STATEMENT TO THE HOUSE COMMITTEE ON SCIENCE AND TECHNOLOGY OF THE UNITED STATES HOUSE OF REPRESENTATIVES

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Introduction

I thank the Chairman and the Committee for the opportunity to offer testimony this morning on "The State of Climate Change Science 2007: The Findings of the Fourth Assessment Report by the Intergovernmental Panel on Climate Change (IPCC), Working Group III: Mitigation of Climate Change." I am a Professor of Environmental Studies at the University of Colorado and also director of the university's Center for Science and Technology Policy Research.[1] My research focuses on the connections of science and decision making. I also have been studying climate change science and policy for about 15 years. A short biography can be found at the end of my written testimony, including links to my publications. I am the author of a recently released book, **The Honest Broker: Making Sense of Science in Policy and Politics** (Cambridge University Press, 2007).

On a personal note it is a pleasure to appear before the Science and Technology Committee. In 1991 I had the opportunity to serve as an intern for the Committee under Chairman George Brown (D-CA) (and his staff director, Radford Byerly) and the experience greatly shaped my thinking and has influenced my career ever since.

Three Assertions

My testimony today is based entirely on the information provided in the Summaries for Policymakers (SPMs) of Working Groups (WGs) II and III of the Intergovernmental Panel on Climate Change (IPCC). My testimony today begins with three assertions:

- Current debate over climate change represents a great opportunity to discuss what kind of future will result from our current decisions. This opportunity is often

[1] At the University of Colorado I am affiliated with CIRES, the Cooperative Institute for Research in Environmental Sciences, a joint institute of the University of Colorado and the National Oceanic and Atmospheric Administration (NOAA). The Center that I direct at CIRES has received research funding from a number of other federal research agencies, including NSF and NASA. I thank a number of colleagues who offered perspectives on early versions of this testimony. The views presented here are my own.

missed because of a focus on the negative aspects of climate change or because debate degenerates into unhelpful partisan or ideological attacks.

- The IPCC WG III indicates that the benefits of mitigation outweigh its costs, and based on this conclusion, mitigation should be a policy priority. Of course, the exact details of mitigation policies, and in particular the time symmetry between costs and benefits, are not trivial.[2]
- The IPCC WG II is concerned with one of many pressing challenges to global well-being, and emphasizes greenhouse gas mitigation is only one of many avenues for confronting those challenges.[3] However, this important message often goes unappreciated in policy debates. We need to make certain that the focus on the issue of greenhouse gas emissions does not crowd out other important challenges.

What is the Problem?

The problem is that we can successfully meet the challenge of greenhouse gas mitigation but still fail in the broader effort to promote a sustainable future for our globalizing society. In a commentary in *Nature*, Gwyn Prins, Steve Rayner, Dan Sarewitz and I argued that mitigation alone cannot solve many of the world's most pressing environmental problems, including many that are related to climate[4]:

> For example, in the Philippines, policymakers have begun to acknowledge the flood threats posed by the gradual sea-level rise of 1 to 3 millimetres per year, projected to occur with climate change. At the same time, they remain oblivious to, or ignore, the main reason for increasing flood risk: excessive groundwater extraction, which is lowering the land surface by several centimetres to more than a decimetre per year.
>
> Similarly, non-climate factors are by far the most important drivers of increased risk to tropical disease. For instance, one study found that without taking into account climate change, the global population at risk from malaria would increase by 100% by 2080, whereas the effect of climate change would increase the risk of malaria by at most 7%. Yet tropical disease risk is repeatedly invoked by climate-mitigation advocates as a key reason to curb emissions. In a world where political attention is limited, such distortions reinforce the current neglect of adaptation.

In another example, the threat of hurricane damages is often invoked in the climate debate as a justification for action on energy policies (e.g., see Figure 1 below), creating an expectation that future damages can somehow be effectively modulated according to

[2] I discuss this challenge in this testimony: Pielke, Jr., R.A., 2006. Statement to the Committee on Government Reform of the United States House of Representatives, Hearing on Climate Change: Understanding the Degree of the Problem, 20 July. http://sciencepolicy.colorado.edu/admin/publication_files/resource-2466-2006.09.pdf

[3] On this point see especially Chapter 20 of the forthcoming full AR4 WG II report.

