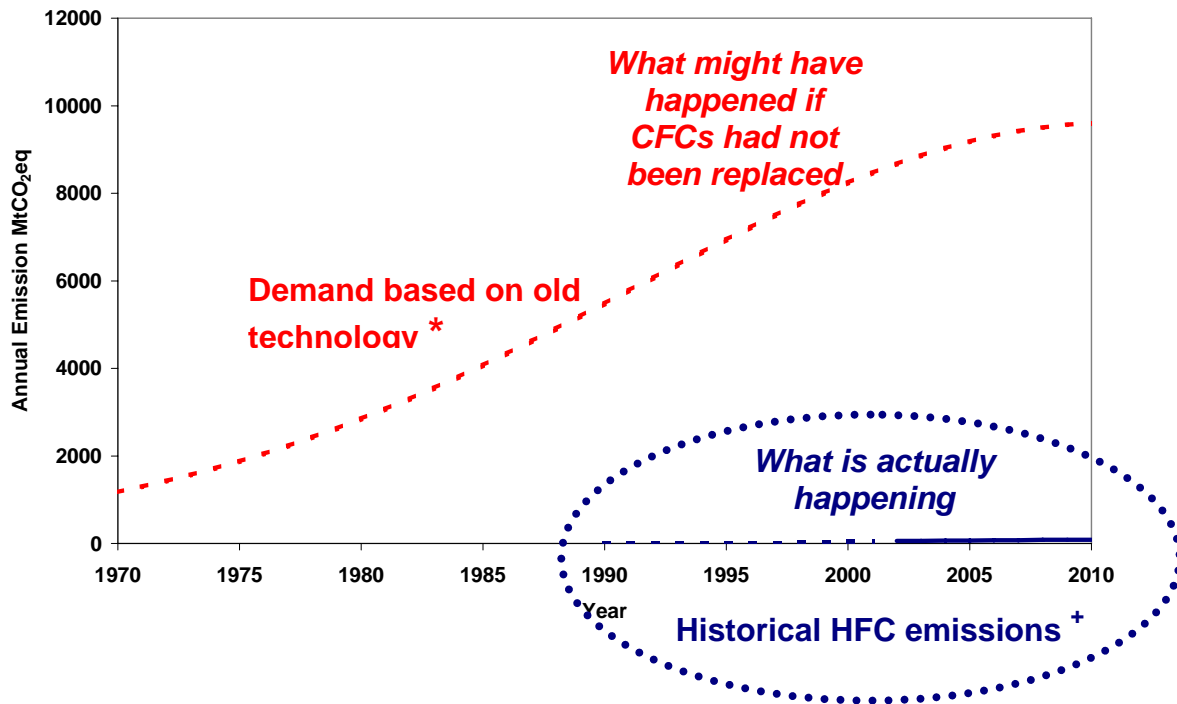


## Lessons from replacing CFCs in Europe

The graph shows impacts from refrigerant fluids, precision cleaning solvents, insulation foam blowing agents and aerosol and open cell foam propellants, expressed as million tonnes CO<sub>2</sub> equivalent



\* Calculated from the audited historic demand for CFCs (up to 1975), projected according to the scenario in "The ozone layer: the road not taken" by Prather, Midgley, Sherwood Rowland and Stolarski in *Nature*, 381, 551-554, 13 June 1996 (Notes 1 and 2)

+ Calculated from audited historic sales of HFCs (Note 3)

Replacing CFCs in Europe, a consequence of their phase-out under the Montreal Protocol and the subsequent EU Regulation, has been an opportunity to lower the quantity deployed and lower emissions from better contained applications

The massive reduction in impact from HFCs compared to CFCs is due mainly to the much lower quantities used:

- Because leakage rates have been substantially reduced, the quantities charged to each refrigeration system can be much less (50% or less).
- Most (over 90%) of the requirements for precision cleaning are now met by other technologies.
- HFCs are now used only in critical applications for insulation foam, reducing the requirement by more than 90%
- Aerosols and open cell foams represented about half of the demand for old technology and, except for very specialised applications, CFCs have been

replaced by non-fluorocarbon systems.

These challenging technology changes have led to a very much lower climate impact from the replacing HFCs.

HFCs are one of many new technologies that were developed to replace the old CFC technologies. They continue to be used where they provide a better answer than other solutions, or where other solutions cannot be used due to safety, health or technical reasons. Furthermore, an HFC emission is equivalent to much less CO<sub>2</sub> than the same emission of CFC (Note 4).

(February 2010)

### Notes

1. Demand for the "old technology" is based on projection of the use of CFCs within Europe for:
  - a. refrigerant fluids,
  - b. precision cleaning solvents,
  - c. insulation foam blowing agents
  - d. aerosol and open cell foam propellants.
2. This was projected from the demand during the 1970s at an initial compound growth rate of 6%/year, falling in time exactly as described in *Prather et al.*, referenced above. The actual level of transfer of demand to HCFCs (which are also Ozone Depleting Substances and are regulated in Europe) was small compared to the increase projected here and, for all practical purposes, can be ignored.
3. Emissions of HFCs are calculated from audited production and sales data and are consistent with atmospheric measurements.
4. Furthermore, in applications where HFCs are the technically superior option, any release has a lower impact. The GWP conversion factors (to equate an emission to a quantity of CO<sub>2</sub>) for HFCs are about one quarter those of CFCs.

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