April 9, 2007

Mr. Scott Schliebe
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Dear Mr. Schliebe:

On behalf of the Competitive Enterprise Institute (CEI), a non-profit public policy organization headquartered in Washington, D.C., I am pleased to submit these comments on the Fish and Wildlife Service's (FWS) proposal (72 FR 5, Jan. 9, 2007) to list the polar bear as a threatened species under the Endangered Species Act (ESA).

The FWS should not list the polar bear as a threatened species at this time, because the justification for listing the species depends on too many speculative claims and inferences.

The FWS's basic argument for listing the polar bear may be summarized as follows:

> (1) Loss of polar sea ice in recent decades is due to global warming from rising greenhouse gas (GHG) levels.
> (2) Therefore, Arctic ice will continue to shrink as GHG levels rise, producing ice-free or nearly ice-free conditions in the summer months by the end of the 21st century or sooner, possibly as early as 2040.
> (3) Polar bears depend on sea ice as a platform for hunting prey, for mating, for transport from areas of low prey availability to areas of higher prey availability, and for transport from hunting areas to maternal denning areas and vice versa.
> (4) Therefore, projected losses in Arctic ice are likely to push the polar bear to the brink of extinction within its habitat in the foreseeable future (roughly 45 years).

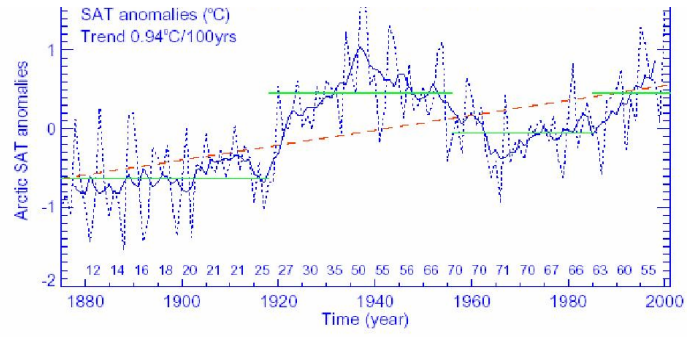
Steps (1) and (2) are questionable, and consequently so is Step (4). Arctic climate has a high degree of natural variability on a wide range of time scales. Much remains to be discovered about the underlying mechanisms and the extent of their influence on Arctic ice conditions. Current science is thus unable to quantify how much of the Arctic ice loss of recent decades is due to mankind's enhancement of the greenhouse effect. For the same reason, projections of future ice losses in the 21st century are educated guesses at best. A listing of the polar bear as a threatened species should rest on more solid evidence.

**(1) The proposed rule ignores natural Arctic climate variability**

The FWS notes that, "Observations have shown a decline in late summer Arctic sea ice extent of 7.7 percent per decade and in the perennial sea ice area of up to 9.8 percent per decade since 1978" (p. 1071). The FWS assumes that this trend is entirely or chiefly due to mankind's enhancement of the greenhouse effect. Consistent with that assumption, the agency reports that "accepted [greenhouse climate] models project almost no sea ice cover during summer in the Arctic Ocean by the end of the 21st century" (p. 1072), notes one group of scientists' warning that "the Arctic will be ice-free by 2060 if current warming trends continue" (p. 1072), and cites another group's prediction of near ice-free September conditions "as early as 2040" (p. 1071).

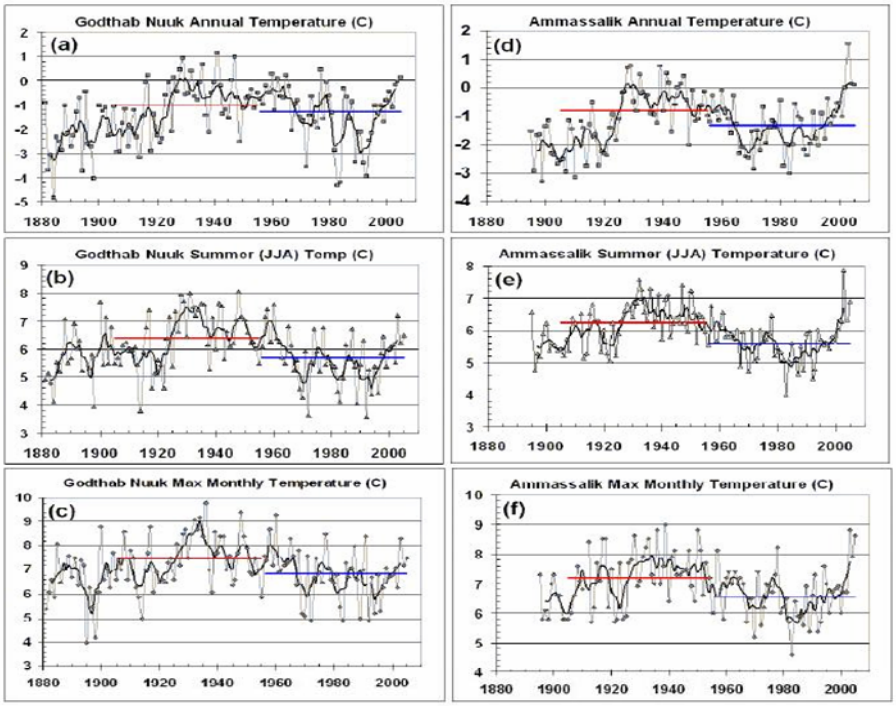
These forecasts are speculative because Arctic climate has a high degree of natural variability and scientists cannot quantify the respective contributions of Man and Nature to the observed ice loss in recent decades.