[4] Pielke, Jr., R.A., Prins, G., Rayner, S. and Sarewitz, D., 2007. Lifting the taboo on adaptation. *Nature*, **445**, 597-598. http://sciencepolicy.colorado.edu/admin/publication_files/resource-2506-2007.11.pdf See this paper for citations to the literature.

atmospheric greenhouse gas concentrations. This is simply wrong. In a forthcoming paper I conclude[5]:

> .. . . under a wide range of assumptions about future growth in wealth and population, and about the effects of human-caused climate change, in every case there is far greater potential to affect future losses by focusing attention on the societal conditions that generate vulnerability to losses. Efforts to modulate tropical cyclone intensities through climate stabilization policies have extremely limited potential to reduce future losses. This conclusion is robust across assumptions, even unrealistic assumptions about the timing and magnitude of emissions reductions policies on tropical cyclone behavior. The importance of the societal factors increases with the time horizon.
>
> This does not mean that climate stabilization policies do not make sense or that policy makers should ignore influences of human-caused climate change on tropical cyclone behavior. It does mean that efforts to justify emissions reductions based on future tropical cyclone damages are misleading at best, given that available alternatives have far greater potential to achieve reductions in damage. The most effective policies in the face of tropical cyclones have been and will continue to be adaptive in nature, and thus should play a prominent role in any comprehensive approach to climate policy.

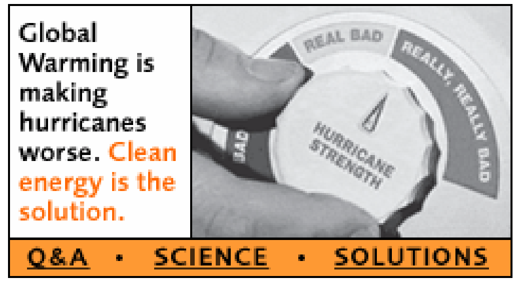

Figure 1. Promotional ad linking linking energy policy and hurricanes

The lesson from these three examples is that effective progress on coping with sea level rise, tropical diseases, and disaster impacts requires a broad focus on sustainable development. I wish to emphasize that nothing in this testimony—or in any of my work on climate change over the past decade or more—should be interpreted as being opposed to or somehow contrary to the mitigation of greenhouse gases. The main point is that a focus of control of carbon dioxide cannot substitute for a broader discussion of policies that will enable the most desirable futures. And this is indeed one of the main messages of the IPCC, which is discussed in its Working Group II report, but which seems to be overlooked in the broader debate on climate change. Today I want to make sure that this message is clear.

Which Path to the Future?

The IPCC bases its work on four families of scenarios for future which are named A1, A2, B1, and B2.[6] The scenarios provide a basis for projecting how greenhouse gas

[5] Pielke, Jr., R. A., 2007 (accepted). Future Economic Damage from Tropical Cyclones: Sensitivities to Societal and Climate Changes, *Proceedings of the Philosophical Transactions of the Royal Society*. http://sciencepolicy.colorado.edu/admin/publication_files/resource-2517-2007.14.pdf

emissions might grow into the future as input to climate models which use the projected future emissions as a key input. Figure 2 (below) illustrates the four scenarios as presented by the IPCC with respect to two dimensions.

But the scenarios are much more than projections of emissions. The IPCC describes them as follows:

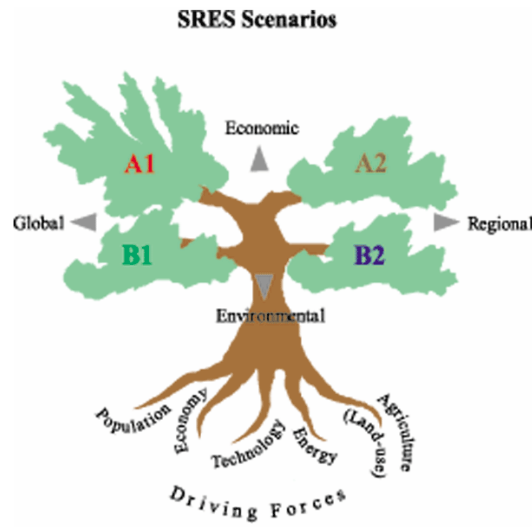

Figure 2. IPCC Scenarios.
http://www.grida.no/climate/ipcc/emission/1-4.htm

> Scenarios are images of the future, or alternative futures. They are neither predictions nor forecasts. Rather, each scenario is one alternative image of how the future might unfold. A set of scenarios assists in the understanding of possible future developments of complex systems. Some systems, those that are well understood and for which complete information is available, can be modeled with some certainty, as is frequently the case in the physical sciences, and their future states predicted. However, many physical and social systems are poorly understood, and information on the relevant variables is so incomplete that they can be appreciated only through intuition and are best communicated by images and stories. Prediction is not possible in such cases.[7]

