IPCC/TEAP Special Report

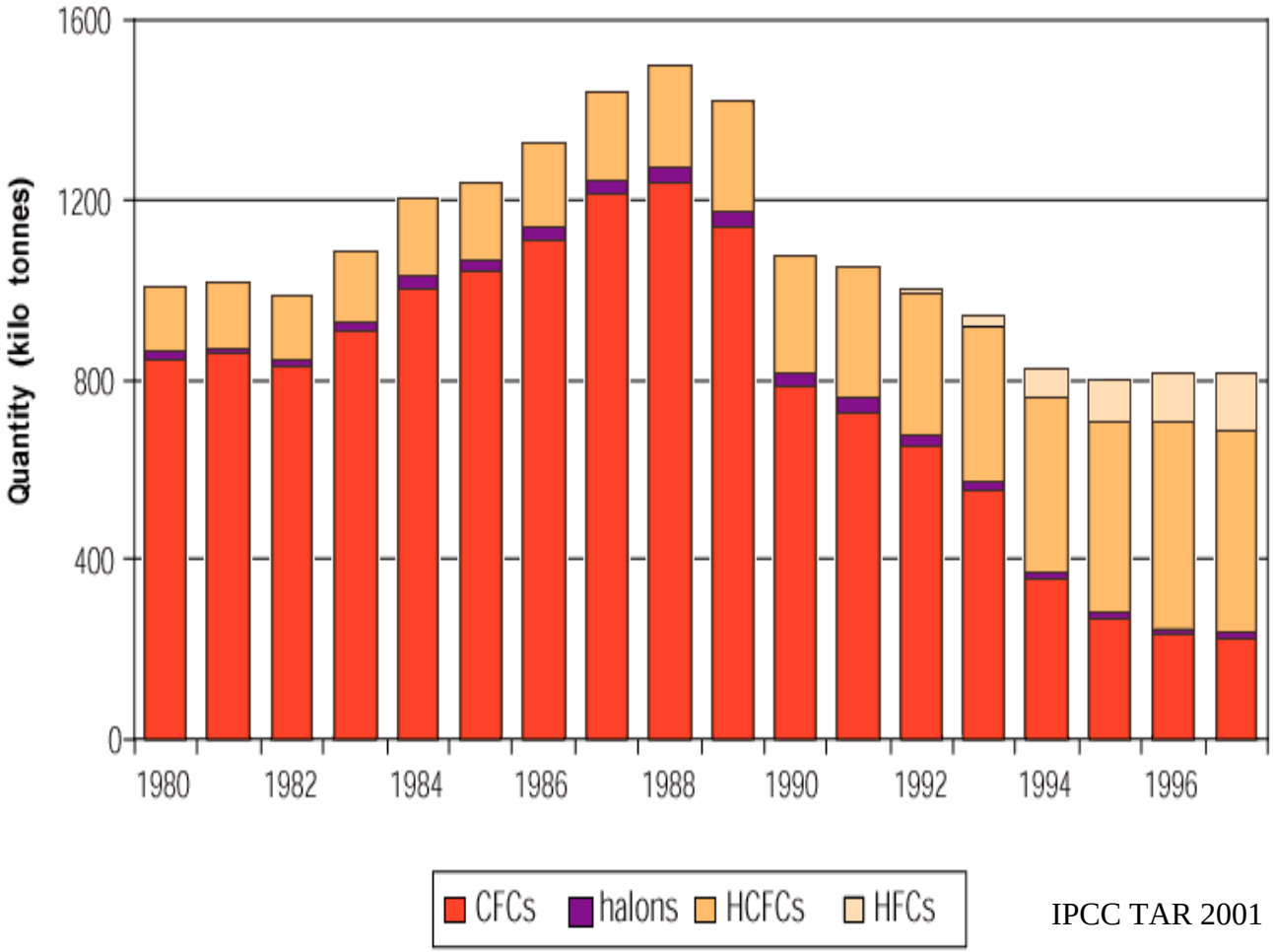
Safeguarding the ozone layer and the global climate system

Issues related to HFCs and PFCs

May 19, 2005

UNFCCC/SBSTA 22, Bonn, Germany

MP effect on ODS and HFC consumption



IPCC TAR 2001

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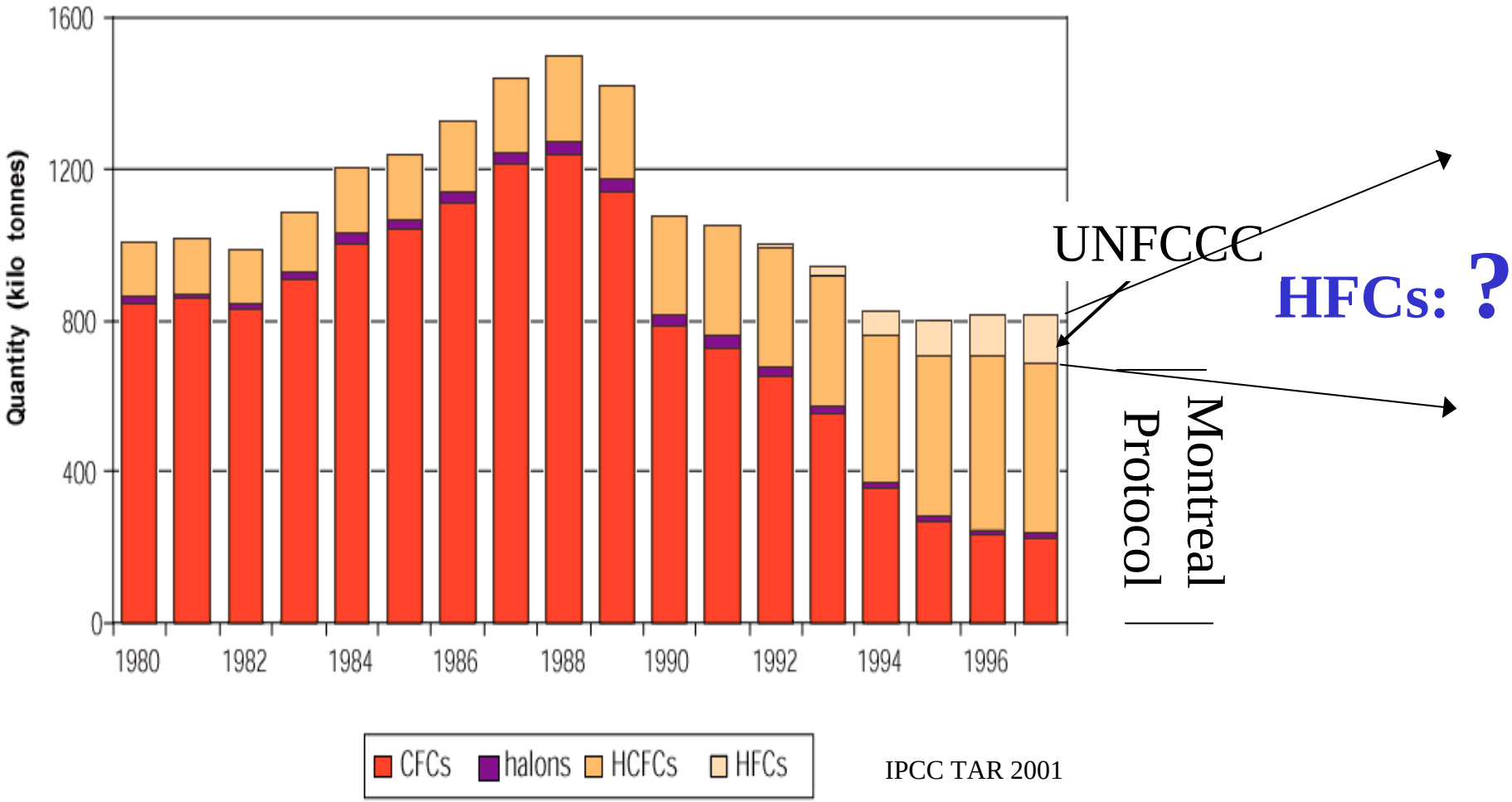

