Global warming: Politics muddle policy

A mixed message has emerged from a United Nations-sponsored panel studying global warming. The panel's scientific committee, which issued its final report this month, predicts global temperatures will rise dramatically in the next century unless nations halt the buildup of greenhouse gases in the atmosphere. But a separate policy committee, whose final report is expected next week, downplays the urgency of the problem.

Meanwhile, several European nations continue to take the lead in preventive action by adopting specific targets for reducing emissions of greenhouse gases.

Over the past several years, scientists have actively debated the significance of the global warming threat, with a few arguing that the world will not warm at all. But the much-awaited scientific report from the Intergovernmental Panel on Climate Change (IPCC) — sponsored by the United Nations Environment Program and the World Meteorological Organization — offers the most comprehensive consensus statement yet from scientists. About 250 top climate experts from around the world helped prepare the science committee's final report.

The committee predicts that in the absence of international controls on greenhouse-gas emissions, global mean temperatures will increase by 0.3°C per decade, with an uncertainty range of 0.2°C to 0.5°C per decade. The warming would raise the global average temperature about 1°C by 2025 and 3°C before the end of the 21st century, forcing humans and ecosystems to adapt. In the last 10,000 years, Earth has never warmed at such a rapid rate, the scientists note.

The science committee also estimates that sea levels will rise about 20 centimeters by 2030 and 65 cm by the end of the next century.

Only drastic action by the world's nations can stabilize the increasing accumulations of greenhouse gases and thus stave off significant future warming, the group concludes. In a Senate hearing last week on the IPCC results, NASA's Robert T. Watson, a member of the science committee, testified: "With the long-lived gases [carbon dioxide, nitrous oxide and chlorofluorocarbons], if we want to stabilize their concentrations at today's levels, it would require between a 60 and 85 percent reduction compared to today's emissions." Methane emissions would require a 15 to 20 percent reduction, Watson said.

At the hearing, Sen. Albert Gore Jr. (D-Tenn.) alleged that the Bush administration used its influence to weaken the report of the panel committee examining policy options. The United States chaired the policy committee, while the United Kingdom headed the science committee. The Soviet Union led a group examining the consequences of climate change and has yet to issue its report.

In particular, Gore faulted the policy committee for failing to list any specific goals or timetables for reducing emissions. Gore also charged that the U.S. delegation allowed representatives of petroleum-rich Saudi Arabia to dominate discussion and to block any strong statements by the policy committee.

"The U.S. delegation sat on their hands, saying very little, while the Saudis and some others blasted the hell out of any policy options that would have led to reductions," he said.

Frederick Bernthal, deputy director of the National Science Foundation and chairman of the IPCC policy committee, told the hearing the policy report lays out a roadmap for various policy options but could not include specific dates or goals, because opposition from several countries would have prevented the committee from ever reaching agreement.

Bernthal characterized the discussions in the policy committee as a "reality check" revealing that many countries lag far behind the Europeans in terms of pushing for limitations on emissions. "In my judgment, a group of countries — to be quite candid, predominantly northern European countries — are in danger of losing [support from] a good part of the developing world in the way this issue is being pressed," he said.

The day before the Senate hearing, the West German cabinet took the most significant step yet by any major nation on this issue, approving a unilateral plan to cut 25 percent off West Germany's current yearly carbon dioxide emissions in the next 15 years. And in May, British Prime Minister Margaret Thatcher pledged to implement future reductions that would return U.K. emissions to their 1990 levels by the year 2005, "provided others are willing to take their full share."

Many environmentalists contend the United States — the world's largest emitter of carbon dioxide — should assume a leadership role in supporting specific reductions. Says Rafe Pomerance of the World Resources Institute in Washington, D.C., "The point is: How many more countries would be willing to move if the United States was willing to move?"

— R. Monastersky

Hypermutation: Evolutionary fast track?

Two years ago, Boston scientists committed an evolutionary heresy of sorts by suggesting that certain bacteria can mutate on demand to suit themselves (SN: 9/10/88, p. 166; 3/10/90, p. 149). Their research report, based on laboratory experiments, questioned a basic tenet of neo-Darwinian theory: that all mutations arise spontaneously without regard to environmental pressures.

Other researchers soon issued reports challenging the so-called "directed" mutation. Now, evolutionary biologist Barry Hall of the University of Rochester, N.Y., says he has evidence that refutes some of their doubts while suggesting a new explanation of how the bacteria accomplish "this very interesting and evolutionarily important trick."

Hall started with special strains of *Escherichia coli* that require external supplies of the amino acid tryptophan, but that have the potential to mutate in order to synthesize their own. He grew the bacteria in a culture medium provisioned with a three-day ration of tryptophan, then "starved" them of tryptophan for the next nine to 11 days. During that period, the numbers of bacteria mutating to produce their own tryptophan jumped 3- to 30-fold, he says.

Through a rigorous series of controls, Hall adds, he showed that this mutation did not arise before the tryptophan deprivation and did not occur in bacteria starved of a different amino acid, thus helping to refute some of the arguments raised against the 1988 experiments led by John Cairns at the Harvard School of Public Health.

"But the key thing I found," he told SCIENCE NEWS, "was that when I looked in those old colonies, I looked at other genes, and asked: Are there more mutations elsewhere? The answer was no."

"The phenomenon that Cairns describes is real," he asserts. "Mutations that occur more when they're useful than when they're not: That I can document any day, every day, in the laboratory."

Hall's findings will appear in the September GENETICS, along with his hypothesis to explain why only specific mutations would increase so dramatically. Hall proposes that some cells, when stressed by starvation, enter a "hypermutable" state in which mutations of all sorts abound; but only those cells with the specific mutation that solves the immediate problem (in this case, the inability to synthesize tryptophan) survive. The rest, no matter how useful their other mutations might be in the longer run, die before they have a chance to pass on those traits, he suggests.

But evolutionary scientists need not scrap their books just yet. "At the moment, this phenomenon has only been shown in bacteria," observes Cairns. "What about people? That, of course, is another ballgame altogether."

— W. Stolzenburg