EDUCATION, HEALTH, AND ENVIRONMENTAL AFFAIRS COMMITTEE
Maryland State Senate
February 19, 2008

Senate Bill 309

Global Warming Solutions – Reductions in Greenhouse Gases

Testimony by
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Madame Chair and members of the Committee, on behalf of the Scientific and Technical Working Group of the Maryland Commission on Climate Change I am pleased to provide information that provides a basis for the recommendations for greenhouse gas emission reduction goals contained in the Interim Report of the Commission. As Senator Pinsky and Secretary Wilson have indicated these are goals are those included in Senate Bill 309.

The Scientific and Technical Working Group is one of three established under Governor O'Malley's Executive Order that created the Commission. The S&T Group is charged with advising the Commission on scientific and technical aspects of climate change and evaluating the likely consequences of climate change to Maryland's agricultural industry, forestry resources, freshwater supply, aquatic and terrestrial ecosystems and human health. Specifically, it is responsible for preparing a Comprehensive Climate Change Impact Assessment that will be part of the Commission's Action Plan.

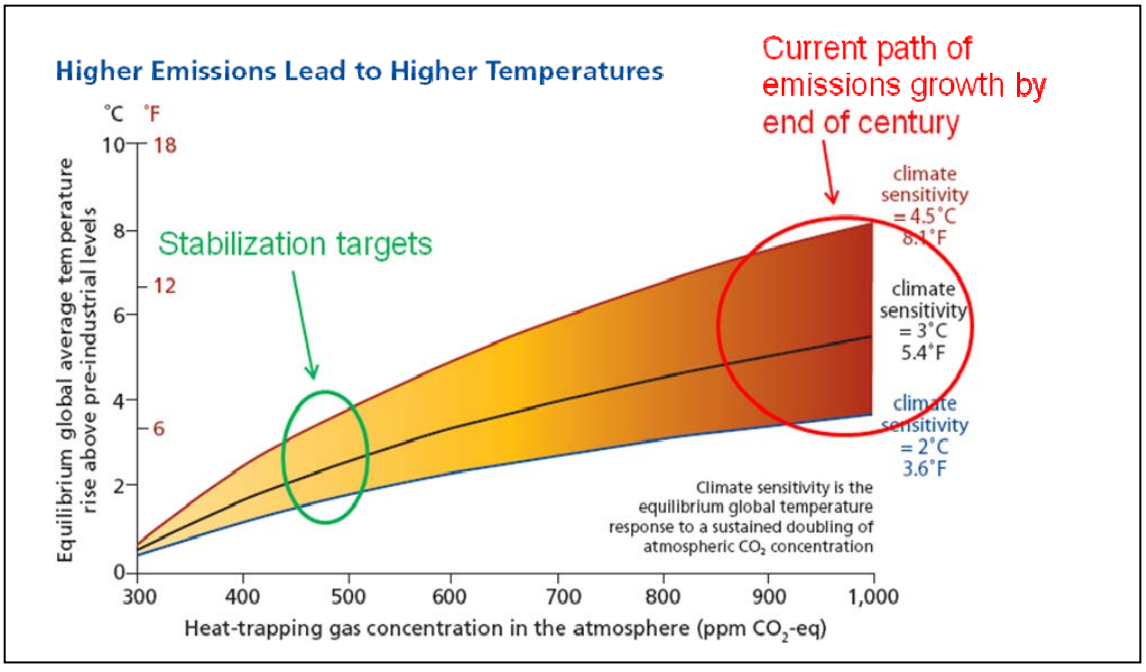
Representing the University System of Maryland, I was appointed as the S&T Group's chair and the Deputy Secretary of the Department of the Environment and the Assistant Secretary for Aquatic Resources of the Department of Natural serve as co-chairs. There are nineteen other scientists and engineers, including many from Maryland's universities, who are working on a voluntary basis to develop the Comprehensive Assessment.

The Commission was charged in the Executive Order with evaluating and recommending goals that include but not be limited to the reduction of Maryland's greenhouse gas emissions to 1990 levels by 2020 and 85% of 2006 levels by 2050 because similar goals had been adopted by other states in lieu of the agreement on national goals. In its evaluation of the appropriate goals for Maryland, the Commission asked the S&T Group to provide an explanation of the scientific basis for such goals. We prepared a briefing on requirements for reducing the global emissions of greenhouse gases based heavily on the recently released Fourth Assessment of the Intergovernmental Panel on Climate Change (the IPCC that was later rewarded for its work with the Nobel Prize). You will hear more about this science from my University of Maryland colleagues, Drs. Busalacchi and Salawitch, but I will briefly try to explain the scientific basis for these goals.

