



Policy *Perspective*

Global Warming: Man-Made or Natural?

by S. Fred Singer

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In the past few years there has been increasing concern about global climate change on the part of the media, politicians, and the public. It has been stimulated by the idea that human activities may influence global climate adversely and that therefore corrective action is required on the part of governments. Recent evidence suggests that this concern is misplaced. Human activities are not influencing the global climate in a perceptible way. Climate will continue to change, as it always has in the past, warming and cooling on different time scales and for different reasons, regardless of human action. I would also argue that—should it occur—a modest warming would be on the whole beneficial.

This is not to say that we don't face a serious problem. But the problem is political. Because of the mistaken idea that governments can and must do something about climate, pressures are building that have the potential of distorting energy policies in a way that will severely damage national economies, decrease standards of living, and increase poverty. This misdirection of resources will adversely affect human health and welfare in industrialized nations, and even more in developing nations. Thus it could well lead to increased social tensions within nations and conflict between them.

If not for this economic and political damage, one might consider the present concern about climate change nothing more than just another environmentalist fad, like the Alar apple scare or the global cooling fears of the 1970s. Given that so much is at stake, however, it is essential that people better understand the issue.

MAN-MADE WARMING?

The most fundamental question is scientific: Is the observed warming of the past 30 years due to natural causes or are human activities a main or even a contributing factor?

At first glance, it is quite plausible that humans could be responsible for warming the climate. After all, the burning of fossil fuels to generate energy releases large quantities of carbon dioxide into the atmosphere. The CO₂ level has been increasing steadily since the beginning of the industrial revolution and is now 35 percent higher than it was 200 years ago. Also, we know from direct measurements that CO₂ is a "greenhouse gas" which strongly absorbs infrared (heat) radiation. So the idea that burning fossil fuels causes an enhanced "greenhouse effect" needs to be taken seriously.

But in seeking to understand recent warming, we also have to consider the natural factors that have regularly warmed the climate prior to the industrial revolution and, indeed, prior to any human presence on the earth. After all, the geological record shows a persistent 1,500-year cycle of warming and cooling extending back at least one million years.

In identifying the burning of fossil fuels as the chief cause of warming today, many politicians and environmental activists simply appeal to a so-called "scientific consensus." There are two things wrong with this. First, there is no such consensus: An increasing number of climate scientists are raising serious questions about the political rush to judgment on this issue. For example, the widely touted "consensus"

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TalkingPoint:

Science proceeds by the scientific method and draws conclusions based on evidence, not on a show of hands.

of 2,500 scientists on the United Nations Intergovernmental Panel on Climate Change (IPCC) is an illusion: Most of the panelists have no scientific qualifications, and many of the others object to some part of the IPCC's report. The Associated Press reported recently that only 52 climate scientists contributed to the report's "Summary for Policymakers."

Likewise, only about a dozen members of the governing board voted on the "consensus statement" on climate change by the American Meteorological Society (AMS). Rank and file AMS scientists never had a say, which is why so many of them are now openly rebelling. Estimates of skepticism within the AMS regarding man-made global warming are well over 50 percent.

The second reason not to rely on a "scientific consensus" in these matters is that this is not how science works. After all, scientific advances customarily come from a minority of scientists who challenge the majority view—or even just a single person (think of Galileo or Einstein). Science proceeds by the scientific method and draws conclusions based on evidence, not on a show of hands.

But aren't glaciers melting? Isn't sea ice shrinking? Yes, but that's not proof for human-caused warming. Any kind of warming, whether natural or human-caused, will melt ice. To assert that melting glaciers prove human causation is just bad logic.

What about the fact that carbon dioxide levels are increasing at the same time temperatures are rising? That's an interesting correlation; but as every scientist knows, correlation is not causation. During much of the last century the climate was cooling while CO₂ levels were rising. And we should note that the climate has not warmed in the past eight years, even though greenhouse gas levels have increased rapidly.

What about the fact—as cited by, among others, those who produced the IPCC report—that every major greenhouse computer model (there are two dozen or so) shows a large temperature increase due to human burning of fossil fuels? Fortunately, there is a scientific way of testing these models to see whether current warming is due to a man-made greenhouse effect. It involves comparing the actual or observed pattern of warming with the warming pattern predicted by or calculated from the models. Essentially, we try to see if the "fingerprints" match—"fingerprints" meaning the rates of warming at different latitudes and altitudes.