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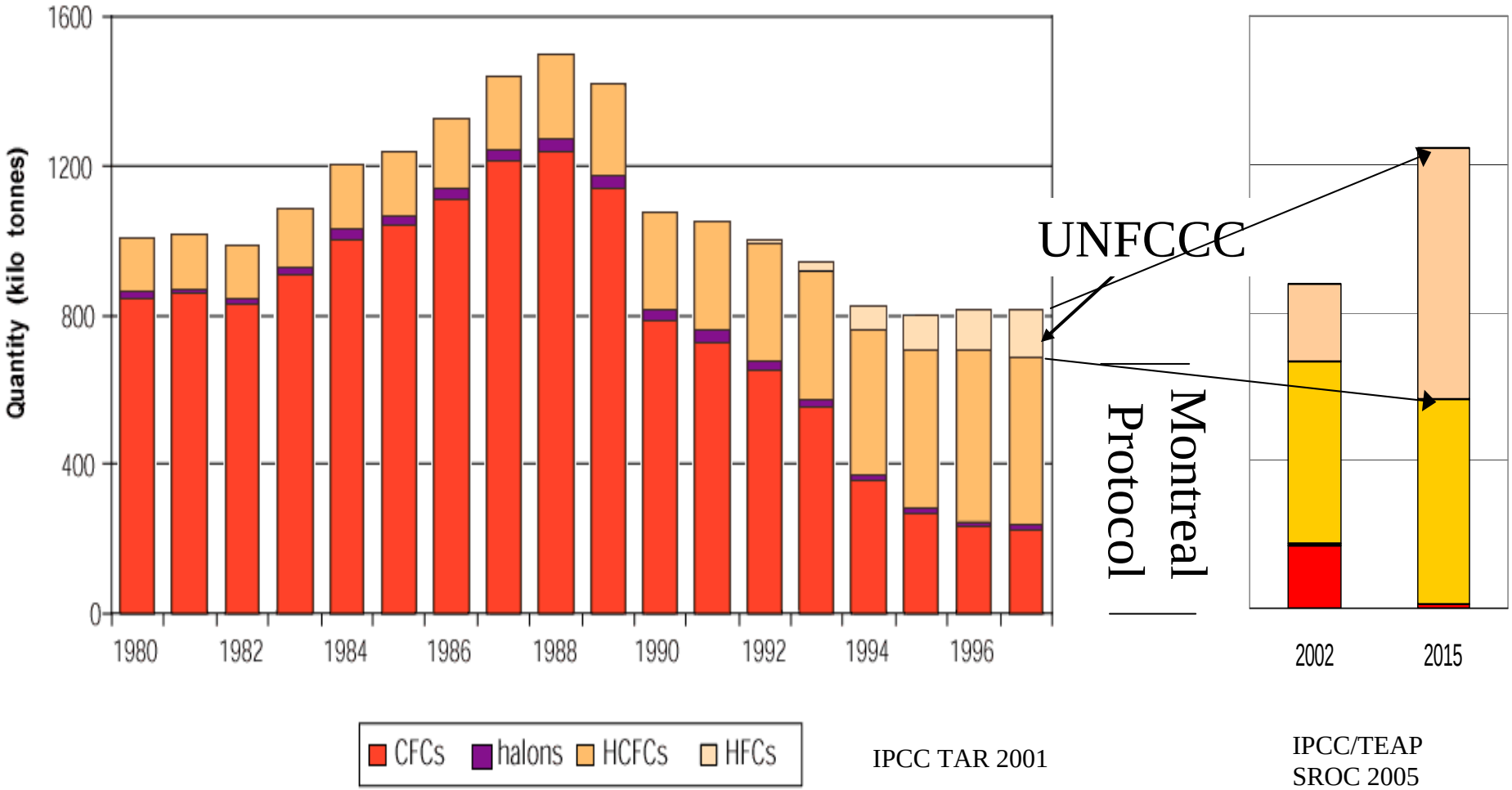


IPCC TAR 2001

IPCC/TEAP SROC 2005

Outline of the IPCC/TEAP special report

A. Ozone depletion and the climate system
B. Options for reducing GHG emissions from ODS replacements
C. Future estimation and availability of HFCs and PFCs

Ozone depletion and the climate system

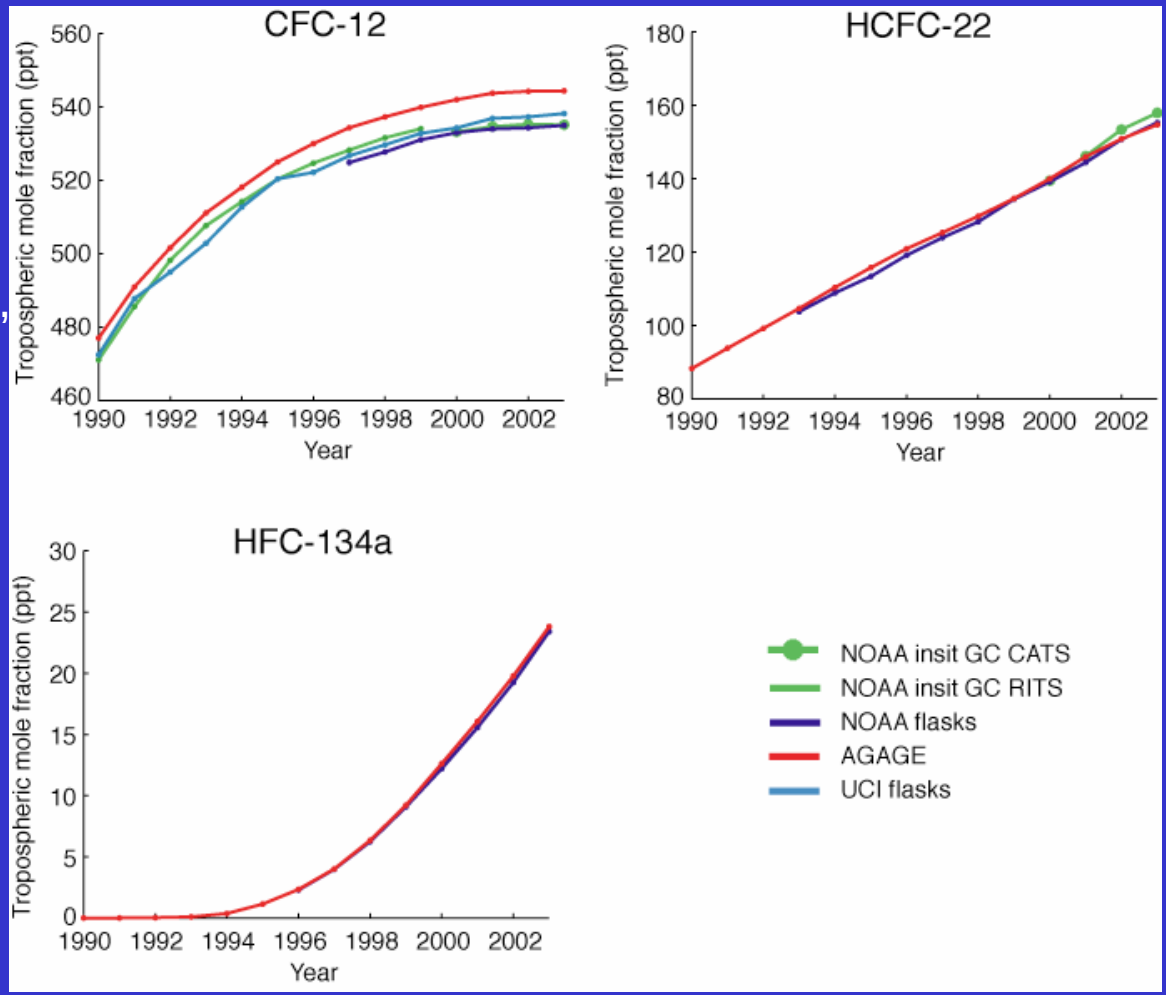
Past and Present Concentrations of CFCs, HCFCs, and HFCs

