I. Introduction

A. Global Climate Change: Humanity's Modern Impact on the Planet

Scientific evidence clearly tells us that the earth is warming, and that humans are influencing this trend.[1]

That was the conclusion of the second scientific assessment by the United Nation's Intergovernmental Panel on Climate Change. The panel was established in 1988, at the bequest of the world's nations. Its assessment took two years and involved some 2,000 scientists from around the world.

This conclusion is a breakthrough because scientists had earlier insisted that even though changes in the world's climate were being observed, the natural variability of earth's climate could not be ruled out as their cause.

The culprit here—the primary cause of global climate change—is modern industrial society's dependence on fossil fuels. Our increased burning of fossil fuels has dramatically increased the concentration of greenhouse gases in the earth's atmosphere.

Among all the human-produced *greenhouse gases*—so called because they hold the sun's warmth close to the earth—the most significant is carbon dioxide, or CO_2. The graph on the next page illustrates changes in of CO_2 levels and in atmospheric temperatures over the last 160,000 years.[2]

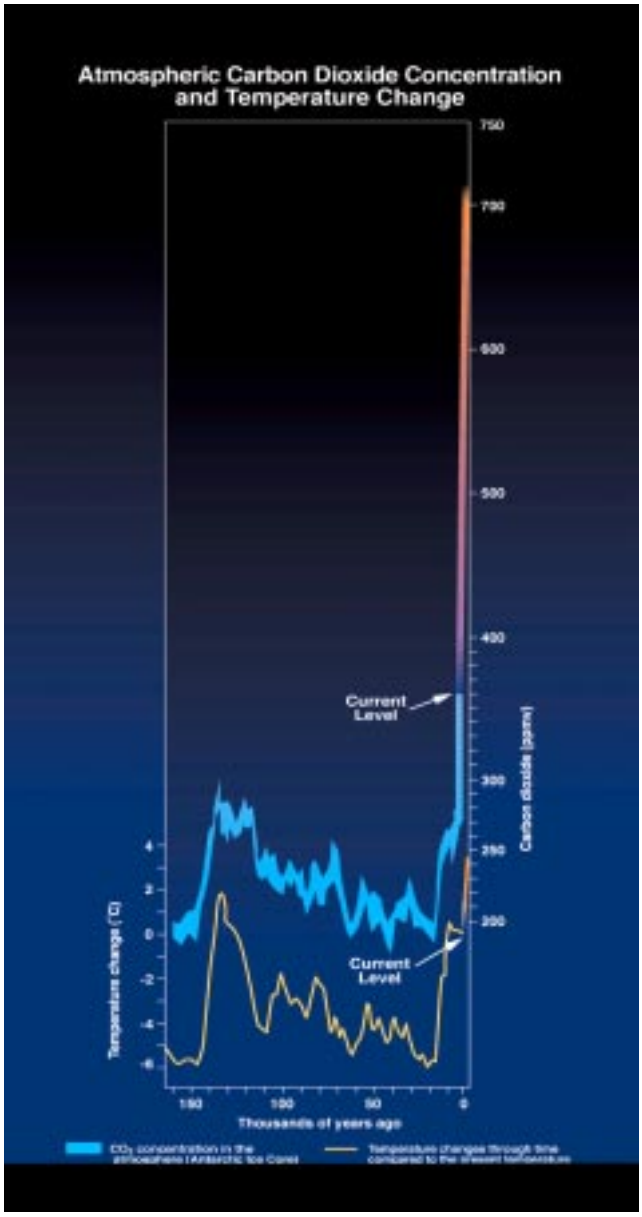
The close tracking of temperature with CO_2 is apparent. Without concerted efforts at climate protection, by the year 2100 atmospheric concentrations of CO_2 are projected to exceed 700 parts per million. This is a level the earth has not experienced for more than 50 million years.[3]

Average global temperatures have already risen by approximately 1-2°F—an unprecedented rate—over the past 200 years. Some climate models now project average surface air warming of 5-10°F for the U.S.. Even though no one is sure which climate model predictions will be correct, the risks and impacts associated with most predictions are a very clear cause for concern.

An increase in the frequency and intensity of extreme weather events is an often-cited potential impact of global warming. The past few years in Vermont, with their historic ice storms, droughts and flooding, are consistent with observations from around the world. They contribute to the growing body of evidence supporting predictions by climate scientists that our world's weather is becoming more volatile and more intense.

A host of other impacts and indicators—among them rising sea levels, an expansion of the range for tropical diseases, and losses from polar and glacial ice-packs—further demonstrates that human-driven climate change is very real, and it is here.

