

## Mainstream Economics and Climate Alarmism

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**M**ainstream economic analysis has roundly rejected the “free lunch” case for regulating man-made greenhouse gases (GHG) to “stabilize climate.” The short-term approach of the Kyoto Protocol has received consensus criticism by the economics modeling community as shown by a collection of essays by 46 economists published as a special edition of *The Energy Journal*. William Nordhaus and Joseph Boyer were speaking for many contributors when they concluded in one essay that “the Kyoto Protocol has no grounding in economics or environmental policy.”<sup>1</sup>

The problem for global warming policy activism runs deeper than the Kyoto Protocol. A second recent anthology assessing agricultural benefits and costs rejected the high-damage conclusion from anthropogenic climate change that was reached in a 1995 report by the Intergovernmental Panel on Climate Change (IPCC). Concluded Robert Mendelsohn and James Newmann for the study’s 26 authors,

*New models and methods predict that mild warming will result in a net benefit rather than a net loss to the economy. The likely warming over the next century is expected to make the US economy better off on average.*<sup>2</sup>

This conclusion reinforces the findings of an earlier book published by economist Thomas Gale Moore that warmer is better.<sup>3</sup> The Mendelsohn/Neumann study also gives credence to an educational campaign by the Greening Earth Society that higher concentrations of carbon dioxide (CO<sub>2</sub>) in the atmosphere from fossil fuel combustion are a windfall to plant life and agricultural productivity. In Mendelsohn and Neumann’s words, “Agronomic studies suggest that carbon fertilization is likely to offset some if not all of the damages from warming.”<sup>4</sup>

### Scientific Questioning of Warming Alarmism

A number of arguments against climate alarmism have complemented and in some cases have directly influenced the economists’ case against short-term carbon reduction mandates. They include:

- High climate sensitivity models have overpredicted warming by a factor of two or more given a 50% buildup in the warming potential of greenhouse gas concentrations in the atmosphere to date. The oft-cited reason for model overestimation, the cooling presence of sulfate aerosols, is in dispute since sulfates can warm as well as cool. Another cited reason, ocean absorption of heat to delay the warming, is plausible but begs the question of climate sensitivity to greenhouse gases.
- The two global temperature measurements from satellites and balloons in their two decades of existence have not picked up the “greenhouse signal” where it should be most pronounced or at least discernible—the lower troposphere. This suggests that surface warming may be overestimated and/or the result of other factors than just the enhanced greenhouse effect.
- Taking the surface warming of recent decades at face value, the “greenhouse signal” shows a relatively benign distribution with minimum (night, winter) temperatures increasing

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more than maximum (daytime, summer) temperatures.

- The reduced growth rate of greenhouse gas buildup in the atmosphere in the last decade, as much as half the rate of some alarmist scenarios, extends the warming timetable to facilitate adaptation under any scenario. The reduced buildup is primarily related to greater carbon intake—the “greening of planet earth” phenomenon of robust carbon sinks.
- IPCC warming estimates from doubled atmospheric GHG concentrations [estimated to be between 1.5°C (2.7°F) and 4.5°C (8.1°F) with a best guess of 2.5°C (4.5°F)] crucially depend on strong positive feedback effects, especially with water vapor. These feedbacks are under increasing scrutiny from theoreticians. The warming with neutral feedbacks [around 1.2°C (2.2°F)] is well within the positive-to-benign range, particularly given the favorable distribution of the enhanced greenhouse effect to date.
- Scientists who are confident about pinpointing the greenhouse signal from the surface temperature record have not substantiated a greenhouse signal with weather extremes.

