less carbon dioxide will be absorbed out of the air.
3) **Decomposition of organic matter**. The decay of organic landfill waste releases both carbon dioxide and methane into the air. Methane is over 20 times more potent than carbon dioxide as a greenhouse gas.
4) **Livestock.** Ruminants like cows and sheep release methane.

I'm Only Human

By participating in the Cities for Climate Protection Campaign, we are accepting the reality that **WE**, humans, are the major greenhouse gas contributor—especially of carbon dioxide, CO_2. Since the industrial revolution in the middle 19th century, greenhouse gas concentrations have risen to levels higher than any yet seen while humans have existed on this planet.

The atmospheric CO2 concentration has increased from 280 ppm to over 360 since 1860. If emissions continue at current levels, concentrations are projected to rise above 700 parts per million by the year 2100, a level not experienced on Earth since about 50 million years ago. It is anticipated that if the CO2 concentrations increase to this level, then the global average temperature will rise between 1.8 and 6.3° F by the year 2100 (Kattenberg et al. 1996/EPA Website).



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For perspective, this projected climate change is of the same magnitude (but in the opposite direction) as the last ice age when continental ice caps penetrated well into Europe and North America... The difference is that the global warming may occur over the next few decades, whereas the ice-age changes occurred over thousands of years!
(On Global Climate Change Policy, Adopted by the American Meteorological Society Council on September 27, 1990)

Por Que? Warum? Why? Proè? Hvorfor? Paham?

Why Worry? Why bother? The nations of the world have scrutinized these question: "Why should we worry about global warming?" Skeptics ask: "What if we do nothing?" "Are we sure anything will happen?" "What difference can a small city make on such a large, global issue? Let's take a look at doing nothing, or…THE NULL ALTERNATIVE.

The Null Alternative – Doing Nothing

Assuming that no actions are taken to reduce emissions, computer models of the earth's climate predict that global average temperatures will rise by 1.5 to 4.5 degrees C over the next 100 years. This rapid rise is probably faster than any such change over the past 9,000 years. The consequences of global warming will be serious for both human beings and the ecosystems that support all life on earth. Average sea levels may rise, rainfall patterns may change, agriculture may be affected by temperature, soil and moisture changes, and water resources may be threatened.

Consequences of DOING NOTHING - The Null Alternative *

(adapted from Climate Change and Colorado; EPA 230-F-97-0081 and EPA's Climate Change Website: http://www.epa.gov/oppeoee1/globalwarming/index.html)

HUMAN HEALTH

Throughout the world, the prevalence of particular diseases and other threats to human health are a function of local climate. Extreme temperatures can directly cause the loss of life. Moreover, several serious diseases only appear in warm areas. Finally, warm temperatures can increase air and water pollution, which in turn harm human health.

- Statistics show that death rates increase during extremely hot days, particularly among very old and very young people living in cities.
- People with heart problems are vulnerable because one's cardiovascular system must work harder to keep the body cool during hot weather. Heat exhaustion and some respiratory problems increase.
- Higher air temperatures also increase ground level ozone. Modest exposure to ozone can cause healthy individuals to experience chest pains, nausea, and congestion.

INFECTIOUS DISEASES

Warming and other climate changes may expand the habitat and infectivity of disease carrying insects in Colorado.

- Mosquitoes capable of transmitting disease are already present in Colorado. If Colorado's climate becomes warmer and wetter, larger mosquito populations would be enabled to move here.

- A recent study has concluded that a 5-9°F temperature increase would

cause a significant northern shift in Western equine encephalitis outbreaks.

mental Panel on Climate Change and results from the United Kingdom Hadley Centre's climate model and winter.

AGRICULTURE

The success or failure of a harvest has always depended on climate, with the most important factor being a sufficiently moist soil during the growing season. Some climatologists suggest that such conditions could become more widespread due to the drier soils that may accompany changing climate. Increased heat stress, more frequent flooding, and salinization of soils due to sea level rise could also threaten agriculture in some areas.

