Cooling the Chemical Summer

A Call for Action

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The recent calculations and observations of scientists regarding the rapid buildup of destructive gases in the atmosphere should bring home to governments and ordinary citizens that, contrary to common conception, the atmosphere and climate are fragile. Except in parts of the world where the weather is traditionally variable and where life is lived close to the margin, most governments and most people take the stability of climate for granted. The conventional view, to this point, has been of an atmosphere resilient enough to absorb stresses of human origin without danger to existing ecosystems and the economies that depend on them.

Even more dangerous is a Panglossian view, encountered in some governmental quarters, that greater radiation and heat will be good for life on earth. These illusions must be rapidly dispelled.

The American public is gaining a new, realistic view of a fragile climate, thanks largely to landmark congressional hearings this past summer conducted by Senator John Chafee of Rhode Island, and to broad news coverage. The word is being spread on a global level as well, as a result of international scientific conferences being held by the Environmental Protection Agency and the United Nations Environment Programme. The message, however, requires persistent repeating by scientists, governmental officials, nongovernmental organizations, and ordinary citizens around the world.

To be sure, much of the scientific data is incomplete. Yet, the tip of the iceberg, which is visible, argues strongly for changing course now. As EPA Administrator Lee M. Thomas stated during the recent Senate hearings, with the health and environmental stakes so high, the world cannot afford the luxury of waiting for certainty. In fact, with the stakes so high, uncertainty argues most strongly for taking, not delaying, early action to curb emissions. How many unexpected surprises, like the appearance of a "hole" in the ozone layer over the Antarctic, can the world afford to risk?

Even though some degree of warming and ozone destruction are inevitable, the future extent of the damage is dependent on decisions to be made in the coming few years. The magnitude and timing of these changes are fully under human control.

Six chlorofluorocarbons (CFCs), three chlorinated solvents, and two bromine-containing halons are the dominant chemicals causing ozone depletion. These gases also account for at least a sixth of the heat absorbing capacity of the current atmospheric stock of greenhouse gases, and they are growing more rapidly than others.

Domestically, the Environmental Protection Agency is under a court-ordered deadline, reached in a settlement agreement with NRDC, to decide on CFC regulations in 1987. Internationally, the nations of the world will convene negotiations in Geneva in December to try reaching a worldwide CFC control agreement.

Up to this point, discussion has focussed on very modest measures. The options have ranged from letting CFC production continue essentially unabated for twenty more years, or, at most, to stabilizing production at current levels. But recent scientific findings make even current production levels unthinkable. Even at current levels, the amount of CFCs reaching the stratosphere will continue to increase. Given the gravity of both ozone depletion and climate warming, and given the difficulty of affecting emissions of other gases as rapidly, reductions in CFCs and related compounds clearly offer the best present opportunity to stave off calamity.

Consequently, NRDC supports rapid reductions in production of

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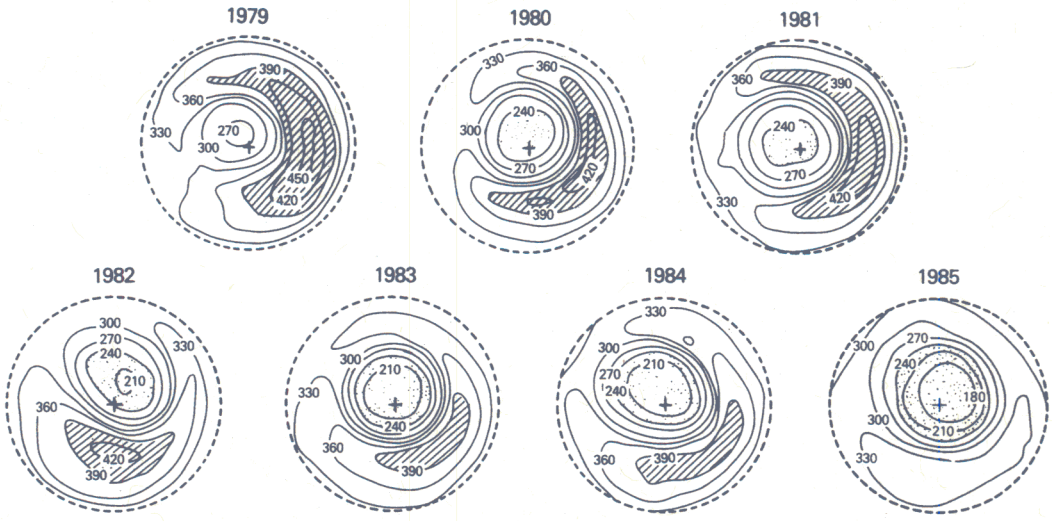
Chlorofluorocarbons

Although banned from aerosol cans in the United States, Canada, and Scandinavia, ozone depleting chemicals continue to be used for a variety of purposes throughout the world. In 1985, more than 1 million tons of chlorofluorocarbons (CFCs) and related compounds were used worldwide in a variety of products from automobile air conditioners to the boxes that keep hamburgers warm.

