

Perspective

Considerations on Governance for Climate Remediation
Technologies: Lessons from the “Ozone Hole”

Ambassador Richard Elliot Benedick¹

I. NO EARLY WARNING: THE OZONE CASE 6
 II. INTERNATIONAL GOVERNANCE: A NEW MODEL 7
 III. PROMOTING A COLLABORATIVE SPIRIT 8

I. NO EARLY WARNING: THE OZONE CASE

Nature does not automatically provide convenient early warning signals of an impending environmental catastrophe that might alert human society in time to undertake a measured moderation of anthropogenic stresses on the planet’s natural systems. As an example, the pre-industrial (i.e., natural) concentrations of chlorine in the Earth’s upper atmosphere was approximately 0.6 parts per billion, engendered by methyl chloride, a naturally occurring substance. Then, beginning in the 1930s, newly created man-made “wonder-chemicals,” chlorofluorocarbons (CFCs), began to find uses in an ever-expanding range of industries and processes. This led to gradual but persistent slight increases of measured chlorine in the stratosphere.

In the mid-1970s, a few scientists theorized that higher chlorine concentrations could possibly diminish or even destroy the natural layers of stratospheric ozone that shield all life on Earth from specific harmful wavelengths of ultraviolet radiation. (At first, their unproven theories were ridiculed; much later, Nobel Prizes were in order.) Gradually, but unremittingly, stratospheric chlorine concentrations did begin to increase: doubling and even tripling with no apparent effect on the stability of the ozone layer. Industry and ideological doubters downplayed the possibility of dangerous impacts on ozone from CFCs.

Then, in the early 1980s, with no advance warning, a totally unexpected seasonal collapse of ozone was detected over Antarctica. Even if the man-made ozone-depleting substances were to be gradually phased out, this phenomenon would continue for decades while natural processes slowly removed the chlorine. The decline in Antarctic ozone was not gradational but precipitous. Continuing minute increases in chlorine concentrations (fractions of one part per billion) had *not* caused any “early warning” alarm of a possible sudden ozone contraction.

¹ Ambassador Benedick, a career Foreign Service Officer, was chief U.S. negotiator for the 1987 Montreal Protocol on Substances That Deplete the Ozone Layer. He is currently President of the National Council for Science and the Environment, Senior Advisor to Pacific Northwest National Laboratory, and Visiting Fellow at the Wissenschaftszentrum Berlin. Benedick is a member of the National Commission on Energy Policy Task Force on Geoengineering, and participated in the 2010 Asilomar International Conference on Climate Intervention Technologies. His book, *Ozone Diplomacy, New Directions in Safeguarding the Planet* (Harvard University Press 1991, enlarged edition 1998), was selected by McGraw Hill for an anthology of the most influential environmental writing of the twentieth century.

Scientists later discovered chemical processes over Antarctica that triggered the unexpected ozone loss only when a specific level of chlorine presence was attained. If a phenomenon of these dimensions had occurred over populated areas, the resulting impacts on human, animal, and plant life would have been devastating.

II. A CLIMATE TIPPING POINT?

It begins to appear increasingly unlikely that the governments and industries of the world's major economies, including both industrialized and "developing" countries, as well as the oil-producing nations, are either politically or technically capable of achieving serious reductions in their emissions of anthropogenic greenhouse gases, chiefly carbon dioxide from modern energy, industrial, and agricultural activities to support growing populations.

Unfortunately, it cannot be excluded that the continuing build-up of these gases in the Earth's atmosphere might not engender gradual changes in climate, but rather reach some unpredictable "tipping point"—analogous to the Antarctic "Ozone Hole"—that would unleash sudden catastrophic regional or global climate reactions: persistent severe droughts, heat waves, changes in monsoon patterns, sea-level rise, wildfires, flooding, monster storms.

In light of this possibility, many responsible scientists have begun to investigate theoretical responses to sudden catastrophic climate changes. Such "climate response" efforts, which have also been characterized as "geoengineering" or "climate remediation," could be aimed at: (a) rapidly removing carbon from the atmosphere, or (b) artificially shielding the planet from excessive solar heat radiation. *Climate remediation* could therefore be considered as a possible supplementary action in the event that climate mitigation and climate adaptation measures prove insufficient.

Deployment of anthropogenic climate remediation techniques might prove to be a last resort to avoid great loss of life, but it also raises important ethical questions. To prevent risky, inadequately tested, or purely profit-motivated interventions in planetary processes, a rigorous and comprehensive development, screening and testing system for proposed climate remediation technologies is imperative. A governance model is essential: if we are to err, we must err on the side of caution.