The IPCC scenarios are thus alternative visions about how the future might evolve. The IPCC makes no claim about the relative probability of each scenario actually occurring.

> The SRES scenarios are descriptive and should not be construed as desirable or undesirable in their own right. They are built as descriptions of possible, rather than preferred, developments. They represent pertinent, plausible, alternative futures. . . Good scenarios are challenging and court controversy, since not everybody is comfortable with every scenario, but used intelligently they allow policies and strategies to be designed in a more robust way.[8]

In reality, of course, how the future evolves is a result of decisions that we make. In other words, by making decisions we make some futures more likely and others less likely.

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[6] http://www.grida.no/climate/ipcc/emission
[7] http://www.grida.no/climate/ipcc/emission/025.htm
[8] http://www.grida.no/climate/ipcc/emission/025.htm

Both IPCC WGs II and III included a short description of the four families of scenarios. The text box on the following page reproduces the summary descriptions of the scenarios from WG III.

The scenarios are important because they allow for a sensitivity analysis of the importance of decisions that lead to one scenario being realized versus another. The collection of decisions that lead to the realization of a particular scenario is a "development pathway." Another way to think about this concept is as a broad conception of what is traditionally called "adaptation."

Development Pathways Matter a Great Deal for Societal Outcomes

There are multiple measures that can be used to measure the relative worth of a particular societal outcome. The SPMs of IPCC WGs II and III emphasize wealth as measured by global Gross Domestic Product (GDP). So that is the measure used here. The IPCC justifies its use of this metric in one its chapters in its SRES report on as follows:

> Income is not an end in itself, but a way to enable human choices, or to foreclose them in the case of poverty. Therefore, levels of per capita income (GDP or GNP) have been widely used as a measure of the degree of economic development, as in many instances such levels correlate closely (as lead or lag indicator) with other indicators and dimensions of social development, such as mortality, nutrition, and access to basic services, etc. Average income values also do not indicate the distribution of income, which is an important quantity. Composite measures, such as the UN Human Development Index, are also used in historical analyses (see Box 3-1). Note, however, that the overall nature of scenario results may not vary much even if some other measure could be used, because often-used components, such as literacy rates, are generally correlated with income levels.
>
> In fact, per capita income is the (and often only) development indicator used in the literature for long-term energy and GHG emissions scenarios. This explains why this review chapter, while recognizing the importance of alternative dimensions and indicators to describe long-term human development, almost exclusively embraces an economic perspective.[9]

Even though the IPCC has chosen to focus on GDP as a primary indicator of relevant societal outcomes, WG II in particular recognizes that decisions are made for a wide range of reasons, wealth being only one of them. Also, the analysis presented below relies on quantitative estimates of the costs of climate change damage and climate mitigation. The IPCC states that both types of estimates are clouded by considerable uncertainties and thus although the analysis presented below relies on specific, quantitative assumptions and conclusions of the IPCC, it should be understood in terms of its qualitative implications.

The SRES scenarios describe very different worlds:

[9] http://www.grida.no/climate/ipcc/emission/057.htm

IPCC Working Group III SPM, text Box SPM.1: *The emission scenarios of the IPCC Special Report on Emission Scenarios (SRES)*

A1. The A1 storyline and scenario family describes a future world of very rapid economic growth, global population that peaks in mid-century and declines thereafter, and the rapid introduction of new and more efficient technologies. Major underlying themes are convergence among regions, capacity building and increased cultural and social interactions, with a substantial reduction in regional differences in per capita income. The A1 scenario family develops into three groups that describe alternative directions of technological change in the energy system. The three A1 groups are distinguished by their technological emphasis: fossil intensive (A1FI), non fossil energy sources (A1T), or a balance across all sources (A1B) (where balanced is defined as not relying too heavily on one particular energy source, on the assumption that similar improvement rates apply to all energy supply and end use technologies).

