Institute for Governance & Sustainable Development

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Contact: Alex Viets, IGSD: +1 213 321 0911 (+45 5232 2386, Copenhagen mobile)
aviets@igsd.org

Cutting Non-CO_2 Pollutants Can Delay Tipping Points for Abrupt Climate Change

Washington, D.C., December 7, 2009 – At the opening of the UN climate negotiations in Copenhagen, a *Special Feature* on climate tipping points appearing in the *Proceedings of the National Academy of Sciences* (*PNAS*), presents compelling evidence that the world is edging ever closer to passing dangerous thresholds for abrupt and irreversible climate changes.

The *Special Feature* also includes a more optimistic account by Nobel Laureate Dr. Mario Molina and colleagues describing how these tipping points can be delayed by reducing non-CO_2 climate change agents such as black carbon soot, tropospheric ozone, and hydrofluorocarbons (HFCs), as well as expanding bio-sequestration through biochar production.

"Tipping Elements in the Earth System" is a compilation of articles reviewing the state of various earth system components and how they are being affected by climate change, including: the response of the Atlantic Ocean to an increasing flow of freshwater into its system; changes in monsoon patterns; the potential release of significant amounts of methane from the ocean floor; the warming and acidification of the ocean; dust storms in the Sahara; the dieback of the Amazon rainforest; and the melting of the Greenland and West Antarctic ice sheets.

"The research presented here underlines that a rise of the global mean temperature beyond two degrees Celsius might push the world into singular-change terrain and therefore needs to be avoided," said Prof. Hans Joachim Schellnhuber, Director of the Potsdam Institute for Climate Impact Research and editor of the *Special Feature.*

While the central focus of the Copenhagen meetings will be on reducing emissions of CO_2, these non-CO_2 climate forcing agents should also be on policymakers' radars:

"Cutting CO_2 emissions is essential, but it won't produce cooling fast enough to avoid passing tipping points for abrupt climate change," said Durwood Zaelke, President of the Institute for Governance & Sustainable Development, and co-author of the Molina paper. "With the world already committed to more than 2˚C of warming, we need these fast-action strategies to put the brakes on climate change, and in the case of biochar, put us in reverse by reducing existing atmospheric concentrations of CO_2."

"Cutting HFCs, black carbon, tropospheric ozone, and methane can buy us about 40 years before we approach the dangerous threshold of 2˚C warming," added co-author Professor Veerabhadran

Ramanathan, a Distinguished Professor of Climate and Atmospheric Sciences at Scripps Institution of Oceanography at the University of California, San Diego.

HFCs are powerful greenhouse gases controlled under the Kyoto Protocol, which by 2050 could equal up to 19 percent of global CO_2 emissions under business-as-usual scenarios. The Parties to the Montreal Protocol ozone treaty came forward this year, under the leadership of small island states, Micronesia and Mauritius, along with the U.S., Mexico, and Canada, proposing to phase-down production and consumption of HFCs under the ozone treaty, while keeping the emissions under Kyoto. Creating this synergy between the two treaties on a major greenhouse gas would help solve a large chunk of the climate problem quickly and cost-effectively. The Parties in Copenhagen now have the opportunity to send a signal to the Montreal Protocol and provide the ozone Parties with a mandate to address HFCs in 2010.

"The Montreal Protocol has already delayed climate change by seven to 12 years, and put the ozone layer on the path to recovery later this century," said Dr. Mario Molina, who shared the Nobel Prize in chemistry for his path-breaking work in 1974 that sounded the alarm on ozone-depleting CFCs. "The Montreal Protocol is critical for avoiding abrupt climate change. We have to take advantage of the proven ability of this legally binding treaty to quickly phase down HFCs."

A neglected fast-action strategy presented in the paper is reducing black carbon soot, an aerosol produced largely from the incomplete combustion of diesel fuels and biofuels, and from biomass burning. It is now considered to be the second or third largest contributor to climate change.

"If we reduce black carbon emissions worldwide by 50 percent by fully deploying all available emissions-control technologies, we could delay the warming effects of CO_2 by one to two decades and at the same time greatly improve the health of those living in heavily polluted regions," said Dr. Ramanathan.

Like black carbon, ground level or tropospheric ozone doubles as a major climate forcer and health hazard. It also lowers crop yields. A recent study reported that ozone's damage to crop yields in 2000 resulted in an economic loss of up to $26 billion annually. Reducing tropospheric ozone by 50 percent could buy another decade's worth of time for countries to start making substantial cuts in CO_2.

Biochar is one of the few promising "carbon-negative" strategies that can draw down existing concentrations of CO_2. The fine-grained charcoal product is a stable form of carbon that can be plowed into soil where it remains for hundreds to thousands of years, also serving as a natural fertilizer. Biochar comes from cooking biomass waste at low temperatures with minimal oxygen—a process called pyrolisis. "The other fast-action strategies can quickly mitigate emissions, but to back away from the cliff of abrupt climate change, we need biochar and other carbon-negative strategies," said Zaelke.

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The Potsdam Institute press release: http://www.pik-potsdam.de/news/press-releases/tipping-elements-in-the-earth-system-how-stable-is-the-contemporary-environment?set_language=en