Global Warming: Divided Science and Unfounded Policy

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"Climate change is the largest, most pervasive and ominous threat that we have ever confronted in this civilization."[1]

It is no coincidence that Bruce Babbitt, U.S. secretary of the interior, made a statement like this just before an international conference on global warming attended by representatives of 160 nations.

The conference, held in Kyoto, Japan, in December 1997, produced what has come to be known as the Kyoto Protocol, which seeks to commit industrialized nations to cut their emissions of carbon dioxide and other greenhouse gases by 2008 to 2012: the United States to 7 percent below 1990 levels; the European Union to 8 percent below 1990 levels; and Japan to 6 percent below 1990 levels.

The emissions reduction protocol is based on a number of premises: that global warming is real and is caused by human activity; that binding commitments will significantly reduce greenhouse gas concentrations worldwide; that the impact of a temperature increase will be negative; and that reducing emissions is an effective mechanism for mitigating the consequences of global climate change.[2]

The truth of the matter is that each of these premises is a weak foundation upon which to build sound international environmental policy.

The Greenhouse Effect

The greenhouse effect is a naturally occurring phenomenon: the sun's energy, in the form of solar radiation, enters the earth's atmosphere and is converted into heat. Greenhouse gases—water vapor, carbon dioxide, methane—absorb this heat and further warm the earth's atmosphere. There is little controversy about the general theory of the greenhouse effect: holding all else constant, an increase in greenhouse gas emissions increases temperature. Indeed, the relatively warm average surface temperature on earth—59 degrees Fahrenheit—is attributed to the greenhouse effect. Making the next logical extension to the greenhouse theory—that increases in human-generated greenhouse gases, especially carbon dioxide, will increase average surface temperature—is natural, but the evidence casts doubt on this presumption. Our climate system is not that simple.

The greenhouse effect does not operate in isolation. If it did, the earth's average surface temperature would be a scorching 170 degrees Fahrenheit. That is, the greenhouse effect operates at only a fraction of its full potential.[3] This means that other factors also must affect global climate. Scientists have only just begun to understand the dynamic nature of complex weather systems; this is especially true of attempts to isolate the impact of increases in greenhouse gases.

Explaining the greenhouse effect is a little like trying to explain how to lose weight by exercising more. The general theory goes like this: If people exercise more—increase the number of miles they jog each week, say—then they will lose weight. But as those of us who have engaged in this experiment can attest, the empirical evidence supports the theory only if other critical factors—caloric intake, age, sex, heredity—are held constant. These other factors can play a significant role in weight loss and therefore in the effectiveness of exercise. We must identify these other factors and incorporate them into the experiment in order to test the theory accurately.

Global climate, like weight loss, is determined by many factors. It is the interplay of these other factors, known as "feedback effects," that fuels the global climate change debate. Despite what you may read in the popular press, there is considerable ongoing scientific debate.[4]

Changes in water vapor and cloud cover are two of these feedback effects. Roy Spencer, senior scientist for climate studies at NASA's Marshall Space Flight Center in Huntsville, Alabama, states the crux of the scientific uncertainty debate: "We know so little about cloud feedback and water vapor feedback, which are probably the most important feedbacks to carbon dioxide, that . . . I think the safest thing is to assume that the earth will continue to do what it does best: that is, reject excess heat."[5]

The complexity of the climate system makes it difficult to distinguish human-induced temperature changes from natural temperature fluctuations. Greenhouse gases constitute only about 1 percent of our atmosphere, most of which is nitrogen and oxygen. Of that 1 percent, the most abundant greenhouse gas is water vapor, which accounts for about 90 to 95 percent of all greenhouse gases in the atmosphere. The importance of water vapor—over which humans have no control—obviously is substantial. If other greenhouse gases such as carbon dioxide and methane were to disappear—a 100 percent reduction from current concentrations—we would still be left with 90 to 98 percent of the greenhouse effect.[6]

The important issue is whether human-induced changes in greenhouse gases significantly affect climate against the backdrop of natural climate variation.[7] Attempts to get industrialized nations to reduce carbon dioxide emissions by 6 to 8 percent below 1990 levels may not have any effect on global climate relative to the climate's natural variability. The science of global warming remains uncertain, though not with respect to the general theory of the greenhouse effect; the uncertainty lies in how feedback effects interact with the greenhouse effect and whether changes in human-generated greenhouse gas emissions cause significant temperature increases in comparison to natural fluctuations in temperature levels.