### Climate Alarmism Today

Scientific alarmism continues to challenge the public policy caution of a large body of economic analysis. In a recent study for the Pew Center on Global Climate Change, Tom Wigley of the National Center for Atmospheric Research reported a higher forecast of temperature and sea level rise than concluded in the 1995 IPCC report. His 48-page summary and analysis of the current state of the science also concluded that anthropogenic interference with climate was “potentially serious,” while not mentioning any possibility that such change could be benign or positive.<sup>5</sup>

Should economists take the new analysis by Wigley seriously? After all, he was the scientist who gave critics of Kyoto Protocol one of their most powerful arguments—that perfect compliance with the accord would have a very small impact on temperature and sea level rise and be “undetectable for many decades.”<sup>6</sup>

Wigley makes a case for clearer detection of the enhanced greenhouse warming effect but never considered its distinct distribution profile. Surface measurements show that the recent-decade warming is twice as great at night as during the day (a decreased diurnal cycle). The warming signature is also most pronounced in the coldest regions of the world at the coldest times of the year.<sup>7</sup> Skeptic Robert Michaels and alarmist James Hansen have both used color-coded maps in their presentations that show that the recent-decade warming has been most pronounced in Alaska and Siberia. This distribution clearly weakens alarmism compared to a neutral distribution or a reverse distribution where maximum temperatures are increasing faster than minimum temperatures. In fact, IPCC scientists should recast the official estimate of enhanced greenhouse warming as the amount that is *above freezing* to replace dead warming with effective warming.

The *timing* of warming is also a threshold variable for energy and agricultural economists who must derive policy implications from estimated costs and benefits. Wigley’s analysis is quiet on this as well as virtually all aspects of the carbon cycle. In fact, like the distribution of warming, the

<sup>1</sup> See footnotes at end of text.

timing of warming moderates the climate alarm and makes a case that anthropogenic warming is benign if not positive. The rate of growth of GHG buildup in the atmosphere in the last decade has been about one-half of some “business-as-usual” estimates of climate models.<sup>8</sup> The slowdown is prominently due to more robust carbon sinks than previously thought, elevating the argument of CO<sub>2</sub> advocates that plant matter is putting the kingpin of the greenhouse gases to good use in a world that depends on fossil fuels for over four-fifths of its energy consumption.

Wigley’s new estimate of a higher warming and sea level rise than concluded in the 1995 IPCC report rests on an assumption of reduced particulate emissions from greater pollution control that would have offset some of the future enhanced greenhouse warming. Yet fellow scientist James Hansen is less sure about the strength of the aerosol offset than is Wigley.<sup>9</sup> Hansen is also cautious about the ability of models to predict future temperatures given general forcing uncertainties. In his words, “The forcings that drive long-term climate change are not known with an accuracy sufficient to define future climate change.”<sup>10</sup> On the question of climate sensitivity to greenhouse gases, however, Hansen remains confident of a strong enhanced greenhouse effect and will not be proven wrong until uncertainties with the all-crucial water vapor feedback effect are resolved.

#### Water Vapor Feedback: The Hinge of Alarmism

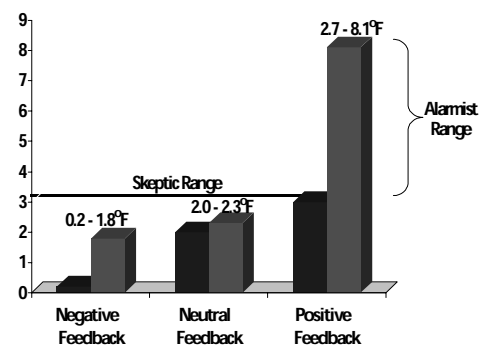
“Feedbacks are what turn the [enhanced] greenhouse effect from a benign curiosity into a potential apocalypse.”<sup>11</sup> The most important driver of high warming estimates in today’s climate models concerns feedbacks from water vapor, the strongest greenhouse gas. A warmer world from man-made GHGs increases evaporation from the surface, primarily oceans. Water molecules trap heat, and water molecules in the upper troposphere where the air is extremely dry trap substantially more heat than near the surface to thicken the greenhouse. The physics of *fixed relative humidity* in climate modeling above the cloud level (as below it) can *double* the primary warming from anthropogenic GHGs and *magnify* the warming estimates from other positive feedbacks with cloud cover and snow cover.

