



GLOBAL CLIMATE COALITION

Global Climate Coalition An Overview

Mission

The Global Climate Coalition (GCC) is an organization of business trade associations and private companies established in 1989 to coordinate business participation in the scientific and policy debate on the global climate change issue.

GCC is dedicated to: 1) assessing scientific research on global climate change, 2) analyzing economic and social impacts of policy options, 3) creating an understanding of the global dimensions of the issue to ensure that solutions are addressed equitably by all nations, 4) encouraging transfer of technology to developing nations, and 5) promoting a voluntary commitment among members to "Guiding Principles for Business" that benefit the environment, are consistent with good business practices and are technically and economically feasible.

Programs

GCC is the leading voice for industry on the global climate change issue, and represents its members both internationally and domestically before government agencies, Congress, the media and the general public. The coalition contributes to a balanced debate on global climate change by sponsoring independent research and studies that examine the potential impacts of proposed global climate change policies on the economy. Through educational materials and programs, GCC supports an informed press and public, and an open scientific dialogue.

Position on Climate Change

GCC accepts the finding that there is a natural "greenhouse effect" which protects the Earth from the freezing rigors of space. GCC agrees that the amount of so-called greenhouse gases in the Earth's atmosphere is increasing. In addition, GCC also accepts that the Earth's climate has warmed about 0.5° C since the late 19th century. It is an open question however, what the cause

of this warming has been. The GCC believes that the preponderance of the evidence indicates that most, if not all, of the observed warming is part of a natural warming trend which began approximately 400 years ago. If there is an anthropogenic component to this observed warming, the GCC believes that it must be very small and must be superimposed on a much larger natural warming trend. These positions are consistent with the following IPCC conclusions:

*"...the long-term change of temperature could be interpreted as showing a gradual increase from the late 16th century, interrupted by cooler conditions in the 19th century."*¹

*"The rather rapid changes in global temperature seen around 1920-1940 are very likely to have had a mainly natural origin."*²

*"None of the studies cited above has shown clear evidence that we can attribute the observed [temperature] changes to the specific cause of increases in greenhouse gases."*³

The GCC believes there is no convincing evidence that future increases in greenhouse gas concentrations will produce significant climatic effects. Such evidence necessarily must be based on projections produced by climate models. The IPCC Second Assessment Report (SAR) has highlighted a large number of inadequacies in current climate models which raise serious doubts about the credibility of current climate change scenarios, and therefore the policy-relevance of impact projections to policy makers.

*"Furthermore, the differences between the internally-generated noise estimates from different GCMs translate into important uncertainties....These noise estimates are the primary yardsticks that must be used to judge the significance of correspondences between modeled and observed changes. They may be flawed on the century time scales of interest....The burden of proof this is not the case lies with climate modellers...."*³

If the "primary yardstick" is flawed, then doubts about the credibility and policy-relevance of climate scenarios and impact projections are justified. The GCC believes the scientific community has not yet met the "burden of proof" that greenhouse gas emissions are likely to cause serious climatic impacts.

In addition, the SAR makes it clear that in order to establish any evidence of a human influence on climate, potential human effects must be distinguished from the background "noise" of natural climate fluctuations. The SAR makes it clear that such quantification requires rigorous statistical analysis, which climate researchers have not yet performed. Consequently, we note the

following IPCC conclusions :

*"While some of the pattern-based studies discussed here have claimed a significant climate change, no study to date has positively attributed all or part of that change to anthropogenic causes. Nor has any study quantified the magnitude of a greenhouse-gas effect or aerosol effect in the observed data--an issue that is of primary relevance to policymakers."*³

Considerable uncertainty remains within the scientific community about fundamental questions relating to this issue. Significant reductions in these uncertainties are essential. For this reason, GCC supports a coordinated international research program, the continuation of U.S. climate research efforts (\$1.8 billion requested for FY 1995), in addition to independent and industry sponsored research. GCC also supports activities to reduce greenhouse gas emissions that make sense in their own right, thus continuing sound business practices that will lead to more efficient use of energy while supporting economic growth.