- Accurate measurements by multiple groups; gives radiative forcing and emissions.
- Industrially produced, effective greenhouse gases, contribute to warming.
- Current trends:

  CFCs decreasing or stable
  (0 to -3%/year)

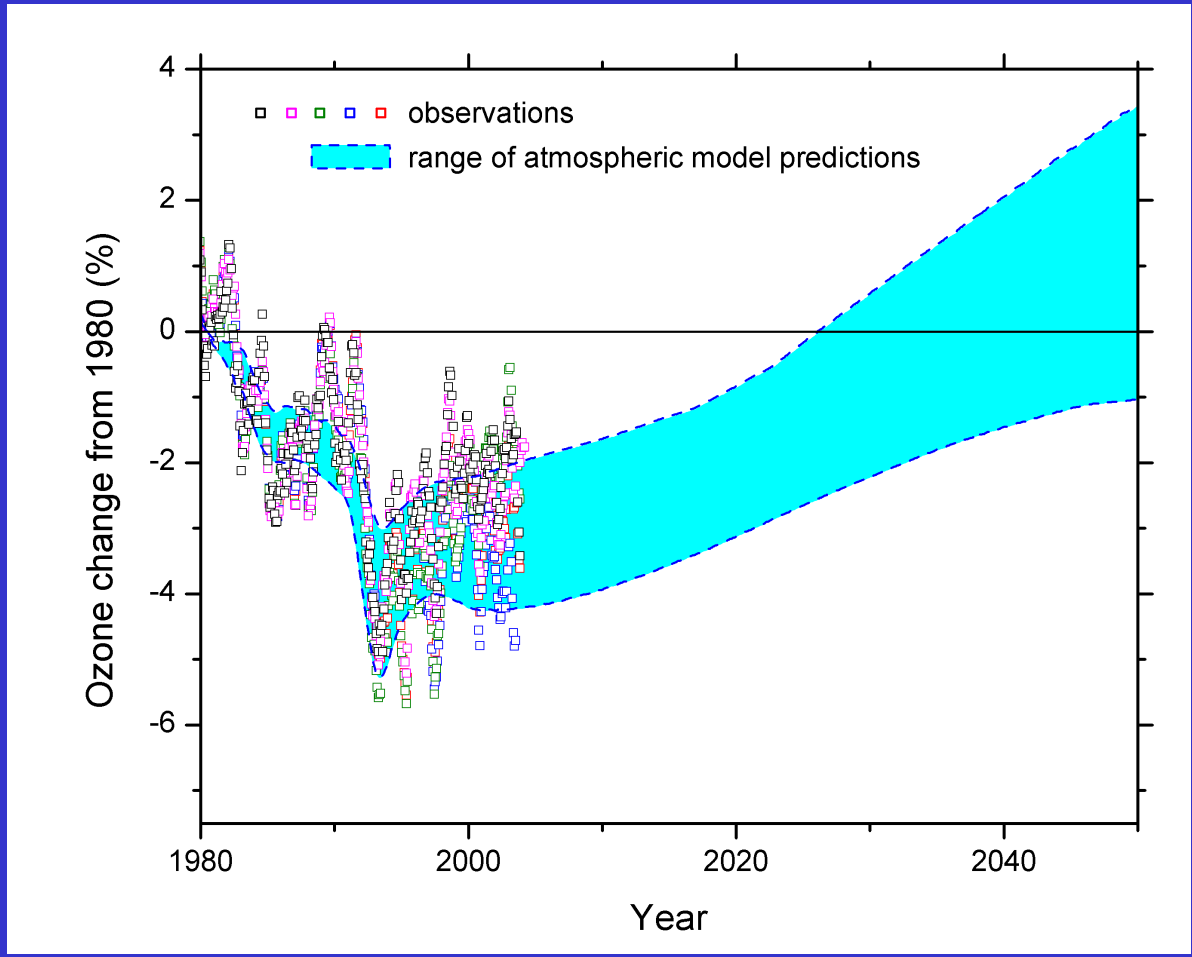
  HCFCs increasing
  (+1 to +3%/year)

  HFCs increasing
  (+13 to +17%/year)



Global Ozone Depletion

- Decreasing ozone linked mainly to CFCs
- Variable from year to year
- Ozone depletion is a cooling influence on climate. Warming due to CFCs and cooling due to ozone depletion may not occur in the same places or times.
- Recovery in 21st century



Radiative Forcing

- Positive direct forcing due to all halocarbons:

  0.34±0.03 W/m^2

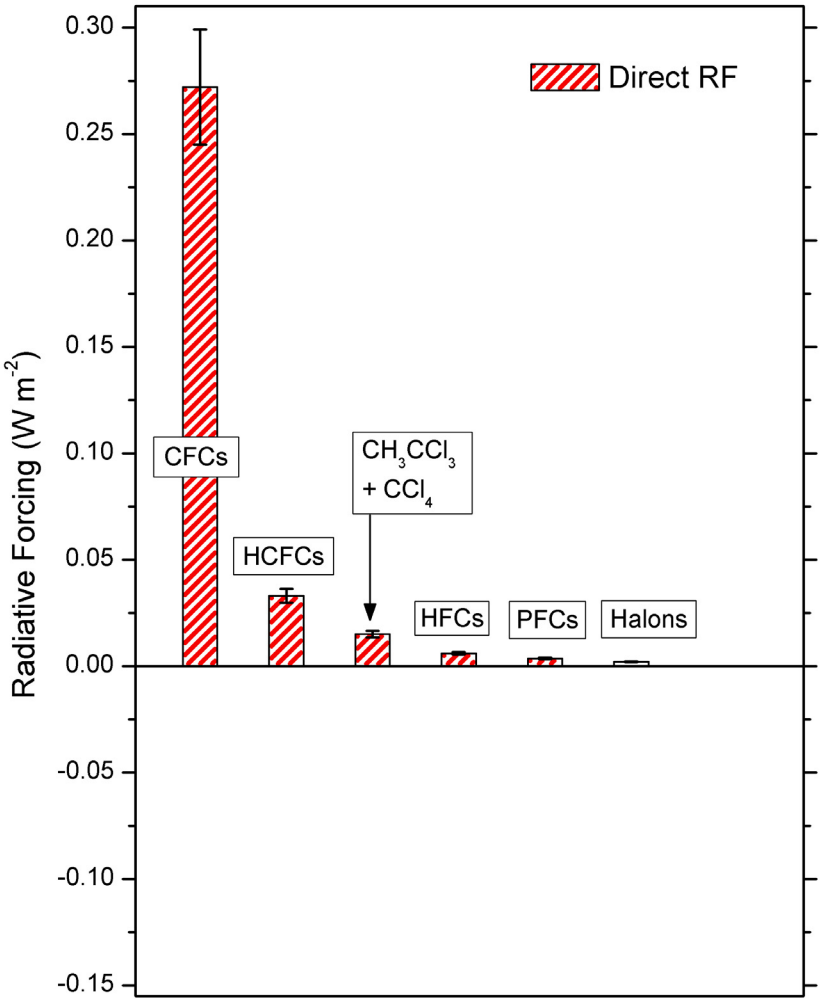
- Positive direct forcing due to ODSs only:

  0.33±0.03 W/m^2

- Negative indirect forcing due to ozone depletion:

  -0.15±0.10 W/m^2

- Different types of gases make different contributions to positive and negative forcing



