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***International Panel's Findings Seared by Peer Review***

**Scientists Set Off Wrong Alarm Bells  
With Global Warming Conclusions**

- The United Nations' Intergovernmental Panel on Climate Change (IPCC) recently has been criticized by several prominent economists and economic statisticians for its technical errors and its use of faulty economic assumptions in making global warming predictions.
- In 2001, the IPCC predicted that the global average temperature could rise by 1.4 to 5.8 degrees Celsius (2.52 to 10.4 degrees Fahrenheit) by the year 2100. The IPCC's critics show in various studies that even the low-end prediction is implausibly high because the IPCC vastly overestimated future greenhouse gas emissions.
- Other scholars have come forward to challenge the IPCC's work. One critic accuses the IPCC of "manifest ignorance" of the relevant issues. A second group of critics argues that the IPCC's work is neither transparent nor reproducible, rendering it of limited value to policymakers. They also agree that the IPCC has greatly overestimated future greenhouse gas emissions and future temperature change.
- What explains such technical sloppiness and use of dubious assumptions? The reason: the IPCC is directed in its governing document to support the international negotiating process to reduce greenhouse gases – a political, rather than scientific, agenda. This predisposes the IPCC to come to overly dire conclusions.
- Peer review cautions policymakers to approach the IPCC's conclusion with skepticism rather than rushing to implement restrictions on energy use.

## Introduction

The United Nations' Intergovernmental Panel on Climate Change (IPCC) has long been touted as the final authority on "global warming," yet peer review of its work suggests policymakers should exercise a healthy dose of skepticism before rushing to act on the panel's conclusions.

The IPCC's *Third Assessment Report*, released in 2001, garnered much media attention and dozens of alarming headlines with its dire predictions of even more global warming over the next century than had been predicted in its previous two assessment reports.<sup>1</sup> Despite the media hype at the time, the global warming predictions of the IPCC since have been criticized by noted scientific peers. Specifically, several economists and economic statisticians recently have taken issue with the report, arguing that its predictions are based on serious technical errors and faulty assumptions about future greenhouse gas emissions, thereby leading to unrealistically high estimates of future global temperatures.

The science of the earth's changing climate and the human actions that may affect it are important policy issues; yet policymakers need to put very-long-term forecasts of future greenhouse gas emissions and temperature changes in proper perspective. Such exercises are fraught with uncertainties and errors, even when best professional practices are employed. And when such practices are not employed – as seems to be the case with the IPCC report – the results easily may be manipulated to serve political ends. Thus, there may indeed be cause for alarm – not necessarily with the scientific data itself, but with its misuse.

## The Problem With Predicting Future Global Temperature

In 2001, the IPCC made a startling prediction: It warned that over the next 100 years, the average global temperature would increase between 1.4 degrees and 5.8 degrees Celsius (2.5 to 10.4 degrees Fahrenheit) due to rising emissions of greenhouse gases (principally carbon dioxide). As with any scientific claim, experts have been attempting to evaluate the validity of the Panel's conclusions through a process known as peer review, which is an essential component to the profession of science. Peer review occurs in two stages, the first of which is a formal preliminary review done before publication. The second, and more important, stage occurs after publication when scientists try to replicate the work and subject its underlying assumptions to extensive testing and review. This second-stage review is informal, but ultimately establishes or rejects the validity of any scientific work. This second stage is currently underway for the IPCC's *Third Assessment Report*.

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<sup>1</sup>See, for example, *Washington Post*, "Scientists Issue Dire Prediction on Warming: Faster Climate Shift Portends Global Calamity This Century," January 23, 2001.

### **Challenges With Climate Models**

The IPCC's prediction was derived from computer models that attempt to simulate the climate's response to increases in greenhouse gases. The quality of the prediction depends on how well the models mimic the earth's climatic processes and on economic assumptions about future greenhouse gas emissions. In both cases, the models appear to fall short.

