



Cato Handbook for Policymakers

CATO
INSTITUTE

7TH EDITION

45. Global Warming and Climate Change

Congress should

- pass no legislation restricting emissions of carbon dioxide,
- repeal current ethanol mandates, and
- inform the public about how little climate change would be prevented by proposed legislation.

Leading politicians and media figures are insisting that Congress make global warming a very high priority. Global warming is indeed real, and human activity has been a contributor since 1975.

But global warming is also a very complicated and difficult issue that can provoke very unwise policy in response to political pressure. In 2005, for instance, Congress clearly made a very bad decision about climate change when it mandated accelerated production of ethanol. Critics had argued then that corn-based ethanol would actually result in *increased* carbon dioxide emissions. An increasing body of science has since verified this position. Further, corn-based ethanol is responsible in part for the skyrocketing price of corn, soybeans, rice, and wheat since the mandates began.

Although there are many different legislative proposals for substantial reductions in carbon dioxide emissions, there is no operational or tested suite of technologies that can accomplish the goals of such legislation. Fortunately, and contrary to much of the rhetoric surrounding climate change, there is ample time to develop such technologies, which will require substantial capital investment by individuals.

Earth's Temperature History

Although there are several different records of planetary surface temperature, the one most cited is from the United Nations' Intergovernmental Panel on Climate Change.

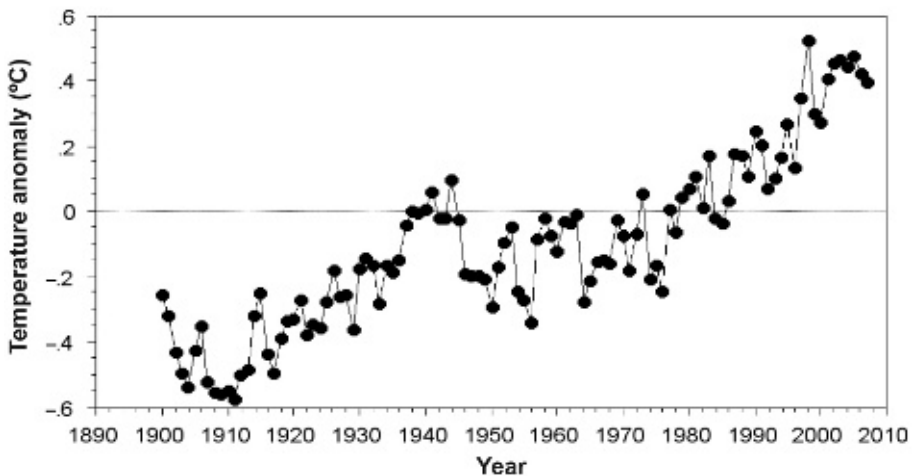
The IPCC history (Figure 45.1) shows two distinct periods of warming: one roughly from 1910 through 1945 and another that began rather abruptly around 1975 and ended in 1998. The rates of warming of the two periods are statistically indistinguishable. However, they likely resulted from two very different causes. The early warming is more attributable to changes in solar activity, whereas the latter warming has a clear “human” signature, although other “natural” changes also contributed to a minority of that warming.

Has Global Warming “Stopped”?

While it is common knowledge in the climate science community, the public is generally unaware that there has been no net change in the earth’s average surface temperature in the last 11 years, as shown in the IPCC history (see Figure 45.2).