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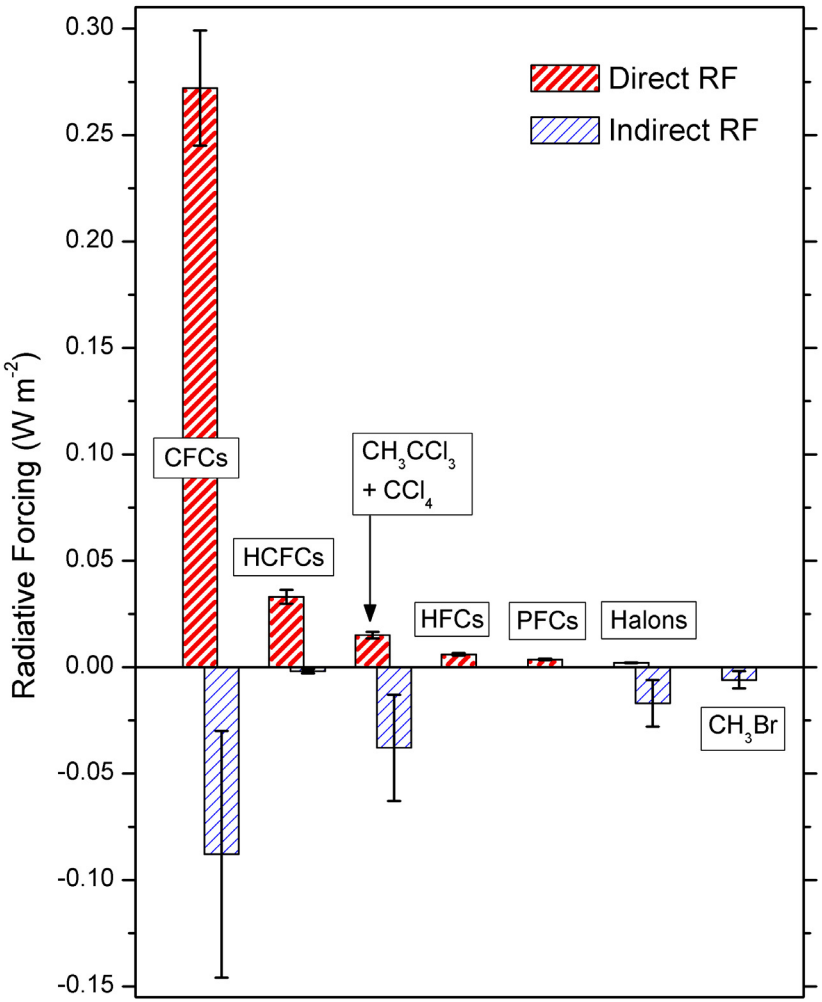
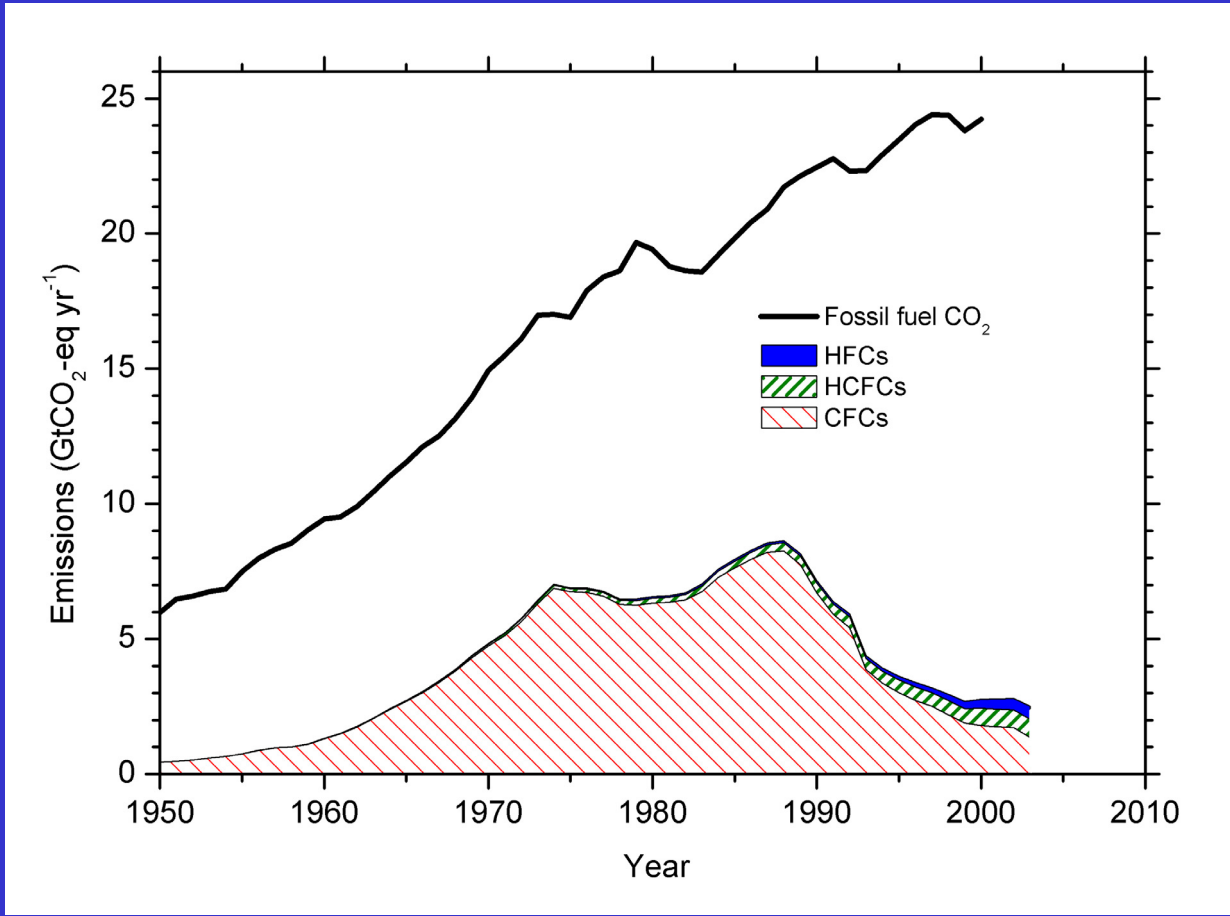


Halocarbon Emissions, continued

Combined CO_2-equivalent emissions from halocarbons:

~7.5 Gt near 1990, about 33% of that year's CO_2 emissions from global fossil fuel burning

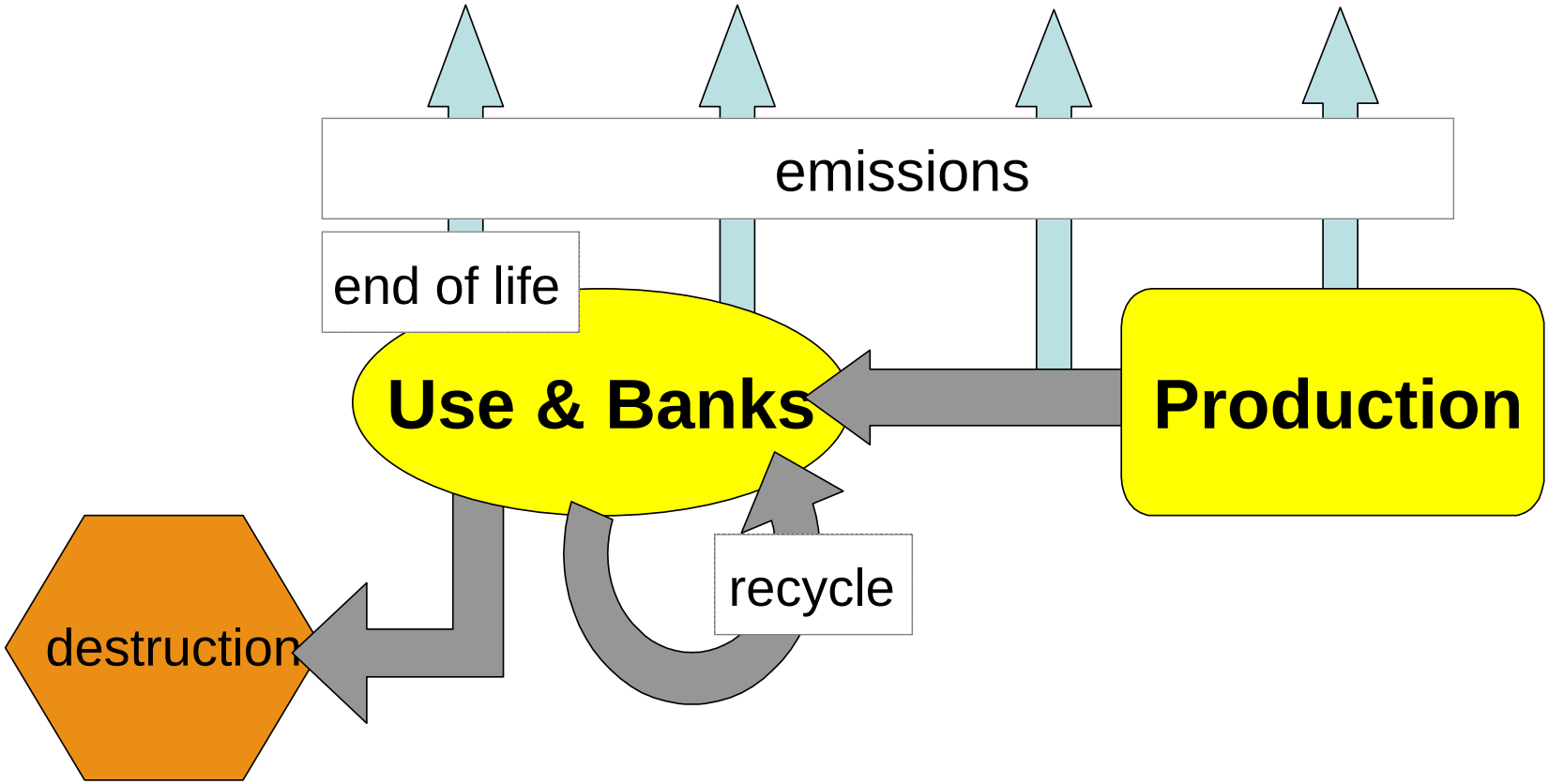
~2.5 Gt near 2000, about 10% of that year's CO_2 emissions from global fossil fuel burning



