

# Global warming

By ANDREW C. REVKIN, 8 December 2009



## Overview

Global warming has become perhaps the most complicated issue facing world leaders. On the one hand, warnings from the scientific community are becoming louder, as an increasing body of science points to rising dangers from the ongoing buildup of human-related greenhouse gases—produced mainly by the burning of fossil fuels and forests. On the other, the technological, economic and political issues that have to be resolved before a concerted worldwide effort to reduce emissions can begin have gotten no simpler, particularly in the face of a global economic slowdown.

After years of preparation for climate talks taking place in Copenhagen through Dec. 18, 2009, President Obama and other leaders announced on Nov. 15 what had already become evident — that no formal treaty could be produced anytime soon. Instead, the leaders pledged to reach a placeholder accord that would call for reductions in emissions and increased aid to help developing nations adapt to a changing climate and get access to non-polluting energy options.

This would in theory give the nations more time to work out the all-important details. Negotiators

would then seek a binding global agreement in 2010, complete with firm emission targets, enforcement mechanisms and specific dollar amounts to aid poorer nations.

At the heart of the debate is a momentous tussle between rich and poor countries over who steps up first and who pays most for changed energy menus.

Within the United States, Congress is similarly fighting over legislation on climate change. The House in the summer of 2009 passed a bill outlining a cap-and-trade system that could, over the next few decades, lead to an early end to conventional use of coal and oil, fuels that have underpinned prosperity and growth for more than a century. But between stiff opposition from energy interests and the overwhelming distractions of health care reform and the economy, the legislation has stalled in the Senate.

In international discussions over climate, Mr. Obama has urged other countries not to be discouraged by the stasis on Capitol Hill, pointing to big investments in energy efficiency, solar and wind power and his move to restrict greenhouse gases using environmental regulations.

In the meantime, recent fluctuations in temperature, seized on by opponents of emissions restrictions, have intensified the public debate over how urgently to respond. The long-term warming trend over the last century has been well-established, and scientists immersed in studying the climate are projecting substantial disruption in water supplies, agriculture, ecosystems and coastal communities. Passionate activists at both ends of the discourse are pushing ever harder for or against rapid action, while polls show the public locked durably in three camps — with roughly a fifth of American voters eager for action, a similar proportion aggressively rejecting projections of catastrophe and most people tuned out or confused.

## Background

Scientists learned long ago that the earth's climate has powerfully shaped the history of the human species — biologically, culturally and geographically. But only in the last few decades has research revealed that humans can be a powerful influence on the climate as well.

A growing body of scientific evidence indicates that since 1950, the world's climate has been warming, primarily as a result of emissions from unfettered burning of fossil fuels and the razing of tropical forests. Such activity adds to the atmosphere's invisible blanket of carbon dioxide and other heat-trapping "greenhouse" gases. Recent research has shown that methane, which flows from landfills, livestock and oil and gas facilities, is a close second to carbon dioxide in impact on the atmosphere.

That conclusion has emerged through a broad body of analysis in fields as disparate as glaciology, the study of glacial formations, and palynology, the study of the distribution of pollen grains in lake mud. It is based on a host of assessments by the world's leading organizations of climate and earth scientists.

In the last several years, the scientific case that the rising human influence on climate could become disruptive has become particularly robust.

Some fluctuations in the Earth's temperature are inevitable regardless of human activity — because of decades-long ocean cycles, for example. But centuries of rising temperatures and seas lie ahead if the release of emissions from the burning of fossil fuels and deforestation continues unabated, according to the Intergovernmental Panel on Climate Change. The panel shared the 2007 Nobel Peace Prize with former Vice President Al Gore for alerting the world to warming's risks.

Despite the scientific consensus on these basic conclusions, enormously important details remain murky. That reality has been seized upon by some groups and scientists disputing the overall consensus and opposing changes in energy policies.

For example, estimates of the amount of warming that would result from a doubling of green-

house gas concentrations (compared to the level just before the Industrial Revolution got under way in the early 19th century) range from 3.6 degrees to 8 degrees Fahrenheit. The intergovernmental climate panel said it could not rule out even higher temperatures). While the low end could probably be tolerated, the high end would almost certainly result in calamitous, long-lasting disruptions of ecosystems and economies, a host of studies have concluded. A wide range of economists and earth scientists say that level of risk justifies an aggressive response.

