CLEAN AIR COOL PLANET

ARCTIC FACT SHEET

The Role of Short-lived Pollutants in Arctic Warming

The Arctic is in crisis due to recent unprecedented warming. Arctic temperatures have increased at almost twice the average global rate, with recently observed results including earlier and longer melt seasons, increasing melt from Greenland's ice sheet, and large reductions in summer sea ice.

Arctic haze over Svalbard, 2006. Photo by Ann-Christine Engvall, Courtesy of AMAP, Arctic Monitoring and Assessment Programme.

These unexpectedly rapid changes have given rise to concerns that the Arctic may be approaching one or more so-called "tipping points" with potentially significant impacts, including increased sea level rise and methane release from melting permafrost, the consequences of which would reach far beyond the Arctic region itself. The drastic change in ice and snow conditions is already showing effects on ice-dependent species, such as polar bears, walrus, and snow seals, and is presenting severe challenges to local and indigenous communities through the Arctic.

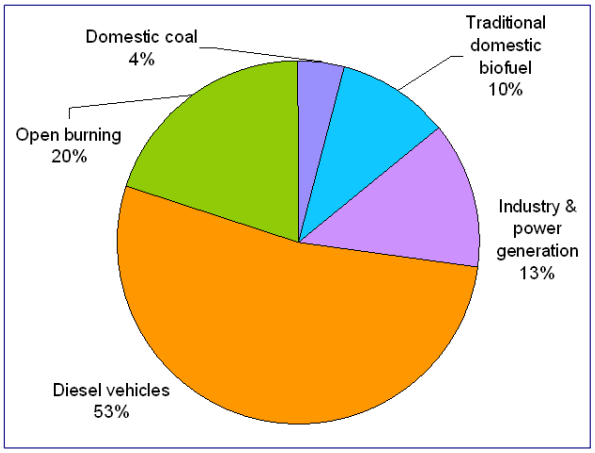
Most discussions on steps to slow global warming have focused on reducing carbon dioxide emissions. Indeed, an effective and expeditious global effort to reduce CO_2 emissions is the only hope for the long-term survival of the Arctic. Unfortunately, even successful controls on CO_2, which remains in the atmosphere for a century or more, will do little for the Arctic in the near term.

But several other substances – notably black carbon, tropospheric ozone, and methane, a relatively short-lived but potent GHG – collectively have roughly the same temperature impact on the Arctic as CO_2. These substances have come to be called 'short-lived forcers' (SLFs) because of their climate impact, and also because they only persist in the atmosphere for a fraction of the time that CO2 does. For this reason, reducing SLF emissions can have a relatively short-term effect on the concentration of SLFs in the atmosphere, thus reducing near-term radiative forcing, and slowing warming. This could "buy time" for the Arctic by slowing warming and giving the region more time for the benefits of CO_2 reductions to take effect.

Black Carbon and Other Short-term Arctic Climate Forcers

Black carbon or "soot" is produced through the combustion of fossil fuels such as coal and diesel, by the burning of crop residues, and through the use of wood and dung for cooking. Black carbon consists of small, dark particles that rise into the atmosphere as a result of incomplete or inefficient combustion. These tiny particles can travel large distances and some and some end up in the Arctic. Black carbon warms the Arctic in two ways. First, it absorbs heat in the atmosphere, contributing to overall global warming that also warms the Arctic. Second, it is deposited on snow and ice, making the surface darker, less reflective and more heat absorbent, resulting in additional melting. Unlike CO_2, black carbon typically stays in the atmosphere for only days to weeks. Once it is deposited on snow and ice, however, its effect lasts much longer.

Although a large fraction of global black carbon comes from sources in developing countries, most of the black carbon actually deposited in the Arctic comes from northern countries. As a result, control of the main sources (primarily diesel and biomass burning) in the Arctic Council member states and near-Arctic nations could have a large and potentially rapid impact in slowing Arctic warming. Because global black carbon emissions are a significant player in overall global atmospheric warming as well, early action focused on Arctic nations has the capacity to serve as a model for more widespread efforts.



Estimated sources of black carbon in Arctic Council States and the European Union
Source: Tammy Bond, 2006.

Tropospheric (ground-level) ozone, better known as "smog," is emitted from a variety of industrial and mobile sources. Ozone serves as a blanket, trapping heat throughout the northern hemisphere; it is also transported to the Arctic from northern hemisphere sources, where it increases autumn through spring, speeding the springtime melt.

Methane, emitted from a variety of industrial, agricultural and solid-waste sources, is 20 times more potent than CO_2 in warming the planet and is second only to CO_2 in total effect. Because methane has a shorter atmospheric lifetime (8-10 years) and a greater climate potency than CO_2, reducing worldwide methane emissions will have a particularly important near-term benefit in the Arctic. In addition, methane contributes to tropospheric ozone formation, which means that global methane reductions will have an added cooling impact by reducing Arctic warming from ozone.

Policy Efforts

Clean Air - Cool Planet's Climate Policy Center and the Clean Air Task Force are engaged in an intensive effort to focus world attention on the contribution of short-lived pollutants to Arctic warming, and to help craft an effective response strategy. To date, we have convened three intergovernmental meetings for scientists and government officials, and worked with the eight-nation Arctic Council and its Arctic Monitoring and Assessment Program (AMAP) to develop in-depth scientific and policy assessments of the impact of SLFs and to explore potential strategies for reducing SLF emissions. The meetings produced a summary with 10 potential actions for formal Council consideration and possible integration into national, regional and multilateral policies. They include specific mitigation measures (such as reduction of springtime agricultural burning in Arctic nations to decrease deposition of black carbon), as well as additional research actions and outreach to other international bodies such as the International Maritime Organization and UNFCCC.

The Council considered these recommendations further first at the Arctic Deputy Ministers meeting mid-October 2008 in Tromsø, Norway, followed by a meeting of the AMAP national Heads of Delegation and the Arctic Council Senior Officials (SAO) in northern Norway in mid-November. Secretary of State Clinton referenced the role of short-lived pollutants in accelerating Arctic warming in her April 6 speech to the Arctic-Antarctic Joint Ministerial in Washington. At the Tromsø Ministerial meeting in April, the foreign ministers of the A-8 focused sustained attention on the need to take action to reduce emissions of SLFs both at home and on a global basis. Such action was considered as one of the primary means available to slow the process of Arctic warming, the loss of summer sea ice, and the melting of the Greenland Ice Sheet. The ministers approved the creation of a Task Force on SLFs, and also committed to take early action to reduce SLF emissions in the near-term. This commitment is the first concerted effort among governments to work together to reduce black carbon, methane, and tropospheric ozone in order to achieve benefits for the earth's climate.

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