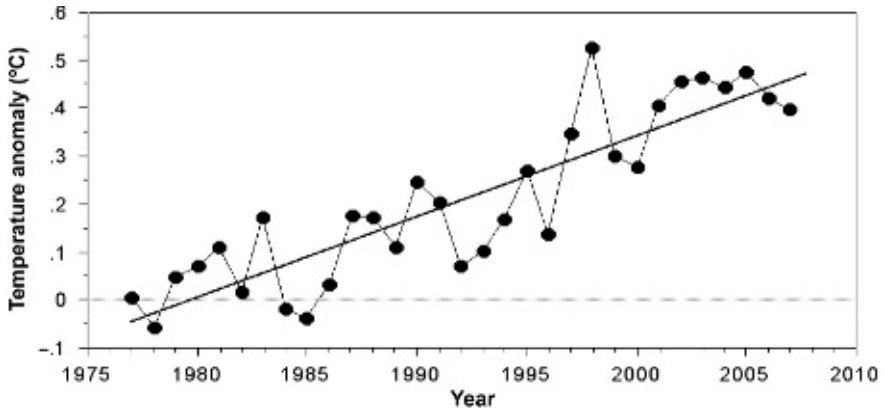
Because of a large El Niño climate event, 1998 was an unusually hot year—in fact, it remains the warmest year in IPCC’s entire temperature history of almost 150 years. After a strong El Niño warming, there is often a cooling of the relative temperature, which occurred in 1999 and 2000.

Figure 45.1
Average Global Surface Temperature Anomalies, 1900–2007



SOURCE: Intergovernmental Panel on Climate Change, 2007 and updates. <http://www.cru.uea.ac.uk/cru/data/temperature/>.

Figure 45.2
Average Global Surface Temperature Anomalies, 1977–2007



SOURCE: Intergovernmental Panel on Climate Change, 2007 and updates. <http://www.cru.uea.ac.uk/cru/data/temperature/>.

To begin a study of any trend at a high or a low point is highly dubious. However, if one starts in 2001, after the compensatory cooling, there was still no warming trend through 2007.

A close examination of observed temperatures since 1998 reveals that a combination of tropical oceanic temperatures (as modulated upward and downward by the presence of a warm or cold phase of El Niño) and low solar activity was responsible for the lack of warming, despite increasing concentrations of atmospheric carbon dioxide, the main global-warming gas. Clearly, these two factors could reverse their effects, which would accelerate a warming trend.

However, current indications are that warming may not resume until the middle of the next decade, as shown in a May 2008 article in *Nature* by Noel Keenlyside. Keenlyside's work is based on a projection of two long-term temperature patterns, in the North Atlantic and the tropical Pacific. These patterns will influence the global mean surface temperature—especially over North America and western Eurasia. Keenlyside's work, along with the lack of warming since 1998, has important policy implications.

What Are the Policy Implications?

Scientists and policymakers really have only one set of tools at their disposal for predicting climate change, namely, computer models of how

increasing atmospheric carbon dioxide should affect earth’s temperature. The thin lines in Figure 45.3 represent individual climate models run by the United Nations’ IPCC. They are for IPCC’s “midrange” scenario for emissions in this century.

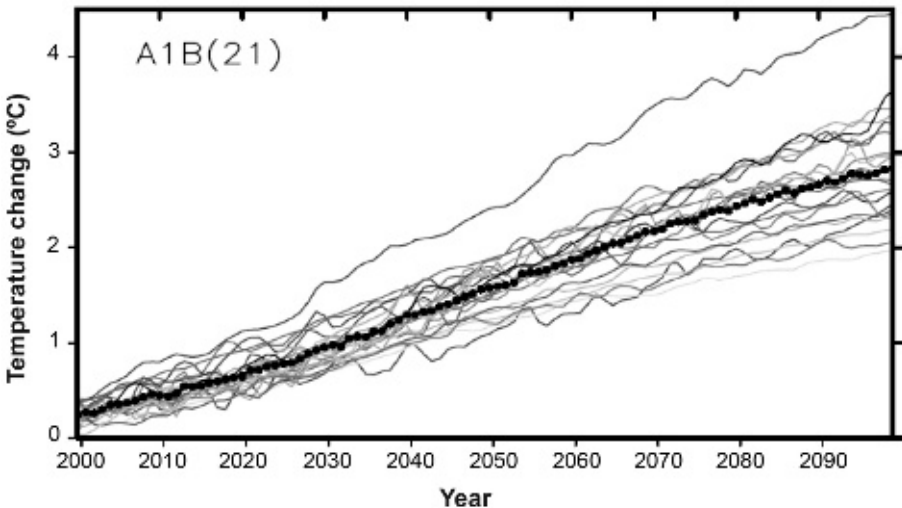
Not one of these computer models for climate in the 21st century contains a 20-year period with no warming. So given the lack of warming since 1998, and projections for little or no warming until the middle of the next decade, *there is no scientifically credible model for future warming.*

