



Ozone Layer Protection

You are here: [EPA Home](#) » [Ozone Layer Protection](#) » Stratospheric Ozone Protection and Climate Change

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Ozone-Depleting Substances Have High Global Warming Potential

Global warming potential (GWP) represents how much a given mass of a chemical contributes to global warming over a given time period compared to the same mass of carbon dioxide. Carbon dioxide's GWP is defined as 1.0. Many ozone-depleting substances have high GWPs. For example, CFC-12 has a GWP around 10,000 and HCFC-22 has a GWP around 1,800.

- [List of Class I ozone-depleting substances and their GWPs](#)
- [List of Class II ozone-depleting substances and their GWPs](#)

Effect of the Montreal Protocol on Climate

Because ozone-depleting substances have high GWPs, efforts to reduce the emissions of these substances under the Montreal Protocol result in a significant benefit to the climate and the stratospheric ozone layer.

A groundbreaking paper in the Proceedings of the National Academy of Sciences titled *[The Importance of the Montreal Protocol in Protecting the Climate](#)* calculates the benefits to the climate from citizen action and the Montreal Protocol in phasing out ozone-depleting substances that are also powerful greenhouse gases. This team of scientists (Drs. Guus Velders, Stephen O. Andersen, John Daniel, David Fahey, and Mack McFarland) estimates that between 1990 and 2010 the Montreal Protocol will avoid roughly 5-6 times the emissions reductions required during the first commitment period of the Kyoto Protocol. They calculate that Montreal Protocol emission reductions will delay climate change by 7-12 years. They show that without the reductions of the Montreal Protocol, the climate impacts predicted by the IPCC and other scientists would be encountered far sooner.

In September 2007, at the 19th Meeting of the Parties to the Montreal Protocol, signatory nations agreed to more aggressively phase out ozone-depleting hydrochlorofluorocarbons (HCFCs). The estimated climate benefit of the new, stronger HCFC phaseout may be around 9,000 million metric tons of carbon dioxide equivalent (MMTCO₂-eq). This is equivalent to avoiding the emissions from 55 million U.S. passenger cars, or 40% of all U.S. passenger cars, each year for the next 30 years. [More information on the benefits of the recent agreement can be found here.](#)

EPA Efforts Reduce Ozone-Depleting Substances and Also Protect the Climate

GreenChill

The GreenChill Advanced Refrigeration Partnership is an EPA cooperative alliance with the supermarket industry and other stakeholders. The goal of GreenChill is to promote advanced

technologies, strategies, and practices that reduce the amount of refrigerant used in equipment and emitted to the atmosphere. Refrigerants are greenhouse gases and may also deplete the ozone layer.

In 2007, GreenChill partners reduced emissions of ozone-depleting substances by 30 ODP weighted metric tons. In 2007, GreenChill also reduced greenhouse gas emissions by 2.5 MMTCO₂-eq, or the equivalent of avoiding the emissions from 0.5 million passenger cars from one year.

Responsible Appliance Disposal (RAD)

Through the voluntary Responsible Appliance Disposal (RAD) Program, EPA partners with retailers, utilities, universities, municipalities, and manufacturers to responsibly dispose of appliances like refrigerators and freezers. The partners in the RAD Program achieve benefits for the ozone layer and for the global climate by using best practices to ensure that:

- Refrigerant is recovered and either reclaimed, or destroyed
- Foam is recovered and destroyed, and
- The foam blowing agent is recovered and reclaimed

In addition, by encouraging appliance owners to retire old, inefficient equipment, RAD is reducing energy consumption, cutting carbon dioxide emissions, and saving consumers money.

EPA estimates that RAD Partners will dispose of more than 1 million refrigerant-containing appliances in 2008. Application of the program's best practices in 2008 will reduce greenhouse gas emissions by over 4 MMTCO₂-eq, or the equivalent of avoiding the emissions from 0.92 million passenger cars from one year.

Additional Resources

- [Intergovernmental Panel on Climate Change Special Report on Safeguarding the Ozone Layer and the Global Climate System: Issues related to Hydrofluorocarbons and Perfluorocarbons](#)
- The [2006 Scientific Assessment of Ozone Depletion](#) contains two chapters related to global climate change.
 - Chapter 5: [Climate-Ozone Connections](#) (53 pp, 2.26 MB, [About PDF](#))
 - Chapter 8: [Halocarbon Scenarios, Ozone Depletion Potentials, and Global Warming Potentials](#) (43 pp, 537 KB, [About PDF](#))