"Climate Change: From Scientific Uncertainty to Public Policy"

Remarks by Congressman George E. Brown, Jr.

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Good evening, and thank you for inviting me to participate in your conference. I have been a long-time friend and supporter of Student Pugwash, for I feel very strongly that students of science and technology worldwide need to play an active role in helping analyze the complex ethical, political, social, and environmental problems raised by the advancement of technology.

I am particularly pleased to have this opportunity to speak on the topic of "Climate Change: From Scientific Uncertainty to Public Policy." I must say, however, that a more challenging topic could hardly have been selected, for embraced within the subject of this session is the vexing question of how much scientific proof in support of global warming do we need before enacting policies that might result in drastic alterations in present energy use patterns.

Pitted against each other within the equation of this policy problem are, on the one hand, potentially enormous disruptions around the globe as the result of an increase in the Earth's temperature due to the build-up of "greenhouse gases" in the atmosphere, and, on the other hand, potentially enormous disruptions to current industries, local economies, personal finances, patterns of mobility, and economic activity as the result of actions to drastically reduce the combustion of fossil fuels.

Scientists tend to focus on the first half of this equation, for it involves measuring atmospheric carbon dioxide levels, predicting how emission patterns might affect the global trapping of heat by the atmosphere, and modeling the impact this would have on the melting of the polar ice caps and the resulting inundation of coastal areas worldwide.

Politicians tend to focus on the second half of the equation, for it deals with the constituencies which they know best: utility companies; constituents who drive cars, pay heating bills, and work in coal mines; and businessmen and women who in some way or another make a living off current energy use patterns.

Increasingly, however, politicians are listening to what the scientists are saying about the prospects of global warming. This is because the degree of uncertainty surrounding this issue is diminishing. It has taken a long time to get to this point, however.

As some of you probably know, the theory of the greenhouse effect was developed more than 160 years ago, by the French physicist Jean Fourier. In 1830, Fourier explained that the Earth's atmosphere acted like the glass of a greenhouse by letting in the visible rays and energy of the sun, but impeding the radiation of heat from the warm Earth back into outer space.

Sixty-six years later, in 1986, the Swedish chemist Svant Arrhenius argued in a paper that the continued burning of fossil fuels by industrial societies could eventually lead to a doubling in atmospheric carbon dioxide and an increase in the Earth's temperature by 10 degrees Fahrenheit.

Obviously, politicians at the time were not listening. Nor should they have been, since the uncertainties involved in Arrhenius' theory were enormous. During the 1930's, the British engineer G.D. Callendar made the first comparisons between the measured growth in carbon dioxide in the atmosphere and long-term temperature records from meteorological stations. Callendar seemed to show a direct link between carbon dioxide build-up and increased global temperatures, yet he argued that the additional carbon dioxide was "likely to prove beneficial to mankind" by increasing plant productivity and forestalling indefinitely a return of the Ice Age. Callendar's work, however, was met with enormous skepticism by the British scientific community.

During the 1960's and early 1970's, the notion of global climate change developed increased credence. Indeed, in 1974 a report issued by the Central Intelligence Agency made the following, seemingly definitive statement:

> "Leaders in climatology and economics are in agreement that a climatic change is taking place and that is has already caused major economic problems throughout the world."

The problem, however, was that there was no agreement at the time as to whether the climatic change underway was a global warming, due to the greenhouse effect, or a global cooling, due to increased particulates in the atmosphere that would reduce the amount of sunlight reaching the Earth. Scientists developed theories and made public pronouncements in support of both a cooling and warming.

For example, in the January 1976 issue of the journal Technology Review, one could have read the following prediction:

> "In the next 25 years the temperature in all latitudes will fall to significantly lower levels than those reached in the mid-1960's."

In contrast, the November 20, 1975 issue of Nature contained a paper arguing that:

> "[Global cooling] is likely to reverse within ten years, and from then until the end of this century the natural trend and the greenhouse effect will combine to produce a pronounced warming, increasing….global temperatures by half a degree or more above the present level."