Further, what warming does occur will likely be lower than the average indicated by all these models. That is because of the nature of carbon dioxide–induced warming.

Carbon dioxide is a “greenhouse” gas, meaning that it absorbs energy coming from the earth’s surface. When a molecule of carbon dioxide releases that energy, it can either go out to space (where it would have normally gone, absent carbon dioxide) or be reradiated downward, which will result in additional warming.

But the effect is rather small. If carbon dioxide were acting alone, the rise in surface temperature expected this century would be a little more

Figure 45.3
Various Runs of IPCC Computer Models for Its “Midrange” Carbon Dioxide Emissions Scenario



SOURCE: Intergovernmental Panel on Climate Change, 2007, p. 763.

than 1 degree Fahrenheit. However, this increment of warming raises the temperature of the oceans, which means they will naturally send more water vapor into the atmosphere. Water vapor, like carbon dioxide, is a greenhouse gas, and is in fact currently responsible for keeping the earth's surface temperature nearly 30 degrees Centigrade warmer than it would be if there were none.

If, for any reason, warming stops for 20 years (it has already stopped for 11), the “feedback” effect between carbon dioxide and water vapor will also be delayed, as the ocean does not warm up instantaneously. This effect will be further delayed, resulting in less warming than was anticipated, at least in the first half of this century.

This delay gives the political process time to address global warming, time that will allow for the development of technologies that can result in lower emissions of carbon dioxide into the atmosphere. The alternative—precipitously mandating major reductions in emissions without any known acceptable technology—is to be avoided.

Global Warming Perceptions versus Realities

The apocalyptic vision of global warming is driven largely by scenarios of rapid sea-level rise caused by the loss of Greenland's ice, and increasingly strong tropical cyclones (hurricanes and typhoons). These are worth discussing in some detail.

Greenland, the Arctic, and Sea Level

In that vision, Greenland, on which sits 10 percent of the world's ice, will suddenly shed that ice, raising sea levels by 20 feet or so, possibly as soon as 2100. This scenario has been popularized in Al Gore's movie and book, *An Inconvenient Truth*, and has been proselytized largely by one scientist, James Hansen, who heads the Goddard Institute for Space Studies, a branch of the U.S. National Aeronautics and Space Administration.

Both the IPCC and reality paint a much different picture.

The 2007 Fourth Assessment Report of the IPCC (which was awarded the 2007 Nobel Peace Prize along with Gore) projects sea-level rise of between 9 and 19 *inches* in the 21st century, for its “midrange” estimate of carbon dioxide and other greenhouse gas emissions. IPCC notes that this estimate does *not* assume a rapid ice loss from Greenland. Instead, the IPCC wrote that there is no current scientific support for this hypothesis.

Indeed, since the IPCC published its report, several scientific papers have been published demonstrating that rapid loss is highly unlikely.

The IPCC's Fourth Assessment Report includes a computer model for Greenland's ice. In the model, the concentration of atmospheric carbon dioxide is four times the preindustrial background, or over 1,100 parts per million, and *that concentration is maintained for 2,000 years*. In that scenario, Greenland loses half its ice approximately a millennium from now.

Clearly, no one can possibly project the energy future of our society 100 years from today, much less 1,000 years.