For instance, theoretically, greenhouse warming in the tropics should register at increasingly high rates as one moves from the surface of the earth up into the atmosphere, peaking at about six miles above the earth's surface. At that point, the level should be greater than at the surface by about a factor of three and quite pronounced, according to all the computer models. In reality, however, there is no increase at all. In fact, the data from balloon-borne radiosondes show the very opposite: a slight decrease in warming over the equator.

The fact that the observed and predicted patterns of warming don't match indicates that the man-made greenhouse contribution to current temperature change is insignificant. This fact emerges from data and graphs collected in the "Climate Change Science Program Report 1.1," published by the federal government in April 2006 (see www.climatechange.gov/Library/sap/sap1-1/finalreport/default.htm). It is remarkable and puzzling that few have noticed this disparity between observed and predicted patterns of warming and drawn the obvious scientific conclusion.

What explains why greenhouse computer models predict temperature trends that

Limitations of Renewable Energy and Conservation

by Drew Thornley, Economic Freedom Policy Analyst, Texas Public Policy Foundation

Activists concerned about global warming and air quality often advocate for renewable energy and conservation. However, a quick review of the facts reveals neither of these can make much of an effect on carbon dioxide emissions or air quality.

With the possible exceptions of California and Florida, Texas surpasses every state in renewable energy capacity, and it surpasses all states in installed wind power capacity. As of October 23, 2006, Texas' wind power capacity was approximately 2,631 megawatts (MW), the largest of any state and one-fourth of the total wind power capacity of the entire United States (10,492 MW, as of October 23, 2006). Texas has also had the greatest increase in wind power capacity of any state in recent years—including the addition of about 1,340 MW of new wind power capacity since the beginning of 2005. Because Senate Bill 20, passed in 2005 during the First Called Session of the Texas Legislature, greatly increased the renewable portfolio standard goal for Texas to 5,880 MW by 2015 and 10,000 MW by 2025, the renewable energy capacity of Texas will continue to increase significantly in the coming years and will almost certainly continue to outpace the growth of renewable energy capacity in every other state. In addition, SB 20 requires at least 500 MW of Texas' energy capacity to be from non-wind renewable generation, such as solar power. However, the main renewable energy options in Texas—wind, solar, and biomass—have significant limitations preventing them from providing the electricity needed to replace existing and/or future electric generating units that use traditional fuels.

The most fundamental limitation facing wind power is that it is not dispatchable and cannot be relied upon when electricity consumers need electricity. Wind-generating facilities generate electricity only when the wind is blowing above a certain minimum speed. Because wind does not consistently blow above that speed, wind generation facilities have low annual capacity factors, which are measures of the reliability and consistency of the generation source. Wind power is even less available during times of peak electricity demand—i.e., summer. The Electric Reliability Council of Texas (ERCOT) calculates that only about 2.6% of wind power is available at the times of peak electricity demand, comparing very poorly to traditionally-fueled electric generating

units, which have their highest availability during the times of peak electricity demand.

Further, due to wind power variability, each wind generation facility requires a reliable backup source of electricity, absent some means to store the wind power on a large-scale basis. With no existing adequate storage, wind generation facilities must have electric generating units that use traditional fuels as backups. Such backup units must operate continuously, and, even if the backup units are run at reduced levels, their operation is expensive.

Another wind power limitation is the problem of transmitting the power to parts of the state needing it most, which in most cases is east of Interstate 35. The best locations in Texas for wind generation facilities are in remote areas, such as in West Texas and the Panhandle. However, there are inadequate transmission lines to transmit wind power such long distances. Building such a transmission line typically takes three to five years and costs from \$1 million to \$1.2 million per mile to construct the lines and \$15 million to \$75 million to construct each transmission station. The estimated cost to build the transmission lines necessary to transmit the 5,880 MW needed to meet the 2015 renewable portfolio standard goal for Texas is approximately \$1 billion, and the estimated cost to build the transmission lines necessary to transmit the 10,000 MW needed to meet the 2025 renewable portfolio standard goal for Texas is from \$1.7 billion to \$3 billion.

Solar power has greater limitations than wind power. Because nighttime and cloud cover prevent the sun's rays from reaching solar electricity generation facilities, solar power has a very low annual capacity—typically less than 15%. Thus, solar power requires backup electricity from traditionally-fueled electric generating units. Further, solar power is less developed and less ready to be used in large-scale electricity generation than wind power. ERCOT recently determined the approximate cost for electricity generated by solar power is over 400% higher than the approximate cost for electricity generated by coal-fired electric generating units. Moreover, even if solar power could be generated cost-effectively and on a large-scale basis, it faces the same transmission challenges as wind power.