Skeptical Scientists

Recall that only a few decades ago some scientists were predicting an impending ice age.[8] (Some still recognize a potential for cooling of the earth's climate.)

Concern turned to global warming in the 1980s with predictions that dramatic increases in temperature would lead to the melting of polar ice caps, rising sea levels, and other catastrophic events. A report released by the United Nations Intergovernmental Panel on Climate Change (IPCC) in the summer of 1996 has been the basis for what subsequently has been called a "virtual consensus among scientists" on global warming.[9] "Scientists concluded—almost unanimously—that global warming is real and the time to act is now," said Vice President Al Gore.[10] A closer look at the IPCC's report, however, reveals that several hundred scientists are listed as contributors and reviewers, but it does not say whether they agree with the statements made in the Summary for Policymakers section—the section cited most often by those claiming consensus.

The summary section, put together by just a handful of people, appears to be more of a political document than a statement of scientific consensus. Immediately after release of the IPCC report, Frederick Seitz, president emeritus of Rockefeller University in New York City and chairman of the George C. Marshall Institute, wrote, "In my more than 60 years as a member of the American scientific community, including service as president of both the National Academy of Sciences and the American Physical Society, I have never witnessed a more disturbing corruption of the peer-review process than the events that led to this IPCC report."[11] Seitz was concerned that policy makers and the public would be deceived into believing that scientific evidence shows a human impact on global climate.

Let's explore the major points of contention in the so-called consensus. The science of global climate change is composed of two parts: actual climate data and climate forecasting.

Actual global temperature change data are mostly from land-based temperature measurements and satellites. The land-based measurements show an increase of about 1 degree Fahrenheit in average global temperature over the past 100 years. Most of the temperature increase occurred before 1940, while most of the increases in greenhouse gas concentrations occurred after 1940. Based on analysis of these data, most scientists—including Professor Bert Bolin, chairman of the IPCC—conclude that the temperature increase resulted from the earth's natural recovery from a "little ice age."[12] Add to the uncertainty the fact that satellite data—which by most standards provide the best estimates of temperature change—gathered over eighteen years do not support the theory of global warming; in fact, the satellite data show a slight cooling trend.

Much has been written about this statement from the Summary for Policymakers: "The balance of evidence suggests that there is a discernible human influence on global climate." Notice that this is a suggestion, not a conclusion. And the caveat that precedes this statement is almost always ignored: "Our ability to quantify the human influence on global climate is currently limited because . . . there are uncertainties in key factors."[13]

This statement is presumably based on the section titled Detection of Climate Change and Attribution of Causes, which contains a more moderate version: "Taken together, these results point towards a human influence on global climate."[14] The report then continues with an explanation of the uncertainties that remain, including feedback effects. When scientists analyze the actual data, a consensus supporting the theory of global warming and a "discernible human influence on climate change" does not follow.

Nor do results from global climate forecasting models—upon which proponents of the global warming theory rely heavily—lead to a consensus. The IPCC in 1990 predicted a 0.3 degree centigrade increase per decade. Just two years later, the IPCC lowered this estimate slightly after learning more about feedback effects. The IPCC's 1996 estimates show an increase of 0.18 degree centigrade per decade. One might infer from these results that a downward trend in predicted temperature estimates is evident as scientists learn more about the climate system and incorporate this knowledge into their models.

Since many different factors affect climate change and we do not know precisely how the climate system responds to change, the forecasting models do not accurately incorporate feedback mechanisms: there is a difference between how the atmosphere works and how "modeled" versions of it work.