A2. The A2 storyline and scenario family describes a very heterogeneous world. The underlying theme is self reliance and preservation of local identities. Fertility patterns across regions converge very slowly, which results in continuously increasing population. Economic development is primarily regionally oriented and per capita economic growth and technological change more fragmented and slower than other storylines.

B1. The B1 storyline and scenario family describes a convergent world with the same global population, that peaks in mid-century and declines thereafter, as in the A1 storyline, but with rapid change in economic structures toward a service and information economy, with reductions in material intensity and the introduction of clean and resource efficient technologies. The emphasis is on global solutions to economic, social and environmental sustainability, including improved equity, but without additional climate initiatives.

B2. The B2 storyline and scenario family describes a world in which the emphasis is on local solutions to economic, social and environmental sustainability. It is a world with continuously increasing global population, at a rate lower than A2, intermediate levels of economic development, and less rapid and more diverse technological change than in the B1 and A1 storylines. While the scenario is also oriented towards environmental protection and social equity, it focuses on local and regional levels.

An illustrative scenario was chosen for each of the six scenario groups A1B, A1FI, A1T, A2, B1 and B2. All should be considered equally sound.

The SRES scenarios do not include additional climate initiatives, which means that no scenarios are included that explicitly assume implementation of the United Nations Framework Convention on Climate Change or the emissions targets of the Kyoto Protocol.

> All four storylines and scenario families describe future worlds that are generally more affluent compared to the current situation. They range from very rapid economic growth and technologic change to high levels of environmental protection, from low-to-high global populations, and from high-to-low GHG emissions. Perhaps more importantly, all the storylines describe dynamic changes and transitions in generally different directions. The storylines do not include specific climate-change policies, but they do include numerous other socio-economic developments and non-climate environmental policies. As time progresses, the storylines diverge from each other in many of their characteristic features.[10]

[10] http://www.grida.no/climate/ipcc/emission/090.htm

In terms of specific economic numbers, the SRES report begins with 1990 global GDP estimated at $20 trillion (T) in 1990 dollars. It then projects future world GDP based on different estimates of future population and per capita growth rates. The SRES growth assumptions[11] (in parentheses below) result in the following baseline global GDP values for 2050:

A1 = (3.6%) $167.0T
A2 = (2.3%) $78.3T
B1 = (3.1%) $124.9T
B2 = (2.8%) $104.9T

These estimates do not include the costs of damage associated with unmitigated climate change. IPCC WG II provides an estimate of future damages for a temperature rise of 4 degrees Celsius: "global mean losses could be 1-5% GDP for 4°C of warming."[12] IPCC Working Group I indicates that 4°C of warming is highly unlikely to occur by 2050 under any of the scenarios (Figure 3 below).[13] So an assumption of 5% reduction in GDP in 2050, the top of the WG II range, very likely overstates the amount of damage projected by the IPCC for 2050.