Biomass power has significant limitations, as well: Generation of electricity using biomass as fuel results in significant CO₂ emissions, often greater CO₂ emissions than from electric-generating units that use traditional fuels; some types of biomass are seasonal; and the handling, transportation, and preparation costs of biomass usually far outweigh the costs to mine and deliver coal.

Even if wind, solar, and biomass power did not have the limitations discussed above, they still could not provide the necessary electricity to meet the huge projected growth in Texas' electricity needs. ERCOT estimates, based on estimated population growth and possible retirement of old fossil fuel-fired electric generating units, that Texas may need up to 48,000 MW of additional peak electric generation capacity by 2015 and up to 79,000 MW of additional peak electric generation capacity by 2025. Based on the renewable portfolio standard goals for 2015 and 2025, the approximate increases in renewable energy between 2005 and 2015 would be less than 4,000 MW and between 2005 and 2025 would be less than 9,000 MW—far below the additional peak electric generation capacities of 48,000 MW and 79,000 MW that ERCOT estimates may be needed in Texas by 2015 and 2025, respectively.

Based on population growth and possible retirement of old electric generating units, ERCOT estimates that Texas may need up to 66,000 MW of additional peak generation capacity by 2020, which would be an increase of about 85% from 2005. According to a June 2006 report by the environmental group U.S. Public Interest Research Group ("U.S. PIRG"), it is estimated that conservation measures may reduce electricity needed in the United States by about 28% by 2020. Even if this estimate is accurate for Texas, it would pale in comparison to the 85% increase in electricity that ERCOT estimates may be needed in Texas by 2020. Thus, while voluntary electricity conservation measures should be encouraged, they will not prevent the need for new electric generating units that use traditional fuels, much less support the shutdown of any existing electric generating units using traditional fuels. ★

are so much larger than those observed? The answer lies in the proper evaluation of feedback within the models. Remember that in addition to carbon dioxide, the real atmosphere contains water vapor, the most powerful greenhouse gas. Every one of the climate models calculates a significant positive feedback from water vapor—i.e., a feedback that amplifies the warming effect of the CO₂ increase by an average factor of two or three. But it is quite possible that the water vapor feedback is negative rather than positive and thereby reduces the effect of increased CO₂.

There are several ways this might occur. For example, when increased CO₂ produces a warming of the ocean, a higher rate of evaporation might lead to more humidity and cloudiness (provided the atmosphere contains a sufficient number of cloud condensation nuclei). These low clouds reflect incoming solar radiation back into space and thereby cool the earth. Climate researchers have discovered other possible feedbacks and are busy evaluating which ones enhance and which diminish the effect of increasing CO₂.

the stratosphere; and variations in the solar wind that modulate the intensity of cosmic rays (which, upon impact into the earth's atmosphere, produce cloud condensation nuclei, affecting cloudiness and thus climate).

Scientists have been able to trace the impact of the sun on past climate using proxy data (since thermometers are relatively modern). A conventional proxy for temperature is the ratio of the heavy isotope of oxygen, Oxygen-18, to the most common form, Oxygen-16.

A paper published in *Nature* in 2001 describes the Oxygen-18 data (reflecting temperature) from a stalagmite in a cave in Oman, covering a period of over 3,000 years. It also shows corresponding Carbon-14 data, which are directly related to the intensity of cosmic rays striking the earth's atmosphere. One sees there a remarkably detailed correlation, almost on a year-by-year basis. While such research cannot establish the detailed mechanism of climate change, the causal connection is quite clear: Since the stalagmite temperature cannot affect the sun, it is the sun that affects climate.

TalkingPoint:

Natural causes of climate change, for their part, cannot be controlled by man. They are unstoppable.

NATURAL CAUSES OF WARMING

A quite different question, but scientifically interesting, has to do with the natural factors influencing climate. This is a big topic about which much has been written. Natural factors include continental drift and mountain-building, changes in the Earth's orbit, volcanic eruptions, and solar variability. Different factors operate on different time scales. But on a time scale important for human experience—a scale of decades, let's say—solar variability may be the most important.

Solar influence can manifest itself in different ways: fluctuations of solar irradiance (total energy), which has been measured in satellites and related to the sunspot cycle; variability of the ultraviolet portion of the solar spectrum, which in turn affects the amount of ozone in

POLICY CONSEQUENCES

If this line of reasoning is correct, human-caused increases in the CO₂ level are quite insignificant to climate change. Natural causes of climate change, for their part, cannot be controlled by man. They are unstoppable. Several policy consequences would follow from this simple fact:

- Regulation of CO₂ emissions is pointless and even counterproductive, in that no matter what kind of mitigation scheme is used, such regulation is hugely expensive.
- The development of non-fossil fuel energy sources, like ethanol and hydrogen, might be counterproductive, given that they have to be manufactured, often with the investment of great amounts of ordinary energy. Nor do they offer much reduction in oil imports.