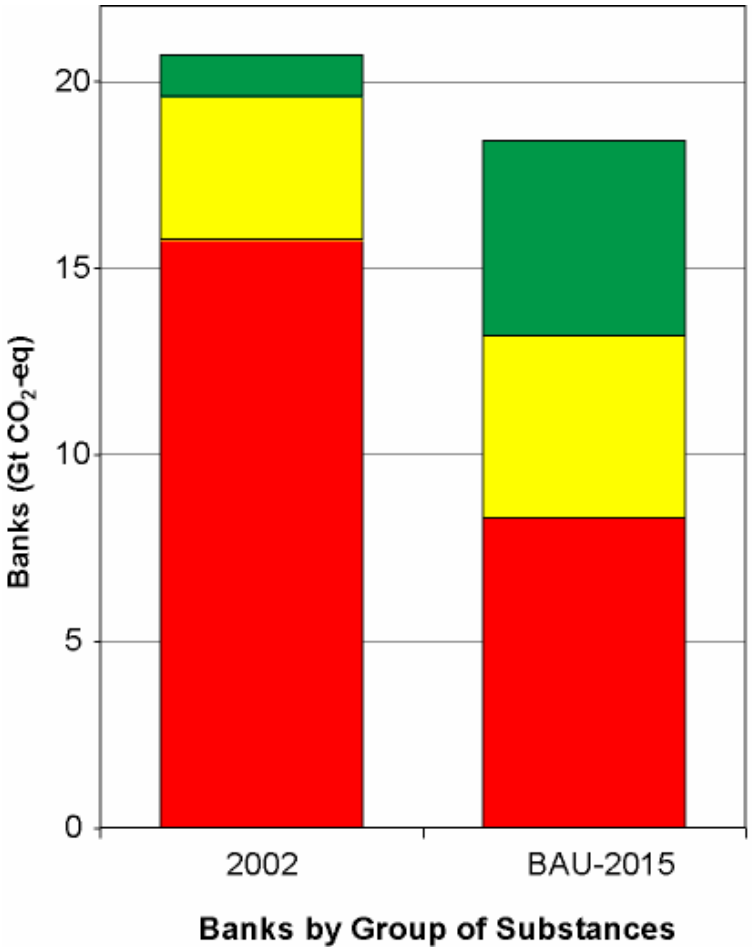
Options for reducing GHG emissions from ODS replacements

- Sectors/applications covered
  - Refrigeration, Stationary and Mobile Air Conditioning
  - Foams
  - Medical Aerosols
  - Fire Protection
  - Non-Medical Aerosols, Solvents and HFC-23 byproduct emissions
- Gases covered
  - CFCs, HCFCs, HFCs, PFCs
  - NOT: non-ODS replacement applications (PFCs), methylbromide