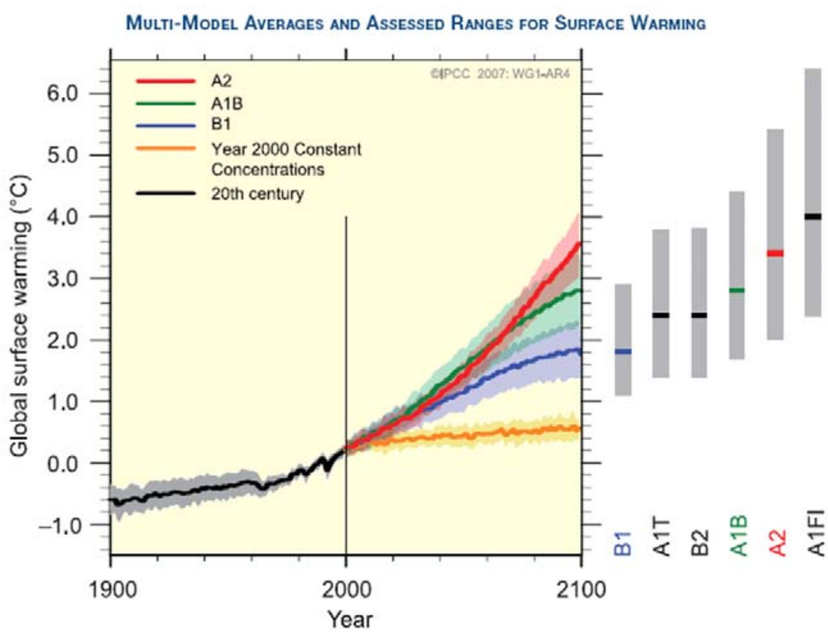

Figure 3. IPCC WG I SPM.5 appears with the following caption: "Solid lines are multi-model global averages of surface warming (relative to 1980–1999) for the scenarios A2, A1B and B1, shown as continuations of the 20th century simulations. Shading denotes the ±1 standard deviation range of individual model annual averages. The orange line is for the experiment where concentrations were held constant at year 2000 values. The grey bars at right indicate the best estimate (solid line within each bar) and the **likely** range assessed for the six SRES marker scenarios. The assessment of the best estimate and **likely** ranges in the grey bars includes the AOGCMs in the left part of the figure, as well as results from a hierarchy of independent models and observational constraints."

[11] http://www.grida.no/climate/ipcc/emission/100.htm
[12] http://www.ipcc.ch/SPM13apr07.pdf at p. 16.
[13] http://www.ipcc.ch/WG1_SPM_17Apr07.pdf, at p. 14

Reducing the baseline global GDP by 5% results in the following totals:

A1 = $158.6T
A2 = $74.4T
B1 = $118.7T
B2 = $99.6T

If we assume that all of the 5% in damage costs can be avoid through aggressive mitigation then net 2050 global GDP would be the following totals[14]:

A1 = $159.9T
A2 = $75.0T
B1 = $119.6T
B2 = $100.4T

These figures allow for a comparison of the sensitivity of future global GDP to mitigation policies alone versus a more comprehensive focus on differences between different development paths. Figures 4 and 5 (next page) below shows this comparison.

The first column of Figure 4 (next page) shows (in grey) the $20T used by the IPCC for 1990. The second column shows (in green) 2050 global GDP ($74.4T) under the IPCC growth and damage assumptions for the A2 scenario which has the lowest total GDP of the four scenario families. On top of this bar is a smaller (red) bar showing the additional benefit ($0.6T = $75.0T- $74.6T)) to global GDP for aggressive mitigation that avoids damage. On the right hand side of the figure is a third column that indicates 2050 global GDP ($84.2T = $158.6T - $74.4T) under the IPCC growth and damage assumptions for the A1 scenario which has the highest total GDP of the four scenario families. Similarly, on top of this bar is a smaller (red) bar showing the additional benefit ($1.3T = $159.9 - $158.6) to global GDP for aggressive mitigation that avoids damage.[15]

Figure 5 (next page) shows the relative sensitivity of future global GDP to aggressive mitigation policies and development pathway. The inset figure (yellow box) on the lower right shows that aggressive mitigation provides a benefit to global GDP of $0.6 or $1.3T (depending on scenario) and choice of development pathway provides a benefit of up to $84.4T (i.e., the difference between the GDP in scenario A1 and scenario A2, = $158.6 - $74.4T). **It must be underscored that this analysis reflects assumptions explicit in the IPCC assessments.**

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[14] The costs of aggressive mitigation (i.e., stabilization at 445-590) are estimated by IPCC WG III to be at most 3% of GDP in 2030 and 5.5% of GDP in 2050 according to WG III SPM tables SPM.4 and SPM.6. Because these values are at the top of the IPCC range, and the IPCC does not provide a midrange value, I arbitrarily cut them in half to 1.5% and 2.75% in the analysis presented here.

[15] Instead assuming that damage will reduce GDP by 5% annually then the benefit to aggressive mitigation would be $16.5T under A1 and $5.1T under A2. At 2.5% the values are $8.5T and $1.6T respectively.