Other questions have persisted despite a century-long accumulation of studies pointing to human-driven warming. The rate and extent at which sea levels will rise in this century as ice sheets erode remains highly uncertain, even as the long-term forecast of centuries of retreating shorelines remains intact. Scientists are struggling more than ever to disentangle how the heat building in the seas and atmosphere will affect the strength and number of tropical cyclones. The latest science suggests there will be more hurricanes and typhoons that reach the most dangerous categories of intensity, but fewer storms over all.

### Steps Toward a Response

The debate over such climate questions pales next to the fight over what to do, or not do, in a world where fossil fuels still underpin both rich and emerging economies. With the completion of the United Nations Framework Convention on Climate Change at the Earth Summit in 1992, the world's nations pledged to avoid dangerously disrupting the climate through the buildup of greenhouse gases, but they never defined how much warming was too much.

Nonetheless, recognizing that the original climate treaty was proving ineffective, all of the world's industrialized countries except for the

United States accepted binding restrictions on their greenhouse gas emissions under the Kyoto Protocol, which was negotiated in Japan in 1997. That accord took effect in 2005 and its gas restrictions expire in 2012. (The United States signed the treaty, but it was never submitted for ratification, in the face of overwhelming opposition in the Senate because the pact required no steps by China or other fast-growing developing countries.

It took until 2009 for the leaders of the world's largest economic powers to agree on a dangerous climate threshold: an increase of 2 degrees Celsius (3.6 degrees Fahrenheit) from the average global temperature recorded just before the Industrial Revolution kicked into gear. (This translates into an increase of 1.3 degrees Fahrenheit above the Earth's current average temperature, about 59 degrees).

The Group of 8 industrial powers also agreed this year to a goal of reducing global emissions 50 percent by 2050, with the richest countries leading the way by cutting their emissions 80 percent. But they did not set a baseline from which to measure that reduction, and so far firm interim targets — which many climate scientists say would be more meaningful — have not been defined.

At the same time, fast-growing emerging economic powerhouses, led by China and India, still oppose taking on mandatory obligations to curb their emissions. They say they will do what they can to rein in growth in emissions — as long as their economies do not suffer. The world's poorest countries, in the meantime, are seeking payments to help make them less vulnerable to the impacts of climate change, given that the buildup in climate-warming

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gases so far has come mainly from richer nations. Such aid has been promised since the 1992 treaty and a fund was set up under the Kyoto Protocol. But while tens of billions of dollars are said to be needed, only millions have flowed so far.

In many ways, the debate over global climate policy is a result of a global "climate divide." Emissions of carbon dioxide per person range from less than 2 tons per year in India, where 400 million people lack access to electricity, to more than 20 in the United States. The richest countries are also best able to use wealth and technology to insulate themselves from climate hazards, while the poorest, which have done the least to cause the problem, are the most exposed.

In Copenhagen in December 2009, negotiators had planned to try to settle on the basic terms of two new global climate agreements. One would renew the commitments of countries bound by the Kyoto emissions limits; the other would rein in emissions of all countries to varying extents, depending on their wealth and emissions history. Given the many competing interests, and the reality that any big emissions shifts would have substantial economic impacts, the negotiations have been called one of the most complex diplomatic challenges ever.

Democratic leaders in the United States Senate continue to try to follow the lead of the House of Representatives by securing passage of a bill aiming to sharply cut greenhouse gas emissions by 2050. The chief mechanism would be a "cap and trade" system that sets a gradually declining ceiling for over all emissions. Companies and institutions could buy and sell credits from one another as a way to curb emissions at the lowest cost. Companies that made deeper cuts than required could sell credits to companies that fell short of their targets.