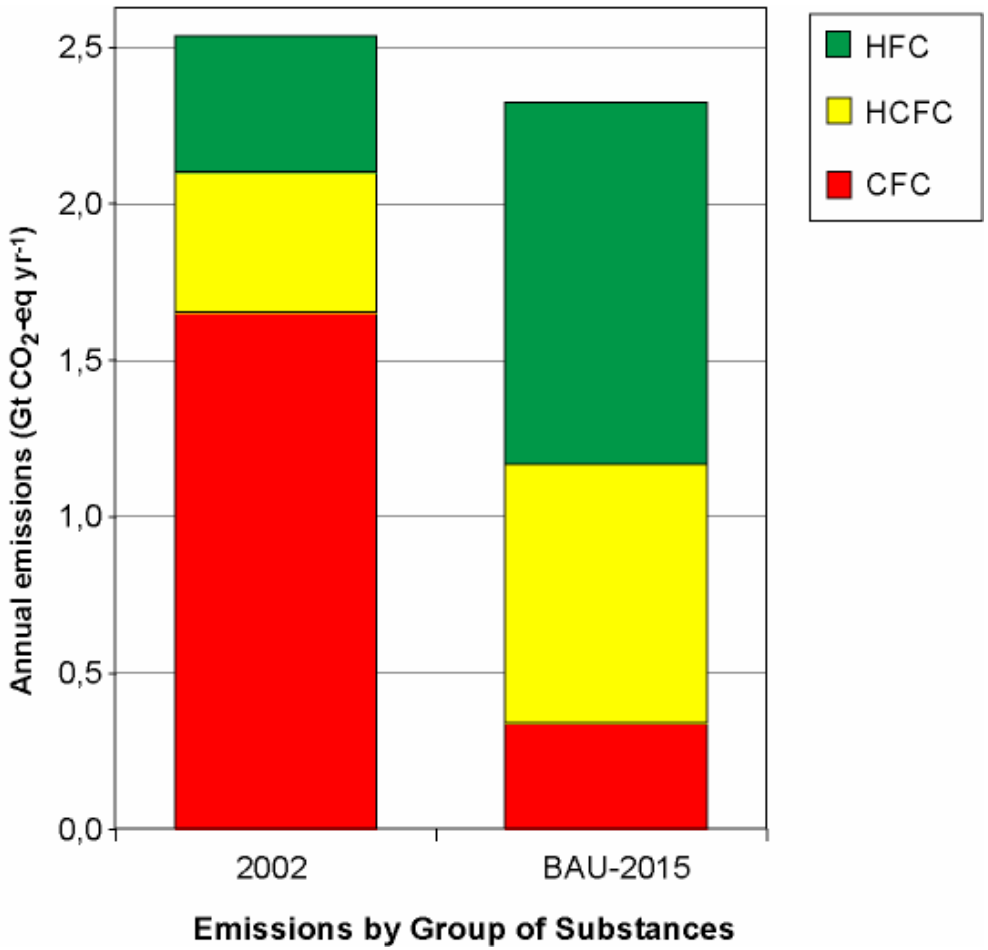
Emission sources and banks



Business-as-usual development of banks and emissions by substance groups



Banks by Group of Substances



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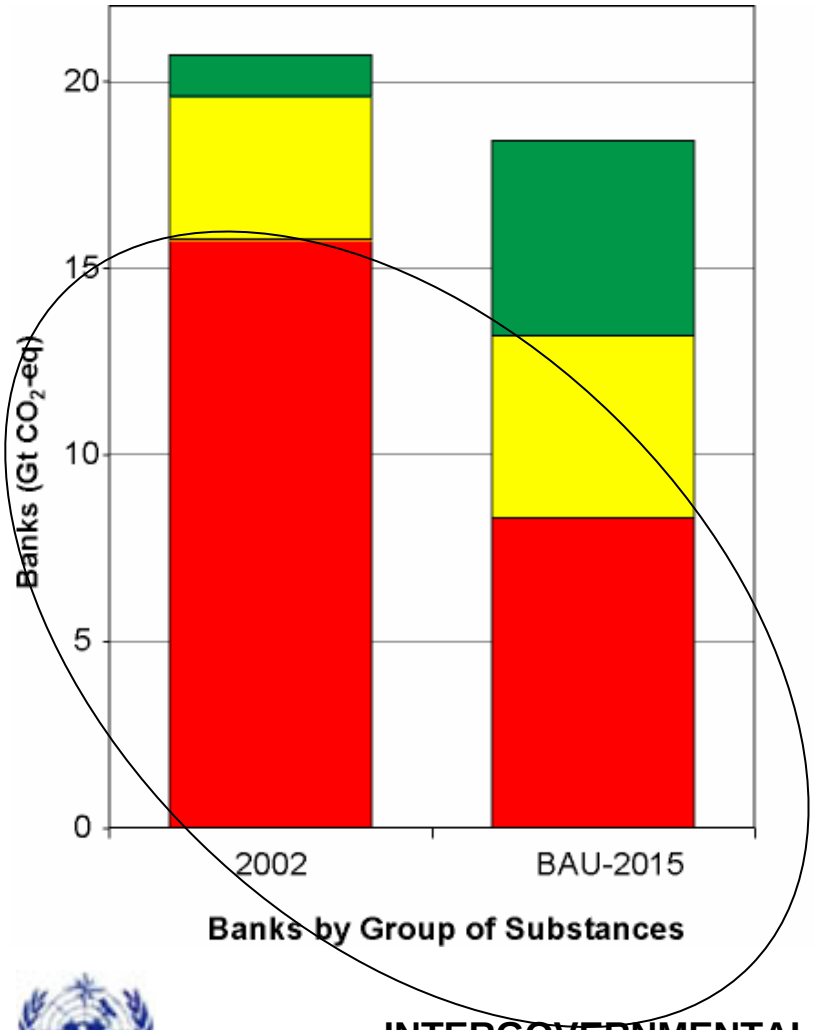

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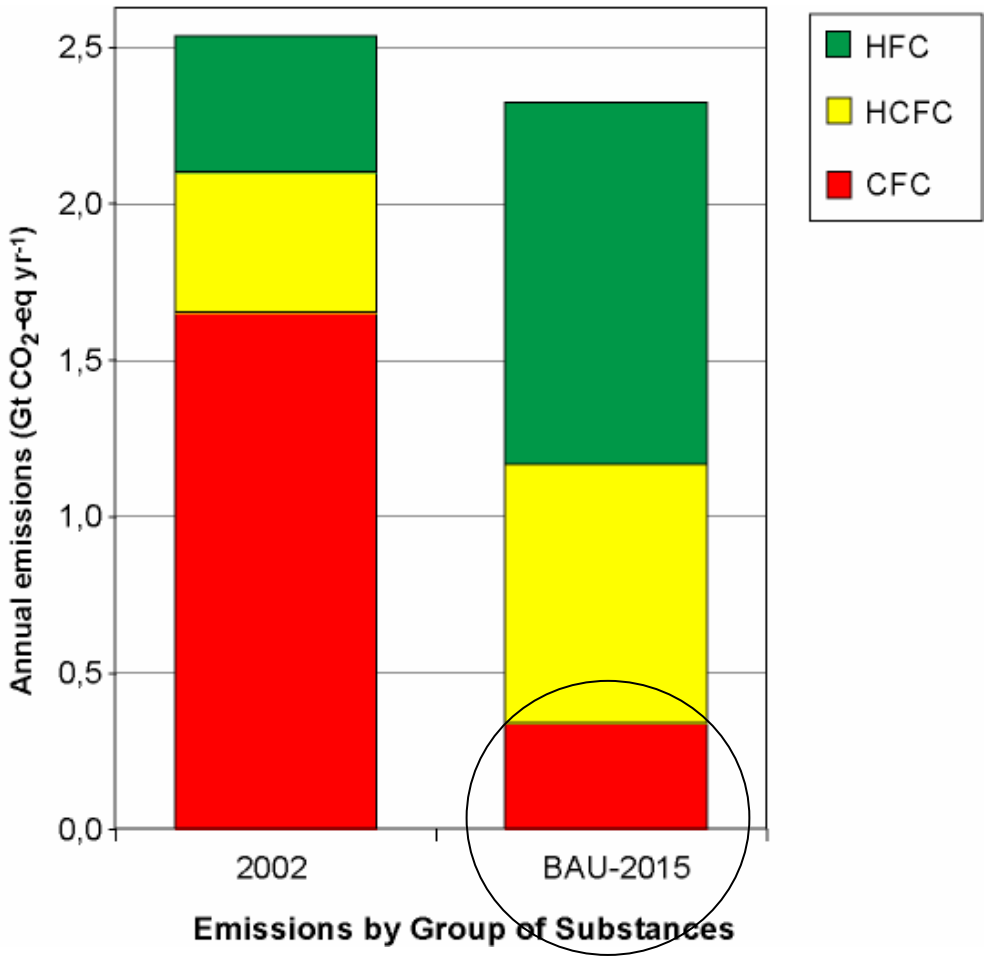

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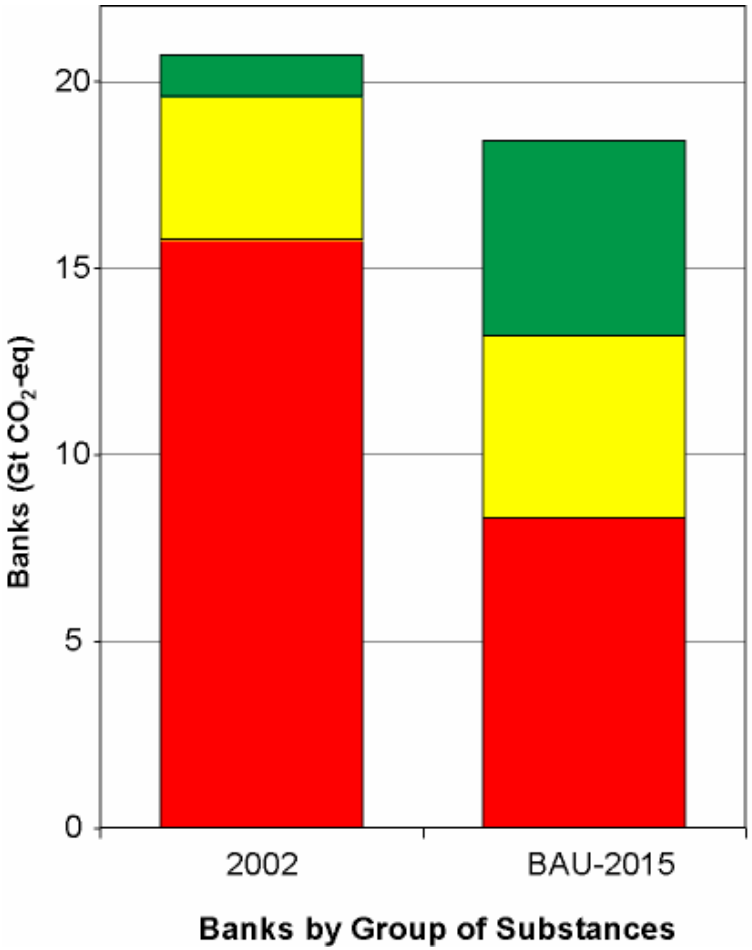