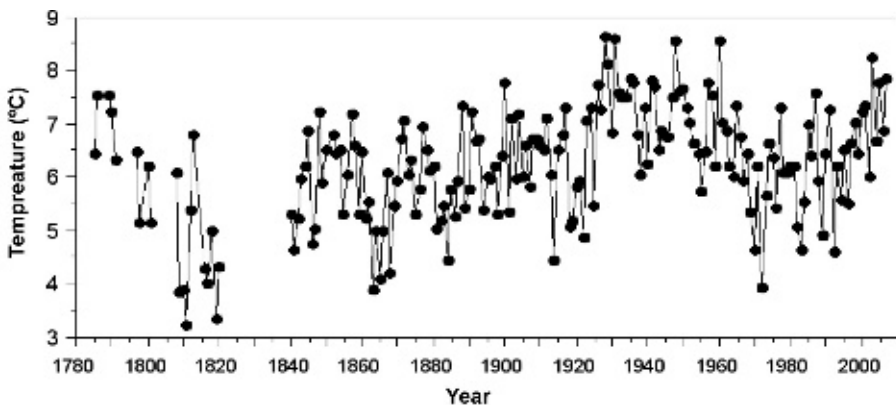
It is also worth noting that the Eurasian Arctic was several degrees warmer for several *millennia* after the end of the last ice age and that there was no catastrophic loss of Greenland's ice.

The notion that Greenland's temperatures are particularly unusual at this juncture is simply untrue. Figure 45.4 shows Danish Meteorological Institute data dating from the 18th century for southern Greenland coastal temperatures. The data clearly demonstrate that the average temperature for the most recent decade is hardly unusual.

Arctic sea ice reaches its annual minimum at the end of summer, and satellites in orbit since 1979 have detected a significant decline in ice extent at this time of the year.

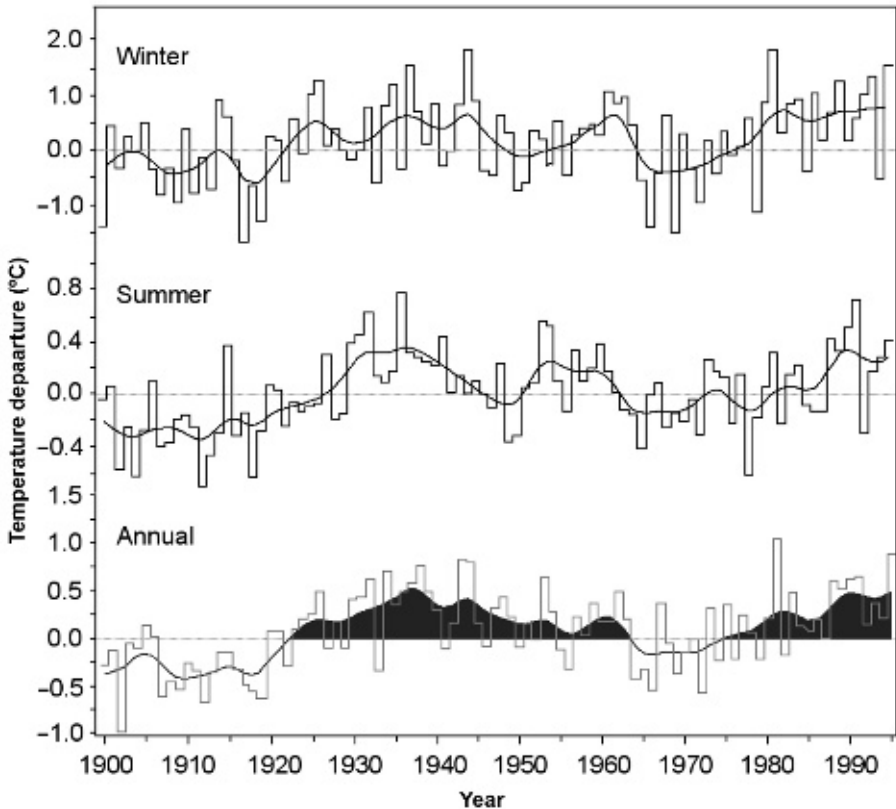
Note that 1979 is near the end of the *coldest* period in the Arctic since the 1920s (See Figure 45.5). Nowhere in news stories about Arctic ice

Figure 45.4
Summer Coastal Temperatures for Southern Greenland, 1782–2007



SOURCE: Danish Meteorological Institute, 2008. <http://www.dmi.dk/dmi/tr08-04.pdf>.