Climate models, for example, do not adequately represent many of the essential characteristics of the atmosphere and how greenhouse gas emissions might affect temperature. Indeed, computer models greatly simplify many of the tremendously complex and poorly understood climate processes that can bias the results. These are weaknesses that most scientists readily admit.<sup>2</sup>

While computer models clearly present challenges to achieving reliable results, this paper will not focus on them. Instead, it focuses on criticisms regarding the economic assumptions that underlie the IPCC's climate predictions.

### **Challenges With Economic Assumptions**

To determine how mankind's emissions of greenhouse gases might affect the climate over the next century, the IPCC had to predict 100 years' worth of greenhouse gas emissions, which depend on a medley of variables, including future population growth, technological change, economic growth in both less developed and developed countries, and changes in the types of energy that would be used.

Making such a prediction is an extraordinarily difficult task. Nobody knows what the world will look like in 100 or even 50 years. For example, 100 years ago the Ford Motor Company had just been formed, and Wilbur and Orville Wright had just completed their first successful flight. The computer would not be invented for another 40 years. Nobody could have predicted today's proliferation of computers, the millions of high-speed automobiles, or the thousands of daily commercial flights. As one scientist put it, "We don't have a clue how people are going to react 30 years from now. The scientific problem you evaluate, the social problem you just hand-wave."<sup>3</sup> Thus, one can infer that, even when conforming to professional best

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<sup>2</sup>Gerald North, Distinguished Professor of Meteorology and Oceanography, and head of the Department of Atmospheric Sciences at Texas A&M University described the problem: "Climate modeling and simulation do not form a science in the classical sense. We cannot formulate a hypothesis and then proceed to test it in the laboratory. We have a complicated system with only a finite history of empirical information about it, far from enough, in fact." North noted that it would take a month to run a point-by-point simulation of a one-second evolution of the atmospheric motions within a one-kilometer cube, meaning that "one is forced to the familiar procedure of parameterization and the inevitable fudge factors. We simply cannot get around it." Gerald North, "L.D. Danny Harvey, Global Warming: The Hard Science," *Climatic Change*, June 2001. See also: *Science*, "Rising Global Temperature, Rising Uncertainty," April 13, 2001.

<sup>3</sup>*Science*, April 13, 2001.

practices, there are still large uncertainties when attempting to project long-term economic growth and associated greenhouse gas emissions worldwide.

According to its critics, however, the IPCC did not follow professional best practices, leading it to significantly overestimate future temperature rise.

## **Questions Raised About IPCC's Economic Assumptions**

Last year, two economic statisticians, Ian Castles of the National Center for Development Studies at Australian National University and formerly the head of Australia's national office of statistics, and David Henderson of the Westminster Business School and former Head of the Economics and Statistics Department at the Organization for Economic Cooperation and Development (OECD), offered a very specific scientific critique of the IPCC's economic assumptions and resulting emissions scenarios.<sup>4</sup>

### **World Economic Growth Overestimated**

In their independent critiques, Castles and Henderson focus on the IPCC's emissions scenario that yields the lowest projected temperature rise (that is, 2.5 degrees Fahrenheit) by 2100, on the premise that, if this (best-case) scenario is unrealistic, then "worst-case" scenarios that project warming of 10.4 degrees Fahrenheit are even more so. In examining the data used for this projection, the scientists' first criticism is that the IPCC significantly overestimated future world economic growth. The IPCC's Special Report on Emissions Scenarios analyzed 166 scenarios of economic growth from the open, peer-reviewed literature. Most of those scenarios showed that the gross world product (GWP) would be roughly five times greater in 2050 than now. But according to Castles, the IPCC's scenarios "assume higher levels of GWP in 2050 than more than 95 percent of the scenarios in the open literature."<sup>5</sup>

### **The Flaw of Using Exchange Rates in Income Comparisons**

The second flaw in the IPCC study, the scientists charge, was its arbitrary assumption that the developing countries' income will converge with the developed countries' income by 2100. To determine the amount of economic growth needed to achieve convergence, the IPCC had to determine the current developing-country income relative to developed-country income. It did this by converting average country incomes to a single currency using exchange rates. This allowed the IPCC study to conclude that the average income of developed countries is 40 times higher than the average income in developing countries in Asia, and it is 12 times higher than the average income in other non-Asian developing countries. Castles and Henderson note that the problem with using exchange rates to make income comparisons is that it fails to take into

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<sup>4</sup>In correspondence with IPCC Chairman Rajendra Pachauri and in presentations at the Experts Meeting of the IPCC Task Group on Scenarios for Climate Impact Assessment in Amsterdam, January 10, 2003. Their criticisms were published in the March 2003 issue of *Energy and Environment*.