GCC believes that there are trade-offs associated with many of the regulatory schemes to control greenhouse gas emissions. Some of these proposals would impose a direct tax on businesses and consumers through energy or environmental fees while other proposals would impose a hidden tax through other indirect, control measures. These trade-offs would include higher energy and product costs to American consumers, higher operating costs for industry and a potential negative impact on employment. Importantly, many of these proposals would create a competitive advantage for our international trading partners at the expense of U.S. jobs and economic growth.

The GCC believes, along with the IPCC, that policymakers should be realistic when considering greenhouse gas mitigation policies:

"The applicability of any option must be evaluated against (among other things) a background of a country's technology and human resources capability, financial resources, cultural and social acceptability, and the political and legal framework. This is not to suggest that these constraints are not insurmountable but that decision makers must be realistic when considering the range of options available to them."⁴

Membership

The current membership of GCC represents a broad cross-section of U.S. business organizations and companies representing a range of industrial sectors, including: oil, coal, paper, automobile manufacturing, railroads, chemical manufacturing, and utilities.

Organization

The GCC Board of Directors serves as the organization's governing body. The Operating Committee oversees the functional implementation of GCC activities, and John Shlaes, Executive Director, has oversight of day-to-day operations. To address specific aspects of the global climate change issue and to evaluate policy options, GCC utilizes ten committees, including Science and Technology, Communications, Economic Analysis, Federal Affairs, and International.

For More Information:

Global Climate Coalition
1331 Pennsylvania Ave. NW
Suite 1500 - North Lobby
Washington, DC 20004
Email: gcc@igc.apc.org
Internet: <http://www.worldcorp.com/dc-online/gcc>

Press Office

Phone: (202) 628-3622/Fax: (202) 639-8685

Executive Director

Phone: (202) 637-3158/ Fax: (202) 638-1043

1. IPCC Working Group I Report, section 3.6.4, Madrid 27-29 Nov., 1995
2. *Climate Change*, the 1990 IPCC Assessment, Cambridge University Press, section 7.12.
3. IPCC Working Group I Report, section 8.7, Madrid 27-29 Nov., 1995
4. IPCC Working Group II Report, section 9.6.3, Montreal 16-20 Oct., 1995

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GLOBAL CLIMATE COALITION

CLIMATE MODELS: ISSUES AND CHALLENGES

The views of the Global Climate Coalition

SCIENCE: *"The observation, identification, description, experimental investigation, and theoretical explanation of phenomena." The science of climate change is in its infancy.*

Computer climate models are the primary tools employed to measure the complex variables that constitute the earth's climate system and to estimate the impact of these variables on climatic change. They are imperfect at best and have produced highly inaccurate projections of climate change.

Climate models consist of mathematical equations designed to simulate climate processes. A model incorporating every possible climate variable would be too complex to run on even the most advanced computer. Adjusting for this level of complexity calls for the use of a variety of simplifications, approximations and assumptions in the models.

Gerald Meehl of the National Center for Atmospheric Research described the difficulty of creating accurate climate models this way: "You can put...components [of climate] together if you have a lot of computing power, but we know from our own experience with ocean, atmosphere, and ice components that it's a major step from components to having it look like the planet Earth."

These challenges are echoed by an international panel of climate experts assembled by the United Nations. According to the Intergovernmental Panel on Climate Change (IPCC):

"The current generation of models are simplistic and are poor representations of dynamic processes. The effect of climate change adaptation in particular is poorly understood." (WGIII, FSM, section 6.5.2.5)

"GCM [Global Circulation Models] outputs, though physically plausible, often fail to reproduce even the seasonal pattern of present-day climate observed at a regional scale. This naturally casts some doubt on the ability of GCMs to provide accurate estimates of future regional climate. Thus

GCM outputs should be treated, at best, as broad-scale sets of possible future climatic conditions and should not be regarded as predictions."

(WGII FSM (Chapter 26, Technical Guidelines), section 6.5.3)

Weaknesses in the climate models have led to inaccurate forecasts predicting that increases in greenhouse gases would bring a relatively rapid warming trend across the globe, on the order of 0.3 degrees Celsius to 0.5 degrees Celsius during the past 15 years. Highly accurate satellite temperature readings analyzed by the National Aeronautics and Space Administration (NASA) indicate that the observed warming trend is within the range of natural variation and that the computer models are overestimating global warming trends by as much as 400%.

