Benefits of Phasing Down HFCs under the Montreal Protocol

- Mexico, Canada, and the United States proposed an amendment to the *Montreal Protocol on Substances that Deplete the Ozone Layer* (Montreal Protocol) to phase down consumption and production of hydrofluorocarbons (HFCs).
- The U.S. Environmental Protection Agency's (USEPA) preliminary analysis of benefits of the amendment proposal suggests it would produce more than 98 Gigatons of CO2eq benefit.
- HFC use in developing countries (Article 5 Parties) is anticipated to grow substantially, driven both by increased demand for refrigeration and air-conditioning and because HFCs were developed as alternatives to ODS.
  - HFC growth is predicted to continue well beyond 2020 if left unconstrained or weakly regulated.
  - HFC emissions could become a significant portion of 2050 emissions in carbon dioxide equivalent (CO_2eq) terms.
- USEPA's analysis assumes a global consumption phase-down as proposed while all Parties continue to comply with their HCFC phaseout obligations.
- Because HFCs may replace HCFCs in many applications, the HFC baseline is set using historic information on HCFC consumption, thus accounting for future transition:
  - Non-Article 5 Parties' baseline combines the average of 2005 through 2008 consumption data for 100% HFCs plus 85% of HCFCs;
  - Article 5 Parties' baseline includes average 2005 through 2008 consumption data for 100% of HCFCs.
- HFC-23 is a potent greenhouse gas that is 14,800 times more damaging to the Earth's climate system than carbon dioxide; despite efforts over the past decade to reduce emissions; global atmospheric concentrations of HFC-23 continue to increase.
  The amendment would also limit HFC-23 byproduct emissions resulting from the production of HCFCs and HFCs beginning in 2014 for certain production lines.

Estimated Benefits of the Amendment Proposal

Cumulative HFC Reductions ($MMTCO_2eq$)*	
Party	**2014 to 2050**
Non-Article 5 Parties	42,600
Article 5 Parties	44,500
World**	**87,200**
Byproduct Controls	**11,600**
World Total**	**98,800**

*Baselines -- Non-Article 5 Parties: 760 $MMTCO_2eq$, Article 5 Parties: 729 $MMTCO_2eq$, Global: 1,475 $MMTCO_2eq$
**World total may not sum due to rounding

Availability of Alternatives for Meeting the Reduction Schedule

- USEPA assessed the availability of alternatives and found that many options are available now and in the near future to reduce HFC use.
- Other options are likely to be developed in response to domestic or international actions.
- USEPA's Significant New Alternatives Policy (SNAP) program has reviewed about 400 substitutes in refrigeration and air conditioning; fire suppression; foam blowing; solvent cleaning; aerosols; adhesives, coatings, and inks; sterilants; and tobacco expansion sectors.
- SNAP provides a broad menu of options including HFCs with range of GWPs and non-HFC options.
- Risk factors considered include: ODP, GWP, flammability, toxicity, contributions to smog, aquatic and ecosystem effects, and, occupational health and safety;
    - Most substitutes were found acceptable although in some cases restrictions may apply to protect the environment and human health.
- SNAP continues to identify substitutes that offer lower overall risks to human health and the environment.
- In addition to using low or no-GWP alternatives, reductions can be achieved by:
    - Implementing new technologies that use much less amounts of HFCs;
    - Process and handling options during manufacture, use, and disposal of HFC-containing products.
- USEPA is developing a series of sector-specific factsheets to improve current information on low-GWP alternatives.
    - Five factsheets available on our website at: www.epa.gov/ozone/intpol/mpagreement.html covering commercial refrigeration, domestic refrigeration, motor vehicle air conditioning, unitary air-conditioning, and construction foam.
    - Additional factsheets for other sectors will be available later this year.