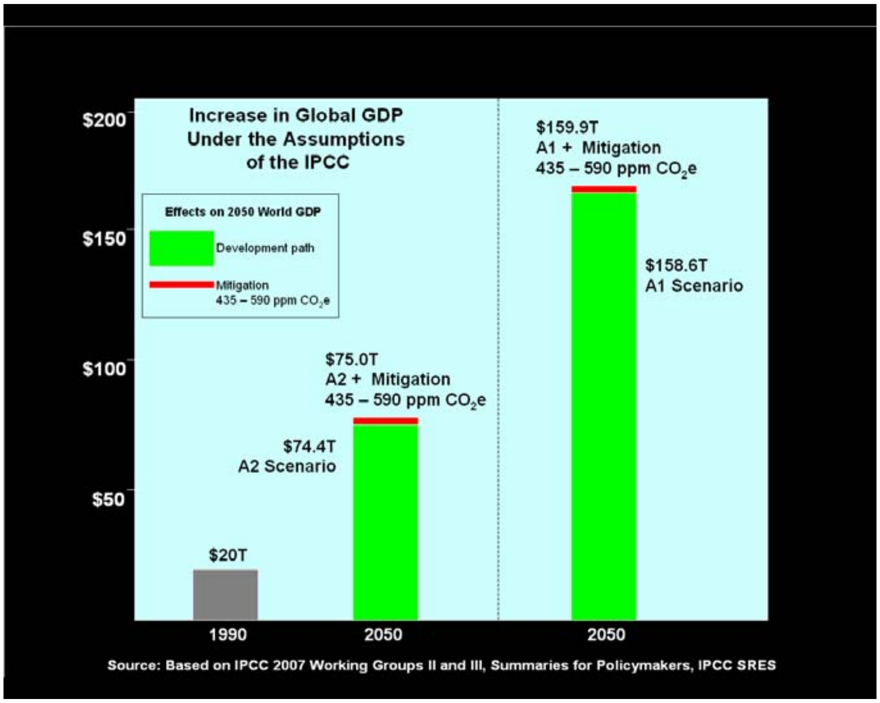

Figure 4. Increase in global GDP to 2050 for IPCC SRES scenarios A2 and A1 including damage costs of 5%. Also shown are the benefits of aggressive mitigation for each scenario

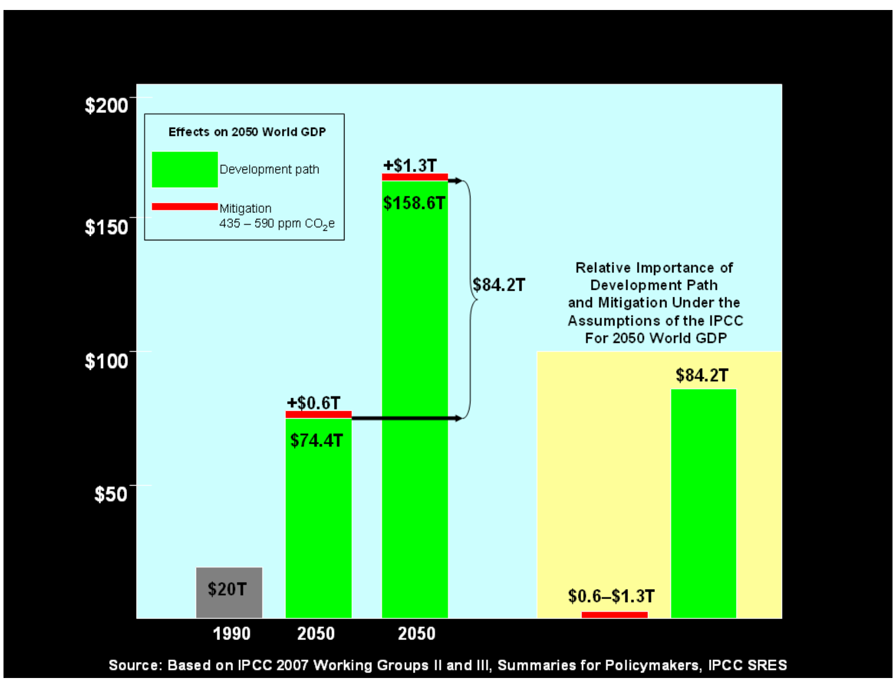

Figure 5. Relative sensitivity of global GDP in 2050 to aggressive mitigation and development path.