Polyakov et al. (2003) found that the Arctic (the area poleward of 62°N) was as warm in the late 1930s as it was at the end of the 20th century.[1] Yet 70 percent of the buildup of atmospheric greenhouse gases since pre-industrial times occurred after 1940.[2]




**The Arctic in the 1930s was as warm as or warmer than it was in the late 20th century. Source: Polyakov et al. (2003)**

Consistent with Polyakov's record, Chylek et al. (2006) found that Greenland was warmer during the first half of the 20th century than during the second half. The researchers also found that the warming from 1920 to 1930 was equal in magnitude to the warming from 1995 to 2005, but that the rate of warming during the earlier decade was "50% higher."[3]




**Greenland in the 1920s to the 1940s was as warm as or warmer than it was in the second half of the 20th century. Source: Chylek et al. (2006)**

Unsurprisingly, a recent study of sea ice extent in the Nordic Seas region, which includes the Iceland, Greenland, Norwegian, and Barents seas, noted that a "a similar shrinkage of ice cover [i.e., similar to that observed in recent decades] was observed in the 1920s–1930s, during the previous warm phase of the low-frequency oscillation, when any anthropogenic influence is believed to have still been negligible."[4]

Going back further in time, temperature measurements from boreholes in glacial ice indicate that Greenland during the Medieval Warm Period—roughly A.D. 1000—was 1°C warmer than it was during the late 20th century.[5]

Going back still further, three studies reviewed by Virginia State Climatologist Patrick Michaels found greater-than-present Arctic warmth in the early Holocene.[6] Briner et al. (2006) found that, 10,000 to 8,500 years ago, Canada's Baffin Bay was ~ 5°C warmer than it is today.[7] Kaufman et al. (2004) found that, 9,000-7,000 years ago, northern Russia (including Siberia) was 2-7.5°C warmer than it is today.[8] McDonald et al. (2000) found 120 sites out of 140 in the Arctic Western hemisphere where proxy data indicate warmer-than-present conditions during the early Holocene.[9] Darby et al. (2001), reviewed by the Center for the Study of Carbon Dioxide and Global Change, found that during the middle Holocene (about 5,000 years ago), Western Arctic sea surface temperature in August was 3-7°C warmer than it is today.[10] A forthcoming study by Caseldine et al. (2006) finds that from roughly 8,000 to 6,700 years ago, July surface air temperatures in northern Iceland were at least 1.5°C warmer than the 1961-1990 average and possibly 2-3°C warmer.[11]

Ice cores, ocean sediment cores, and mammalian bone fragments indicate that, during the early Holocene, the Canadian Arctic Archipelago had less summer ice than occurs today, according to an article by 10 scientists in the journal *EOS*.[12] For the past 8,900 years, Bering Sea and Davis Strait stocks of bowhead whales have been unable to intermingle due to a persistent sea ice barrier separating the two populations. The barrier existed during the last glaciation but disappeared during the warmth of the early Holocene. At the height of that warmth, which was about 3°C warmer than now, "the Pacific and Atlantic bowhead whales could visit each other through the Northwest Passage."

