

## RESPONSES TO QUESTIONS BY STEPHEN H. SCHNEIDER, Oct 29, 2003

QUESTIONS FOR DR. BUSALACCHI, DR. SCHNEIDER, DR. WIGLEY, MR. STEPHENSON, AND MR. PODELL FROM SENATOR KERRY

Hearing on Case for Climate Action  
October 1, 2003

### **Voluntary Approach and UNFCC**

As you know, the US signed and ratified the UN Framework Convention on Climate Change in 1992, which set as its goal “*stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.*”

The UNFCC further stated that “*such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change...*”.

But according to testimony before this Committee in July of last year and the U.S. Climate Action Report, U.S. greenhouse gas emissions will increase under the Bush plan by 43% between 2000-2020, despite improvements in greenhouse gas intensity.

- Is the “emissions intensity” voluntary approach to greenhouse gas emission reductions currently advocated by the Administration is sufficient to put us on track to achieve greenhouse gas stabilization in a timely manner?
- If we continue on the current path – with emissions rising annually – when would we achieve this goal? Ever?
- Can actual emissions reductions on such scale and timeframe be achieved solely through any type of voluntary action?

In short, Senator Kerry, the answers to all three questions above are “No”. But I will explain briefly why in each case.

First, to *emissions intensity*, a measure of the emissions of greenhouse gasses per unit economic product (GDP). There are three factors that can reduce (i.e., improve) intensity: 1-more efficient energy supply and end uses; 2-a transformation of the economy away from materials and energy intensive activities to more service/information based activities (e.g., moving logs around in diesel trucks is much more energy intensive per unit economic product produced than moving electrons around in the microchips of computers); 3-a switch from high carbon emitting energy sources like coal burning to less emitting sources like natural gas burning, or even less emitting energy systems like renewables or deep earth sequestration of CO<sub>2</sub> (produced by a closed cycle fossil fuel plant that produced hydrogen as the energy carrier and buried the CO<sub>2</sub> underground). The latter will take financial incentives to produce the necessary R&D investments, and this bill will certainly provide such incentives.

The problem with the President’s plan, is that he promised to accomplish what will happen anyway without his intervention—that is, for the transformation of the economy to a more efficient, more information based entity. In fact, the emissions intensity

improvement he proposes as his climate “plan” are about what historic levels of emissions intensity have been from the natural evolution of the economy—in other words, little value added to the emissions profile we would get with no plan.

More importantly, emissions intensity is only a part of emissions. Emissions are the product of population size, times affluence (GDP/capita) times emissions intensity. Since the GDP and population sizes are projected to go up dramatically in the next few decades by the Administration’s own figures, then the total emissions will go up too, even with a decrease in emissions intensity offsetting some of the increase, but by no means all. In other words, the Administration “plan” is an emissions increase plan, whereas the McCain-Lieberman bill is a true emissions reduction plan, and its passage would send signals to the very able technologists in the US to work harder on development of lower priced, low-carbon-emitting energy systems and accelerated emissions intensity improvements well beyond those that would be achieved by passive—i.e., no action—policies like that the US is now advocating.

*Greenhouse gas stabilization.* Stabilization of greenhouse gasses requires not only reductions of emission, but also eventual reductions to near zero. How long we take to get there and how much we emit in the interim determines the ultimate stabilization levels. Most scenarios of emissions project a doubling of CO<sub>2</sub> over pre-industrial levels sometime in the mid-21<sup>st</sup> century if we follow a “business-as-usual” policy of no required reductions, and a possible tripling or more of CO<sub>2</sub> concentrations by the end of the century—threatening climatic impacts that are truly catastrophic in their potential. In order to “merely” double CO<sub>2</sub>, we need to cut emission by about half below typical business-as-usual projections in the next five decades and to near zero by century’s end. Anything less is likely to produce more than a doubling of CO<sub>2</sub> by the time it stabilizes. Doing nothing just ups the final stabilization levels once society finally decides to prevent further warming.

*Can voluntary action work?* I must admit I am very skeptical about voluntary actions that have no private and immediate gains. It is the same to ask a company to cut its bottom line for the good of the planet without fair rules to require it in general as it is to ask motorists to obey speed limits and traffic lights on a voluntary basis without police enforcement. It simply is unrealistic to expect compliance or enhancement of R&D on efficient and lower cost decarbonized energy systems without incentives, and the pleading of politicians is a very unlikely incentive for most cost-conscious businesses. It is necessary in my personal opinion, to charge for the dumping of wastes into the atmosphere, just as it is a well-accepted principle to charge for dumping of solid wastes in municipal landfills. The “free sewer” that the air has become cannot be cleaned up without rules—just like it took rules to clean some of the criteria air pollutants from many of our cities and some of the acid rain from many of our industries. The McCain-Lieberman bill does this for greenhouse gasses, and thus is a step in the right direction.