Also, according to some computer simulations of the greenhouse effect, the average temperature in the United States should have increased by approximately 1.5 degrees Celsius during the past 100 years. Information collected by the National Climatic Data Center shows no significant warming in the U.S.

As for the future, according to the IPCC, much work remains to be done before the predictive capacity of computer climate models can be reliably used by policy makers.

"It is worth noting here that while predictive models offer the most promising means of obtaining estimates of possible future impacts of climate change, in some sectors these are not yet sufficiently developed to be used for this purpose. Where the systems are complex and/or poorly understood (e.g., marine ecosystems), considerable efforts are still required to obtain an understanding even of variations in the present-day system. Only after such basic research is completed can meaningful projections be made in the future." (WGII FSM (Chapter 26, Technical Guidelines), section 5.3)

Currently no science exists to accurately forecast long-term climate change. Using the computer models to provide one layer of insight into the study of climate change—while monitoring the more accurate satellite measurement systems—and continually striving for improvement in the field of computer climate modeling, are responsible ways to narrow uncertainties in forecasting to better understand our variable weather. In the meantime, policy makers should recognize that current GCM projections cannot provide reliable information for policy purposes.

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WGI, WGII, WGIII = IPCC Working Groups One, Two and Three.

FSM = Full Supporting Material, the peer reviewed portion of IPCC's work.

[24815: 11/11/96]



GLOBAL CLIMATE COALITION

ECONOMIC AND LIFESTYLE IMPACTS FROM PROPOSED GREENHOUSE GAS EMISSION RESTRICTIONS

The Views of the Global Climate Coalition

U.S. living standards and lifestyles would be seriously damaged by many of the greenhouse gas abatement proposals currently under consideration, especially those that would stabilize or reduce carbon emissions by taxing fossil fuels.

Studies have been conducted on the effects of carbon taxation by a number of experts in the field, including Dr. Lawrence Horwitz of DRI/McGraw-Hill, Dr. Alan Manne of Stanford University, and by the Energy Modeling Forum. All agree that energy taxation would appreciably shrink our economy. While carbon taxes might not be the policy chosen to reduce energy use, economists generally view carbon taxes as a "least-cost" estimate of the impact of other policies that might be used to reduce energy use.

Dr. Horwitz's study determined that about 40 percent of the cost increases brought by a carbon tax imposed to reduce carbon emissions to 1990 levels by 2010 would fall directly on households. This action would increase expenditures on energy use -- electricity for heating, cooling, lighting and running appliances. Carbon taxes would also drive up individual transportation costs.

This might seem like a fair price if it would stop a dangerous "global warming" as some special interests have claimed. But when the Intergovernmental Panel on Climate Change (IPCC), an international panel of climate experts assembled by the United Nations, issued a recent peer-reviewed report on what they actually know about future climate change, the results were enlightening.

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"Future population and economic growth are uncertain, future greenhouse gas emissions given population and economic activity are uncertain, future greenhouse gas concentrations given emissions are uncertain, future climate given atmospheric concentrations of greenhouse gases are uncertain, future physical impacts of climate change are uncertain, and the future valuation of the physical impacts attributable to climate change are uncertain." (WGIII, FSM, chapter 10, section "Elements of an Integrated Assessment Model")

The remainder of the cost increases compelled by carbon taxation would be borne by industry in the form of higher prices for goods and services, which would then be passed along to the general consumer. Real consumer spending would fall about 2 percent, or \$452 per adult. Dr. Horwitz predicts that 89 percent of consumption categories would be negatively affected by the carbon tax.

In response to higher consumer prices and lower demand brought by the tax regime, real business fixed investment would plummet \$56 billion annually by 2010, according to Horwitz. With a general slowdown in business, the employment rate would fall precipitously. Between 1995 and 2010, some 520,000 jobs would be lost annually.

Additionally, real disposable income levels would decline. By 2010 that decline would be in the range of \$75 billion in 1992 dollars, or almost \$400 less income for every American aged 16 to 65. The residual effects of carbon-based taxation would be significant, including a general trend toward smaller homes and a sharp decline in home buyers as the cost of owning and operating a home rises while real disposable income falls.