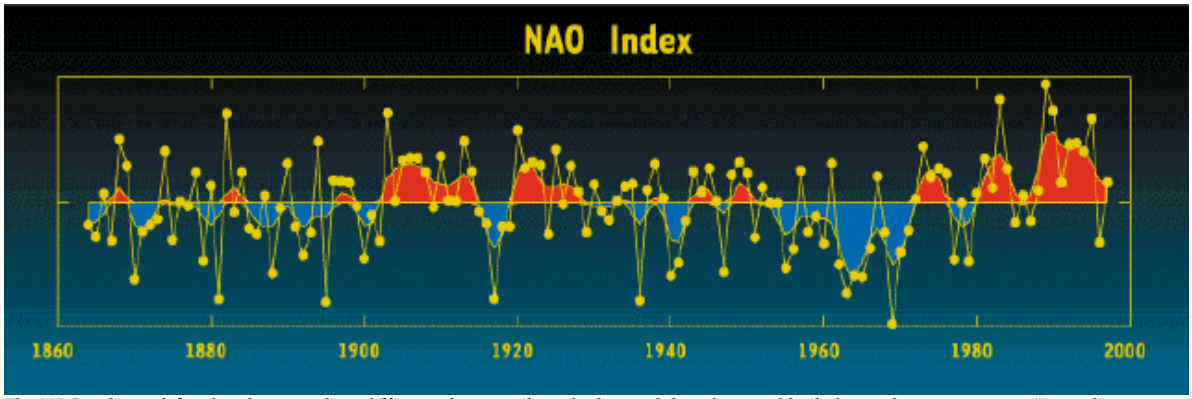
Changes in wind patterns affect Arctic temperatures naturally via their impacts on ocean currents, heat transport, and sea ice. A recent study in *Science* magazine by Serreze et al. (2007)[13] found that changes in wind patterns known as the North Atlantic Oscillation (NAO) and the Northern Annular Mode (NAM)[14] reduced Arctic ice extent in recent decades:

> "From about 1970 through the mid-1990s, winter indices of the NAO-NAM shifted from negative to strongly positive. Rigor et al…showed that altered surface winds resulted in more cyclonic motion of ice and an enhanced transport of ice away from the Siberian and Alaskan coasts…This change in circulation fostered openings in the ice cover. Although these openings quickly refroze in response to low winter SATs [sea surface temperatures], coastal areas in spring were nevertheless left with an anomalous coverage of young, thin ice. This thin ice then melted out in summer, which was expressed as large reductions in ice extent. Summer ice loss was further enhanced as the thinner ice promoted stronger heat fluxes to the atmosphere, fostering higher spring air temperatures and earlier melt onset."

Serreze et al. go on to argue that wind patterns "cannot readily explain the extreme September sea-ice minima of recent years," because the NAO-NAM "regressed back to a more neutral state since the late 1990s." Thus, in their view, although wind forcing was the dominant driver of ice loss from the late 1980s through the mid-1990s, global warming has been dominant in recent years.

However, a new study in *Science* offers an alternative hypothesis that may partly explain ice losses observed since the late 1990s. Mishchenko et al., using remote-sensing satellites, found that "aerosol optical thickness" (reflectivity) decreased steadily during the 14-year period from 1991 to 2005.[15] Aerosols tend to cool the planet by reflecting sunlight back to space. "If real," explains *Science* reporter Richard Kerr, "the [aerosol] thinning would not explain away a century of global warming, experts say, but it might explain the unexpectedly strong global warming of late, the *accelerating loss of glacial ice*, and much of rising sea levels."[16] By implication, a return to earlier aerosol levels—whether due to natural factors or surging energy use in industrializing Asia[17]—would mitigate further ice loss in the Arctic.

As noted above, Serreze et al. report that the NAO-NAM is now in "a more neutral state" than it was in the 1990s. But they offer no evidence that the NAO-NAM cannot swing back to the strongly negative state it was in during the 1960s and 1970s.




The NAO index is defined as the anomalous difference between the polar low and the subtropical high during the winter season (December through March)

According to Martin Visbec of the Leibniz Institute for Marine Science, the NAO index over the past 30 years "exceeds the interdecadal variability during the first 100 plus years of the instrumental record," and the "extreme positive values of the index since the late 1980s may be unprecedented over the past five centuries."[18] A swing back to the strongly negative phase cannot be ruled out. It would create wind patterns favorable to ice accumulation.