CFCs, which drift upward to the stratosphere where they remain relatively unaffected by ultraviolet light for decades, react chemically with and destroy the layer of ozone that shields plants and animals from ultraviolet radiation. Exposure to ultraviolet radiation causes sunburn, skin cancer, and damage to DNA in cells. CFCs are also "greenhouse" gases, responsible for about one-sixth of the global warming that is occuring.



Six-year sequence of October monthly means of ozone concentration over the South Pole and Antarctic Region, 1979-85, as obtained by NASA. South polar projections, with the pole indicated by a cross and 30° latitude by a dashed circle. Contours measure stratospheric ozone concentration and are given in Dobson units (DU). The lower values refer to the lower concentrations and the so-called "hole" in the ozone layer. (Source: NASA/Goddard Space Flight Center)

CFCs and related chemicals. We propose, both for domestic regulation and international agreement, a five-year 85 percent cut in permissible production of eleven compounds: CFC_{11}, CFC_{12}, CFC_{22}, CFC_{113}, CFC_{114}, CFC_{115}; $halon_{1211}$ and $halon_{1301}$ (used in fire extinguishers); carbon tetrachloride, methylene chloride, and methyl chloroform. Our goal is a total phaseout over ten years.

We emphasize that even with cuts of this magnitude, the level of ozone-destroying chemicals reaching the stratosphere will still increase. Preventing such increases would require an *immediate* 85 percent production cut. We propose a phaseout over time in order to accommodate economic needs. The proposed phaseout would allow time for development and deployment of safe substitutes for these chemicals. DuPont recently stated it could bring substitutes to market within five years.

Promising substitutes include substances such as CFC_{123} and CFC_{134A} for use in air conditioning units and refrigeration. They are safer, at least from a stratospheric ozone perspective, because they will break down in the lower atmosphere. Unfortunately, the major domestic producers of CFCs have done little work on development and toxicological testing of potential alternatives since the early 1980s. Currently available information indicates, nonetheless, that CFC_{123} and CFC_{134A} can be readily developed into feasible alternatives. According to domestic producers, they can be produced for three to six times the amount of CFC_{11} and CFC_{12}. The cost should decline with volume and time, but even if it does not, it still would amount to less than a $10 rise in the price of a refrigerator costing $500 or more.

Under our proposal, producers or users could earn partial credits against these production limits for advances in recovery, recycling, or destruction of CFCs and related compounds. Any such credits, however, would be granted only after rigorous demonstrations, with the burden of proof strongly on the applicant.

A market oriented phaseout should be supplemented with a ban on specific frivolous uses. In the United States, substantial strides have been taken to eliminate nonessential aerosol uses. But even here certain absurdities are still cherished. We ought to be able to reach reasonably quick agreement that the modest virtues of using CFC_{115} as a whipped topping stabilizer or CFC_{12} in chewing gum remover, boat horns, and pressurized drain cleaners should give way to protection of the atmosphere and climate.

Failing international agreement, the United States has considerable power as a major importing nation to implement a phaseout unilaterally. Legislation has been be proposed to phase out domestic production of CFCs. In order to protect domestic industry, as well as to promote reductions of emissions worldwide, such legislation would prohibit imports of CFC-derived goods from any nation which does not adopt an equivalent production phaseout.

A phaseout over this period would allow time for an orderly transition to other chemicals, other processes, and other end-products. Given the gravity of the situation, less cannot be justified.

Complex strategies are needed to comprehensively address CO_2 control. At least in the industrial-

ized world, the keystone of such strategies must be conservation and efficiency improvements in the generation and use of electric power, whence most CO_2 emissions come. Conservation and efficiency improvements offer an enormous opportunity to stabilize or even cut CO_2 emissions from industrialized nations' electric power generation.