The damage done to the nation's Gross Domestic Product would be significant. The Energy Modeling Forum found a decline of about 2 percent in GDP assuming a 20 percent emissions reduction by 2010. The results of Horwitz's study were even more alarming, projecting a reduction of 2.3 percent or \$203 billion dollars by 2010. This is about \$862 for every adult in the U.S.

The IPCC, quoted above, offers additional insight into claims that U.S. taxpayers must be immediately forced into a new regime of energy taxation.

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"As a policy question, global climate is sometimes posed as a choice between doing nothing at all, and committing to an all out effort. Given the large current uncertainties about costs and benefits of greenhouse mitigation, this is the wrong way to frame the issue. A more useful formulation is: 'Given current knowledge and concerns, what actions should we take over the next one or two decades to position ourselves to act on new information that will become available.' " (WGIII, FSM, section 1.3.2)

Studies of the costs and benefits of emissions reduction policies demonstrate that a more gradual, long-term approach is advisable. In the place of carbon taxation, for example, energy saving is still possible within our economy. This and other alternatives should be explored thoroughly before instituting policies that would bring drastic and possibly unwarranted change to our living standards and lifestyles.

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[24820: 11/11/96]

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GLOBAL CLIMATE COALITION

ISSUES RELATED TO POTENTIAL HEALTH IMPACTS RESULTING FROM CLIMATE CHANGE

The Views Of The Global Climate Coalition

Attempting to link global climate change and adverse health impacts requires a long and very tenuous stretch. Attention to this labored hypothesis detracts from a much needed focus on solid, identifiable ways to improve public health around the globe.

Concerns that climate change might be the cause of various health problems rests on a number of unproved assumptions. Most of the existing literature concerning the potential health impacts of climate change is based on computer-generated projections of possible increases in global average temperatures into the next century. Climate related health impact projections reported in 1995 by the Intergovernmental Panel on Climate Change (IPCC), a panel of international climate and economic experts assembled by the United Nations, are based on the 1992 IPCC climate projections.

However, since 1992, improvements in climate models have resulted in significant reductions in the projected rate and magnitude of future climate change. For example, the IPCC in 1995 has stated that their "best estimate" is that global mean surface air temperature will increase about 2 degrees C by the year 2100. This estimate is approximately one third lower than the "best estimate" in 1992. As a result, health impact projections should be reassessed using the 1995 climate projections. The Global Climate Coalition believes that such a reassessment will produce significantly lower health impact projections than currently reported by the IPCC and in general media accounts on the topic.

In addition, when reviewing health impact projections based on regional forecasts from climate models, policy makers should consider that confidence in such projections can be no greater than the confidence which exists in the regional climate forecasts. According to the IPCC, confidence in regional climate forecasts "remains low". Therefore, confidence in health impact projections based on these models must also be low.

As a result, any assessment of potential health impacts suggested in the literature needs to be placed in context. Suggestions have been made that man-made greenhouse gases either have or will lead to death and illnesses from increased heat waves, climate-related droughts, floods and other disasters. Global warming alarmists also claim that infectious diseases would be spread to new regions of the world, especially "vector borne diseases" such as malaria and dengue, which are transmitted by mosquitoes, rodents and other carriers.

Duane Gubler, chief of the vector-borne disease branch of the U.S. Centers for Disease Control, is skeptical that any connection exists between global warming and the spread of disease. "Dengue is an example that all the people who talk about this use....," he told the Baltimore Sun recently. "But none of this has been associated with global warming...."

Dr. Gubler believes the primary culprits for the spread of disease are poverty, poor sanitation, increased world population and a declining health infrastructure. Dr. John La Montagnac, a director at the National Institute of Allergy and Infectious Diseases, agrees with this view and adds that mass human migration and the growing ineffectiveness of antibiotics are also responsible for the spread of disease.