B. What Are Climate Change and Greenhouse Gases?



The terms climate and weather are often used interchangeably. In fact, they are different: Climate is the average pattern of weather in a given place, while weather is a condition of the atmosphere at one particular place and time. The measures of weather are wind speeds, temperature, humidity, atmospheric pressure and precipitation. The weather often changes substantially from day to day.

Climate, on the other hand, refers to the big picture. It includes the broader overall relationships between the earth's atmosphere, oceans, land, and solar radiation. Weather patterns are a product of climate. While humans are more or less used to dealing with changes in the weather, we do not have experience with extreme climate change. The direct effects of climate change will include changes in weather, soil moisture, and sea level. These changes are likely to have long-lasting and widespread adverse impacts on ecological systems, human health, and economies. The lag time between the emissions of greenhouse gases and their full impact on the climate can be decades or even centuries. The time required to reverse any effects is similarly long.

But what are the greenhouse effect, and greenhouse gases? To put it simply, the greenhouse effect is the process whereby energy from the sun is trapped by the atmosphere to cause warming. Much of this energy is infrared radiation emitted from the earth's surface. The greenhouse effect keeps the Earth much warmer than it would be otherwise, and is essential for life on earth, but rapidly increasing concentrations of greenhouse gases threaten to severely destabilize the climate.

A greenhouse gas is any gas in the atmosphere that contributes to the greenhouse effect. The major greenhouse gases are carbon dioxide, methane, nitrous oxide, and water vapor. Of these, carbon dioxide (CO_2) is the most important of the emissions produced human activities.

C. How Will Climate Change Affect Life in Vermont?

Although it is now understood that human caused emissions of greenhouse gases are directly tied to recent warming, the global climate system is large, complex and dynamic. Predicting the impacts of climate change for a specific area, such as Vermont, is much less certain. Scientists are, however, increasingly confident that the impacts over the next 50 – 100 years promise to be significant.

On a global scale, projecting the impacts of global climate change is less certain. Anticipated climate related challenges are likely to involve rising sea levels, water resources, food security, human health, and disruptions to natural ecosystems. The frequency and severity of extreme weather events is also expected to increase.

For Vermont, the effects may include the migration of hardwood forests—including sugar maples—to cooler northern temperatures, shortened fall foliage and ski seasons, hotter summers, and the decline in cold-water fish populations. Ecological diversity and our natural resources are likely to suffer a broad range of negative impacts and losses. Ski seasons will be affected because there will be less snow due to warmer weather, meaning fewer tourists and less tax money for the state.

D. What Is Burlington Doing About Climate Change?

The City Council of Burlington has joined local business and political leaders, along with other communities, in recognizing the need for action and the dangers posed by global climate change. In 1996, the City Council voted to participate in the “Cities for Climate Protection” campaign organized by the International Council For Local Environmental Initiatives.

In 1998, the Council passed a second resolution. It set a target for the year 2005 of reducing greenhouse gas emissions in Burlington by 10 percent below 1990 levels.

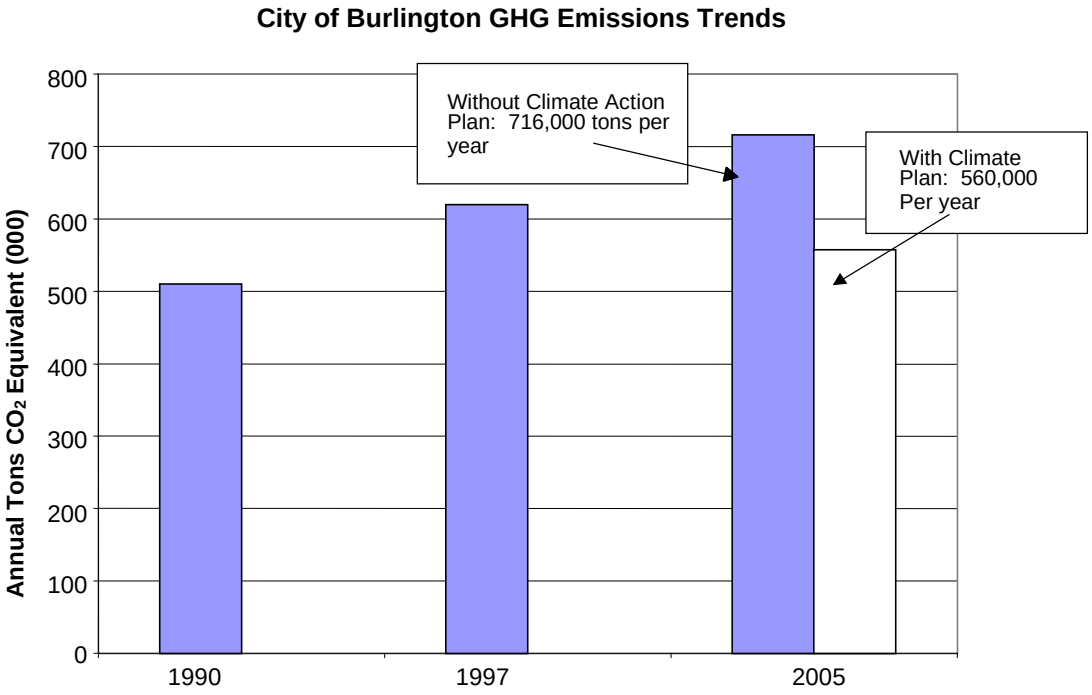
The mayor then formed the Climate Protection Task Force. He charged it with developing an action plan, with specific suggestions for achieving the city’s 10 percent reduction goal.

