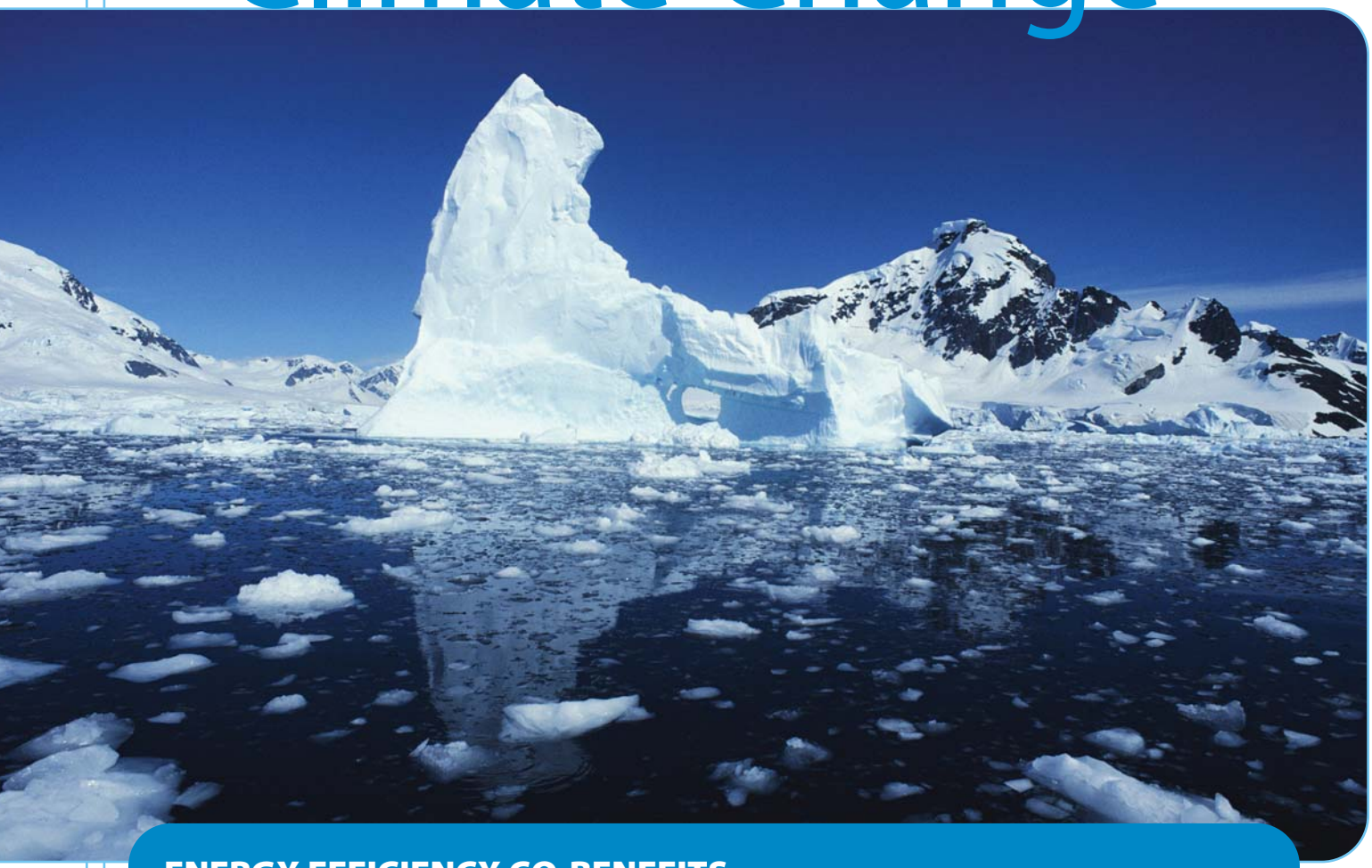
The Impact of Ozone-Depleting Substances on Climate Change