## QUESTIONS FOR DR. SCHNEIDER AND DR. WIGLEY FROM SENATOR KERRY

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### **Level of Scientific Justification for Action**

The Climate Action Report states: “Green house gases are accumulating in Earth’s atmosphere as a result of human activities, causing global mean surface air temperature and subsurface ocean temperature to rise”. It also states: “the best scientific information indicates that if greenhouse gas concentration continue to increase, changes are likely to occur”.

We also are already seeing the effects of climate change, according to recent studies shrinking ice sheets, shifts in species ranges, and loss of snow cover on Mt. Kilimanjaro – to name only a few of many examples of the frightening consequences of climate change.

- Do we not have sufficient conclusions and studies to justify some level of mandatory reductions in greenhouse gases?
- If not, why not?
- What additional evidence -- short of flooding of the National Mall -- must we gain to have sufficient justification for mandatory reductions in greenhouse gas emissions?

We need to separate out two aspects of this question. First, science can provide the “what ifs”—what if we do not have enforceable incentives to cut greenhouse gas emissions, by how much will concentrations rise and what might that imply for impacts on environment and society. In other words, science assesses the risks of alternative policies. Second, is the value laden political exercise of deciding how much risk should we take before trying to hedge against potentially harmful or irreversible prospects. Science can—and has—told us that climate change beyond a few degrees further warming will have a much greater likelihood of dangerous outcomes than keeping it below a few degrees. The latter is much less likely to happen without climate policies like the McCain-Lieberman bill than with climate policies. Thus, the value choice is whether to hedge—i.e. adopt a precautionary principle to hedge against dangerous possibilities, whose severity increases with delay in dealing with the problem. That is the risk-management gamble we take if we ignore the problem and hope it will turn out on the low side of the current uncertainty range. Of course, if our luck—in truth, the luck of our children and grandchildren and nature—is bad, we will have much greater damages by doing nothing than by hedging.

However, sensible policies also solve more than one problem at once. So cutting greenhouse emissions via more efficient or renewable systems reduces health-damaging air pollution in cities, and can reduce dangerous dependence on foreign supplies of oil. Such “win-win” strategies are usually the cheapest and most politically acceptable hedging strategies, and in my personal opinion we knew enough science—a better than even chance for serious climate damages from business-as-usual—that we should have implemented climate policies 15 years ago (as I said to this committee in testimony in 1989 and again this month—see my written testimony on Oct 1, 2003, for references).

In terms of how much shock it will take to wake us up, the 1988 heat waves were the first such shock, and moved this problem from a largely academic setting to congressional hearing rooms and media programs. Since then a contentions and too often special interest driven polemical debate has arisen, pitting “end of the world” pessimism versus “CO<sub>2</sub> is good for the environment” optimism—the former from “deep ecology” groups and the latter from the fossil fuel industry and their ideological supporters. This debate has confused many, as it is technical and shrill. But the vast bulk of the knowledgeable scientific community that specializes in climatology has agreed over the past 10 years that effects of human activities are already discernible in the observational record, that plants and animal are already responding and will be greatly disturbed if the trends continue for decades more, and that cost effective solutions need not cost more than a year’s delay in achieving phenomenal income growth—hundreds of percent improvement—and can eliminate the global warming risk (see the discussion in my testimony to this committee on Oct 1, 2003). Thus, in my personal view we have had many clear signs of potential trouble and to risk more and greater threats seems foolish in view of the available cost-effective steps that can be taken now to lower the threat and provide co-benefits such as greater energy independence and reduced air pollution.

QUESTIONS FOR DR. BUSALACCHI, DR. SCHNEIDER, DR. WIGLEY, AND MR. WALKER FROM SENATOR KERRY

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**Delay of Action and Costs to Society**

Despite the President's declaration to cut U.S. green house gas intensity by 18 percent in the next ten years, we have heard in previous testimony from Mr. James Connaughton, head of CEQ, that his proposal will result in steadily increasing GHG emissions.

- Speaking as a scientist, doesn't each decade that we delay in reducing greenhouse gas emissions commit us to enduring greater warming in the future and make it exceedingly difficult to stabilize atmospheric GHG concentrations?
- Doesn't this mean that either mitigation or adaptation will come at a much greater cost to society in the future?

