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CLIMATE AND CLEAN AIR COALITION TO REDUCE SHORT-LIVED CLIMATE POLLUTANTS

SCIENTIFIC ADVISORY PANEL 2013 ANNUAL SCIENCE UPDATE

EXECUTIVE SUMMARY

This report provides basic information about short lived climate pollutants (SLCPs) as well as new scientific findings relevant to policy.

What do the Latest Scientific Findings say about the Actions Undertaken by the CCAC?

Multiple recent studies indicate that the benefits of targeted actions to reduce SLCPs may be even larger than previously estimated owing to greater climate impacts of black and brown carbon, greater leak rates of methane, and additional long-term impacts of SLCP mitigation that increase the urgency of reductions. The latest estimates of the health impact of particulate matter reinforce the importance of emissions reductions for public health, especially of women and children in developing nations.

Which substances are short-lived climate pollutants?

SLCPs are a subset of climate forcers with a lifetime in the atmosphere of 15 years or less, which include: black carbon, methane, tropospheric ozone, and some hydrofluorocarbons (HFCs).

How are SLCPs different from CO2 and other long-lived greenhouse gases?

The most important difference between SLCPs and long-lived greenhouse gases, such as CO_2 and N_2O, is that SLCPs have a much shorter lifetime in the atmosphere. This means that if emissions of SLCPs are reduced, their atmospheric concentrations will decrease in a matter of weeks to years, with a noticeable effect on global temperature during the following decades. Comparatively, while 50-60% of CO_2 is removed from the atmosphere in the first hundred years, as much as 25% will remain for many millennia accumulating in the atmosphere with a long legacy effect. Hence, reducing SLCPs will slow the near- term rate of warming, but deep and persistent cuts in CO_2 and other long-lived greenhouse gases are necessary to stabilize global temperature rise through 2100 and beyond. Aside from HFCs, the SLCPs are also air pollutants (or precursors of air pollutants) with serious adverse impacts on human and ecosystem health (including crop and forest yields).

How much can SLCP reductions slow global warming?

Black carbon and methane are emitted from a variety of natural and anthropogenic sources, a 2011 UNEP/WMO assessment identified a set of 16 optimal measures, out of 130 existing controls, which if realized worldwide can reduce 90% of the total mitigation potential of the 130 measures from black carbon, methane, and tropospheric ozone (these measures include immediately feasible actions such as upgrading brick kilns, installing particle filters on diesel vehicles, and recovering fugitive methane from energy facilities). Implementing these measures in all parts of the world by 2030 can slow the speed of global warming between now and 2050 by half, relative to a reference case with no reductions beyond current policies. Globally this means that temperatures in 2050 would be 0.5°C lower than the reference value, and even lower in the Arctic.

HFCs, widely used as refrigerants and propellants, are a small contributor to global warming today, but are the fastest-growing emissions of greenhouse gases (increasing by 10% to 15% annually) in many countries and regions, including the United States, the European Union, China, and India. A recent study concluded that replacing high-GWP HFCs with more climate-friendly alternatives can avert 0.1°C of warming by 2050 relative to a reference case with uncontrolled growth in HFCs. The avoided warming from replacing high-GWP HFCs is additional to the benefit of cutting black carbon, methane, and tropospheric ozone.

What are the near-term climate benefits SLCP mitigation?

Slowing the rate of near-term climate change reduces its impacts on those alive today. It will reduce biodiversity loss, provide greater time for adaptation to climate change, and reduce the risk of crossing dangerous climate thresholds (e.g. the melting of permafrost which leads to the further emissions of greenhouse gases). Reducing SLCPs is very likely to have the additional benefits of reducing the disruption of rainfall patterns caused by particle pollution, and slowing the melting rate of ice and snow in the Arctic and high elevation regions caused by the deposition of black carbon particles.

What are the long term climate benefits of SLCP mitigation?

New studies are showing that reducing SLCPs can also have long term benefits. Although stringent reductions of CO_2 and other long-lived greenhouse gases are needed to avoid a substantial rise in sea level, one set of model experiments showed that cutting SLCPs could reduce cumulative sea level rise by as much as 22% at the end of the century relative to long-term uncontrolled SLCP emissions. Delayed reductions in SLCPs substantially reduced this benefit. Slowing the near-term rate of warming would also provide long-term benefits by slowing the decline in carbon uptake projected to occur in response to warming. These long-term benefits increase the urgency of reducing SLCPs.

What are the other benefits of reducing black carbon and methane?

SLCPs also differ from CO_2 and other long-lived greenhouse gases in that black carbon and tropospheric ozone are important air pollutants and methane contributes to as much as two-thirds of tropospheric ozone production. Black carbon and co-emissions have a particularly large impact on public health because they make up a substantial part of indoor and outdoor particle pollution. A study just published by several universities and the WHO ("The Global Burden of Disease") reported that indoor air pollution is the fourth most important contributor to the global burden of disease and outdoor air pollution the ninth. If women are considered separately, indoor air pollution is the second most important cause of poor health.

Therefore, reducing SLCPs will reduce threats to public health and food security related to air pollution. If the 16 black carbon-related and methane measures are fully implemented, then the reduced air pollution by 2030 will save around 2.4 million air pollution related deaths each year and about 50 million tonnes of crop losses each year, relative to a reference case.

Important new information on sources of SLCP emissions and their impacts

New information useful to policymaking is becoming available about the SLCP sources and impacts:

- Gas flaring in the Arctic is now realized to be a more important source of black carbon particles in the Arctic than in earlier estimates. The deposition of these particles is known to contribute to the accelerated melting of ice.
- The kerosene lamps commonly used in households in South Asia, Africa, and parts of Latin America have been confirmed to be a major source of indoor black carbon air pollution in these regions. Controlling this source would not only reduce air pollution, but also bring regional and global climate benefits. And of particular interest to policymaking, experts note that affordable alternatives to kerosene lamps are already available. A comprehensive view of residential energy use would help identify optimal methods to lower emissions associated with cooking, heating and lighting.
- New information shows that diesel generators are an important source of black carbon emissions in countries where public power supply lags behind electricity demand (e.g. India, Nepal and Nigeria).
- New evidence confirms that reducing black carbon emissions from diesel engines (both generators and vehicles) and some types of cook stoves provides clear climate benefits.
- Recently published data from the US indicate greater leakage of methane from energy facilities than earlier suspected. This includes emissions from fossil fuel production facilities in the Gulf of Mexico and from distribution systems in the LA basin, and suggests leakage rates may be underestimated in most countries.