For example, an increase in greenhouse gases might increase cloud cover, which would then reflect more solar radiation, decreasing the amount of available, absorbable heat. Many of the forecasting models are based on a decrease in cloud cover, which enhances the greenhouse effect and exaggerates predicted temperature increases. NASA's Spencer states that the predictive models that forecast global warming do not do a very good job of dealing with feedback effects.[15]

In a 1997 survey of U.S. state and regional climatologists, 58 percent disagreed with this statement: "The overwhelming balance of evidence and scientific opinion . . . is that global warming is for real [and] there is ample evidence that human activities are already disrupting the global climate."[16] In 1995 some 100 independent scientists expressed their skepticism about global warming in the Leipzig Declaration on Global Climate Change, written at an international symposium in Germany. The Leipzig Declaration summarizes their doubts thus:

> It has become increasingly clear that—contrary to conventional wisdom—there does not exist today a general scientific consensus about the importance of greenhouse warming from rising levels of carbon dioxide. On the contrary, most scientists now accept the fact that actual observations from earth satellites show no climate warming whatsoever. And to match this fact, the mathematical climate models are becoming more realistic and are forecasting temperature increases that are only 30 percent of what was considered the "best" value just four years ago.[17]

How Much CO_2 Is Too Much?

Despite all the uncertainties and unsubstantiated claims of a human fingerprint on climate change, global warming proponents raced to Kyoto with proposals to reduce greenhouse gas emissions. Through these proposed policies and ultimately through the Kyoto Protocol, international governmental bodies were attempting to engineer the amount of greenhouse gases in our atmosphere. In truth, however, nobody knows what the right amount is—nobody knows how much carbon dioxide is dangerous. Some greenhouse gases in our atmosphere are beneficial; without them the earth's temperature would be considerably colder. We simply do not know if more or less carbon dioxide in our atmosphere would be beneficial.

Assume for a moment that less carbon dioxide would be beneficial. The proposed policies only delay increases in carbon dioxide concentration. Global climate change is determined in part by changes in the concentration of carbon dioxide in the atmosphere, while changes in carbon dioxide emissions determine concentration. Carbon dioxide emissions can remain in the atmosphere for fifty to two hundred years, so concentrations are determined cumulatively over a long period of time.

Because emissions remain in the atmosphere for such a long time, the proposed reductions of greenhouse gas emissions to 6 to 8 percent below 1990 levels would not stabilize greenhouse gas concentrations at low levels. Instead, reducing greenhouse gas emissions to 1990 levels would merely defer increases in greenhouse gas concentrations by, at most, a couple of decades.[18] Considering the cumulative effect, the Kyoto Protocol's objective—reduction in carbon dioxide emissions—is not likely to generate environmentally significant reductions in greenhouse gas concentrations.

The Leipzig Declaration urges caution in moving forward with greenhouse gas emission-reduction policies based on current knowledge: "Although we understand the motivation to eliminate what are perceived to be the driving forces behind a potential climate change, we believe this approach may be dangerously simplistic. Based on the evidence available to us, we cannot subscribe to the so-called 'scientific consensus' that envisages climate catastrophes and advocates hasty actions."[19]

In a study dated January 1998, the authors report not finding evidence to support the theory that increases in carbon dioxide are likely to cause catastrophic changes in global temperatures or weather.[20] In fact, they analyze the very real possibility that more carbon dioxide in our atmosphere would accelerate plant growth rates, and, since animals depend on plants, animal life might also flourish. Human activity is moving the carbon in oil, coal, and natural gas from below ground to the earth's surface and atmosphere, making it available for use by living things. The study concludes:

> We are living in an increasingly lush environment of plants and animals as a result of the carbon dioxide increase. Our children will enjoy an Earth with far more plant and animal life [than] that with which we now are blessed. This is a wonderful and unexpected gift of the Industrial Revolution.[21]

Footing the Bill

Media hype about global warming suggests that dangerous temperature increases are looming and immediate government intervention is warranted. The Kyoto Protocol ultimately would impose controls on energy use and production.[22] If it is signed into a treaty, industrialized nations probably will be assigned emission quotas. For example, each nation might be required to reduce carbon dioxide emissions to an agreed upon percentage (7 percent below 1990 levels for the United States) and assigned an emission limit based on current energy consumption or a projected future consumption level. Put simply, the point is this: emission limits would ration or tax carbon-based energy.