Here are some startling statistics derived from the work of our NRDC colleagues Ralph Cavanagh and David Goldstein:

> The typical American office building is lit by electric lights that consume 6-9 kilowatt hours per square foot per year of electricity. State-of-the-art technology which is commercially available, with no sacrifice of reading ability or the other functions of lighting, can reduce consumption to 1.5 kilowatt hours per square foot per year.
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> Typical residential water heaters use 4500-6000 kilowatt hours per year of electricity; the state-of-the-art uses 800-1200 kilowatt hours per year.
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> A typical home using electric space heating in the Seattle, Washington, area consumes 8,500-15,000 kilowatt hours per year; the state-of-the-art is 13,50 kilowatt hours per year or less.
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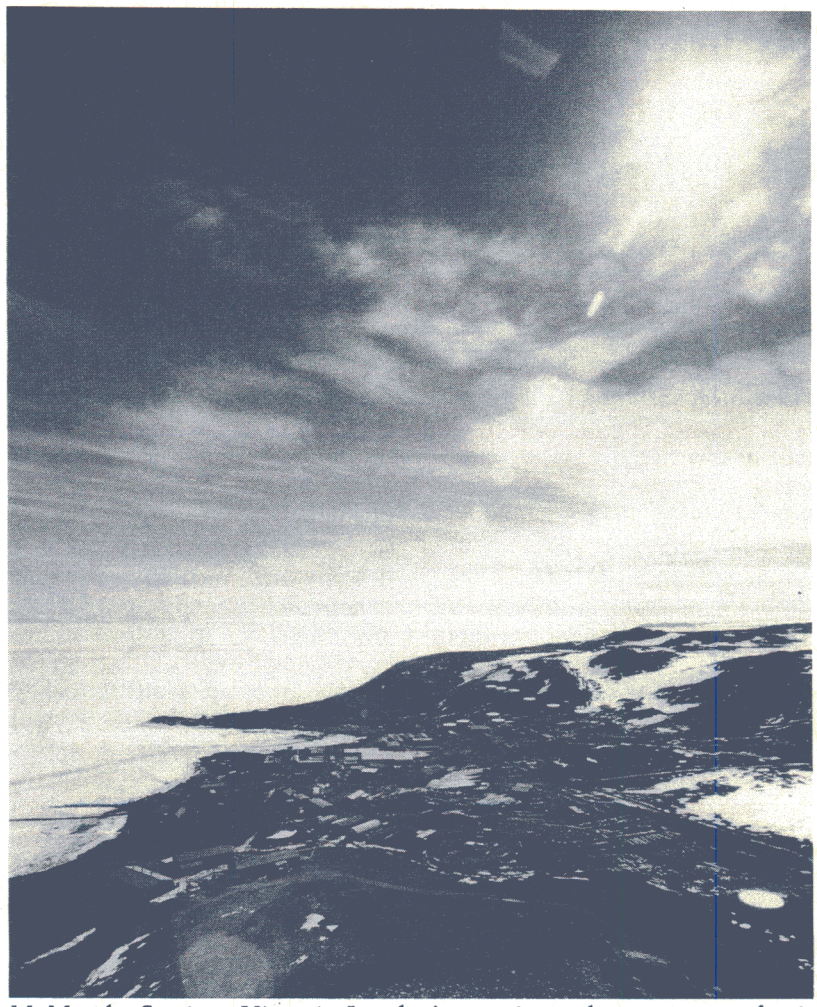
> A typical upright frost-free refrigerator uses 1,200 kilowatt hours per year; the state-of-the-art uses 180 kilowatt hours per year.

NRDC estimates that American residential and commercial electricity use can be cut in half by efficiency improvements such as these, while industrial use could be cut 25 percent. In California and in Pacific Northwest, utilities have invested more than half a billion dollars in residential efficiency improvements—buying efficient refrigerators instead of building new power plants. These efficiency investments, moreover, are clearly the cheaper. Measures such as these, applied nationwide, could substantially trim projected CO_2 emissions.

On the basis of these potential savings, we offer the outlines of a proposal for establishing "CO_2 budgets" for the utilities and industries of the United States. For a start, Congress should enact legislation requiring each utility to develop scenarios for alternative CO_2 futures, in conjunction with state regulatory authorities, EPA, and other agencies, through an open, objective public process. These scenarios should include low- and no-CO_2 growth futures, and they should place primary reliance on efficiency improvements and alternative energy sources, without increased dependence on nuclear power. Similar efficiency analyses should be required for major energy-consuming industries, including the transportation sector. Once the opportunities for saving energy through attractive conservation and efficiency investments are apparent, the public, industry, state governments, and Congress will be able to take concrete steps toward lower emissions of CO_2 and lower global warming.



Russ Kinne, National Science Foundation

McMurdo Station, Victoria Land, Antarctica, where a team of scientists sponsored by the National Science Foundation are currently studying the dramatic loss of ozone over the South Pole.

We do not delude ourselves that these proposals on CFCs and CO_2 are either fully worked out or sufficient alone. But the institutions of government, science, business, and other sectors must not be paralyzed by the enormity of the total ozone depletion and global warming problems. Rather, we must break these problems down and come to grips with as many of the pieces as possible, as fast as we can. Even if significant stratospheric and climatic change results, our efforts will have been justified, for surely we will know that without them, things would have been worse. □