**(2) The proposed rule gives too much credence to speculative model projections**

One key issue the FWS does not address at all is the realism of the models on which Arctic climate forecasts are based. Most models assume that carbon dioxide ($CO_2$) levels increase at about 1% per year. However, the observed rate of increase is less than half that amount. As Patrick Michaels observes, "The actual annual increases in carbon dioxide in the last ten years averaged 0.49%. It was 0.42% in the ten years before that, and 0.43% between twenty and thirty years ago."[19] Because the error compounds annually, the models' unrealistic $CO_2$ input can produce wildly exaggerated long-term forecasts.

Specifically, a 1% annual increase triples the current $CO_2$ level by 2100 and quadruples it by 2130. "With current trends," Michaels comments, "that would happen in year 2269. By then, energy-production technology probably will have turned over two or three times and this will never have become an issue."

No greenhouse climate model can replicate the Arctic warmth of the late 1930s, the greater than present Greenland warmth during the first half of the 20$^{th}$ century, the greater-than-present Greenland warmth during the Medieval Warm Period, or the greater-than-present Arctic warmth during the early- to mid-Holocene. This suggests that model representations of the natural mechanisms determining Arctic climate are still too crude to serve as a basis for prediction.

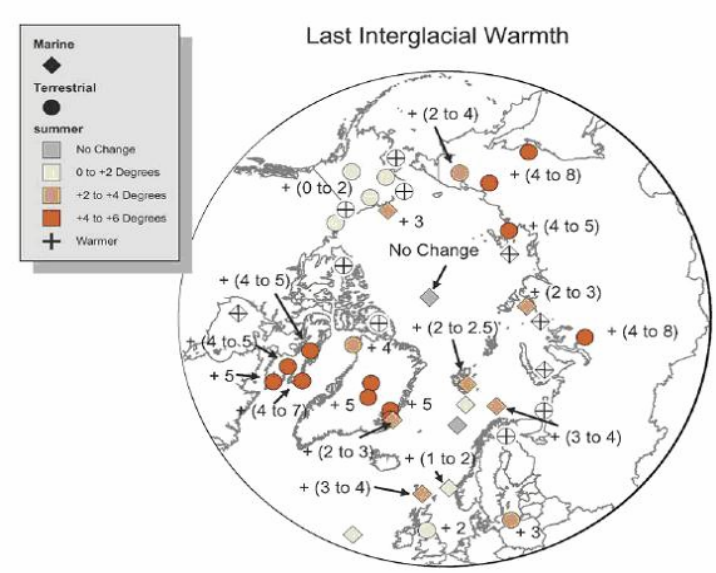
**(3) Polar bear population data are too sketchy to support the proposed listing**

The FWS examined available information on the "status" (not reduced, reduced, or severely reduced from historic abundance levels) and "trend" (increasing, stable, or declining) of individual polar bear populations (p. 1070). There are 19 polar bear populations. Insufficient data exist to determine the trend and status of seven populations (East Greenland, Barents Sea, Kara Sea, Laptev Sea, Chukchi Sea, Davis Strait, and Arctic Basin). The trend and status of five populations (Northern Beaufort Sea, Lancaster Sound, Gulf of Boothia, Foxe Basin, and Southern Hudson Bay) are stable and not reduced. The Viscount-Melville population trend is increasing; the status is severely reduced but due to "prior excessive harvest," not climate change. The Norwegian Bay population trend is declining but the status is not reduced. The M'Clintock Channel population trend is increasing, although the status is severely reduced—again, due to "excessive harvest" rather than climate change. The trend and status of four populations—Southern Beaufort Sea, Kane Basin, Baffin Bay, and Western Hudson Bay—are declining and reduced.

It is difficult to draw any general conclusions from these data. Some populations are increasing, others declining. Some are reduced compared to historic levels, others not. Insufficient data exist to determine status and trend in more than one-third of the individual populations. Population status is measured against "historic levels of abundance," but FWS does not say what period serves as the baseline for comparison, nor do we find any discussion of how polar bear populations might fluctuate naturally on decadal or other time scales.

**(4) Paleoclimate research does not support the hypothesis that the polar bear will face extinction within the foreseeable future**

As discussed above, the Arctic during the early Holocene was warmer and had less ice cover than the present. Yet the polar bear managed to survive. More tellingly, Arctic summer temperatures during the Last Interglacial Period (LIG) were 4-8°C warmer than the present.[20] See the Figure below.




LIG summertime temperatures exceeded present values in the following areas by the following amounts: Chukchi Sea, 2-4°C; Southern Beaufort Sea, 0-3°C; Baffin Bay, 4-6°C; Davis Strait, 4-6°C; Kane Basin, 2-4°C; East Greenland, 5°C; Barents Sea, 2-2.5°C; Kara Sea, 2-8°C; Laptev Sea, 4-8°C. Note that these warmer-than-present summer conditions persisted for centuries, perhaps millennia. Yet the polar bear did not become extinct.