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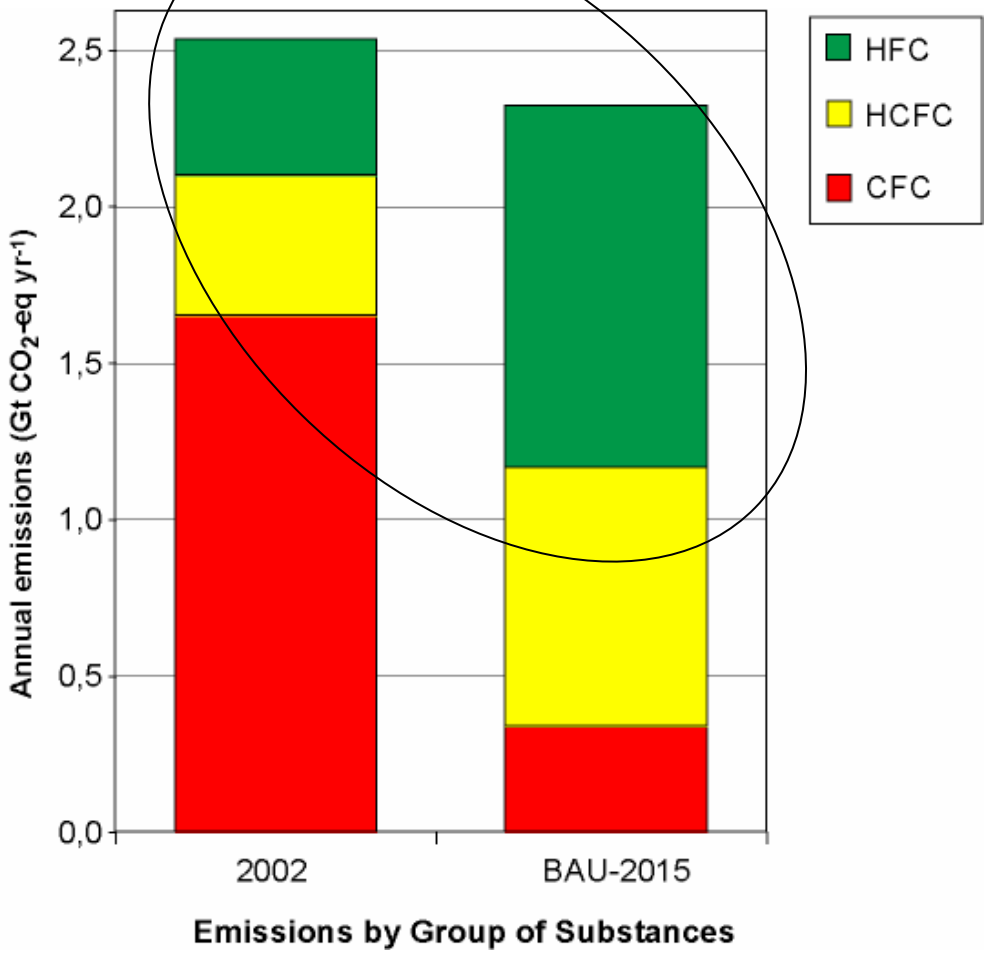


Emissions by Group of Substances

Importance of banks

- For CFCs and HCFCs a significant contribution comes from their respective banks
- No regulatory obligations exist to restrict these emissions under either Montreal Protocol or UNFCCC/Kyoto Protocol
- HFC banks are still building up

Emission reduction options

- CFCs, HCFCs, HFCs and PFCs:
  - Containment
  - Recovery
  - Recycling
  - Destruction
  - Lower GWP gases
- Alternative (no GWP) fluids
- Not-in-kind technologies
- Reduction of indirect emission from energy use

Analysing options

- General description
- Technical performance
- Costs
- Availability
- Environment (ODP and GWP, ..)
- Health
- Safety
- Energy and resource efficiency

Lifecycle perspective:

- **TEWI**
- **LCCP**
- **LCA**

Scenarios 2002 – 2015

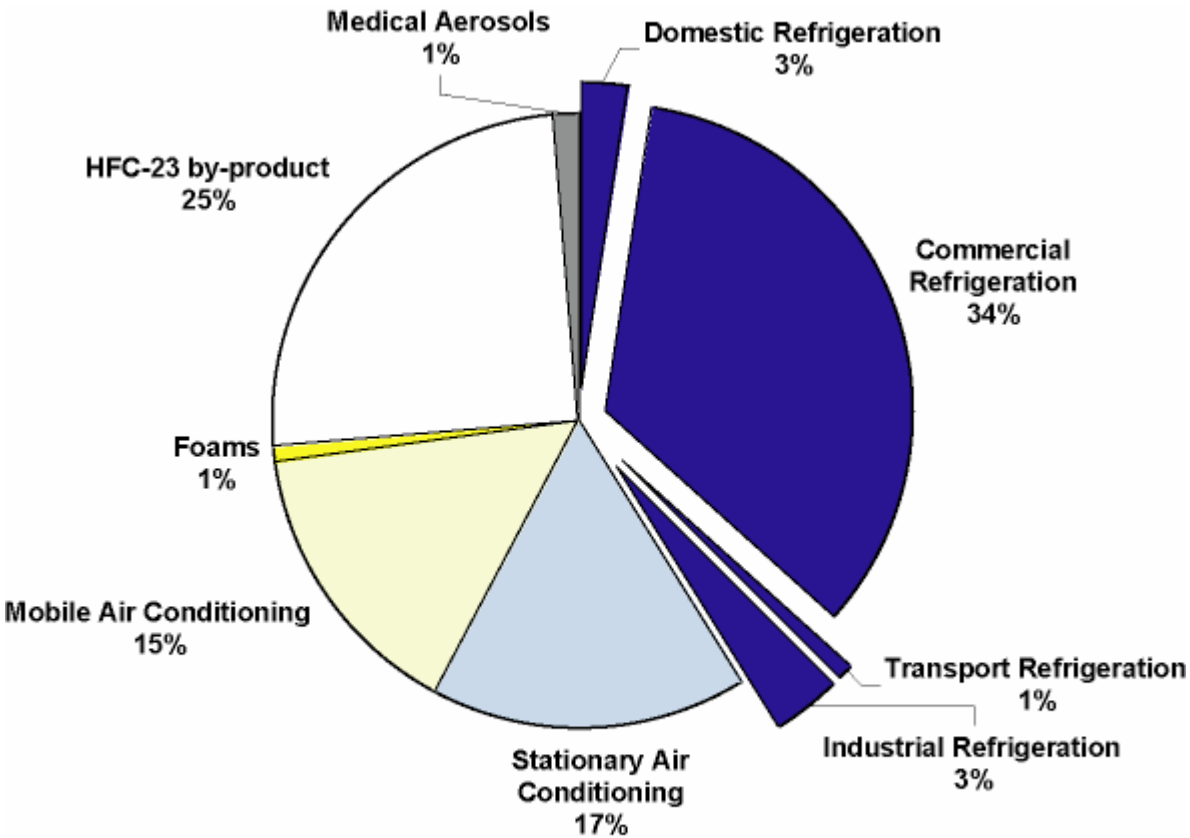
- **Business-as-Usual (BAU)** and **Mitigation (MIT)**
- General Elements
  - Continuation of existing growth in demand
  - All existing measures continue (Montreal Protocol, national regulations)
  - Regional differentiation
- **BAU** vs **MIT**
  - Current trends in practices, penetration of alternatives, charge sizes and emission factors:

  Maintained in BAU - Increased uptake in MIT
  - End-of-life recovery efficiency:

  No increase in BAU / Increase in MIT

Direct emission reduction potential (2015):