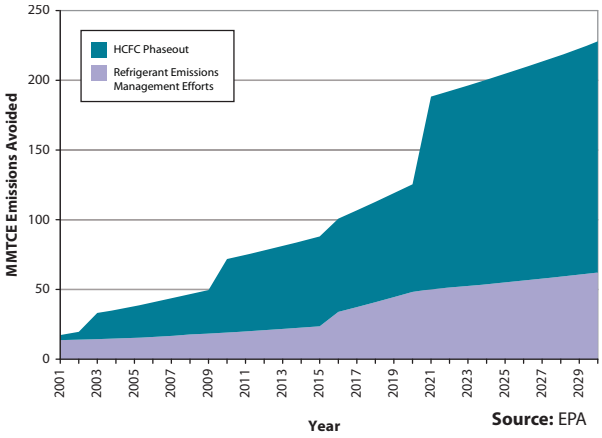
ENERGY EFFICIENCY CO-BENEFITS

The search for alternatives for ozone depleting substances has also led to opportunities to enhance energy efficiency. For example, to avoid potential efficiency losses in some refrigeration applications, EPA has worked extensively with automobile and equipment manufacturers and the supermarket industry to transition to alternative refrigerants that not only protect the stratospheric ozone layer, but that also contribute to better energy efficiency. This transition has improved cooling performance and enhanced fuel efficiency, leading to a reduced demand for fossil fuel combustion and reduced emissions and concentrations of greenhouse gases.

Phasing out ozone-depleting substances in order to protect the ozone layer directly benefits the Earth's climate in two ways. First, because most ozone-depleting substances are also potent greenhouse gases, phasing out these substances directly reduces greenhouse gas emissions. The Intergovernmental Panel on Climate Change (IPCC) noted that the global decline in emissions of ozone-depleting substances has substantial climate benefits. The combined emissions of CFCs, HCFCs, and HFCs have fallen from about 33 percent of the annual carbon dioxide emissions from fossil fuel combustion around 1990 to about 10 percent around 2000.*

The U.S. phaseout of CFCs and halons will result in substantial reductions in greenhouse gas emissions over the period 1990 to 2010, as well as additional reductions from the phaseout of HCFCs over the period 2000 to 2030.

Projected Greenhouse Gas Emissions Avoided Through HCFC Phaseout and Management of Refrigerant Emissions



Source: EPA

This graph illustrates the projected annual greenhouse gas emissions (measured in million metric tons of carbon equivalent) that will be avoided as a result of both the U.S. phaseout of HCFCs and the improved management of refrigerant emissions.

Second, when substitute materials are introduced, the equipment in which they are used is usually upgraded. This means that the equipment is often less leaky and more energy efficient. Less leakage reduces direct emissions of the substitute materials to the environment. Greater energy efficiency requires less power production, which in turn reduces the greenhouse gases emitted during fossil fuel combustion.

The International Perspective

EPA's work to achieve climate co-benefits extends globally as well. For example, EPA and the U.S. Department of Energy's National Renewable Energy Laboratory have partnered with The Energy and Resources Institute (TERI) in India to quantify fuel consumption due to car air-conditioning use in India. In Europe and the United States, car air conditioning systems are responsible for 4 to 6 percent of total car fuel use. In India, that figure can be as high as 20 to 30 percent of total car fuel consumption due to India's climatic conditions and the predominance of smaller engine vehicles. TERI is examining various regulatory and voluntary options that the government of India can exercise to improve engine efficiency and reduce emissions of ozone-depleting substances and greenhouse gases.

* Intergovernmental Panel on Climate Change/Technology and Economic Assessment Panel. Special Report on Safeguarding the Ozone Layer and the Global Climate System: Issues Related to Hydrofluorocarbons and Perfluorocarbons. (Cambridge: Cambridge University Press, 2005.) Figure SPM-3.

CURRENT AND FUTURE CLIMATE CHANGE

For over the past 200 years, the burning of fossil fuels, such as coal and oil, and deforestation have caused the concentrations of heat-trapping "greenhouse gases" to increase significantly in our atmosphere. These gases prevent heat from escaping to space, somewhat like the glass panels of a greenhouse.

Greenhouse gases are necessary to life as we know it, because they keep the planet's surface warmer than it otherwise would be. But, as the concentrations of these gases continue to increase in the atmosphere, the Earth's temperature is climbing above past levels. According to NOAA and NASA data, the Earth's average surface temperature has increased by about 1.2 to 1.4ºF since 1900. The warmest global average temperatures on record have all occurred within the past 15 years, with the warmest two years being 1998 and 2005. Most of the warming in recent decades is likely the result of human activities. Other aspects of the climate are also changing, such as rainfall patterns, snow and ice cover, and sea level.

If greenhouse gases continue to increase, climate models predict that the average temperature at the Earth's surface could increase from 2.5 to 10.4ºF above 1990 levels by the end of this century. Scientists are certain that human activities are changing the composition of the atmosphere, and that increasing the concentration of greenhouse gases will change the planet's climate. But they are not sure by how much it will change, at what rate it will change, or what the exact effects will be.