Because the IPCC estimates of damage related to anthropogenic climate change and mitigation costs are highly uncertain, it is worth examining a wide range of assumptions in this analysis. Such an examination leads to qualitatively similar results across assumptions about damage and mitigation. For instance, if one instead uses global per capita GDP rather than total GDP (as shown in Table 1 below[16]) the largest difference between development paths (i.e., between A1 and A2 = $11,388) is about *76 times* larger than the largest benefit associated with aggressive mitigation (A1 = $150).

Table 1. Per capita GDP for IPCC SRES scenarios under the assumptions of 5% total damage in 2050 under BAU and 1.5% (in 2030) and 2.75% (in 2050) cost of aggressive mitigation to prevent damage (as above).

SRES Scenario	2050 per capita GDP BAU (with damage of 5% of total)	2050 GDP Aggressive Mitigation (445-570 ppm CO_2e)
A1	$18,024	$18,174
A2	$6,636	$6,639
B1	$13,483	$13,595
B2	$9,962	$10,045

These result hold qualitatively if one uses the assumptions of the Stern Review report[17] on climate change which included much larger estimated damage associated with unmitigated emissions (of a 5%-20%reduction in *annual* global GDP starting immediately) with aggressive stabilization policies of costing 3% annually, as summarized in Tables 2 and 3.

Table 2. World per capita GDP for IPCC SRES scenarios under the assumptions of Stern Review of 20% damage per year under BAU and 3% annual cost of mitigation to prevent damage.

SRES Scenario	2050 per capita GDP BAU (with damage of 5% of GDP annually)[18]	2050 GDP Aggressive Mitigation (3% of GDP annually)
A1	$17,880	$18,470
A2	$6,900	$6,990
B1	$13,530	$13,900
B2	$10, 230	$10,450

[16] The IPCC SRES discussion of global population growth can be found at http://www.grida.no/climate/ipcc/emission/051.htm

[17] The Stern Review Report on the Economics of Climate Change, http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_report.cfm

[18] In Tables 2 and 3 the calculations use the IPCC assumptions of 1990 world per capita GDP of $3,700 and growth rates to 2050, see: http://www.grida.no/climate/ipcc/emission/100.htm

Table 3. World per capita GDP for SRES scenarios under assumptions of Stern Review of 20% damage per year and 3% annual cost of mitigation.

SRES Scenario	2050 per capita GDP BAU (with damage of 20% of GDP annually)	2050 GDP Aggressive Mitigation (3% of GDP annually)
A1	$13,980	$18,470
A2	$6,260	$6,990
B1	$11,050	$13,900
B2	$8,720	$10,450

For 5% annual damage the largest difference between development paths (i.e., between A1 and A2 = $10,980) is about 19 times larger than the largest benefit associated with aggressive mitigation (for A1 = $590). For 20% annual damage the largest difference between development paths (i.e., between A1 and A2 = $7,720) is about 1.7 times larger than the largest benefit associated with aggressive mitigation (for A1 = $4,490).

What does this analysis mean?

The conclusions to take from this analysis are as follows:

1. **Mitigation provides benefits under all scenarios discussed here, and almost all scenarios presented by the IPCC. According to the IPCC these benefits increase as the time horizon extends further into the future.**

2. **In all scenarios discussed here, under the assumptions, conclusions, and metrics of value used by the IPCC, the importance of the development path far exceeds the importance of mitigation. Consequently, a focus on sustainable development should be central to any discussion of climate policies. This point is in fact reflected especially by IPCC WG II, but often it is overlooked in broader discussions of climate change policy.**

3. **Adaptation provides the link between sustainable development and climate change, by ensuring that the capacity of societies to develop is not compromised by the impacts of climate on their socioeconomic prospects.**

To reiterate, nothing in this testimony should be interpreted as being opposed to or contrary to the mitigation of greenhouse gases. To the contrary, under all scenarios discussed here the benefits of mitigation exceed its costs. Mitigation is good policy, and many decision makers are now coming to understand that it is good politics, as well.

However, policy discussions about what sort of future we collectively wish to see unfold are myopic if focused only on greenhouse gas emissions. It would be the equivalent of a family discussion of their future focused only on their utility bill, ignoring their healthcare, education, housing, and everything else that matters (or simply how their utility bill is related to their health, education, housing, and everything else that matters).

