IEAGHG Information Paper: 2017-IP34; New Threat to Ozone Layer Could Undermine Gains made by Montreal Protocol to date

The Montreal Protocol on Substances that Deplete the Ozone Layer (a protocol to the Vienna Convention for the Protection of the Ozone Layer) is an international treaty designed to protect the ozone layer by phasing out the production of numerous substances that are responsible for ozone depletion. The Montreal Protocol is considered to be the single most successful international agreement to date. Its singular success is in addressing the problem it was set up to fix – a growing hole in the earth's ozone layer over Antarctica, and to a lesser extent the Arctic. Due to the actions of the Montreal Protocol parities and the phasing out of ozone depleting chemicals life CFCs, the holes have started to close, although experts consider it will take more than 30 years to restore the health of the ozone layer to where it was in 1980.

In IP 2015-18 IEAGHG reported that HFCs (the successor chemicals to CFCs) were now included under the Montreal Protocol.
See: www.ieaghg.org/docs/General_Docs/Publications/Information_Papers/2015-IP28.pdf

New research suggests that rising atmospheric levels of the industrial solvent, dichloromethane (DCM) could offset the successes of the Montreal Protocol achieved to date. Rapidly increasing use of the industrial solvent DCM is leading to the chemical accumulating in the stratosphere where it could set the recovery of the ozone layer back by 30 years, atmospheric chemists have found.

Unlike long-lived ozone-depleting chemicals, such as chlorofluorocarbons (CFCs), DCM production is not currently controlled by the 1987 Montreal protocol. Although DCM reacts with ozone, its half-life in the stratosphere is much shorter than for CFCs, a matter of months rather than years.

However, DCMs use is increasing. As a common industrial solvent, it has a wide variety of applications. It is an ingredient in paint stripper, used for metal cleaning and degreasing or as a chemical feedstock to produce drugs and other chemicals. Its use in developing countries is rising as they develop their chemical and pharmaceutical industries.

Scientists at the Lancaster Environment Centre, Lancaster University, UK have become aware that dichloromethane was increasing in the atmosphere, though the implications for stratospheric ozone and future recovery of the ozone layer were initially unknown. Their research has been published in Nature Communications see: https://www.nature.com/articles/ncomms15962

The scientists used atmospheric data from the NOAA[1] to calculate the rate at which DCM levels have increased in the stratosphere, and it was found that the concentration of DCM has approximately doubled since the turn of the millennium. They then used computer simulations to model the effect future increases might have on the ozone layer. This showed that for a scenario in which DCM remained at present day levels throughout coming decades (i.e. no further increases), the return of Antarctic ozone to pre-1980 levels was delayed by five years. If, However, they assumed dichloromethane growth continued into the future, at the mean rate observed over the 2004–2014 period, then the delay was 30 years. Even if DCM is taken out of the simulation altogether, the date of ozone returning to pre-1980 levels comes out at 2065, raising the possibility that if DCM usage increases more rapidly than the current rate, it could push the recovery date into the next century.

The message from the research id clear. Policymakers need to take note, and DCM needs to become regulated under the Montreal Protocol soon.

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05/07/2017

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1 National Oceanographic and