One can only speculate as to why the polar bear survived previous periods of global warming despite the animal's dependence on sea ice for hunting, mating, and transport. One possibility is that global warming eliminated or reduced cold-related threats to polar bear survival.

On page 1067, the FWS notes that, "In the southern Beaufort Sea, anomalous heavy ice conditions in the mid-1970s and mid-1980s … caused significant declines in productivity of ringed seals … Each event lasted approximately three years and caused similar declines in the natality of polar bears and the survival of sub-adults, after which reproductive success and survival of both species increased again." Global warming should reduce the risk of "anomalous heavy ice conditions."

The threat posed by extreme cold to Arctic wildlife is not trivial. A complete freeze-over of wintering areas can literally suffocate whales and prevent foraging by polar bears, seals, and birds. A study[21] by two scientists from the Greenland Institute of Natural Resources found that anomalous cold in Arctic marine habitats "can result in catastrophic mortalities that can affect population trajectories." Here is an excerpt from a review of the study:

> "In the case of Disko Bay, for example, they [the two Greenland scientists] report that 'less than 5% open-water was observed on 89% of the days in March between 1992 and1995, and during this period, 15% of these days had complete freeze over.' Already, in fact, there have been reports of common eiders, little auks and

> thick-billed murres succumbing in ice entrapments [reference omitted], while hundreds of narwhals have periodically died during episodes of rapid sea ice formation caused by sudden cold periods [references omitted].'"[22]

In short, the polar bear may have survived previous periods of global warming partly because the warming ensured the availability of open water in the bears' wintering areas.

**(5) FWS has not analyzed the adequacy of existing regulatory mechanisms**

Section 4(a) of the ESA requires the FWS to determine whether any species is threatened or endangered because of any of five factors, one of which is "the inadequacy of existing regulatory mechanisms." The proposed rule contains only one substantive sentence on this matter: "There are no known regulatory mechanisms effectively addressing reductions in sea ice habitat at this time."

If by this the FWS means that the Kyoto Protocol, plus the California and New England greenhouse gas regulatory regimes, plus the plethora of federal, state, and local energy efficiency, bio-fuel, and renewable energy mandates will have no detectable impact on global temperatures and, thus, on Arctic sea ice, then CEI concurs. The Kyoto Protocol, for example, even if fully and faithfully implemented by all industrial countries including the United States, is projected to avert only 0.07°C of global warming by 2050[23]—too small an amount for scientists to distinguish from the "noise" of inter-annual temperature variability.

But the FWS has an obligation to present its reasons for concluding that existing regulatory mechanisms are inadequate. It would also be most useful to the regulated community to know how many additional Kyoto Protocols the FWS estimates would be required to conserve polar sea ice.

**(6) Where is this going?**

Since even the Kyoto Protocol, which could lower annual U.S. GDP by $250 billion or more,[24] would have no detectable effect on long-term temperature trends, it has occurred to at least some observers that global warming alarmism provides a bottomless well of excuses for political meddling in energy markets and regulatory suppression of economic growth.

A question that leaps to mind, but which the FWS never addresses, is what additional legal and regulatory actions would the proposed polar bear listing obligate or allow U.S. policymakers to take?

ESA regulations often operate as prohibitions on economic activities believed to destroy, modify, or curtail species habitat. In the instant case, the FWS claims that $CO_2$ emissions are destroying polar bear habitat. Thus, it would seem, if the ESA is not to be ineffectual, the Act must somehow be stretched to prohibit $CO_2$-emitting activities.

The problem, of course, is that $CO_2$ emissions derive from energy use, which in turn derives from economic activity. There is hardly any economic activity in the modern world that does not, directly or indirectly, cause or contribute to $CO_2$ emissions. The soccer mom produces $CO_2$ emissions each time she takes her kids to school, cooks their dinner, pays the household electric bill, earns a paycheck, or brings another child into the world.

CEI can easily imagine a scenario in which environmental litigants sue to enjoin builders, developers, utilities, manufacturers, banks, etc. from going about their otherwise lawful pursuits on the grounds that the associated emissions endanger polar bear habitat.