The most recent scientific assessment of the Intergovernmental Panel on Climate Change states that:

"Improved primary health care for vulnerable populations could play a significant role in reducing a range of health impacts, including some vector-borne and other communicable diseases, and the effects of extreme events." (WGII FSM, section 18.5)

The IPCC lists a number of actions that would be far more effective and far more responsive to human suffering than directing limited resources to cutting current greenhouse gas emissions. Disease vector distribution can change for a number of environmental reasons, including natural variability in weather patterns. There are many ways to respond to those changes according to the IPCC.

"Improved sanitation and water treatment both reduce the spread of waterborne diseases and may provide a measure of safeguard against importing exotic enteric waterborne diseases such as cholera...Finally, disease surveillance could be strengthened and integrated with other environmental monitoring to design early warning systems; develop early, environmentally sound public health interventions; and develop anticipatory societal policies to reduce the risk of outbreaks and the subsequent spread of epidemics." (WGII FSM, section 12.5.6)

Since natural variations exist in the forces that control climate change, regional and global average temperature changes are likely to occur regardless of attempts to reduce man-made emissions of greenhouse gases. As a result, the most prudent and effective course of action to protect public health is to improve basic health services as outlined above.

The Global Climate Coalition believes that health professionals have a responsibility to focus on known health threats such as: the inadequacy of public health surveillance to provide early detection of diseases, the inadequacy of sanitation and water quality, inadequate nutrition and personal behavior. Nations with higher standards of living are generally healthier. Economic growth and development generate resources that enable societies to improve living standards, which include better access to health care facilities and disease prevention.

In short, climate change is a marginal factor in the broad range of public policy options that should be examined in addressing health concerns around the globe. The issue is one of priorities and proper use of scarce human and capital resources. Attention should be directed at those who suffer from inadequate nutrition, a lack of fresh water, subpar health care, deficient sanitation and similar problems. Improvements should also be made in disease warning networks and national vaccination programs, and disease prevention should be emphasized over treatment.

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GLOBAL CLIMATE COALITION

ECONOMIC AND EMPLOYMENT IMPACTS FROM PROPOSED GREENHOUSE GAS EMISSION RESTRICTIONS

The Views of The Global Climate Coalition

Any program geared to near-term stabilization or reduction in carbon emissions, whether voluntary or induced, is likely to produce significant economic dislocations in the United States, including profound job losses and major economic restructuring.

Profound economic consequences would result from some of the programs being considered to reduce greenhouse gas emissions in the next two decades. For example, a DRI/McGraw-Hill study of carbon taxation as a method to reduce carbon emissions to 1990 levels by 2010 suggests that such an approach would lead to job losses averaging more than 500,000 per year between 1995 and 2010, with peak losses of 1,000,000 jobs per year in the two years after the tax was fully implemented.

One reason that so many jobs would be lost is that current carbon-tax proposals would only apply to a limited number of countries. In fact, most countries in the world would be exempt. The result would be that energy intensive industries would be economically compelled to move to non-taxed countries, taking jobs with them. According to the Intergovernmental Panel on Climate Change (IPCC), a panel of international climate experts assembled by the United Nations, carbon-based energy taxes (advocated by anti-growth special interest groups and endorsed by the Clinton Administration) could provoke industry relocation, which would force jobs out of the United States.

"Taxes that are not levied on a global scale may provoke industry relocation, which may adversely affect emissions efficiency as well as international competitiveness. Most countries are hesitant to embark on policy ventures that might endanger their international market position and their attractiveness as industrial locations...It is difficult for a single nation to impose full environmental cost accounting and remain competitive unless other nations do the same." (WGII FSM, section 20.5.3.3)

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"If different countries have different obligations to reduce greenhouse gas emissions, different implicit tax rates will result...possibly with little effect on total greenhouse gas emissions." (WGIII, FSM, section 1.3.6)

The carbon-tax proposals also would lead to the restructuring of large sectors of the American manufacturing community. The aluminum, ferrous metals, iron core mining, paper mills, fertilizer and metal container industries would experience severe impacts. Restructuring in these sectors would not come without significant job losses.

Longer term shrinkage in the job market could also result from other near-term emissions reduction proposals, which have been projected to cause anywhere from a 1 percent reduction in the Gross Domestic Product by the year 2000 to a 2.3 percent decline by 2010. This is doubly alarming considering that the U.S. GDP has already slowed from an annual growth rate of 4.2 percent annually between 1963 and 1972 to 2.6 percent over the past two decades.