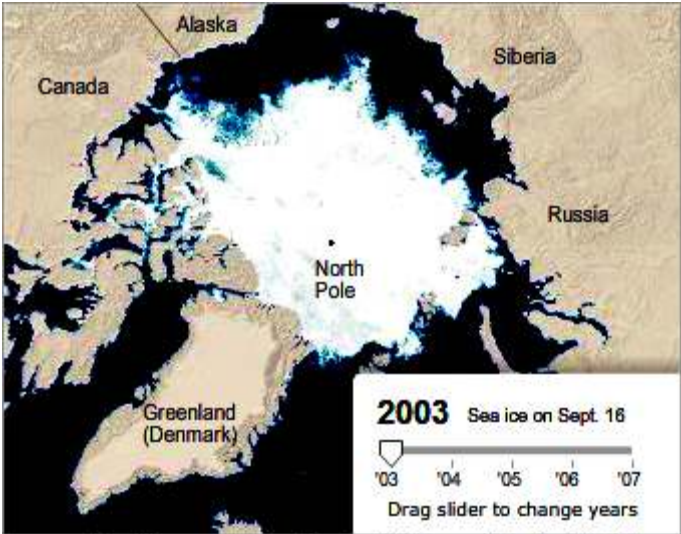
But a national preoccupation with the slow economy and competing

issues, led by health care, threaten to delay or weaken such legislation. Another impediment is the shortage of money flowing to basic energy research and large-scale demonstrations of non-polluting energy technology. While the Obama administration and Congress directed some stimulus money toward such efforts, such spending comes only after decades of declining investment in these areas.

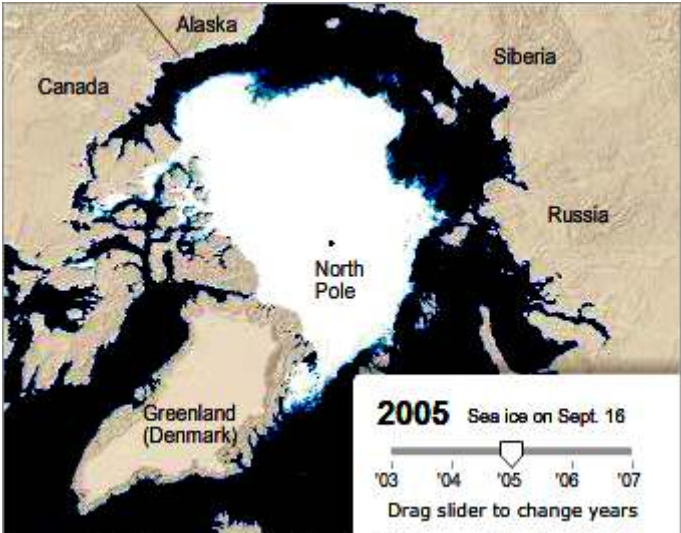
President Obama came into office vowing to take swift action on climate change, and under him, the Environmental Protection Agency has declared that it will regulate carbon dioxide emissions. But with the cap-and-trade bill facing an uncertain future in the Senate, his ability to take big steps on the issue has been severely constrained, and without significant actions by the United States, China and India had made it clear they would remain on the sidelines. Just weeks before the planned Copenhagen session, he and other leaders gathered for an Asian summit announced that no treaty would be reached in 2009. Instead, leaders will try to reach a political agreement that could be the basis for new treaty talks in 2010.

In the meantime, a recent dip in emissions caused by the global economic slowdown is almost certain to be followed by a rise, scientists warn, and with population and appetites for energy projected to rise through mid-century, they say the entwined challenges of climate and energy will only intensify.

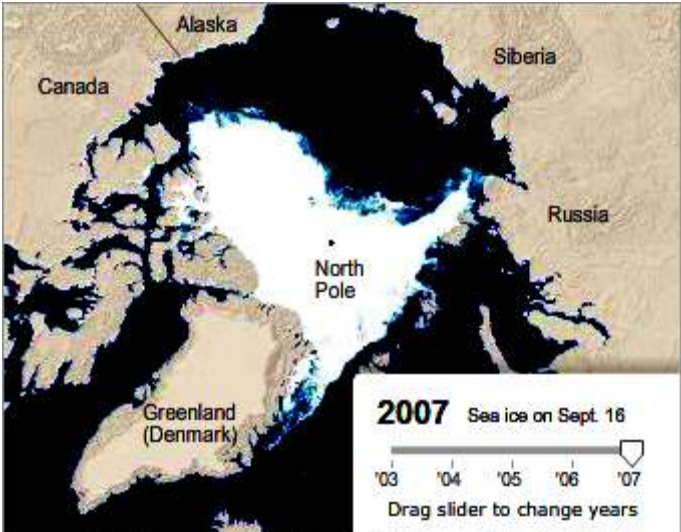
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