There seem to be two possibilities. Either the proposed listing is a purely symbolic gesture with no practical relevance to any of the firms and households that cause or contribute to the $CO_2$ emissions allegedly destroying polar bear habitat, or the proposed listing is a regulatory Pandora's Box that will empower litigants and regulators to harass, impede, and penalize those who create jobs, provide for their families, and grow the economy.

The FWS owes the public an explanation of its long-term vision for polar bear protection. Presumably, this listing, if adopted, would be a first step, not the end of the journey. What further actions does the FWS plan to take or anticipate that others will take? Where is this going?

**(7) Conclusion**

(A) The proposed rule ignores the potentially large role of natural variability in Arctic ice extent changes during the past 30 years. Science cannot quantify how much of recent and ongoing ice loss is due to changes in the NAO and in aerosol optical thickness.

(B) The models on which forecasts of an ice-free summer Arctic in the 21$^{st}$ century rely assume a rate of $CO_2$ buildup more than twice that of the actual observed rate.

(C) Polar bear population data are too sketchy to draw overall conclusions about species status and trend.

(D) Paleoclimate research indicates that the polar bear survived protracted periods of Arctic warmth significantly warmer than the current warm period.

(E) The FWS asserts that existing regulatory mechanisms are inadequate to conserve Arctic sea ice, but provides no explanation for this conclusion. CEI agrees that the Kyoto Protocol and other regulatory options under consideration would have no detectable effect on global temperatures over the foreseeable future. But that simply raises the question, never addressed by the FWS, of what conservation benefits the agency hopes to accomplish through the proposed listing and what the agency's long-term agenda might be.

For all these reasons, CEI recommends that the FWS not list the polar bear at this time. Too little is known about the role of natural variability in recent and ongoing Arctic ice losses. Too little is known about polar bear status and trends. Too little is known about how actual GHG levels will affect polar bear habitat in the foreseeable future. The dire ice loss forecasts on which the agency relies are too speculative to support a determination that could in principle affect every U.S. firm and household.

Sincerely,

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[6] *World Climate Rep*ort, "More Evidence of Arctic Warmth (a long time ago)," May 25, 2006, http://www.worldclimatereport.com/index.php/2006/05/25/more-evidence-of-arctic-warmth-a-long-time-ago/.

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[14] Serreze et al. define the NAO and NAM as follows: "The NAO refers to co-variability between the strength of the Icelandic Low [pressure system] and that of the Azores High [pressure system], which are the two centers of action in the North Atlantic atmospheric circulation. When both are strong (or weak), the NAO is in its positive (or negative) phase. The NAM refers to an oscillation of atmospheric mass between the Arctic and middle latitudes and is positive when arctic pressures are low and mid-latitude pressures are high. The NAO and NAM are closely related and can largely be viewed as expressions of the same phenomenon."

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[16] Richard A. Kerr, "Is a Thinning Haze Unveiling the Real Global Warming?" *Science* 315: 1480 (emphasis added).

[17] According to Mishchenko et al., satellite instruments cannot be used "to determine unequivocally whether the recent AOT [aerosol optical thickness] trend is due to long-term global changes in natural or anthropogenic aerosols."

[18] Martin Visbec, North Atlantic Oscillation, http://www.ldeo.columbia.edu/NAO/

[19] *World Climate Report*, "No News Is Bad News," March 24, 2006, http://www.worldclimatereport.com/index.php/2006/03/24/no-news-is-bad-news/ See also Covey, C., K. M. AchutaRao, U. Cusbasch, P. Jones, S. J. Lambert, M. E. Mann, T. J. Phillips, and K. E. Taylor, 2003: An overview of Results from the Coupled Model Intercomparison Project (CMIP). *Global and Planetary Change*, 37, 103-133: "The rate of radiative forcing increase implied by 1% per year increasing CO2 is nearly a factor of two greater than the actual anthropogenic forcing in recent decades, even if non-CO2 greenhouse gases are added in as part of an 'equivalent CO2 forcing' and anthropogenic aerosols are ignored (see, e.g., Figure 3 of Hansen et al. 1997). Thus the CMIP2 increasing-CO2 scenario cannot be considered as realistic for purposes of comparing model-predicted and observed climate changes during the past century. It is also not a good estimate of future anthropogenic climate forcing, except perhaps as an extreme case in which the world accelerates its consumption of fossil fuels while reducing its production of anthropogenic aerosols."

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[24] Energy Information Administration, Impacts of the Kyoto Protocol on Energy Markets & Economic Activity, October 1998, http://www.eia.doe.gov/oiaf/kyoto/pdf/c6graph1.pdf.