- Half of Colorado's crop acreage (corn, wheat, hay) is irrigated. Climate change could reduce yields 8-33%. Hay and pasture yields could fall by 6% or rise by 13% depending on whether irrigation is used, leading to changes in acres farmed and production. For example, yields could fall while production rises because of an increase in acres farmed.

WATER RESOURCES

Changing climates are expected to increase both evaporation and precipitation in most areas of the United States. In those areas where evaporation increases more than precipitation, soil will become drier, lake levels will drop, and rivers will carry less water.

- A warmer climate would lead to earlier spring snowmelt. Because most of Colorado's reservoirs are small in relation to total mountain water runoff, an earlier snowmelt could reduce the reliability of many water supplies within the state by limiting the amount stored for use in summer.

- Decreased river flows and higher temperatures could harm the water quality of the nation's rivers, bays, and lakes. In areas where river flows decrease, pollution concentrations will rise because there will be less water to dilute the pollutants.

- The extent of forested area in Colorado could change little or decline by as much as 15-30%. If conditions become drier, the current range and density of forests could be reduced and

FORESTS

Global warming could shift the ideal range for many North American forest species by about 300 km (200 mi.) to the north. If the climate changes slowly enough, warmer temperatures may enable the trees to colonize north into areas that are currently too cold, at about the same rate as southern areas became too hot and dry for the species to survive. If the earth warms 2°C (3.6°F) in 100 years, however, the species would have to migrate about 2 miles every year.

"By 2100, temperatures in Colorado could increase by 3-4 °F in the spring and fall and 5-6 °F in summer …based on projections made by the Intergovern-

replaced by grasslands and pastures. Along the Front Range, drier conditions would reduce the range of lodgepole and ponderosa pine—increasing their susceptibility to fire.

- Hotter, drier weather could increase the frequency and intensity of wildfires, threatening both property and forests

The U.S. became the 60th and last nations to sign the Kyoto protocol treaty, agreeing to a 7% reduction in greenhouse gas emissions between 2008 and 2012.

United States Response to Global Warming

We will remember the 1990's as a decade of international agreements to reduce global warming and climate change. The United States participated in the two largest agreements this decade:

1992 **Earth Summit**: Rio de Janeiro, Brazil (Framework Convention on Climate Change.)

1997 **Kyoto Protocol**: Kyoto, Japan

The first agreement to reduce the risks of climate change was signed during the Earth Summit. This treaty, ratified by the United States with the consent of the Senate in October 1992, set the following objective:

> "[To achieve the] stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropocentric interference with the climate system. Such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is no threatened and to enable economic development to proceed in a sustainable manner" (Framework Convention on Climate Change, Article 2).

To address these climate change risks better and to build on the 1992 treaty, approximately 160 countries met in Kyoto, Japan in December of 1997 and agreed to take substantial steps toward meeting the Convention's ultimate objective. The Kyoto Protocol places binding limits on industrial countries' emissions of the six principal types of greenhouse gases: carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, perfluorocarbons, and hydrofluorocarbons. The Protocol embraces several flexible, market-based approaches to allow for the emissions targets to be achieved at least cost.

Kyoto Protocol: Industrialized Nations Reduction Target

Industrial nations signing the

treaty committed to cut emissions of their greenhouse gases an average of five percent below 1990 levels beginning in 2008. The U.S. became the 60th and last industrial nation to sign the treaty, agreeing to a seven (7%) percent reduction in greenhouse gas emissions below 1990 levels between 2008 and 2012.

The two-week negotiations resulted in an action plan that was approved by 160 countries. The plan established a 2000 deadline for the development of specific strategies to implement the Kyoto Protocol, including provisions for the international trading of emissions credits as well as mechanisms to monitor compliance and assess penalties. The plan also includes the creation of a Clean Development Mechanism that will enable wealthier nations to fund emissions reduction projects in developing countries.

Before signing the Protocol, the United States required that certain objectives be met. These objectives included:

1**) Realistic Targets and Timetables**

The Untied States was committed to achieving realistic targets and timetable among developed countries that would represent a credible step in slowing the accumulation of greenhouse gases in the atmosphere, yet be measured enough to ensure continuous economic prosperity.