- Wind power and solar power become less attractive, being uneconomic and requiring huge subsidies.
- Substituting natural gas for coal in electricity generation makes less sense for the same reasons.

None of this is intended to argue against energy conservation. On the contrary, conserving energy reduces waste, saves money, and lowers energy prices—irrespective of what one may believe about global warming.

SCIENCE vs. HYSTERIA

You will note that this has been a rational discussion. We asked the important question of whether there is appreciable man-made warming today. We presented evidence that indicates there is not, thereby suggesting that attempts by governments to control greenhouse-gas emissions are pointless and unwise. Nevertheless, we have state governors calling for CO₂ emissions limits on cars; we have city mayors calling for mandatory CO₂ controls; we have the Supreme Court declaring CO₂ a pollutant that may have to be regulated; we have every industrialized nation (with the exception of the U.S. and Australia) signed on to the Kyoto Protocol; and we have ongoing international demands for even more stringent controls when Kyoto expires in 2012. What's going on here?

To begin, perhaps even some of the advocates of these anti-warming policies are not so serious about them, as seen in a feature of the Kyoto Protocol called the Clean Development Mechanism, which allows a CO₂ emitter—i.e., an energy user—to support a fanciful CO₂ reduction scheme in developing nations in exchange for the right to keep on emitting CO₂ unabated. “Emission trading” among those countries that have ratified Kyoto allows for the sale of certificates of unused emission quotas. In many cases, the initial quota was simply given away by governments to power

companies and other entities, which in turn collect a windfall fee from consumers. All of this has become a huge financial racket that could someday make the UN's “Oil for Food” scandal in Iraq seem minor by comparison. Even more fraudulent, these schemes do not reduce total CO₂ emissions—not even in theory.

It is also worth noting that tens of thousands of interested persons benefit directly from the global warming scare—at the expense of the ordinary consumer. Environmental organizations globally, such as Greenpeace, the Sierra Club, and the Environmental Defense Fund, have raked in billions of dollars. Multi-billion-dollar government subsidies for useless mitigation schemes are large and growing. Emission trading programs will soon reach the \$100 billion a year level, with large fees paid to brokers and those who operate the scams. In other words, many people have discovered they can benefit from climate scares and have formed an entrenched interest. Of course, there are also many sincere believers in an impending global warming catastrophe, spurred on in their fears by the growing number of one-sided books, movies, and media coverage.

The irony is that a slightly warmer climate with more carbon dioxide is in many ways beneficial rather than damaging. Economic studies have demonstrated that a modest warming and higher CO₂ levels will increase GNP and raise standards of living, primarily by improving agriculture and forestry. It's a well-known fact that CO₂ is plant food and essential to the growth of crops and trees—and ultimately to the well-being of animals and humans.

You wouldn't know it from Al Gore's *An Inconvenient Truth*, but there are many upsides to global warming: Northern homes could save on heating fuel. Canadian farmers could harvest bumper crops. Greenland may become awash in cod and oil riches.

TalkingPoint:

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Shippers could count on an Arctic shortcut between the Atlantic and Pacific. Forests may expand. Mongolia could become an economic superpower.

This is all speculative, even a little facetious. But still, might there be a silver lining for the frigid regions of Canada and Russia? “It’s not that there won’t be bad things happening in those countries,” economics professor Robert O. Mendelsohn of the Yale School of Forestry & Environmental Studies says. “But the idea is that they will get such large gains, especially in agriculture, that they will be bigger than the losses.” Mendelsohn has looked at how gross domestic product around the world would be affected under different warming scenarios through 2100. Canada and Russia tend to come out as clear gainers, as does much of northern Europe and Mongolia, largely because of projected increases in agricultural production.

To repeat a point made at the beginning: Climate has been changing cyclically for at least a million years and has shown huge variations over geological time. Human beings have adapted well, and will continue to do so.

CONCLUSION

The nations of the world face many difficult problems. Many have societal problems like poverty, disease, lack of sanitation, and shortage of clean water. There are grave security problems arising from global terrorism and the proliferation of nuclear weapons. Any of these problems are vastly more important than the imaginary problem of man-made global warming. It is a great shame that so many of our resources are being diverted from real problems to this non-problem. Perhaps in 10 or 20 years this will become apparent to everyone, particularly if the climate should stop warming (as it has for eight years now) or even begin to cool.