A decline in investment spending also would result at a time when this category compares unfavorably to that of our major competitors. And our net saving rate is low compared to these nations, averaging 4.6 percent while Japan's net saving rate stands at 19 percent, Germany's at 11 percent and Canada's at almost 8 percent.

Fossil fuel detractors are pushing for the United States and other industrialized nations to bear the entire burden of greenhouse gas emissions reduction even though the developing countries will be responsible for the vast majority of future emissions. Such an approach would force U.S. taxpayers to pay enormous amounts to other countries with little environmental benefit. According to the IPCC, such unilateral action by the U.S. would produce exaggerated economic impacts and would be ineffective in reducing global greenhouse emissions:

"... unilateral action by the US or by OECD countries are likely to be less effective than global action, and that unilateral actions are likely to exaggerate the impact on GDP." (WGIII, FSM, section 5.4)

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Further rebuttal of the calls by various anti-growth special interest groups for new energy taxes is the finding by the IPCC that a range of other policy issues carry far greater impact on social welfare than potential future climate change.

"Local environmental and socioeconomic situations are changing rapidly for reasons other than climate change. Worldwide, population growth,

industrialization, urbanization, poverty, technological change, and government policy could overwhelm any effects of climate change."
(WGII FSM, section 12.0)

The potential economic consequences of the greenhouse gas emissions reduction proposals now under consideration are large enough that policymakers should call for a rejection of the current direction. Policies that promote a more studied, balanced and less destructive approach should be encouraged. Studies have demonstrated a longer term, measured approach to emissions reductions can have an equal impact at considerably less cost to the economy, jobs, and growth.

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[24819: 11/11/96]

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GLOBAL CLIMATE COALITION

IMPACTS ON TRADE AND COMPETITIVENESS FROM PROPOSED GREENHOUSE GAS EMISSION RESTRICTIONS

The Views of the Global Climate Coalition

Imposing near-term goals to stabilize or reduce carbon emissions would weaken the U.S. economy and cripple the nation's competitiveness in the global marketplace. Given the uncertainties about the impact of carbon emissions on global climate change, a more studied approach to the development of these greenhouse gas mitigation policies should be adopted.

Economist Dr. Alan Manne of Stanford University studied typical abatement proposals intended to stabilize global carbon emissions between 1990 and the year 2000, reduce them to 80 percent of this level by 2010, and stabilize them thereafter. According to Dr. Manne's findings, price-induced energy conservation and shifts to low carbon fuels to reach the goals set forth in these proposals would result in annual losses ranging from 1 percent of the U.S. Gross Domestic Product to nearly 2.5 percent of the nation's GDP.¹

Dr. Manne argues that these restrictive approaches to limit carbon emissions would hinder U.S. international competitiveness in such basic industries as chemicals, steel, aluminum, petroleum refining and mining -- all of which are energy intensive. He contends further that the U.S. coal exporting industry would be put out of business and severe strains would be placed on important trade pacts like NAFTA and GATT.

Dr. Manne's conclusions have been supported in studies conducted by Economist Lawrence M. Horwitz of DRI/McGraw-Hill, an economic modeling consultancy. Mr. Horwitz reports that efforts to reduce greenhouse gas emissions to 1990 levels by 2010 through the use of carbon taxes would reduce the U.S. GDP by 2.3 percent, or \$203 billion, relative to the baseline forecast; decrease business investment by almost 5 percent; and reduce consumer spending by 2 percent. Overall, 89 percent of consumption categories would be negatively affected by the carbon tax. An American economy so weakened could be a handicapped player in the

¹ "Costs and Benefits of Alternative CO₂ Emissions Reduction Strategies".

international marketplace.

According to the Intergovernmental Panel on Climate Change (IPCC), a panel of international climate and economic experts assembled by the United Nations, countries, such as the United States, that actually implement carbon taxes and other fiscal instruments to restrict greenhouse gas emissions may be at a severe disadvantage.