No matter how emission reductions are packaged—as emission quotas or as energy taxes combined with alternative-energy subsidies—they make energy less abundant, which has substantial economic implications. Many studies have quantified the potential impact of emission reductions on economic output and employment. The studies, unsurprisingly, produce various results, but a common assumption is that a carbon tax of $100 or more per ton would be necessary to achieve the emission reduction goals.[23] The carbon tax would lead to corresponding increases in energy prices. Following are summaries of the findings of some of these studies.

Impact on Output

• U.S. gross domestic product would be reduced between 0.2 and 0.7 percent.[24]

• By 2010, gross state output would decrease an average of 2.5 percent per state, or about $230 billion collectively. The U.S. economy would permanently lose $3.3 trillion between 2001 and 2020.[25]

Impact on Employment

• By 2005, total nonfarm employment would decline by more than 900,000.[26]

• The U.S. economy would suffer total employment declines of 0.7 percent by 2005, 1.3 percent by 2010, and 0.9 percent by 2020. By 2010, average employment would decrease 1.35 percent per state—2.17 million jobs nationally.[27]

• Job losses could rise above 1.6 million, an estimate that does not include workers who could experience reductions in wages and hours worked, increased frequency and duration of layoffs, and diminished prospects for job growth.[28]

• Although the science and engineering professions would experience relatively small job gains, substantial job losses would occur in the blue-collar manufacturing sector.[29]

Impact on Industrial Sectors

• By 2010, manufacturing wages would decrease by about 2.9 percent, or $870 per $30,000 salary; nonmanufacturing wages would decrease by about 1.8 percent, or $540 per $30,000 salary.[30]

• Estimates of job losses in key industrial sectors by 2010 include 32,000 in mining and oil and gas extraction, 162,000 in manufacturing, and 288,000 in service industries.[31]

• The agricultural, metal mining, service, and trade sectors all would experience billions of dollars of losses in output.[32]

Impact on One State: Minnesota

A Heritage Foundation study quantified the costs of committing each state to a lower standard of living, fewer jobs, and higher prices. Based on assumptions closely resembling U.S. government proposals, the reported results for Minnesota by 2010 show a decline of:

• 2.35 percent in total output—about $4.2 billion;

• 1 percent in total employment—about 30,000 jobs;

• 3.16 percent in manufacturing wages and salaries—about $518 million;

• 1.8 percent in nonmanufacturing wages and salaries—about $1.3 billion;

• about 2.3 percent in agricultural output;

• about 2 percent and 1 percent, respectively, in the service sector's output and employment; and

• about 2 percent and 1.5 percent, respectively, in the trade sector's output and employment.[33]

A study by WEFA Inc., an independent consulting firm, showed that much of the direct impact in Minnesota would be in the mining and manufacturing sectors. Due to a decrease in demand from energy-intensive metal finishers and end-product producers, the mining sector—which is especially key to northern Minnesota—would experience decreases in output and employment. In the manufacturing sector—particularly computer and electronic manufacturers—output would decrease by 3.4 percent; about 13,000 jobs would be lost to reduced international competitiveness by 2010.[34]

The impact would be similar throughout the nation: a decrease in output, fewer jobs, higher prices. The statistics, remember, represent real people: working people and consumers.

In brief, greenhouse gas emission-reduction policy would lower America's standard of living. It would create substantial job losses, diminish job quality, and redistribute wealth across industrial sectors and across nations. Restrictions on energy use and production would mean higher costs for virtually every item in a household's monthly budget: housing, heating, air-conditioning, lighting, transportation, food, consumer products.[35] Consumers would be squeezed between slower increases in income and rising costs of necessities—electricity, heat, gas—and would find restrictions on the availability of, and higher prices for, pickup trucks, vans, and sport utility vehicles.