Faced with these conflicting predictions, in 1976, as Chairman of the House Subcommittee on the Environment and the Atmosphere, I convened the first congressional hearings ever to discuss the issue of climate research. Over the course of two weeks, our Subcommittee received testimony of relevance to a bill that some of my colleagues and I had introduced to coordinate and improve national climate research efforts. In large part as a result of those hearings, we succeeded in passing in 1977 the National Climate Program Act. Passage of that legislation was a classic example of how politicians tend to deal with scientific uncertainty: we initiate efforts to study the problem further.

We did this, even though during our very first day of hearings, my fellow panelist, Steve Schnieder, made the following statement:

> "Perhaps the greatest threat to our future security lies in a common misinterpretation by many citizens and decision makers….that…uncertainty in science suggests merely that we study more before we worry—or act."

Steve also made the following poignant remark in his testimony 13 years and one month ago today:

> "The question is, how much proof is enough, and how much chance do you want to take? With regard to the CO2 question, for example, the fundamental [issue].. is: can you accept the level of risk which follows from the fact that the only certain proof of the CO2 greenhouse theory is to have the atmosphere itself perform the experiment?"

The problem facing me and my colleagues, however, was that at the time, the greenhouse theory remained just that: a theory. As explained by another witness during those 1976 hearings, the Swedish Climatologist Bert Bolin:

> "Let me state that theory is not worth much until, with the aid of data and reality, you have in some way proven it s validity; and we are, as yet, at the stage where this is theory."

Getting from theory to proof remains the fundamental dilemma, however, of the debate over human-induced climate change. To wait for proof to appear may mean committing ourselves to an enormously large level of global disruption. According to some estimates, the build-up of greenhouse gases already released into the atmosphere has

destined the planet for an increase of between 2 and 4 degreed Fahrenheit in the Earth's average temperature.

Last summer, however, NASA climatologist James Hansen thrust himself into the gulf between the theory and the proof of global warming. In the midst of a nationwide drought, Hansen testified before a congressional committee that he was 99 percent sure that the Earth was getting warmer, and that he could say with a high degree of confidence that the warming was due to the greenhouse effect.

Instantly, Hansen's statement got nationwide attention. It made the headlines of virtually every major newspaper and was covered by every network news station. And although Hansen's views remain controversial within the scientific community – with many climatologists feeling that he has gone beyond what current models support – it is fairly clear to everyone involved in the business of studying the problem of global warming that the degree of uncertainty involved has been narrowed enormously in recent years.

Has it narrowed enough to force the developed of public policy? Not quite, but almost. A variety of bills have been introduced in the Congress to reduce global emissions of greenhouse gases. And within the Bush Administration, the problem of global warming is not going unnoticed. In his first public appearance after taking office, Secretary of State Baker delivered a speech on the importance of countering the dangers of emissions, improved energy efficiency, and reforestation. He also made the following statement, which I will use as my conclusion:

> "The truth is that we face some very difficult problems. But it is also true that we now recognize them to be problems. And in my experience in government, that is half the problem."

This statement seems to demonstrate for that we have crossed an important threshold along the continuum between uncertainty and proof, as it pertains to the problem of global warming, and that now what confronts us is the difficult task of developing and implementing a policy response. This challenge will be enormous, and will need to involve unprecedented international cooperation, but that process has begun.

I anticipate that within the next few years we should be able to negotiate an international agreement to deal with global warming, similar to what was achieved with the Montreal Protocol as a response to depletion of the ozone layer. I would hope that we will have the good sense to develop a national energy plan that shifts us away from fossil fuels and toward alternative energy sources, and that we work with the developing nations of the world to pursue a sustainable path of economic development. Many of you in this audience may be involved in helping develop the global response to the problem of climate change. I hope that your week in Boulder to engage in an intensive analysis of this and other problems helps – in some small way – bring us all a little closer to solving the problem of global warming. [end]