Figure 45.5
IPCC Record of Arctic Temperatures



SOURCE: Serreze and others, 2000.

has this fact been noted: in the beginning of the satellite history, sea ice had to have been abnormally expanded. Since then, about half the contraction probably represents a return to more normal conditions for the 20th century, whereas the warming of the most recent years has resulted in another contraction to far below normal, compared to the last century.

The fact that warmer temperatures in the Arctic persisted for *millennia* after the end of the last ice age almost certainly means that the sea ice was depleted far beyond today's level for much of that era, and was perhaps even gone at the end of almost every summer.

We often hear of the "irreversibility" of loss of Arctic sea ice, as the surface changes from white to dark, absorbing (rather than reflecting)

radiation, and resulting in additional warming. But if the loss of ice is “irreversible,” why did it then return after the warm millennia immediately following the ice age? Clearly, there are several problems with glib projections of any climate disaster in the near future.

Tropical Cyclones and Global Warming

The unusually strong 2004 and 2005 hurricane seasons in the Atlantic basin heightened concern about a relationship between planetary warming and the frequency or severity of tropical cyclones.

On September 16, 2004, in the midst of a hurricane season in which Florida was struck by four major storms, the *Journal of Climate* published an article by Thomas Knutson of the National Oceanic and Atmospheric Administration and Robert Tuleya from Old Dominion University in which computer-generated hurricanes showed a slight increase in strength as carbon dioxide accumulated in the atmosphere. This article received considerable attention, particularly from the *New York Times*, which summarized the work with these words:

Global warming is likely to produce a significant increase in the intensity and rainfall of hurricanes in coming decades, according to the most comprehensive computer analysis done so far.

This type of press coverage creates a political climate in which policymakers feel compelled to act. In reality, Knutson and Tuleya’s article said, “CO₂-induced tropical cyclone intensity changes are unlikely to be detectable in historical observations and will probably not be detectable for decades to come.”

It is noteworthy that Knutson’s most recent work now calculates that the number of *Atlantic* tropical storms and hurricanes will *decrease* with global warming. In recent decades, as the surface temperature has warmed, the frequency of these storms has dropped in both the eastern North Pacific and Southern oceans.

Nonetheless, alarmist press statements on melting ice, rising seas, and hurricanes cause serious difficulties for policymakers. Further, the proclivity of the media to publicize dramatic interpretations of global warming science should be obvious: stories suggesting that climate change might be more benign are simply not as attractive as those spelling gloom and doom.

Past and Future Anthropogenerated Warming and the Policy Response

Most scientists agree that a substantial component of the surface warming that began in the mid-1970s is a result of changes in the earth's greenhouse effect, largely caused by increases in atmospheric carbon dioxide.

It has long been known that atmospheric carbon dioxide must build up at an ever-increasing (“exponential”) rate in order to simply support a constant rate of warming. Most future projections for atmospheric carbon dioxide indeed make this assumption. As a result, they tend to predict constant rates of warming, once that warming is established. These are apparent in Figure 45.3. While the rates of the various models differ, the rates for each model are indeed constant.

Figure 45.2 shows IPCC temperatures since the beginning of the recent warming in the mid-1970s. The rate of overall warming also appears to be quite constant, despite the lack of warming since 1998. If this is indeed the rate that has been established as a result of greenhouse gas changes, that should be quite reassuring. It means that warming is modest and will continue to be so. As noted earlier, projections indicating the continued absence of warming in the next few years mean that the IPCC's average warming forecast for this century is most likely an overestimate.