"Taxes that are not levied on a global scale may provoke industry relocation, which may adversely affect emissions efficiency as well as international competitiveness. Most countries are hesitant to embark on policy ventures that might endanger their international market position and their attractiveness as industrial locations...It is difficult for a single nation to impose full environmental cost accounting and remain competitive unless other nations do the same." (WGII FSM, section 20.5.3.3)

The IPCC estimates the cost of carbon-based taxes is fairly high. Estimates range from \$20 to \$150 per ton for the carbon taxes required to hold emissions at 1990 levels in 2010 and from \$50 to \$330 per ton to reduce emissions by an additional 20 percent. While the impact on economies from fiscal instruments such as carbon-based taxes can be assessed fairly easily, the social and economic impacts from potential warming cannot, according to the IPCC.

"The level of sophistication of climate change damage analysis is comparatively low. Damage estimates are generally tentative and based on several simplifying, and often controversial assumptions. The degree of uncertainty is correspondingly high, both with respect to physical impacts as well as their consequences for social welfare. No attempt has been made to specify confidence intervals. Rather, estimates are best guesses." (WGIII, FSM, section 6.1)

Economist Dr. W. David Montgomery, an IPCC lead author, argues that concentrating on near-term emissions reduction targets represents a costly and potentially unnecessary approach to climate policy. It would be much more cost effective to focus on the long-term stabilization of atmospheric concentrations of greenhouse gases rather than on short-term emissions.

Many of the reasons for this are cited in the IPCC Second Assessment Report.

"There are several reasons why a less restrictive near-term emissions path may turn out to be less expensive. First, large emissions reductions in the near term will require premature retirement of the existing capital stock. This is apt to be costly. There will be more opportunities for reducing emissions cheaply once the current capital equipment turns over. Second, the availability and cost of substitutes are likely to improve over time. There is ample historical evidence for improvements in the efficiency of energy supply, transformation, and end-

use technologies (Chapter 8) , and expectation of substantial further improvement in the future... Finally, even if the costs of removing a ton of carbon were the same in all periods, a positive marginal productivity of capital will favor the deferral of reductions. This is because with a positive real rate of return on capital, it will be desirable to invest some of today's potential emission reduction dollars in enhancing our future productive capacity. As a result, the same level of cumulative emission reductions can be achieved at a lower total cost to society." (WGIII, FSM, chapter 10, section "Cost-effective Strategies for Stabilizing Atmospheric CO₂ Concentrations")

Montgomery suggests that various steps are necessary for a more rational approach to developing climate change policies. Among these:

- analyze implications for U.S. net costs and benefits of international sharing of the burden of response;
- inventory possible policy responses and analyze the economic merits of alternative response options.

Emissions reduction policies that promote grave economic consequences for the U.S. economy and threaten the nation's foreign trade position should be avoided. Instead, a studied approach to greenhouse gas policy development should be adopted along with continued investment in climate science and the development of new energy technologies.

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GLOBAL CLIMATE COALITION

EXTREME WEATHER EVENTS AND CLIMATE CHANGE

The Views of the Global Climate Coalition

No credible evidence exists to support the contention that hurricanes, tornadoes and other extreme weather events are on the rise or that man-made greenhouse gas emissions are causing increases in extreme weather events.

According to the Intergovernmental Panel on Climate Change (IPCC), an international panel of climate and economic experts assembled by the United Nations, there is no convincing evidence that man-made greenhouse gas emissions have led to any increase in extreme weather events. Claims that human activities have led to more extreme weather events have been made in a few media accounts and by a few special interest groups trying to frighten the general public into supporting unnecessary energy taxes and other restrictions on fossil fuel use. According to the peer-reviewed scientific literature:

"Overall, there is no evidence that extreme weather events, or climate variability, has increased, in a global sense, through the 20th century, although data and analyses are poor and not comprehensive. On regional scales there is clear evidence of changes in some extremes and climate variability indicators. Some of these changes have been toward greater variability; some have been toward lower variability." (WGI FSM, section 3.5.4)

According to a study of global weather data by Accu-Weather, the world's leading commercial weather firm based in State College, Pennsylvania, a number of factors have contributed to misleading conclusions in the popular media that there has been an increase in weather-related natural disasters, specifically:

- Important statistical principles have been ignored leading to a reliance on data collected from regions of high natural variability.
- Incomplete information has been used about the behavior of complex meteorological variables resulting in simplistic conclusions.
- Important physical evidence has been ignored.

