

# HFCs and the emissions gap

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Uachtaránacht na hÉireann ar  
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# Introduction – Why HFCs are of concern?

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- HFCs are “super greenhouse gases”, replacing Ozone Depleting Substances being phased out under Montreal Protocol
- HFCs currently ~1% global GHG emissions
- But are the fastest growing:
  - 10%-15% per year world-wide, doubling 5 yr
- By 2050 HFCs up to **27%** of Radiative Forcing of CO<sub>2</sub>, and up to **40%** if we are stay below 2°C

# What are HFCs

- These are man-made gases
- They contain
  - Hydrogen, Fluorine and Carbon
  - No Chlorine
- They are replacement gases for CFCs and HCFCs
- There are cost effective replacement options

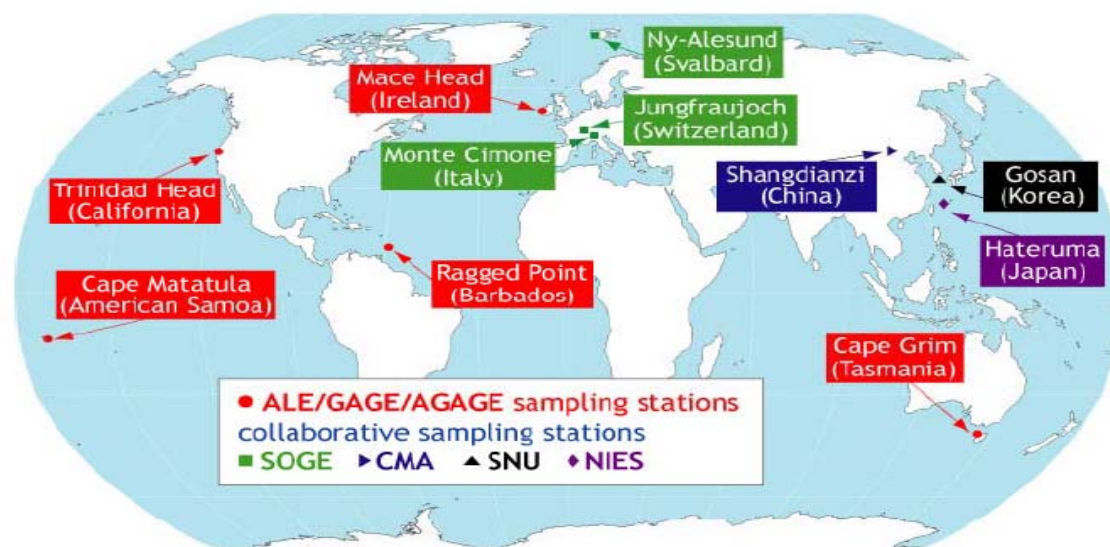
# Global Warming Potentials of HFCs

Gas	GWP (AR 4, 100 year)
CO <sub>2</sub>	1
Methane	25
Nitrous Oxide	298
HFC 134a	1 430
HFC 404A	3 922
HFC 23	14 800
SF <sub>6</sub>	22 899

# Global Observations



The AGAGE and Affiliated Networks



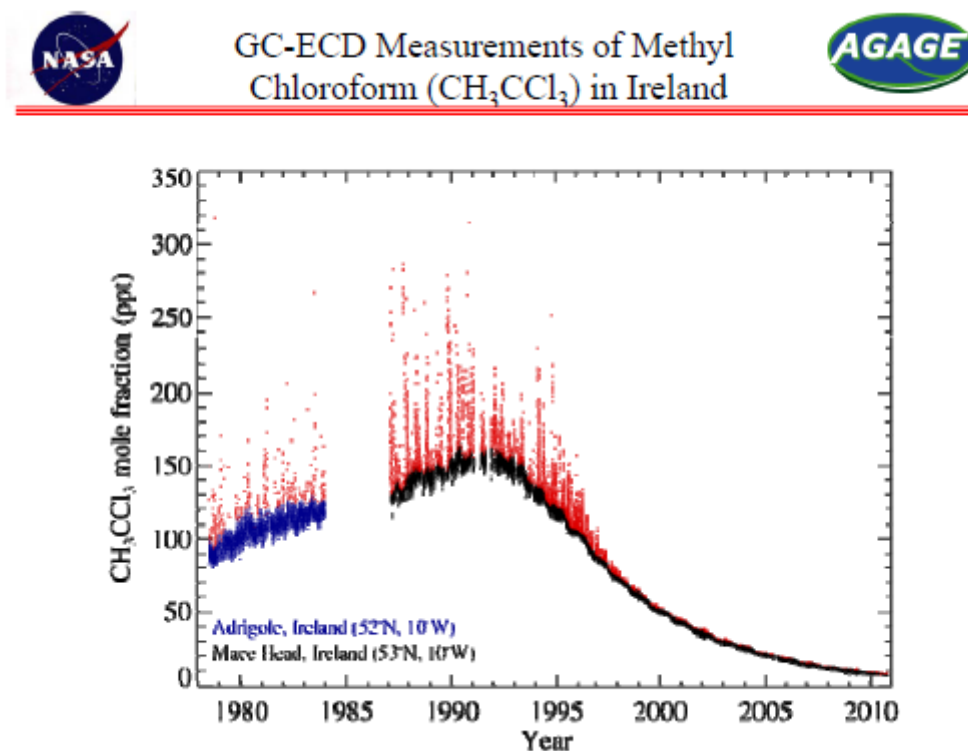
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# Global Observation Network Mace Head, Ireland



- West coast of Ireland
- Marine and Continental air masses
- Global Atmospheric Watch site
- Leading centre for international research