2) Flexibility and Market Mechanisms

The Unites States insisted that the Protocol include flexible, market-based provisions designed to permit our environmental objectives to be accomplished at least cost.

These same concepts of setting a realistic target and incorporating flexibility and market mechanisms were embraced when developing Fort Collins' greenhouse gas reduction plan.

Union of Concerned Scientists have stated that U.S. can meet the Kyoto Protocol through domestic actions that will have zero or negative net costs.
- UCS, Tellus, 1998

The Benefits of Reducing Greenhouse Gases

There are many benefits of reducing greenhouse gases that go beyond simply doing our part to stem the tide of climate change. Many actions outlined in this plan have significant local environmental and economic benefits. These benefits range from reduced air pollution, reduced energy bills for businesses and families, expanded recycling opportunities, new jobs, reduced urban sprawl and traffic congestion, decreased reliance non-renewable energy sources. If implemented, these actions will help preserve and even improve the quality of life in our community.

Saving Money

Many cities in the Cities for Climate Protection Campaign are already enjoying the benefits of their greenhouse gas reduction measures. For example, the City of Portland, Oregon has reached $1 million in annual savings by decreasing city building energy consumption between 1990 and 1996. These annual savings are the result of a total investment of $3.6 million.

Creating Jobs

The City of San Jose has an energy efficiency investment program that is expected to increase net employment by 85 jobs and increase money spent in the local economy by $20.8 million over eleven years.

Boosting Local Economic Development

Berkeley, CA is involved in a regional project that provides technical assistance to commercial businesses to maximize cost savings by increasing energy efficiency. This program contains bid specifications that favor the hiring of local contractors, which contributes to local economic development.

"Implementing policies and measures like energy efficient technologies and use of low carbon resources could translate into average savings of US$400 per year for U.S. households and 900,000 new jobs by 2010."
--*America's Global Warming Solutions,* A Study for the World Wildlife Federation, 8/99

Is Fort Collins Willing to Accept the Null Alternative – Doing Nothing?

Cities are the first to confront environmental issues such as waste disposal and the pollution of air and water. Because cities influence land use, transportation, building construction, waste management, and often energy supply, they play a vital role in reducing energy use and greenhouse gas emissions.
Despite the fact that Fort Collins greenhouse gas emissions only account for approximately 0.037% of the U.S. 1990 greenhouse gas emissions and a much smaller fraction of global emissions, it is incumbent upon any responsible city to consider efforts to reduce the emissions they are responsible for.

It is reasonable to embrace the "No Regrets" approach already adopted by numerous cities and corporations in the United States and around the world. This approach entails making economically sound choices to reduce greenhouse gas emissions that provide multiple benefits to the community and provide support for existing community goals.

The role of this project is not to debate the issue of global warming. In recent years, the scientific community has reached a nearly

unanimous consensus that global warming is occurring and the potential consequences could be severe. **The role of this plan is to identify local actions we can take to reduce greenhouse gas emissions caused by human activity in and around Fort Collins.** Many who have contributed to the development of this plan believe it would be unwise, irresponsible even, for our city not to take proactive steps to reduce greenhouses gases today. The evidence that climate change is occurring is significant, and the benefits of energy conservation and solid waste reduction are compelling.

The Target

The combined benefits of Existing, New, and Pending measures identified in this plan, if fully implemented, would result in approximately a 30% reduction of Fort Collins' 2010 predicted emissions levels.

The Challenge

Even achieving a 30% reduction below 2010 levels will be challenging, much less a larger reduction target. It will take each new and existing measure to reach it. It will take the commitment of the City government to provide adequate funding to implement the actions outlined here. It will take the commitment of businesses, small and large, to pay attention to energy consumption and waste generation, and strive to reduce it. It will take the commitment of each individual citizen to make the choices to drive less, conserve energy, produce less garbage, and recycle more. No one entity has the responsibility or the ability to do it alone. Together, if we embrace the actions laid out in this plan, we can achieve our greenhouse gas reduction goal and realize the multiple additional benefits of improved air quality, reduced energy consumption and utility costs, etc.