<sup>5</sup>Castles and Henderson, March 2003.

account differing price levels. “This comparison is invalid,” said Castles, “because it is based on the assumption that [a] poor Bangladeshi family has converted the whole of its income into foreign currency, and spent it on goods and services at average world prices rather than [at much lower] Bangladeshi prices.”<sup>6</sup>

Rather than using exchange rates, the accepted practice of making inter-country income comparisons (according to the internationally recognized *System of National Accounts*) is to use “purchasing power parity,” which takes into account differing price levels between countries. The purchasing power of a Bangladeshi’s income is much greater if he can buy goods and services at Bangladeshi prices, rather than at world prices. Assuming that he must buy those goods and services at world prices makes him look much poorer than he really is, and the gap between his income and the income of the average person from a developed country also looks much larger than it really is. So, instead of a 40-to-1 difference in per-capita income between developed countries and Asia’s developing countries, for instance, the use of purchasing power parity results in a 10-to-1 ratio.

The assumption that incomes in developing countries will converge with those of developed countries, and the erroneous use of exchange-rate comparisons lead to scenarios where developing countries experience mind-boggling levels of economic growth – and similarly spectacular growth in greenhouse gas emissions – over the next 100 years. For example, the amount of goods and services produced per person in developing countries in Asia would increase 70-fold by 2100 under the IPCC’s low-end scenario, and increase nearly 30-fold for other developing countries. To put that conclusion in perspective, the United States only achieved a five-fold increase in per-capita economic growth in the 19<sup>th</sup> century and Japan achieved a nearly 20-fold increase in the 20<sup>th</sup> century. As Castles has noted, “These assumptions are patently unrealistic, even for a ‘high-emissions scenario’.” Yet, these are the IPCC’s low-emissions (best-case) scenario assumptions.

### **Effects of Flawed Data on Carbon Dioxide Emissions**

These scenarios also lead to the conclusion that global emissions of carbon dioxide will skyrocket. For example, under the IPCC low-end projection, carbon dioxide emissions are projected to increase by 1.6 billion tons between 2000 and 2010 and by 1.5 billion tons between 2010 and 2020. But this flies in the face of the historical evidence: the decade of the 1980s experienced a growth rate of only 0.8 billion tons; in the 1990s, the rate fell to 0.7 billion tons. There is no historical justification for the IPCC’s emissions scenarios, say Castles and Henderson.

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<sup>6</sup>Castles and Henderson, March 2003.

## *Additional Critiques of the IPCC's Emissions Scenarios*

The IPCC dispatched a team of authors associated with its *Special Report on Emissions Scenarios* to respond to the Castles/Henderson critique.<sup>7</sup> It argued that market exchange rates is a superior method to develop long-term emissions scenarios than the purchasing-power parity method, claiming that exchange rates “can be observed in market transactions for any currency used anywhere globally at any instant in time.”<sup>8</sup>

This is simply not true, according to another prominent scientist working on this issue. Jacob Ryten, a leading figure in the development, evaluation, and implementation of the U.N.'s International Comparisons Programme,<sup>9</sup> points out that market exchange rates are observable only in the most trivial contexts. Ryten continues, “If ‘observation’ is the key to methodological soundness, the only feasible approach to measurement of relative price and output levels between countries is that of purchasing-power parity.”<sup>10</sup>

Although purchasing-power parity is not perfect, it is the best tool available for the task at hand, according to Ryten. Exchange rates, on the other hand, are “inapplicable, known to give the wrong signals and generally discredited.” Thus, their use “should be banned rather than used as a crutch.”

