

Earth's Optimal Temperature?

By Robert H. Nelson
Public Policy, College Park

Only about 150 years ago, an event altogether unprecedented in the 4-billion-year history of the earth occurred. One of its creatures - human beings - acquired the capacity to remake "the Creation." At first, the reaction was boundlessly optimistic; a future heaven on earth was widely forecast. More recently, there has been deep anxiety, expressed especially in two policy areas - the applications of nuclear energy and the future climate of the earth.

The power to remake the world is of great theological as well as scientific significance. In the Bible, God punishes severely those who challenge his authority, as modern men and women are now terrified about the dangers of climate change, MIT professor of meteorology Richard Lindzen warns that past climate models predicted substantially more warming over the past 150 years - perhaps as much as 5° F more - than has actually occurred. No one has any clear idea what the total population of the earth will be in 2050 or 2100. The future economic development of many nations in Asia, Africa, and Latin America - another key factor in predicting total future emissions - is equally unknown.

Whatever the actual climate change turns out to be, the human welfare impacts are also subject to large uncertainties. Many people prefer warmer to colder weather and, since air conditioning, most population movement in the United States has been from north to south. Yale economics professor Robert Mendelsohn calculates that overall the United States, Russia, China, Japan, and northern Europe, encompassing a large part of the current population of the earth, would actually benefit from a moderate degree of future warming (at the more optimistic end of current projections) - and assuming no large rise in the most extreme weather events.

Another Yale economist, William Nordhaus, estimates that it would cost the whole world about \$3 trillion in total "present value" over the course of the 21st century to achieve, and then sustain, the emissions levels mandated in the Kyoto Protocols. This is a tiny amount relative to a predicted world gross product well in excess of \$1,000 trillion over the same 100 years, but it is large in comparison to current international economic assistance and other existing "world welfare" programs.

If the costs of Kyoto may ultimately be very small, so may the projected benefits. Based on current estimates, full implementation of Kyoto is likely to reduce world temperatures in 2100 by about 0.2° F - a difference with negligible economic and ecological consequences. For the U.S. and other countries, therefore, signing or not signing Kyoto is mainly a symbolic gesture, a way of "signaling" national commitments and possible stances with respect to future climate change negotiations.

When Kyoto was signed in 1997, Germany (owing to the absorption of East Germany) and England (owing to massive conversion from coal to natural gas in the early 1990s) were already showing significant absolute decreases in total greenhouse emissions from 1990 levels, while the U.S. had already experienced a 10 percent increase. Hence, Kyoto compliance was much more burdensome for the U.S., as compared with European counterparts. Although the Clinton administration in 1997 was willing to ignore this imbalance, future American administrations are not as likely to be as generous. The considerably higher expected future birthrates in the U.S., relative to Europe, will only compound such equity issues.

In the midst of many other climate change uncertainties, there is one surprising area of agreement among American climate policy experts. Writing in 2002 in the *Journal of Economic Perspectives* (the policy journal of the American Economic Association), William McKibbin and Peter Wilcoxon state that "the Kyoto Protocol is an impractical policy focused on achieving an unrealistic and inappropriate goal." In 2002 as well, my colleague at the Maryland

School of Public Policy, and recent winner of the Nobel prize in economics, Thomas Schelling, declared in *Foreign Affairs* that Kyoto's "exclusive focus on the short term neglected the crucial importance of expanding worldwide research and development of technologies to make severe reductions feasible later in the century. It also adopted a format incompatible with the most economical trajectory of emissions over time: a rise for some decades followed by a sharp decline."

Greater energy efficiency and other climate change benefits are achieved most economically through a gradual turnover of infrastructure and other capital investments. New technologies such as the removal of carbon dioxide from gasified coal and its sequestration are only now being perfected. The socio-economic assumptions and modeling methods of the IPCC - a critical element in its forecasts of future climate impacts -- have recently been subject to strong criticisms, a deficiency that can readily be corrected but will take some time.

Rather than hearing about these many complicating factors, the American public is routinely exposed to predictions of looming environmental apocalypse from an altered climate. There are elements of self interest in this - it sells newspapers and brings in donor contributions. In the end, however, forecasts of climate change catastrophes are probably best understood as a religious phenomenon. The Judeo-Christian world is no stranger to prophecies of apocalypse and the wide current anxieties about the new human powers to remake the world create an especially fertile environment. As the history of Marxism has already amply demonstrated, apocalyptic prophecies can take entirely secular as well as traditionally religious forms.

The religious side of climate change thinking affects policy as well. World climate discussions have focused on preventing climate change altogether, and have neglected the study of practical means of adapting to it. This reflects a powerful sense of moral imperative to maintain "natural" conditions - the climate as God created it. The most radical form of adaptation would be to geo-engineer the world's climate.

After Mt. Pinatubo erupted in 1991, dust clouds cooled the earth's climate by about 1° F (equal to the total warming over the previous century) for several years. It is possible that similar cooling effects could be achieved by design - by putting up sunlight reflectors or by seeding the oceans with iron to stimulate plant growth -- and sustained over the long run. While there are still large technical uncertainties, the policy discussion and research funding devoted to such alternatives have been limited compared with reducing greenhouse emissions. Determining and then sustaining an "optimal world temperature" is generally regarded as unthinkable - for religious, not for scientific reasons.

The reality is that, short of greatly reducing the numbers of people and other aspects of the human presence on earth, human beings have assumed and will continue to exercise a large degree of control over the future world environment. Any risks of future environmental calamity will be increased, rather than diminished, by pretending otherwise. A more rational policy discussion thus would decide on future world climate objectives, and then seek policy actions to achieve these goals. Not playing God is not an option.