Enter Richard Lindzen, considered by some to be the top theoretical meteorologist in the profession today. Formerly the director of Harvard’s Center for Earth and Planetary Physics, Lindzen is currently the Sloan Professor of Meteorology at the Massachusetts Institute of Technology. Like his most serious foe James Hansen, Lindzen is a member of the National Academy of Sciences where he was elected as one of its youngest members at the age of 37. Author of such works as *Dynamic Meteorology*, Lindzen is on the cutting edge of feedback research that is crucial to model estimates of future warming under different forcing scenarios.

Lindzen was among the first to recognize how thoroughly dependent model warming estimates were on a strong positive feedback with water vapor (fixed relative humidity physics). He has trenchantly argued that humidity levels are *decoupled* at the cloud boundary level, with some or all of the surface area moisture not reaching the upper troposphere. Substituting climate physics for model physics reverses the water vapor feedback in Lindzen’s estimation to make IPCC warming range from doubled CO<sub>2</sub> (2.7°F to 8.1°F) entirely too high as seen in Figure 1.<sup>12</sup>

Figure 1 shows that *all* warming estimates from doubled CO<sub>2</sub> are positive whatever the finding with water vapor feedback. Cloud and snow cover feedbacks are also neutral in the neutral water vapor case and are positive in the upper range of the positive water vapor feedback case. Of importance for the public policy debate, economic cost/benefit analysis is not necessary in the skeptic range (roughly at or below 2.7°F). It is in the upper half of the positive feedback range where warming costs may exceed warming benefits. Robert Mendelsohn’s finding of a slight net benefit under the IPCC best guess (4.5°F warming and a 7% precipitation increase) suggests that higher warming would find costs exceeding benefits. This would bring into play the public policy question of adaptation versus mitigation—and source-versus-sink strategies if the latter strategy were chosen.

Figure 1  
**Water Vapor Feedback and Warming Estimates  
Doubled Atmospheric CO<sub>2</sub> Warming Potential**



CRITICS OF LINDZEN state that a lack of observational data makes his theory only a hypothesis. Yet increased relative humidity from GHG warming above the cloud level is little more than a hypothesis also. Both sides, in fact, are awaiting more observational data. But several things suggest momentum toward Lindzen in this debate. One, his theory that increased surface warming in the tropics leads to a net drying of the air in the 5 to 6 kilometer range due to a more efficient precipitation mechanism is consistent with what is now known about atmospheric processes in that important part of the world. Second, interest in Lindzen’s hypothesis is widespread among feedback specialists who are not confident that climate models treat water vapor correctly. Third, the Lindzen hypothesis solves many existing climate puzzles such as the surface-atmospheric temperature discrepancy and model over-estimation of warming. For economists evaluating what this debate means, the most important conclusion is that even a *partially correct* Lindzen hypothesis will lower the range of expected warming in the next century and beyond in mainstream modeling.

Cloud cover is treated as a positive feedback in models, but this is controversial even among alarmists. James Hansen has commented, “Uncertain variables such as size, brightness, and longevity result in cloud modeling [that] is so primitive that even the sign of the feedback is uncertain.”<sup>13</sup> The 1995 IPCC report also commented, “[cloud] uncertainty represents a significant source of potential error in climate simula-

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tions.”<sup>14</sup> However, cloud feedback is secondary to water vapor feedback as a driver of warming estimates in today’s climate models. Without water vapor feedback revision, much of the current estimated IPCC warming range can hold.