The cost of electricity and household fuel could increase by 50 percent; gasoline prices could rise twenty-six to sixty cents per gallon.[36] Although all consumers would bear the costs of energy restrictions, low-income individuals (including many seniors)—who spend a high portion of their income on these staples—would be disproportionately affected.[37] Karen Kerrigan of the Small Business Survival Committee said this of the cost of emission limits: "Despite President Clinton's attempt to play down the 'pain factor' in his proposals to put U.S. energy use under U.N. authority, the facts cannot be denied. It will mean energy rationing or massive tax hikes or some of both."[38]

The Reduction Strategy

Forecasts of ecological doom—like Bruce Babbitt's "pervasive and ominous threat"—have been around for a long time. In the early nineteenth century, Thomas Malthus theorized that the demands of an expanding population would outstrip known food supplies.[39] We have seen very real food shortages, of course, but there was always the capacity to feed everyone, including those who starved. More recent Malthusian visions have worked their way into the popular imagination through sensational doomsday scenarios.[40]

In the 1970s the world's oil reserves were estimated at 550 billion barrels, oil prices were rising, the energy crisis was rippling through the economy, and President Jimmy Carter predicted that "we could use up all of the proven reserves of oil in the entire world by the end of the next decade."[41] Our profligate habits threatened to end a way of life. By 1990, sure enough, the world had consumed 600 billion barrels of oil, 50 billion beyond earlier reserve estimates. But where was the crisis? Truth be told, the real price of oil actually had declined, known reserves had climbed to 900 billion barrels, and other sources of energy—natural gas and solar power, for example—were flourishing.

As a particular doomsday scenario unfolds, the pundits of ecological disaster prescribe a reduction strategy: to avoid world starvation, we must reduce the rate of growth in population; to bequeath a sustainable level of resources to future generations, we must reduce energy consumption.

Like those who predict famine and resource exhaustion, proponents of emissions reduction say that "our reckless use of energy is non-sustainable, catastrophe is imminent." If we don't incur painful sacrifice today, we "condemn people born a century hence to life on a damaged planet."[42] In fairness to the new predictors of gloom, the human and economic systems that they worry about today are more complex than those of Malthus's time, and even those of the 1970s. The global climate system and the interplay between demographic, economic, and environmental changes are complicated, to say the least. For example, the inability of global climate forecasting models—incorporating millions of mathematical equations—to accurately replicate yesterday's weather exemplifies the complexity of the system and bolsters their distress.

However—and this point is central—the doomsday pundits have merely shifted their predictions from resource depletion to global warming. The basic mantra is the same: reduction and sacrifice are necessary today if there is to be a tomorrow. And, most pertinently, the premise remains the same: economic growth cultivates a deleterious future.[43] It's the same old premise, invariably wrong in the past and not likely to be right in the future.

The planet is teetering on the brink of disaster, according to the new argument, and any human-generated disturbance, such as an increase in carbon dioxide emissions, runs the risk of destroying it. The proper response, according to the Kyoto Protocol, is to reduce carbon dioxide emissions immediately. Indeed, news reports hailed the Protocol as a historic measure to "save the planet."[44]

Reducing the rate of increase in the concentration of greenhouse gases might not affect temperature. Climate has always varied, and the cause of this variation is largely unknown, and therefore unpredictable.[45] The more scientists learn about the atmosphere's ability to adjust, the more they learn of its complexity.

The environmental benefits of a reduction strategy are difficult to estimate. The costs, on the other hand, are clear: reducing emissions to 1990 levels would affect the life of every American. Governmental reorganization of energy use and production would not be painless or inexpensive. Reduction strategy advocates maintain that the economy would adjust to higher energy prices, but the twenty- to thirty-year period of adjustment could bring economic distress like the recessions and inflation during the energy crisis of the 1970s. As Fred Smith of the Competitive Enterprise Institute warns: "While global warming itself may or may not pose a threat, global warming policies pose very real threats to our civilization."[46]

The Resiliency Strategy

Framed properly and soberly, the issue is this: Global warming is a risk; it presents a possibility of loss. The theory of a human fingerprint on the global climate is inherently plausible. But it remains an unsubstantiated theory. One can reasonably hypothesize many plausible scenarios in which our society and future generations risk some type of devastation. Only two decades ago we were warned about the imminent danger of falling worldwide temperatures,[47] and the risk of earthquakes, hurricanes, viruses—and even asteroids—is not negligible. Given all of the possible risks, how should our democratic society respond?

A balanced approach to global warming seeks to improve society's overall ability to prevent and respond to disaster.[48] In the future, we are likely to face social, biological, geological, economic, and political risks—and quite possibly risks from potential climate change. Because we do not know which of these risks is likely to be dominant, we ought to improve our overall ability to adapt, survive, and recover from whatever surprises the future has to offer. This resiliency strategy is based on the empirically valid notion that a prosperous economy nurtures a healthy society.