We can only trust that reason will prevail in the face of an onslaught of propaganda like Al Gore’s movie and despite the incessant misinformation generated by the media. Today, the imposed costs are still modest, and mostly hidden in taxes and in charges for electricity and motor fuels. If the scaremongers have their way, these costs will become enormous. But I believe that sound science and good sense will prevail in the face of irrational and scientifically baseless climate fears. ★

Talking Point:

It is a great shame that so many of our resources are being diverted from real problems to this non-problem.

The Climate Debate Is Anything but Over

by Drew Thornley, Economic Freedom Policy Analyst, Texas Public Policy Foundation

According to many commentators, the man-made global warming debate is over.

On an episode of CNN's *The Situation Room*, former congressman J.C. Watts told Miles O'Brien, CNN's chief technology and environment correspondent, "I don't believe the Earth is melting because of carbon dioxide emissions." In response, O'Brien told Watts, "Well, you're not paying attention to the science, J.C. You're definitely not paying attention . . . The scientific debate is over, J.C. We're done."

NBC environmental correspondent Ann Thompson said, "The debate is no longer over society's role in global warming, it is a matter of degrees."

Boston Globe columnist Ellen Goodman wrote, "I would like to say we're at a point where global warming is impossible to deny. Let's just say that global warming deniers are now on a par with Holocaust deniers, though one denies the past and the other denies the present and future."

In an article entitled "Reality Check: The Global Warming Debate is Over. It's Real, Inexorable, and Headed Our Way," environmental magazine *E* writes, "Why, then, is there any doubt in the public mind about the reality of climate change? And why is this *E* Magazine article necessary? The answer lies in the millions of dollars spent by a shrinking number of industry players to maintain the illusion of 'scientific uncertainty.' Also to blame is the U.S. press, which has been too lazy to look at the science and too intimidated by the fossil fuel lobby to tell the truth."

According to Michael Mann, associate professor and director of the Earth System Science Center at Pennsylvania State University, "All this time we should have been moving forward . . . has been wasted by arguing if the problem even exists."

In a television interview with George Stephanopolous, Al Gore stated "the debate in the scientific community is over." Furthermore, in his global warming documentary, Gore cites a study of every article in a peer-reviewed journal written

on global warming in a recent 10-year period. Gore says, "They took a big sample of 10 percent, 928 articles. And you know the number of those that disagreed with the scientific consensus that we're causing global warming and that is a serious problem out of the 928: Zero."

In response, Richard Lindzen, Professor of Atmospheric Science at the Massachusetts Institute of Technology, writes that

a study in the journal *Science* by the social scientist Nancy Oreskes claimed that a search of the ISI Web of Knowledge Database for the years 1993 to 2003 under the key words 'global climate change' produced 928 articles, all of whose abstracts supported what she referred to as the consensus view. A British social scientist, Benny Peiser, checked her procedure and found that only 913 of the 928 articles had abstracts at all, and that only 13 of the remaining 913 explicitly endorsed the so-called consensus view. Several actually opposed it.

Despite all of these protestations to the contrary, Lindzen is not alone in his skepticism of many of the claims being made about global warming today. Research released in September 2007 reveals more than 500 scientists have published re-search findings refuting one or more elements of man-made global warming theory. The data was compiled by climate physicist S. Fred Singer and Hudson Institute Senior Fellow Dennis Avery, coauthors of "Unstoppable Global Warming: Every 1,500 Years" (Rowman & Littlefield, 2007). Avery said the findings make "a mockery of recent claims that a scientific consensus blames humans as the primary cause of global temperature increases."

More and more climate scientists (not to mention well informed analysts, commentators, and others) are disputing man-made global warming theory. Repeatedly asserting the debate is over is an attempt to escape the burden of defending one's positions. Despite what the alarmists say, the climate debate is far from over. ★

About the Author

S. FRED SINGER is professor emeritus of environmental sciences at the University of Virginia, a distinguished research professor at George Mason University, and president of the Science and Environmental Policy Project.

He performed his undergraduate studies at Ohio State University and earned his Ph.D. in Physics from Princeton University. He was the founding dean of the School of Environmental and Planetary Sciences at the University of Miami, the founding director of the U.S. National Weather Satellite Service, and served for five years as vice chairman of the U.S. National Advisory Committee on Oceans and Atmosphere.

Dr. Singer has written or edited over a dozen books and mono-graphs, including, most recently, *Unstoppable Global Warming: Every 1,500 Years*.

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