1.2 Gt CO2-eq/yr or **50% compared to BAU**



Sectoral Emission Reduction Potentials 2015

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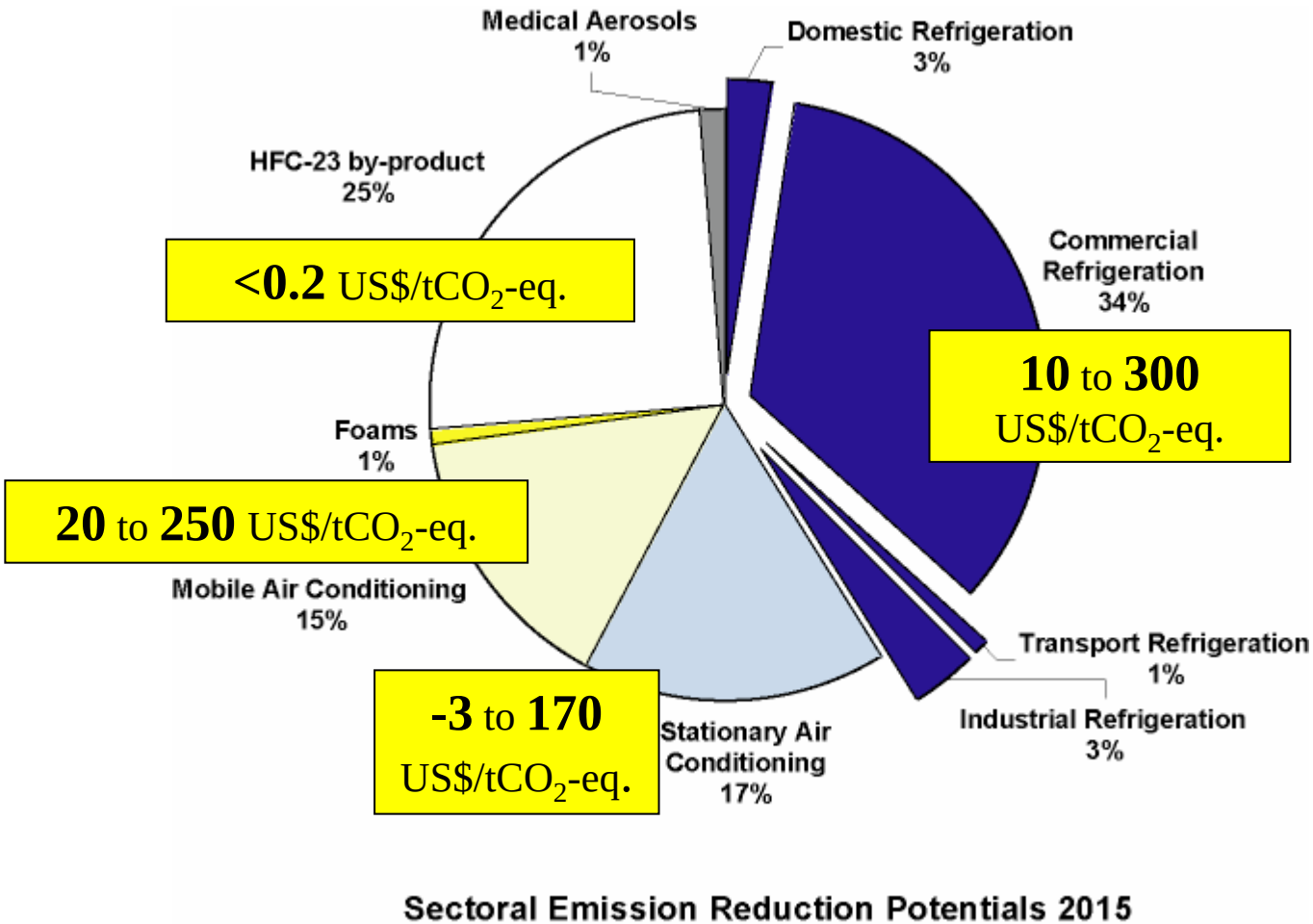
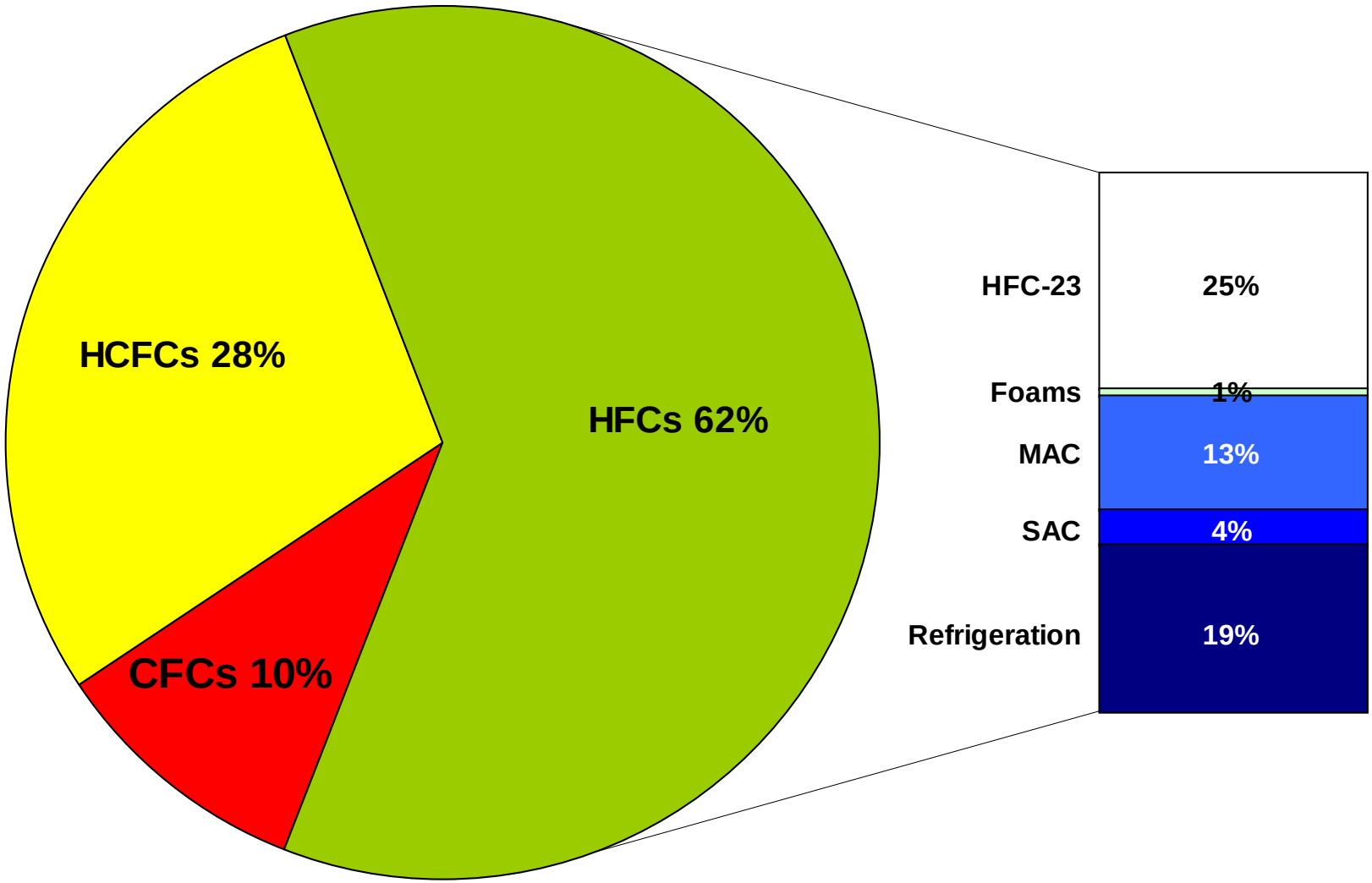


Sectoral Emission Reduction Potentials 2015

Direct emission reduction potential by substance



Indirect emissions

- CO_2 emissions related to energy-use of equipment
- Not enough literature to make overall estimate
- Relevance, compared to direct emission, varies widely (application, electricity origin, containment, end-of life treatment)
- Energy efficiency improvement of equipment has significant reduction potential

Future availability of HFCs and PFCs

- No published data available to project future production capacities
- Global HFC production capacity will generally continue to satisfy demand
- Production capacity is expected to expand, particularly in developing countries