

# Beyond CO<sub>2</sub>: Study reveals growing importance of HFCs in climate warming

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Some of the substances that are helping to avert the destruction of the ozone layer could increasingly contribute to climate warming, according to scientists from NOAA's Earth System Research Laboratory and their colleagues in a new study published today in the journal *Proceedings of the National Academy of Sciences*.

The authors took a fresh look at how the global use of hydrofluorocarbons (HFCs) is expected to grow in coming decades. Using updated usage estimates and looking farther ahead than past projections (to the year 2050), they found that HFCs—especially from developing countries—will become an increasingly larger factor in future climate warming.

"HFCs are good for protecting the ozone layer, but they are not climate friendly," said David W. Fahey, a scientist at NOAA and second author of the new study. "Our research shows that their effect on climate could become significantly larger than we expected, if we continue along a business-as-usual path."

HFCs currently have a climate change contribution that is small (less than 1 percent) in comparison to the contribution of carbon dioxide (CO<sub>2</sub>) emissions. The authors have shown that by 2050 the HFCs contribution could rise to 7 to 12 percent of what CO<sub>2</sub> contributes. And if international efforts succeed in stabilizing CO<sub>2</sub> emissions, the relative climate contribution from HFCs would increase further.

HFCs, which do not contain ozone-destroying chlorine or bromine atoms, are used as substitutes for ozone-depleting compounds such as chlorofluorocarbons (CFCs) in such uses as refrigeration, air conditioning, and the production of insulating foams. The Montreal Protocol, a 1987 international agreement, has gradually phased out the use of CFCs and other ozone-depleting substances, leading to the development of long-term replacements such as HFCs.

Though the HFCs do not deplete the [ozone layer](#), they are potent greenhouse gases. Molecule for molecule, all HFCs are more potent warming agents than CO<sub>2</sub> and some are thousands of times more effective. HFCs are in the "basket of gases" regulated under the 1997 Kyoto Protocol, an international treaty to reduce emissions of greenhouse gases.

The new study factored in the expected growth in demand for air conditioning, refrigerants, and other technology in developed and developing countries. The Montreal Protocol's gradual phasing out of the consumption of ozone-depleting substances in developing countries after 2012, along with the complete phase-out in developed countries in 2020, are other factors that will lead to increased usage of HFCs and other alternatives.

Decision-makers in Europe and the United States have begun to consider possible steps to limit the potential climate consequences of HFCs. The PNAS study examined several hypothetical scenarios to mitigate HFC consumption. For example, a global consumption limit followed by a 4 percent annual reduction would cause HFC-induced climate forcing to peak in the year 2040 and then begin to decrease before the year 2050.

"While unrestrained growth of HFC use could lead to significant [climate](#) implications by 2050, we have shown some examples of global limits that can effectively reduce the HFCs' impact," said John S. Daniel, a

NOAA coauthor of the study.

Source: NOAA

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