Fixing climate: Beyond carbon dioxide

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Coal mines are a major source of methane, an important greenhouse gas

Climate scientists at a meeting of the American Association for the Advancement of Science this week were elated to hear that the United States and five other countries had agreed to work toward cutting pollutants other than carbon dioxide thought to cause about a third of current human-influenced global warming. After all, many of them had done the work that led directly to the pact, by showing the effects of such substances, and how emissions might be reduced.

At the meeting, a session on-carbon dioxide greenhouse gases and aerosols drilled into details not touched in the announcement by U.S. Secretary of State Hillary Clinton. Among the presenters was atmospheric scientist Arlene Fiore of Lamont-Doherty Earth Observatory, who examined the role of methane—the major non-CO2

pollutant–and the complexities of dealing with it.

Since preindustrial times, manmade emissions of methane and ozone (into which methane eventually degrades) have increased the energy of earth's surface by about a watt per square meter, according to the most recent estimates. Carbon dioxide, the main source of warming, has added about 1.6 watts per square meter. Aside from quantity, the difference, says Fiore, is that once in the air, carbon dioxide remains for centuries–but methane lasts only about 10 years, before breaking down or otherwise dropping out. Thus, cutting methane offers a fast track to reducing future warming (combined with cuts in other short-lived pollutants including soot and hydrofluorcarbons, half a degree C by 2050, says a recent paper in the journal Science led by another Earth Institute scientist, Drew Shindell).

About the only good side effect of global warming is that higher temperatures will probably cause methane to degrade faster–but only by about 5 percent, said Fiore; so that won't help much. Furthermore, mounting heat on earth's surface will almost certainly cause increased emissions of methane from wetlands and permafrost, where vast quantities of it are stored naturally—though how much is unclear she said. As for ozone—a major component of unhealthy urban smog—there are opportunities to reduce it on local, as well as global levels, she said. Cutting emissions would be a "win-win," she said, as it would not only reduce warming, but improve air quality over U.S. cities. "Reducing methane is good for both climate and air quality," she said. Fiore and others are working to see how much certain U.S. regions might improve their air quality, but this so far is not clear either; for instance, some climate models show increased stagnation of air over cities as it gets warmer, which would stymie some of the benefits.

Scientists working in this area are often careful to note that dealing with them is no substitute for confronting reducing carbon dioxide. Indeed,

while the non-CO2 pollutants were in the news this week, the session was lightly attended;. Concurrently, right around the corner, a series of talks on reducing CO2 to preindustrial levels was packed, and overflowing out into the hallway. Here, James Hansen of the NASA Goddard Institute for Space Studies and others argued that atmospheric CO2 must be brought back to about 350 parts per million—the level it was at before around 1800—in order to avoid huge sea-level rises, crop failures and other catastrophes . It is now up to 393, but so far there appears to be little political will to do much about it.

By contrast, people like Shindell and Fiore, working on the non-CO2 aspects, have gotten relatively quick results, assuming nations follow up on the pact. “I hadn’t realized the initiative would be announced this week when I wrote the talk,” said Fiore. “It’s exciting to see a policy response to science we’ve been doing for the past 10 years.”

In California’s Death Valley, death is looking just a bit closer. Geologists have determined that the half-mile-wide Ubehebe Crater, formed by a prehistoric volcanic explosion, was created far more recently than previously thought—and that conditions for a sequel may exist today.

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