Much of America's economic success is attributable to free markets and private enterprise, which are now the rule, not the exception, around the globe. An unfettered energy market is a critical ingredient in society's continued economic prosperity. Energy is the lifeblood of modern economies; it is a cornerstone to a nation's supply of useful goods and services. Our plentiful supply of energy, which is mostly fossil fuel–based, has improved people's lives in many ways: affordable transportation, heat for their homes in the winter and air-conditioning in the summer, easy access to drinkable water. Without continued prosperity, it would be no easy matter for America and other nations to finance improvements in the quality of life—and, most pertinently, research and development in energy-efficient technology.

Only a prosperous economy has the resources to effectively protect against risks and undertake remedial activity. In a book titled The Costs of Kyoto, Fred Smith describes an appropriate analogy for the resiliency strategy:

> When a hurricane occurs in Florida, people are alerted early and move out of the path of the storm. . . . The wealth of our society makes it possible for people to incur the expenses of temporary relocation, and it funds rapid clean-up, restoration, and recovery. The storms in Bangladesh are not dissimilar. Yet Bangladesh lacks the wealth, the communication technology infrastructure, and the mobility needed to respond to such risks.[49]

The consequences reflect differences in resiliency: there are few fatalities in the United States, while fatality lists are tragically long in Bangladesh. Our economic well-being reduces our exposure to risk and facilitates recuperation when disaster strikes.

The energy restrictions of the Kyoto Protocol attempt to avoid one uncertain problem while potentially imposing substantial cost. This, in turn, diminishes our ability to adapt, survive, and recover from potential climate changes and a variety of other risks. A resiliency strategy, which builds on economic strength, freedom, responsibility, and limited government—the foundations of American prosperity—better prepares us to face the risk of global warming.

Notes

1. Bruce Babbitt, "Global Warming: A Call to Action on Climate Change," http://www.doi.gov/secretary. More generally, see Bruce Babbitt, "Melting Glaciers Are Call to Act on Global Warming," [Minneapolis] Star Tribune, November 16, 1997.

2. Fred L. Smith, "Conclusion: The Role of Opportunity Costs in the Global Warming Debate," in The Costs of Kyoto: Climate Change Policy and Its Implications (Washington, D.C.: Competitive Enterprise Institute, 1997), pp. 151-67.

3. Richard S. Lindzen, "Global Warming: The Origin and Nature of the Alleged Scientific Consensus," Regulation 15, no. 2 (1992).

4. See, for example, Michael D. Lemonick, "Courting Disaster," Time, November 3, 1997.

5. Roy Spencer, "The State of Climate Change Science," presentation at the Competitive Enterprise Institute's Global Warming Conference: The Costs of Kyoto, Washington, D.C., July 15, 1997.

6. Lindzen, "Global Warming."

7. Sallie Baliunas and Willie Soon, "A Scientific Discussion of Climate Change: Comments on 'The Truths About 10 Leading Myths,' " Washington, D.C.: George C. Marshall Institute, November 1997.

8. See, for example, S. H. Schneider, The Genesis Strategy: Climate and Global Survival (New York: Plenum, 1976), and L. Ponte, The Cooling (Englewood Cliffs, N.J.: Prentice Hall, 1976).

9. Intergovernmental Panel on Climate Change (IPCC), Climate Change 1995: The Science of Climate Change (New York: Cambridge University Press, 1996).

10. Quoted in "Environmental Scares: Plenty of Gloom," Economist, December 20, 1997, p. 20.

11. Frederick Seitz, "A Major Deception on 'Global Warming,' " Wall Street Journal, June 12, 1996.

12. In fact, much of the one-degree F. warming appears to be a product of the sun. That is, there is a correlation between temperature and solar activity, which implies reduced climate sensitivity to human-caused greenhouse gases. See Patrick J. Michaels and Paul C. Knappenberger, "The Decline and Fall of Global Warming," Jobs & Capital 6, no. 4 (Fall 1997).

13. IPCC, Climate Change 1995, p. 5.

14. Ibid., p. 412.

15. Spencer, "The State of Climate Change Science."

16. American Viewpoint Inc., "Citizens for a Sound Economy, Survey of State and Regional Climatologists," Alexandria, Va., September-October 1997.