### Conclusion

Economists are familiar with the rise and fall of the Phillips Curve. A postulated fixed relationship between inflation and unemployment, long a staple of macroeconomic modeling and public policy, was statistically falsified in the 1970s and has been expunged from the textbooks. The “Phillips Curve” of the global warming debate could well be the fixed relative humidity driver of mainstream climate modeling, a feedback that single-handedly turns a modest, beneficial warming into potentially problematic one. If Lindzen’s theory passes the observational test in whole or part, many anomalies in the current debate will be solved. The tension between economic analysis and climate alarmism will lessen, and an anti-carbon crusade that promises only tenths of a degree temperature reduction a century out compared with business-as-usual will become less urgent to alarmists. For historians of scientific thought, Lindzen will also become the “F.A. Hayek” of the climate debate since he left the mainstream by emphasizing the inconvenient but crucial micro underpinnings of macroclimate modeling.<sup>15</sup> But for now, with uncertainties over aerosols, ocean delay, feedback effects, temperature records, and other factors continuing to rage, caution over climate alarmism can be expected to continue within the economics profession.

### Footnotes

<sup>1</sup> William Nordhaus and Joseph Boyer, “Requiem for Kyoto: An Economic Analysis of the Kyoto Protocol,” *The Costs of the Kyoto Protocol: A Multi-Model Evaluation*, International Association for Energy Economics, 1999, p. 125.

<sup>2</sup> Robert Mendelsohn and James Neumann, *The Impact of Climate Change on the United States Economy* (Cambridge, UK: Cambridge University Press, 1999), p. 321. The authors state

elsewhere (p. 5): “Efficient private adaptation is likely to occur, even if there is not official (government) response to global warming.”

<sup>3</sup> Thomas Gale Moore, *Climate of Fear: Why We Should Not Worry About Global Warming* (Washington, D.C.: Cato Institute, 1997).

<sup>4</sup> Mendelsohn and Neumann, op. cit., p. 321.

<sup>5</sup> Tom M.L. Wigley, *The Science of Climate Change: Global and U.S. Perspectives*, Pew Center on Global Climate Change, June 29, 1999, p. 3.

<sup>6</sup> T.M.L. Wigley, “The Kyoto Protocol: CO<sub>2</sub>, CH<sub>4</sub> and Climate Implications,” *Geophysical Research Letters*, July 1998, p. 2288.

<sup>7</sup> See IPCC, *Climate Change 1995: The Science of Climate Change* (Cambridge: Cambridge University Press, 1996), pp. 4, 42, 61, 141, 144-45, 151, 168, 172, and 201.

<sup>8</sup> James Hansen et al., “Climate Forcings in the Industrial Era,” *Proceedings of the National Academy of Science*, October 1998, p. 12758.

<sup>9</sup> James Hansen et al., “Radiative Forcing and Climate Response,” *Journal of Geophysical Research*, March 27, 1997, pp. 6856-61; Richard Kerr, “Greenhouse Forecasting Still Cloudy,” *Science*, May 16, 1997, p. 1042.

<sup>10</sup> Hansen, “Climate Forcings in the Industrial Era, p. 12753.

<sup>11</sup> Fred Piece, “Greenhouse Wars,” *New Scientist*, July 19, 1997, p. 40.

<sup>12</sup> Richard Lindzen, “Can Increasing Carbon Dioxide Cause Climate Change?,” *Proceedings of the National Academy of Sciences*, August 1997, pp. 8335-42; idem., “The Greenhouse Effect,” *Oxford University Encyclopedia of Global Change*, forthcoming.

<sup>13</sup> James Hansen, “How Sensitive Is the World’s Climate?,” *National Geographic Research & Exploration*, 9(2), 1993, p. 144.

<sup>14</sup> *Climate Change 1995*, pp. 34, 197.

<sup>15</sup> The economics debate between F.A. Hayek (microeconomics) and J.M. Keynes (macroeconomics) is chronicled in J.R. Hicks, “The Hayek Story,” in *Critical Essays in Monetary Theory* (Oxford: Clarendon Press, 1967).

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Applications should be accompanied by a brief explanation as to why the applicant considers themselves worthy of the award together with a letter of recommendation from the student’s supervisor (in confidence if desired). Applications will close 1 April 2000 and awards will be announced by 1 June 2000 at the latest.