It is true of course that a family that does not focus on its utility bill may find themselves in deep trouble. So a focus on the utility bill is indeed important, but that cannot be the entire focus. With respect to the current political debate about the world's future focused on energy polices, the analysis presented in this testimony based on the assumptions of IPCC indicates that our focus needs to be much broader -- on the path of development itself. A discussion of greenhouse gas mitigation cannot substitute for that broader discussion, but should be a part of it.

The IPCC WG II SPM recognizes the importance of a discussion of development pathways explicitly:

> . . . the projected impacts of climate change can vary greatly due to the development pathway assumed. For example, there may be large differences in regional population, income and technological development under alternative scenarios, which are often a strong determinant of the level of vulnerability to climate change.
>
> To illustrate, in a number of recent studies of global impacts of climate change on food supply, risk of coastal flooding and water scarcity, the projected number of people affected is considerably greater under the A2-type scenario of development (characterised by relatively low per capita income and large population growth) than under other SRES futures. This difference is largely explained, not by differences in changes of climate, but by differences in vulnerability.[19]

And so too does WG III SPM:

> Making development more sustainable by changing development paths can make a major contribution to climate change mitigation, but implementation may require resources to overcome multiple barriers. . .
>
> Changes in development paths emerge from the interactions of public and private decision processes involving government, business and civil society, many of which are not traditionally considered as climate policy. This process is most effective when actors participate equitably and decentralized decision making processes are coordinated. . .
>
> Making development more sustainable can enhance both mitigative and adaptive capacity, and reduce emissions and vulnerability to climate change.[20]

Until our discussions of climate change are broadened to include a more comprehensive focus on development pathways, it is unlikely that we will make wise decisions about the future, including those about the emissions of greenhouse gases. Put somewhat

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[19] http://www.ipcc.ch/SPM13apr07.pdf, p. 18
[20] http://www.ipcc.ch/SPM040507.pdf, p. 33-34

differently, poor decisions about development can ruin the benefits of wise decisions about mitigation.

Recommendations

The most immediate way that the U.S. Congress can influence sustainable development as related to climate change would be to focus as intensively on the issue of adaptation as it has on mitigation. Adaptation allows societies to maintain their vitality in the face of climate variability and change, and also the pressures caused by development itself. Effective policies with respect to sea level rise, tropical diseases, and the impacts of natural disasters would complement progress on mitigation and provide benefits in the near term, since these issues are already of considerable importance.

The Science Committee in particular can contribute to this agenda by ensuring that that the nation's climate research portfolio is organized in such a way so as to reflect the information needs of decision makers facing choices about adaptation. For example, legislation proposed by Congressman Mark Udall (D-CO) is notable for its efforts to more closely connect climate research with the needs of decision makers.[21]

In closing, the IPCC has great potential to serve as a unique resource for decision makers. In my opinion, it will best reach its full potential not by replicating the important work of advocacy groups that seek to reduce the scope of choice available to decision makers. Instead, the IPCC should serve to empower decision makers by expanding their view and their options in order to clearly distinguish the role of advisor from advocate, and advisor from decision maker.[22]

[21] See, http://democrats.science.house.gov/Media/File/Commdocs/hearings/2007/energy/03may/hearing_charter.pdf

[22] Pielke, Jr., R. A. 2007. **The Honest Broker: Making Sense of Science in Policy and Politics** (Cambridge University Press).

Short Biography

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Roger A. Pielke, Jr. has been on the faculty of the University of Colorado since 2001 and is a Professor in the Environmental Studies Program and a Fellow of the Cooperative Institute for Research in Environmental Sciences (CIRES). At CIRES, Roger serves as the Director of the Center for Science and Technology Policy Research. Roger's current areas of interest include understanding disasters and climate change, the politicization of science, decision making under uncertainty, and policy education for scientists. In 2006 Roger received the Eduard Brückner Prize in Munich, Germany for outstanding achievement in interdisciplinary climate research. Before joining the University of Colorado, from 1993-2001 Roger was a Scientist at the National Center for Atmospheric Research. Roger serves on various editorial boards and advisory committees, and is the author of numerous articles and essays. He is also author, co-author or co-editor of five books. Roger has degrees in mathematics, public policy, and political science, all from the University of Colorado. His most recent book is titled: **The Honest Broker: Making Sense of Science in Policy and Politics** published by Cambridge University Press.

For more information see:
http://sciencepolicy.colorado.edu/about_us/meet_us/roger_pielke/