The U.S. program could comprise a consortium of federal agencies (e.g., Department of Energy, Department of State, Environmental Protection Agency, National Academy of Sciences, National Aeronautics and Space Administration, National Oceanic and Atmospheric Administration, National Science Foundation), in collaboration with recognized and experienced scientists and experts from universities, scientific and research institutes, respected civil society organizations, and industry. This would be familiar territory, similar to the process that led to the 1987 Montreal Protocol on Substances that Deplete the Stratospheric Ozone Layer. The program should be designed on the one hand to inhibit and counteract emotional fear-mongering by groups or individuals seeking to gain public attention (as occurred in the early experience with nuclear energy and human genome research), and on the other hand to control and forestall unripe, risky or chiefly profit-oriented schemes.

III. INTERNATIONAL GOVERNANCE: A NEW MODEL

Because the Earth's climate transcends national boundaries, an international dimension of cooperation and collaboration in theoretical research, development, testing and possible deployment of climate remediation projects is indispensable. We should, however, avoid

repeating the “politically correct” United Nations universal treaty negotiation syndrome, as exemplified by the Kyoto-Copenhagen-Cancun process addressing the climate change issue. During fifteen years of annual megaconferences and dozens of inter-sessional ad hoc working groups involving thousands of diplomats, politicians, and specialists from over 190 nations, the Kyoto Protocol “negotiated” bookshelves of convoluted texts and resolutions, but failed to achieve consensus on any actual greenhouse gas reductions. The process itself encouraged rhetoric and political posturing as opposed to specific new policies and actions. A further obstacle was the insistence by numerous developing nation governments on being granted large financial transfers as a condition for their “cooperation.” Such financial ambitions, combined with short-term nationalistic concerns, would doubtlessly similarly complicate, and inhibit, any attempt to design an effective United Nations-sponsored climate remediation or geoengineering “treaty.”

As an alternative, I propose U.S. scientific and policy collaboration on geoengineering research and implementation with a geographically broad but numerically limited number of governments. Membership in a proposed *Climate Remediation Policy Council* would be based on considerations of a nation’s general scientific infrastructure, its objectively-ranked standing in earth and planetary sciences, its record of climate mitigation efforts, and geographical balance. Such a council could include (alphabetically): Australia, Belgium, Brazil, Canada, China, Denmark, Egypt, France, Germany, India, Italy, Japan, Mexico, the Netherlands, Nigeria, Norway, Poland, Russia, South Africa, South Korea, Spain, Sweden, Switzerland, the United Kingdom, and the United States. This list of twenty-five countries is not immutable; scientists and government officials from additional nations could eventually become involved in specific activities within the process, based on their particular expertise or potential contributions. The deliberations would not resemble treaty negotiations, but rather would serve as a collegial council to test and exchange ideas, to soberly reflect on risks of action and of inaction, and to develop principles and guidelines for collaborative research, field testing and possible eventual deployment.

IV. PROMOTING A COLLABORATIVE SPIRIT

The Council’s objective would *not* be to negotiate a treaty, but rather to forge a community of mutual trust and commitment among government policymakers, scientists, and civil society across international borders. The desired result would be a generally agreed-upon set of guidelines, together with a process for ongoing consultation and collaboration among the parties. The scientific academies and relevant government agencies of the countries represented on the Council—which traditionally administer major research grants—would stimulate and finance a serious international research effort sensitive to legitimate concerns of transparency, peer review, caution, and potential effectiveness.

Hopefully, the relatively small group of participants would engender a collegial atmosphere similar to the now-famous “*Spirit of Montreal*” that evolved with the original 1987 Montreal Protocol on protecting the stratospheric ozone layer. Starting with only a handful of governments and about forty(!) individuals, this “Spirit” of commitment and mutual trust was in subsequent years repeatedly invoked even by new generations of negotiators. Throughout a period of more than two decades, the original Montreal Protocol was substantially redesigned and strengthened on the basis of new scientific evidence and technological innovation spurred by ever more stringent Protocol targets. Notwithstanding that, over time, many additional nations

formally ratified the treaty and numerous new individual diplomats and scientists joined the ongoing treaty revision process; a spirit of common interest prevailed.

Precedents do exist for informal cooperation among a relatively small number of committed governments on complex subjects with far-reaching international or global implications. Among successful intergovernmental models that did *not* rely on United Nations procedures or a “universal treaty format” are the agricultural “Green Revolution,” smallpox eradication, cooperation on space programs, malaria control, the European Centre for Nuclear Research (CERN), the Groups of Eight and Twenty, the Helsinki Accords, and the Organization for Economic Cooperation and Development (OECD).

Initially, informal intergovernmental contacts on a Climate Remediation Policy Council should be undertaken by the United States and the United Kingdom (whose Royal Society is already actively engaged in the subject), together with a few other governments, in order to explore modalities while gradually convening a larger group.