

# Climate Protection Saves Lives Now

Diplomats who will be negotiating in Kyoto, Japan, next month for an aggressive new treaty to curb emissions of greenhouse gases received an unanticipated bargaining chip this week. An international analysis concludes that such climate protection policies could save hundreds of thousands of lives annually by 2020.

This preliminary study "shows that if sensible policies are taken on greenhouse gases, they will have benefits far beyond climate change prevention," says epidemiologist Tord Kjellstrom, director of the Office of Global and Integrated Environmental Health of the World Health Organization (WHO) in Geneva and an organizer of the team that conducted the analysis.

Moreover, notes coauthor Devra Lee Davis of the World Resources Institute in Washington, D.C., "these health benefits show up immediately—the year the policies are put in place."

Any controls that limit fossil fuel combustion, the major source of carbon dioxide—and the leading agent of global warming—also limit emissions of the traditional combustion pollutants, such as microscopic particles. When inhaled, these dustlike particulates can aggravate respiratory and heart diseases. Indeed, as concentrations of airborne particulates rise, so do death rates from these diseases (SN: 7/1/95, p. 5).

Last year, WHO issued a 400-page report on projected health impacts of climate change. It focused on problems associated with heat (SN: 4/6/96, p. 218) and only briefly acknowledged likely effects of particulates on health, Kjellstrom notes.

To investigate this issue, he and Davis teamed up with colleagues from a host of institutions, including the U.S. Environmental Protection Agency and the Harvard School of Public Health in Boston. Their Working Group on Public Health and Fossil-Fuel Combustion analyzed how fossil fuel use would drop if the European Union's proposed restrictions take effect (SN: 11/1/97, p. 277). In that proposal, industrial nations would cut greenhouse gas releases by 2010 to a level 15 percent below their 1990 emissions. The working group also assumed developing nations would slow their increase in greenhouse emissions to peak by 2010 at about 10 percent below where they would be if current trends continue.

The scientists plugged these estimates into computer programs that model how particulate concentrations change regionally and then tallied death rates, based

on associations seen in several recent health studies.

In the Nov. 8 LANCET, the working group predicts that "700,000 avoidable deaths will occur annually" from particulate exposures by 2020 "under the business-as-usual forecasts, when compared with the climate-policy scenario." The cumulative impact between 2000 and 2020 of not adopting sharp climate protection policies could be some 8 million premature deaths, most of them in developing countries, they say.

What makes this analysis special is its scope, says Richard Wilson, a physicist at Harvard University and adviser to the working group. "It's the first time that anybody has looked at this [particulates and health] issue globally."

Economist Dallas Burtraw of the Washington, D.C.-based Resources for the

Future has estimated the economic value of such health benefits for the United States. He finds that they could offset about 30 percent of the costs associated with new climate protection policies—and an even greater proportion of the costs in developing countries.

C. Arden Pope III of Brigham Young University in Provo, Utah, who has conducted many of the particulates and health studies upon which the LANCET analysis is based, hopes that people will not place too much weight on its estimates of lives that can be saved by climate policies. Those numbers are still preliminary and rest on substantial uncertainties.

"The heart of that paper is the framework it offers for understanding how important a public health issue the reduction of combustion[-generated] particulates is," he says. —J. Raloff

## Gamma-ray glow bathes Milky Way

A mysterious halo of gamma rays not associated with any known celestial objects extends thousands of light-years from the core of the Milky Way and may surround the entire galaxy, astronomers report.

"These gamma rays are providing the first evidence that some sort of high-energy process is occurring at large distances from the galactic core," says physicist David D. Dixon of the University of California, Riverside.

Analyzing data from the Earth-orbiting Compton Gamma Ray Observatory, Dixon and his collaborators have mapped the strength and extent of the gamma-ray halo. He presented the findings this week at a meeting of the High-Energy Astrophysics Division of the American Astronomical Society in Estes Park, Colo.

Another assessment of satellite data, slated for publication in the *ASTROPHYSICAL JOURNAL* early next year, also reveals the presence of an extended halo, says David L. Bertsch of NASA's Goddard Space Flight Center in Greenbelt, Md. Bertsch is an author of the forthcoming study.

The gamma rays forming the halo have energies up to a billion times that of visible light. One possible explanation of the gamma rays' origin, Dixon says, is that they are created when electrons traveling near the speed of light collide with lower-energy, infrared photons. Cosmic rays are a source of such electrons, and an aura of dim infrared photons around the Milky Way like those found recently around similar spiral galaxies could provide "seed photons."

The gamma-ray distribution may also provide indirect evidence of dark matter—the universe's missing mass, whose existence scientists have inferred but not yet demonstrated—Dixon says. According to one theory, some massive, dark-matter particles occasionally collide with each other and either generate gamma rays or produce particles that decay into gamma rays.

"The most likely explanation [for the extended halo] is that cosmic rays are boosting lower-energy photons to gamma-ray strength," asserts Bertsch. —S. Perkins

*In this 360° false-color image, the Milky Way's gamma-ray halo is shown in violet and blue. The horizontal yellow band depicts the plane of the galaxy. Bright spots located away from the galactic plane represent distant galaxies and other sources of gamma rays.*