17. The Leipzig Declaration on Global Climate Change, International Symposium on the Greenhouse Controversy, Leipzig, Germany, November 9-10, 1995.

18. Frederick H. Rueter, Framing a Coherent Climate Change Policy, Center for the Study of American Business, St. Louis, Mo., October 1997.

19. Leipzig Declaration.

20. Arthur S. Robinson, Sallie L. Baliunas, Willie Soon, and Zachary W. Robinson, "Environmental Effects of Increased Atmospheric Carbon Dioxide," January 1998. The text is available on the Internet at http://www.oism.org/.

21. Ibid., p. 7.

22. Note that emission reduction is not the sole policy for mitigating potential global climate change; others include carbon sequestration (e.g., replanting forests) and cooling the climate (e.g., launching light-reflecting or -absorbing surfaces into space). Fred S. Singer, Hot Talk, Cold Science: Global Warming's Unfinished Debate, Independent Institute, Oakland, Calif., 1997.

23. Interagency Analytical Team (IAT), "Economic Effects of Global Climate Change Policies," draft report, U.S. Department of Energy and U.S. Environmental Protection Agency, June 1997.

24. Intergovernmental Panel on Climate Change (IPCC), "Economic and Social Dimensions of Climate Change," in Climate Change 1995, vol. 3 (Cambridge: Cambridge University Press, 1996).

25. Brett D. Schaefer, "How the Global Warming Treaty Will Harm the Economic Health of the States," Heritage Foundation, Washington, D.C., November 1997.

26. IAT, "Economic Effects."

27. Schaefer, "How the Global Warming Treaty Will Harm Economic Health."

28. Wilbur Steger and Frederick Rueter, "Transitional Economic Impacts on Climate Change Policies," in The Costs of Kyoto, pp. 21-37.

29. Ibid.

30. Schaefer, "How the Global Warming Treaty Will Harm Economic Health."

31. IAT, "Economic Effects."

32. Schaefer, "How the Global Warming Treaty Will Harm Economic Health."

33. Ibid.

34. WEFA Inc., "Global Warming: The Economic Cost of Early Action—National Impacts," Philadelphia, 1997.

35. Frances B. Smith, "The Human Costs of Global Warming Policy," in The Costs of Kyoto, pp. 39-48.

36. Ibid.

37. Glenn R. Schleede, "Impact of Potential Greenhouse Gas Emissions on the People and Economy of Texas," National Consumer Coalition, September 1997.

38. American Petroleum Institute, "Notable Quotes," http://www.api.org/.

39. Thomas Malthus, "A Summary View of the Principle of Population," in Introduction to Malthus, ed. D. V. Glass (London: Watts, 1953).

40. See, for example, Donella Meadows, Dennis Meadows, Jorgen Randers, and William W. Behrans III, The Limits to Growth (Paris: Club of Rome, 1972), and Donella Meadows, Dennis Meadows, and Jorgen Randers, Beyond the Limits (Post Mills, Vt.: Chelsea Green Publishing, 1992).

41. "Environmental Scares," p. 20.

42. "Global Warming: Despite the Heat, Remember to Keep Cool," [Minneapolis] Star Tribune, February 20, 1998, p. A18.

43. For more on the evils of well-intentioned government intervention as opposed to the natural harmony between private self-interest and society as a whole, see Julian L. Simon, The Ultimate Resource (Princeton, N.J.: Princeton University Press, 1981).

44. Sharon Begley, "Wake Up Call," Newsweek, December 22, 1997, and Michael D. Lemonick, "Turning Down the Heat," Time, December 22, 1997.

45. See, generally, Singer, Hot Talk, Cold Science, and Spencer, "The State of Climate Change Science."

46. Fred. L. Smith, "Conclusion," p. 151.

47. Schneider, Genesis Strategy. For a

unique historical examination of the global warming issue, see J. Hinderaker and S. Johnson, “The Global Warming Hoax,” working paper, Center of the American Experiment, Minneapolis, 1997.

48. Smith, “Conclusion,” p. 165.

49. Ibid. n