Ryten concludes that the IPCC team lacks the necessary expertise to carry out this work. “I cannot help being shocked by the contrast between the team’s bold assertions and peremptory dismissal of the arguments advanced by Castles and Henderson, and their manifest ignorance of the conceptual and practical issues involved in developing and using intercountry measures of economic product,”<sup>11</sup> he says.

Another group of researchers from Australia, Warwick McKibbin, David Pearce and Alison Stegman, have also come out in support of Castles and Henderson, finding that the IPCC’s work on emissions scenarios is neither transparent nor reproducible, making it difficult for researchers to evaluate the validity of the IPCC’s work.<sup>12</sup> They conclude that the relationship

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<sup>7</sup>Nebojsa Nakicenovic et al., “IPCC SRES Revisited: A Response,” *Energy and Environment*, May 1, 2004, and Grubler, Arnulf et al., “Emissions Scenarios: A Final Response,” *Energy and Environment*, January 1, 2004.

<sup>8</sup>Grubler et al., January 1, 2004.

<sup>9</sup>See his *Evaluation of the International Comparisons Programme*, United Nations’ Economic and Social Council, November 16, 1998.

<sup>10</sup>Jacob Ryten, “MERs, PPPs and IPCC: Illusions and Reality,” *Energy and Environment*, July 1, 2004.

<sup>11</sup>Ryten, July 1, 2004.

<sup>12</sup>Warwick McKibbin, David Pearce, and Alison Stegman, “Can the IPCC SRES be Improved?” *Energy and Environment*, July 1, 2004. (McKibbin is from the Centre for Applied Macroeconomic Analysis, Australian National University, Canberra, and is associated with the Brookings Institution; Pearce is with the Centre for International Economics, Canberra; and Stegman is with Australian National University, Canberra.) For a more detailed treatment by the same team see, *Long Run*

between the demographic, social, economic, and technological assumptions and projected emissions “is far from clear.” Thus the IPCC’s projections are of limited use to policymakers.

Despite these limitations, McKibbin and his colleagues attempt to evaluate the effect of the Castles and Henderson critique on the IPCC’s conclusions. As noted above, one of the main driving forces behind the IPCC’s emissions scenarios is the assumption that developing and developed country incomes will converge over the next century. McKibbin and his colleagues find this unlikely at all, let alone within the next 100 years. Even if it were to happen, “the empirical literature suggests that the rate of convergence in income per capita would be very slow.” The IPCC admits as much, stating, “It may well take a century (given all other factors set favorably) for a poor country to catch up to [income] levels that prevail in the industrial countries today, never mind the levels that might prevail in affluent countries 100 years in the future.”<sup>13</sup> Yet, the IPCC assumes the latter, more unrealistic scenario.

Finally, the Australian researchers calculated new emissions scenarios based on the Castles and Henderson critique. They found that by 2050, emissions based on market exchange rates would be 21-percent higher than emissions using purchasing-power parity. By 2100, emissions would be 40-percent higher. The percentage effect on temperature would not be as large since the temperature response to greenhouse gases is dependent on cumulative emissions. Nevertheless, the result is a substantial overestimate of future temperature increases.<sup>14</sup>

The authors conclude that it would be a mistake to “rely on the accuracy of these projections for the efficacy of the policy responses that might follow from the predictions. Rather, they say, given the enormous uncertainties, “the policy responses should deal with the uncertainties and the need for flexible responses rather than fixed targets based on projected outcomes.”<sup>15</sup>

## The IPCC’s Mission

What explains the IPCC’s apparent technical sloppiness and use of dubious assumptions? And why do its errors always seem to lead to higher, rather than lower, temperature projections? The answer to these questions may be found in the role it plays in the international political process.

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*Projections for Climate Change Scenarios*, Working Papers in International Economics, May 2004. Available at <http://www.lowyinstitute.org/Publication.asp?pid=129>.

<sup>13</sup>IPCC, *Emissions Scenarios: Special Report of the Intergovernmental Panel on Climate Change*, Nebojsa Nakicenovic and Rob Swart (eds.), Cambridge University Press, 2000.