There are essentially three things one needs to know to determine the level of reduction of greenhouse gases that should be achieved on a global basis: (1) the level of heating of the planet one wants to avoid; (2) the relationship of atmospheric greenhouse gas concentrations to heating and other climatic effects; and (3) the relationship of

greenhouse gas emissions to atmospheric concentrations. The first of these is clearly a value judgment, explaining why the IPCC avoided making a specific recommendation on what constitutes a dangerous level of climate change. However, there is a broad consensus, the basis for which is summarized by the IPCC, that an increase in global mean temperature of 2°C (3.6°F) over pre-industrial levels (the current global warming is about 0.6°C) would risk substantial extinctions to unique and threatened ecosystems, increase the frequency and severity of extreme climatic events, create more negative impacts than positive impacts around the globe, have negative economic impacts for the majority of people, and begin to risk large and irreversible transitions such as ice sheet disintegration and 20 feet or more of sea level rise. Some would say that we could tolerate more warming, while others such as NASA's James Hansen argues that even 2°C is too dangerous.

The rest of the determination of required emission reductions is based strictly on scientific information and reasoning. As this graph shows that the various climate models predict that with a greenhouse gas concentration of about 450 parts per million (all greenhouse gases expressed in CO_2 equivalents) there is an average chance for maintaining global average temperature at 2°C. Beyond that it becomes increasingly unlikely that this temperature will not be exceeded. If emissions continue to grow at present rates, then we can expect in excess of a 4°C increase by the end of the century. Additional models run by the IPCC show that in order to stabilize the atmospheric concentrations in the range of 445-490 ppm reductions in emissions of 50 to 85% below 2000 levels on a global basis will be required by 2050. Because the U.S. is the largest emitter of greenhouse gases on a per capita basis, the U.S. share of that goal would have to be on the upper end of that range.



In order to achieve this level of reduction we must begin to slow the rate of growth of emission and then begin to reduce this rate almost immediately. Also, the graphs shows that, because the rate of warming levels off as greenhouse gas concentrations increase, early actions have a much greater effect than waiting to take the same actions later. This explains why the Commission's recommendations stress reducing Maryland's

emissions back to at least 1990 levels, i.e. by 25% or more, by 2020. This can be done by conservation and existing technologies. The additional reductions that are needed between 2020 and 2050 will require extensive new technologies and national policy and commitment to achieve.

The Scientific and Technical Working Group has been spending most of its effort in developing the Comprehensive Climate Impacts Assessment for Maryland. We are examining recent trends in climate related variables. And we are projecting future climatic conditions under a continued high emission scenario and a reduced emission scenario using the same computer models used in the IPCC assessment. We are interpreting the results for Maryland by mining the massive archives of output from these models and focusing on those models that do the best job replicating our 20th century climate. While this is still very much a work in progress, I will offer just a few preliminary results.

There is significant evidence that our climate has been warming over the past 50 years, both in the air and in the Chesapeake Bay, where annual average temperatures have increased by about 2°F. Relative sea level in the Bay increased about 1 foot during the 20th century (about half of that due to land sinking and half due to the level of the ocean rising). Satellites have revealed that ocean levels began to rise more rapidly during the 1990s and we project that relative sea level will rise this century in the Bay by at least 2 feet by the end of the century. Under the high emissions scenario the sea level rise could be closer to 4 feet, depending on how fast the Greenland ice sheet melts. Interestingly, summer air temperature is expected to increase more than temperature in other seasons. If emissions are not curtailed we could be in store for an 8°F increase in our summer temperatures. Ninety degree plus temperatures will be the norm and one hundred degree days will be as common as ninety degree days now are. Although precipitation is projected to increase, this will mostly come during the winter and spring. Summers will likely be characterized by longer periods without rain, which when coupled with more evaporation due the warmer temperatures, will reduce soil moisture and pose a serious problem for agriculture. Again, this is just a glimpse, but it illustrates that climate change will affect not only polar bears and coral reefs but our environments, our resources, our health and quality of life right here in Maryland in unacceptable ways.

Finally, I would like to point out that the University System of Maryland is taking action to address global warming through its new Environmental Sustainability Initiative that Chancellor Brit Kirwan has asked me to lead. The presidents of our 13 institutions have signed or will shortly sign the American College and University Presidents Climate Commitment to inventory and significantly reduce greenhouse gas emissions toward carbon neutrality. Through the Maryland Student Climate Coalition, 11,000 Maryland college students have signed a petition urging our universities and state to take aggressive action to find solutions to global warming. Mindful that we are just borrowing the planet from them and future generations, the University System of Maryland is committed to doing its part.