

## Oral Testimony

### **"A Broader View of the Role of Humans in the Climate System is Required In the Assessment of Costs and Benefits Effective Climate Policy"**

**Dr. Roger A. Pielke Sr.  
Senior Research Scientist, University of Colorado, Boulder, CO  
Professor Emeritus, Colorado State University, Fort Collins, CO**

**For the Subcommittee on Energy and Air Quality of the Committee on Energy and Commerce – Honorable Rick Boucher, Chairman**

**June 26, 2008**

The human addition of CO<sub>2</sub> into the atmosphere is a first-order climate forcing. We need an effective policy to limit the atmospheric concentration of this gas. However, humans are significantly altering the climate system in a diverse range of ways in addition to CO<sub>2</sub>. The information that I am presenting will assist in properly placing CO<sub>2</sub> policies into the broader context of climate policy.

Climate is much more than just long-term weather statistics but includes all physical, chemical, and biological components of the atmosphere, oceans, land surface, and glacier-covered areas. In 2005, the National Research Council published a report “Radiative forcing of climate change: Expanding the concept and addressing uncertainties” that documented that a human disturbance of any component of the climate system, necessarily alters other aspects of the climate.

The role of humans within the climate system must, therefore, be one of the following three possibilities

- **The human influence is minimal and natural variations dominate climate variations on all time scales;**
- **While natural variations are important, the human influence is significant and involves a diverse range of first-order climate forcings, including, but not limited to the human input of CO<sub>2</sub>;**
- **The human influence is dominated by the emissions into the atmosphere of greenhouse gases, particularly carbon dioxide.**

My written testimony presents evidence that the correct scientific conclusion is that

**The human influence on climate is significant and involves a diverse range of first-order climate forcings, including, but not limited to the human input of CO<sub>2</sub>.**

Modulating carbon emissions as the sole mechanism to mitigate climate change neglects the diversity of the other, important first-order human climate forcings. As a result, a narrow focus only on carbon dioxide, to predict future climate impacts, will lead to erroneous confidence in the ability to predict future climate, and, thus, costs and benefits will be miscalculated. CO<sub>2</sub>

policies need to be complemented by other policies focused on the other first-order climate forcings.

In addition, the 2005 National Research Council Report concluded that a global average surface temperature trend offers little information on regional climate change. In other words, the concept of “global warming”, by itself, does not accurately communicate the regional responses to the diverse range of human climate forcings. Regional variations in warming and cooling for example, such as from tropospheric aerosols and landscape changes, as concluded in the National Research Council report, have important regional and global impacts on weather.

The human climate forcings that have been ignored, or are insufficiently presented in the IPCC [Intergovernmental Panel on Climate Change] and CCSP [US Climate Change Science Program] reports include

- **The influence of human-caused aerosols on regional (and global) radiative heating**
- **The effect of aerosols on clouds and precipitation**
- **The influence of aerosol deposition (e.g. soot; nitrogen) on climate**
- **The effect of land cover/ land use on climate**
- **The biogeochemical effect of added atmospheric CO<sub>2</sub>**

Thus climate policy that is designed to mitigate the human impact on regional climate by focusing only on the emissions of CO<sub>2</sub> is seriously incomplete unless these other first-order human climate forcings are included, or complementary policies for these other human climate forcings are developed. Moreover, it is important to recognize that climate policy and energy policy, while having overlaps, are distinctly different topics with different mitigation and adaptation options.

A way forward with respect to a more effective climate policy is to focus on the assessment of adaptation and mitigation strategies that reduce vulnerability of important societal and environmental resources to both natural and human caused climate variability and change. For example, restricting development in flood plains or in hurricane storm surge coastal locations is an effective adaptation strategy regardless of how climate changes.

In conclusion, humans are significantly altering the global climate, but in a variety of diverse ways beyond the radiative effect of carbon dioxide. The CCSP assessments have been too conservative in recognizing the importance of these human climate forcings as they alter regional and global climate. These assessments have also not communicated the inability of the models to accurately forecast future regional climate on multi-decadal time scales since these other first-order human climate forcings are excluded. The forecasts, therefore, do not provide skill in quantifying the impact of different mitigation strategies on the actual climate response that would occur as a result of policy intervention with respect to only CO<sub>2</sub>.