The IPCC was very specific on the issue of whether so-called global warming has led to

extreme weather activity such as occurred, for example, in many parts of the United States and Europe in 1995-1996.

"Of course, it is not possible to attribute particular, isolated, events to a change in climate or weather pattern; other plausible explanations exist for each of them, and a number of different factors may combine to produce each event." (WGII FSM, section 18.7)

"There is little or no evidence of consistent increases in such events. For instance, Ostby (1993) found no evidence of increased occurrence of strong or violent tornadoes in the USA, although the numbers of reports of less severe tornadoes appears to have increased, perhaps due to increased population, eagerness in reporting, or improved reporting procedures. Grazulis (1993) reported a drop in damaging tornadoes in the 1980s, over the USA." (WGI FSM, section 3.5.3.5)

The Accu-Weather study reports similar findings in a review of information compiled on the frequency of tornadoes. There is no evidence of an increase in strong or violent tornadoes observed in the 48 contiguous states from 1953 to 1993. Actually, the data point to a downward trend in the incidence of such events.

The data collected by Accu-Weather also show that hurricanes have not increased in number or intensity during the past few decades. In fact, it is entirely possible that the number of hurricanes in the Northern Hemisphere has actually decreased in recent years. Some storms detected today would have gone unnoticed 50 to 100 years ago.

A recent World Meteorological Organization report on global climate and extreme weather confirms that, "...there is no evidence that would indicate an increased frequency of such events."

As to the assertions by some special interest groups that the weather will become more extreme if global average temperatures increase during the next century, the IPCC peer-reviewed literature makes the following point:

"Despite the often repeated assertion that climate variability could increase in a warmer world, there is little evidence from climate models to support this notion." (WGII FSM, section 9.3.2)

The Accu-Weather study attributes the *impression* of an increase in extreme weather to several factors: an increase in housing and related development in areas that were once sparsely populated, especially along coast lines; the ability of scientists to identify and track weather events using improved technology; and modern communications systems which allow rapid

reporting of such events. The IPCC supports this point.

"Although there is uncertainty, the extent of damage caused by great windstorm catastrophes has expanded in recent years. The concentrations of people living in high-risk coastal regions must be considered the main reason for this alarming trend...It is therefore quite possible to get a scientific assessment of low injury to an ecosystem combined with high economic loss value, especially given that the value of waterfront real estate is normally high." (WGII FSM, section 8.3.1.6)

In this regard, the World Meteorological Organization notes that, "...any increases in the number of fatalities, injuries and amount of damage and destruction caused by extreme events can often be related to population increases, especially in those regions most susceptible to climate variability." Here again, the IPCC provides useful insight, in this case on why insurance related damages may be increasing even though storm activity may not be.

"There are several reasons for the escalation in the cost of severe weather. Developed countries have become wealthier. Many more people now live in coastal areas with costly infrastructures. Personal goods and business processes are generally more vulnerable to water damage. The built environment also contributes through inappropriate or incorrect design and construction. The insurance industry has compounded matters by extending the basis of coverage. It is a common perception in the insurance industry that there is a trend towards an increased frequency of severity of extreme climate events. The meteorological literature fails to substantiate this in the context of long-term change, though there may have been a shift within the limits of natural variability." (WGII FSM, section 17.0)

It is reasonable to expect extreme weather events to continue with a frequency and intensity that will match past patterns. Rather than attempting to blame weather variability on unfounded claims of "global warming," it would be more useful to prepare people to handle extreme weather events, improve forecasting, communicate warnings, support coastal land use restrictions, and design safer structures.

The Global Climate Coalition is an organization of business trade associations and private companies established in 1989 to coordinate business participation in the scientific and policy debate on global climate change.

WGI, WGII, WGIII = IPCC Working Groups One, Two and Three.

FSM = Full Supporting Material, the peer reviewed portion of IPCC's work.

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