<sup>14</sup>The estimate by McKibbin et al. is three times as high as the overestimate found by Alan S. Manne and Richard G. Richels, “Market Exchange Rates or Purchasing Power Parity: Do They Make a Difference to the Climate Debate?” AEI-Brookings Joint Center for Regulatory Studies Working Paper, November 2003.

<sup>15</sup>McKibbin et al., July 1, 2004.

The IPCC portrays itself as an objective assessor of climate science. As it says on its Internet web page, “The role of the IPCC is to assess on a comprehensive, objective, open, and transparent basis the scientific, technical and socio-economic information relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts and options for adaptation and mitigation.”

In reality, however, the IPCC exists to support a political, rather than a scientific, agenda. In the *Principles Governing IPCC Work*, the IPCC is directed to “concentrate its activities . . . on actions in support of the U.N. Framework Convention on Climate Change processes.”<sup>16</sup> The Framework Convention states, among other things, that “change in the Earth’s climate and its adverse effects are a common concern of all mankind,” and that “the global nature of climate change calls for . . . an effective international response.” Thus, *the IPCC exists to support the Framework Convention’s predetermined conclusions, not to objectively assess whether global warming is real or not, or whether it would be potentially harmful or benign.*

The political nature of the IPCC has been further illustrated by statements of both past and present chairmen. When the *Third Assessment Report* was released, then Chairman Robert Watson stated, “This adds impetus for governments of the world to find ways to live up to their commitments . . . to reduce emissions of greenhouse gases.”<sup>17</sup> The *New York Times* characterized Watson as an “outspoken advocate of the idea that human actions – mainly burning coal and oil – are contributing to global warming and must be changed to avert environmental upheavals.”

Rajendra Pachauri, the current chairman of the IPCC, has carried on in this vein. In expressing support for international commitments to reduce greenhouse gases, Pachauri explained, “I think that the science must provide a compelling reason and a logic to take those steps, and this is what I hope the IPCC will be able to do in the future.”<sup>18</sup>

It should not be surprising, then, that the IPCC’s assessment reports and climate predictions reflect the biases of the Framework Convention, and that the IPCC’s biased conclusions flow from the use of dubious assumptions and technical errors designed to reach predetermined conclusions.

## Conclusion

The IPCC is currently in the process of producing its *Fourth Assessment Report* on global climate change. There is no indication that it will address any of the criticisms raised by

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<sup>16</sup>Intergovernmental Panel on Climate Change, “Principles Governing IPCC Work,” Approved at the Fourteenth Session (Vienna, 1-3 October 1998) on October 1, 1998, and amended at the 21<sup>st</sup> Session (Vienna, 3 and 6-7 November 2003). <http://www.ipcc.ch/about/princ.pdf>.

<sup>17</sup>*Associated Press*, “Report Warns of Disaster From Global Warming,” January 22, 2001.

<sup>18</sup>*BBC News*, “Climate Chief Defends Independence,” May 17, 2004.



scientific peers,<sup>19</sup> or deviate from its current path of twisting the data to fit a political agenda – despite the conclusion by peers that its work on emissions scenarios suffers from dubious assumptions and serious technical errors. The result is that the IPCC report represents an unreliable assessment of future climate change.

Because of the IPCC's inherent bias – to provide a justification for regulating energy use – its conclusions are causing undue alarm. Yet, due to the unwieldy nature of the data, it is important to recognize that, even if the IPCC conformed in every way to professional best practices, there would still be large uncertainties. It is simply not possible to predict demographic change, technological change, or other social and economic changes 30, 50, or 100 years into the future. Policymakers should approach the IPCC's claims with a healthy dose of skepticism before considering whether restrictions on energy use based on the IPCC's conclusions are warranted. Alarm may well be in order – alarm that the IPCC's science cannot be relied upon.

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<sup>19</sup>Ian Castles, “The Role of the IPCC is to Assess Climate Change Not Advocate Kyoto,” April 19, 2004, <http://www.onlineopinion.com.au/view.asp?article=2147>.