What is a reasonable policy response to such a modest warming? Clearly, an unreasonable response is one that costs a tremendous amount of money while doing nothing about global warming. Legislation to reduce emissions by 70 percent by 2050 is an example. No known technology can accomplish that reduction. Consequently, the policy response is known as “cap-and-trade,” where corporations or individuals buy “permits” to emit carbon dioxide above a certain limit, sold by entities that have reduced emissions below that limit. The result is that carbon-based fuels become increasingly expensive as fewer and fewer “permits” are allowed. The most popular version of this legislation is the Lieberman-Warner Climate Security Act (S. 2191), which was debated in the Senate in June 2008. It did not survive a vote for cloture.

Passage of S. 2191 would create an economic disaster. It requires emission reductions to 2005 levels by 2012; 15 percent below 2005 levels by 2020; 33 percent below by 2030; and 66 percent below by 2050. This is an enormously expensive undertaking (with aggregate costs totaling trillions of dollars) with no real climatic gain. Because of growth in

emissions since 1990, the actual result of this bill is to lower emissions by only 11 percent from 1990 levels by 2030, and 25 percent by 2050.

The 2030 figure is only a slight increment more than the (unfulfilled) U.S. commitment to the Kyoto Protocol. Assume that the United States adopts Lieberman-Warner and that all other industrial nations meet and keep their obligations under the Kyoto Protocol (only two major countries, Germany and the United Kingdom, will do so, but because of political rather than environmental changes). The net result would be a reduction in warming of 0.08 degrees Centigrade by 2050, an amount far too small to measure. The basis for this calculation was published by the U.S. National Center for Atmospheric Research in 1998.

However, the cost of this bill is enormous, aggregating into trillions of dollars as it goes into effect. Among other things, the costs included the issuance of “credits” for the production of biomass ethanol. Although this cannot yet be achieved on a cost-effective basis, recent research published in *Science* magazine has demonstrated that using existing forested or agricultural land for this process produces *more* carbon dioxide than is emitted by the simple combustion of gasoline for motor fuel.

The lesson to the new Congress must be clear. Observed warming is at or near the low end of the IPCC’s projection ranges. The lack of recent warming and projections that this will continue for several years reinforce the notion that warming will be modest, at least in coming decades. Drastic action is unwarranted at this time.

Members of Congress need to ask difficult questions about global warming.

Does the most recent science and climate data argue for precipitous action? (No.) Is there a suite of technologies that can dramatically cut emissions by, say, 2050? (No.) Would such actions take away capital, in a futile attempt to stop warming, that would best be invested in the future? (Yes.) Finally, do we not have the responsibility to communicate this information to our citizens, despite disconnections between perceptions of climate change and climate reality? The answer is surely yes. If not the U.S. Congress, then whom? If not now, when? After we have committed to expensive policies *that do not work* in response to a misperception of global warming?

That is the reality of climate change and the new Congress. It may take courage to resist the political and media demands for drastic action, but the facts point toward caution.

Suggested Readings

- Keenlyside, N. S., and others. “Advancing Decadal-Scale Climate Prediction in the North Atlantic Sector.” *Nature* 453 (2008).
- Knutson, T., and others. “Simulated Reduction in Atlantic Hurricane Frequency under Twenty-First-Century Warming Conditions.” *Nature Geoscience* 1 (2008).
- Michaels, Patrick J. *Meltdown: The Predictable Distortion of Global Warming by Scientists, Politicians, and the Media*. Washington: Cato Institute, 2004.
- Michaels, Patrick J., and Robert C. Balling. *Climate of Extremes: Global Warming Science They Don't Want You to Know*. Washington: Cato Institute, 2009.

—*Prepared by Patrick J. Michaels*

FOREIGN AND DEFENSE POLICY