The answer to both questions is "yes", and I elaborated on them in answering the above questions, so will not repeat that here. But let me make one distinction here I did not make above. We must distinguish between policies that cause immediate abatement and policies that invest in the means to make abatement cheaper in the future. While I believe there are opportunities to implement immediate abatement actions at low costs—plugging inefficiencies and reducing air pollution at the same time is already a good economic policy—the bulk of the abatement of CO<sub>2</sub> relative to most business-as-usual projections will be in the decades ahead as new discoveries and learning-by-doing lowers the price of substituting current polluting systems with cleaner less emitting alternatives. But, and here is the point, *such low-carbon-emitting systems will not invent themselves*, will not create a better learning curve if we do not immediately invest in research, development and early deployment to learn how to do it better and cheaper at a massive scale later on. *Doing nothing is the worst policy*, but we should not expect to have a major cut in emissions instantly, as that will take some time and effort to bring about in the most cost-effective manner. But, incentives to foster that investment in discovery and efficiency should have been in place two decades ago—we'd have the fruits of it now had we been more farsighted—but to delay and do little will only increase costs over time and increase risks of large and potentially dangerous climate changes in the decades ahead.

QUESTIONS FOR DR. BUSALACCHI, DR. SCHNEIDER AND DR. WIGLEY FROM  
SENATOR HOLLINGS

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**The Need for Science and Technical Advice in Congress**

From 1972 to 1995, Congress had its own bipartisan, scientific and technical analysis organization called the Office of Technology Assessment (OTA). The office was shut down for economic reasons. The OTA's function was to do analysis for committees and to provide consultations for congressional staff and members, providing a needed level of expertise on complex science and technology issues.

1) If such an advisory office still existed, do you think it would benefit Congressional understanding of climate change science (i.e. is it the nature of the science causing debate or is it the people interpreting the science)?

I was one of those very saddened, Senator Hollings, when the OTA was eliminated, having worked with many of its staff on climate and energy issues over the years. They checked facts, reviewed the literature broadly and produced credible assessments—not always liked by those who preferred spin to balanced assessment. Fortunately, in the climate arena at least, there are many other assessment bodies of high credibility you can turn to, even in the absence of a good in-house body like OTA was. These include the Intergovernmental Panel on Climate Change (IPCC) internationally (but with major US scientific and administrative input), and the US National Research Council, whose many reports say virtually the same things about the science and impacts of climate as the IPCC. That is, both reflect the strong consensus of mainstream climate scientists on the likelihood of human interference in the natural climate and its potential for some problematic outcomes if we do not attempt to slow down this threat--via policies, like the McCain Lieberman bill. Of course, the assessments do not take positions on particular policies, except to evaluate the differential climatic implications of various options.

2) Do you see a need for increased scientific advice at the congressional level?

I think the greatest need is to have a reasonable debate of parties who put the nature of the science above special interests. Unfortunately, the latter have dominated both the media and congressional hearing rooms for 15 years with a cacophonous “end of the world” versus “good for you” debate over climate change, though the vast bulk of the knowledgeable scientific community would rate the two polar extremes as the lowest probability outcomes. My personal wish is you could hear nothing but opinions of those dedicated to honest and balanced assessment of the literature rather than the selective special-interest spin all too prevalent in debates on climate change over the past 15 years. I appreciate your questions, and admit a great personal frustration being constantly forced to respond to non-scientific polemics from those dabbling in climate science with an agenda and spouting seemingly technically competent arguments that would not pass muster at any decent peer reviewed journal. Fortunately, the IPCC and NRC are mega peer reviewed, and are clearly the most credible sources for Congress right now on climate and other related technical issues.

3) Do you think the National Academy of Sciences, universities, and other institutions successfully fill the gap left by the removal of the OTA, with respect to climate change?

Please see remarks above in answer to part 1 of your question. Basically yes, I argued.

4) Do you think the lack of scientific and technical expertise at the congressional level puts us at a disadvantage? How about at the international level?

Yes, Senator Hollings, I worry about this, as a veteran of testimony before congress since 1976. I find many staffers dedicated and honest, but too easily persuaded by less-than-objective but credible-sounding *unsound* scientific arguments of special interest PhDs. This is a very difficult job to do--be highly literate in the subtleties of complex issues like climate change—but if our leaders are to make decisions commensurate with their values—those of the public that elected them—then it is imperative that those in the process of decision making know enough about what the potential consequences and probabilities are of various policies, so they can make the trade-offs between investing present resources as a hedge against potential future risks or not. So a greater number of staff that can be more discerning about who is credible and who is spinning would be helpful. At a minimum, some staff should be fully able to understand technical assessment reports of the National Research Council and IPCC to help members fathom these complex issues. So yes, I think a few more specialists in understanding complex system scientific issues in the Congress would aid the process of putting decision making on a firmer scientific foundation.

As to international disadvantages, I don't see more knowledgeable government scientists or policy analysts in European or Australian institutions than here, but perhaps there is better communication between parliamentarians and the technically competent governmental and academic worlds in Europe than in the US, where so much of the Congressional debate is highly polarized, and frankly, as I said above, not very reflective of the debates the scientist have--the public debate being captured by extreme special interest views in the US to a degree far exceeding what I observe in Europe.