The decision to reduce local emissions by 10 percent below 1990 levels is linked to the International Kyoto Protocol agreement. With an eye on keeping data collection consistent and measurable, those nations participating in the Kyoto Protocol agreed that 1990 would serve as the base year for assessing climate emission reductions. The United States, has not ratified the Kyoto protocol agreement, which would require U.S. emissions to be reduced by roughly seven percent below 1990 levels by 2010.

This action plan is a tool for both the city government and the community to launch a campaign to reduce greenhouse gas emissions. The task force hopes this plan inspires and assists you to take actions that reduce your production of greenhouse gases, and thereby benefit everyone's future.

E. Burlington's Action Plan Setting a Goal for Reducing Emissions

The first step in helping the City to meet their Climate Action objective was to estimate historical and projected emissions of greenhouse gases. Having carefully assessed the baseline emissions for Burlington and the potential opportunities to achieve the city's



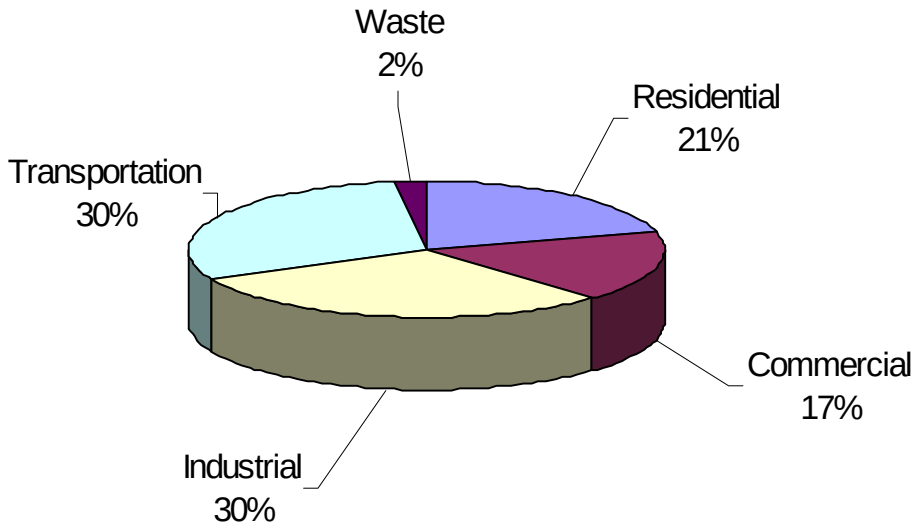
goal, the task force suggests an annual emissions reduction goal of 156,000 tons per year by 2005. This is approximately 10 percent below 1997 emissions levels.

Achieving a 10 percent reduction from 1990 levels would mean total annual emissions reductions of 257,000 tons by 2005. Reductions on that scale are likely to take more time.

Even with the lowered goal for progress, the task force considers this an aggressive plan.The following figure presents the baseline emissions estimates for 1990 and 1997, and projected emissions for 2005, estimated both with and without the impact of the Climate Action Plan. The details of this analysis are presented in Appendix B.

Each sector's share of total 1997 emissions is illustrated in the following pie chart. Note that more than half (60 percent) of the city's load comes from transportation and industry.

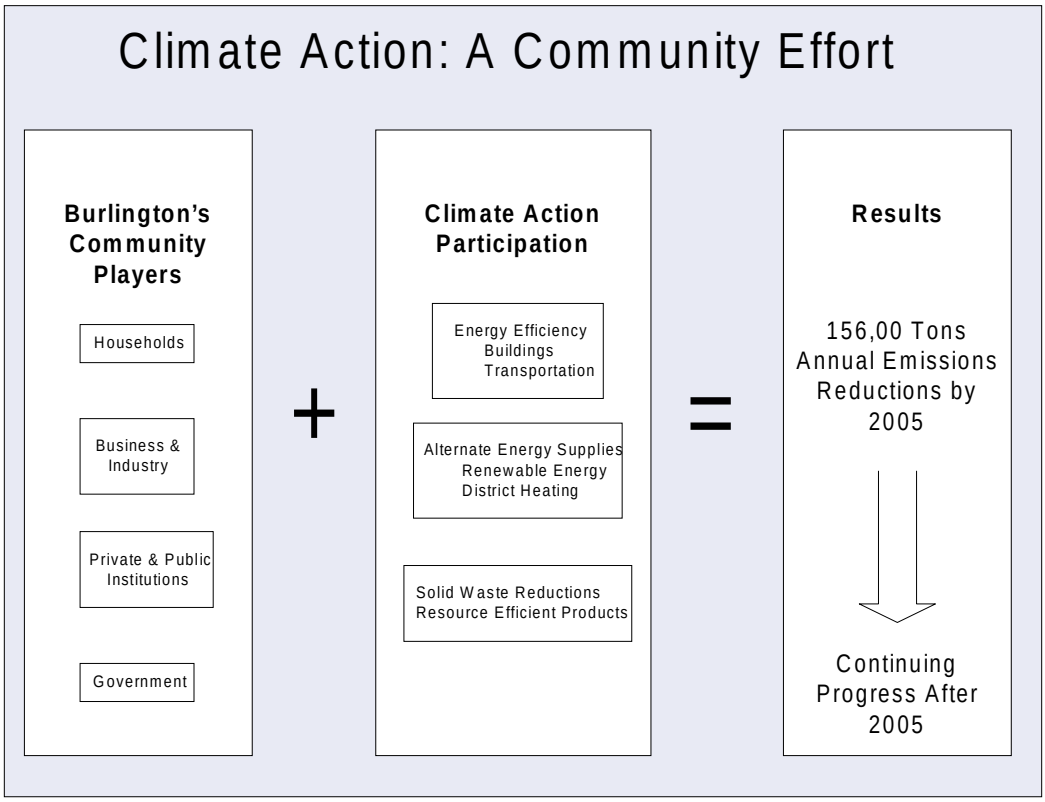
Figure 2. Burlington 1997 CO_2 emissions by Sector



F. Making a Difference through Participation

Of course, reducing emissions in Burlington alone will not solve the world's climate-change problems. But Burlington can connect its efforts to those by hundreds of other cities across the globe that also joined the Cities for Climate Protection Campaign. Together, these communities *can* achieve a significant positive impact.

In a similar way, Burlington's city government is committed to setting policies that will help make this a more sustainable community—but it cannot achieve its goal of reducing emissions goal by acting alone. This effort needs the involvement of the whole community.



G. Additional Benefits of Reducing Emissions

Along with reducing greenhouse gas emissions and positively affecting climate change, the measures suggested in this plan have several important additional benefits. These include:

Cleaner air. Motor vehicles are the single largest source of urban air pollution. In addition to CO_2, cars emit millions of tons of carbon monoxide, nitrogen oxides and volatile organic compounds, including such carcinogenic toxins as butadiene, benzene and formaldehyde.

Improved human health. Fossil fuel emissions contribute to a host of respiratory and other health problems. Across the U.S., motor vehicle emissions cause an estimated 40,000 premature deaths every year.

Improved Economic Vitality. Many of the strategies and measures recommended in the Action Plan make economic sense, even if the benefits of climate protection are not considered. Energy efficiency and climate protection help to reduce Vermont's imports of electricity and fossil fuels. Investing in using energy wisely, and in the use of indigenous renewable energy resources, keeps dollars in the local economy and helps to improve the competitiveness of local businesses.

A more livable community. Picture Burlington with more trees, less traffic, better public transportation, less pollution and a greater collective sense of pride. The city can achieve this, while helping counteract global climate change—and municipal actions can start the trend toward a community lifestyle that produces fewer greenhouse gases. But to make a real, lasting, sustainable difference, it is vital that the people, the businesses and the organizations of Burlington join in putting this action plan *into* action.

ENDNOTES:

1 Greenhouse effect is the process by which energy from the sun is trapped under the atmosphere to cause warming the same way as glass traps solar heat in a sunroom, p. 13. Global Warming and Climate Change. 1994. Department of Engineering and Public Policy. Carnegie Mellon University.
Warning: The Scientific Evidence is Here" Patrick Mazza and Rhys Roth. http://www.climatesolutions.org/global_warming_is_here/index.html

2 The U.S. Office of Science and Technology Policy, Climate Change, State of Knowledge (Figure 100; Vostok ice core data from Barnola et. al., 1987); current data from the Carbon Dioxide Information Analysis Center, 1997, Oak Ridge, TN.

3 Climate Change State of Knowledge, p.9

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