# Historical context - CFCs



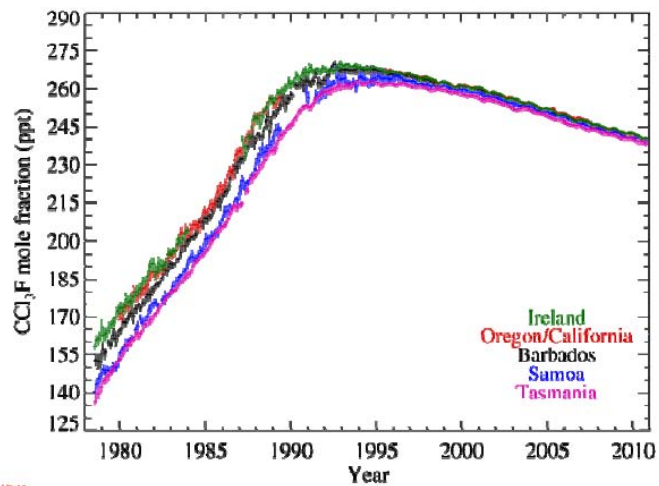
$\text{CH}_3\text{CCl}_3$  atmospheric lifetime ~5-6 years



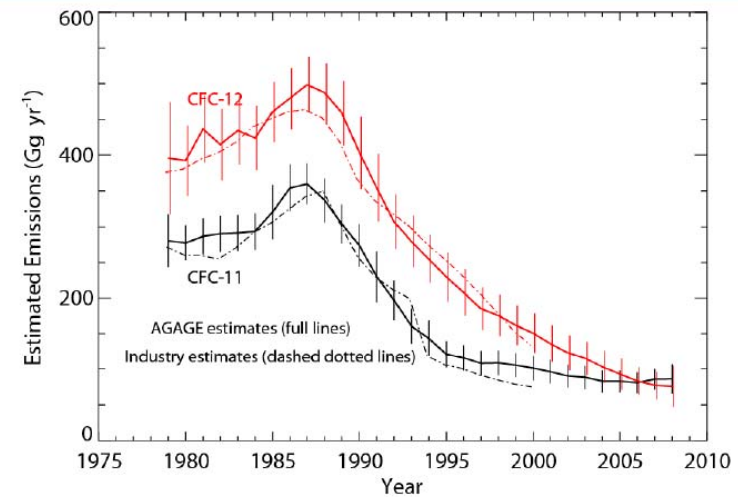
# Historical context 2



CFC-11 ( $\text{CCl}_3\text{F}$ ) monthly means and standard deviations from GC-ECD measurements



Annual Emissions of CFC-11 and CFC-12



CFC-11 atmospheric lifetime ~140 years



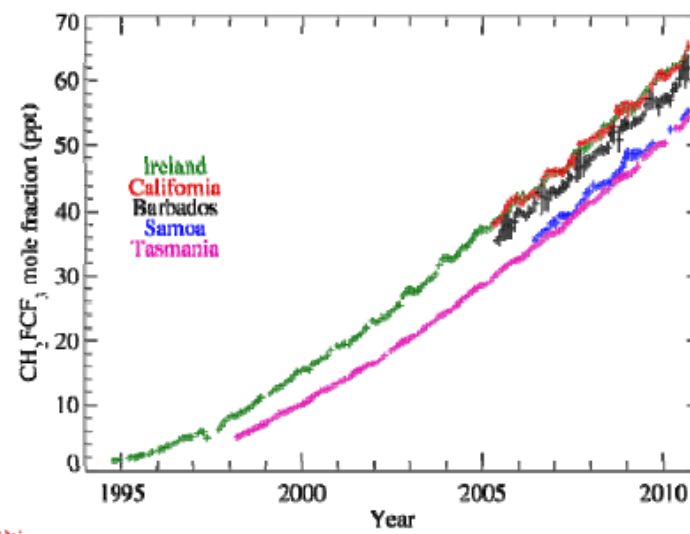
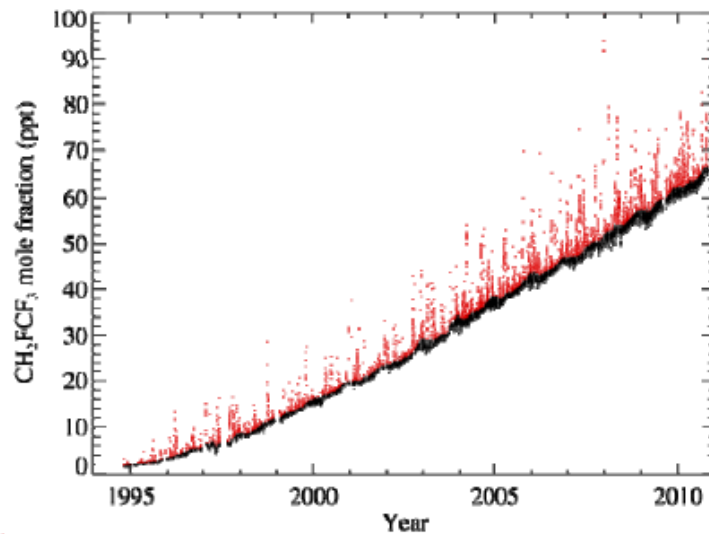
# Build-up of HFCs in the atmosphere



GC-MS Measurements of HFC-134a  
( $\text{CH}_2\text{FCF}_3$ ) in Ireland



HFC-134a ( $\text{CH}_2\text{FCF}_3$ ) monthly means and  
standard deviations from GC-MS measurements



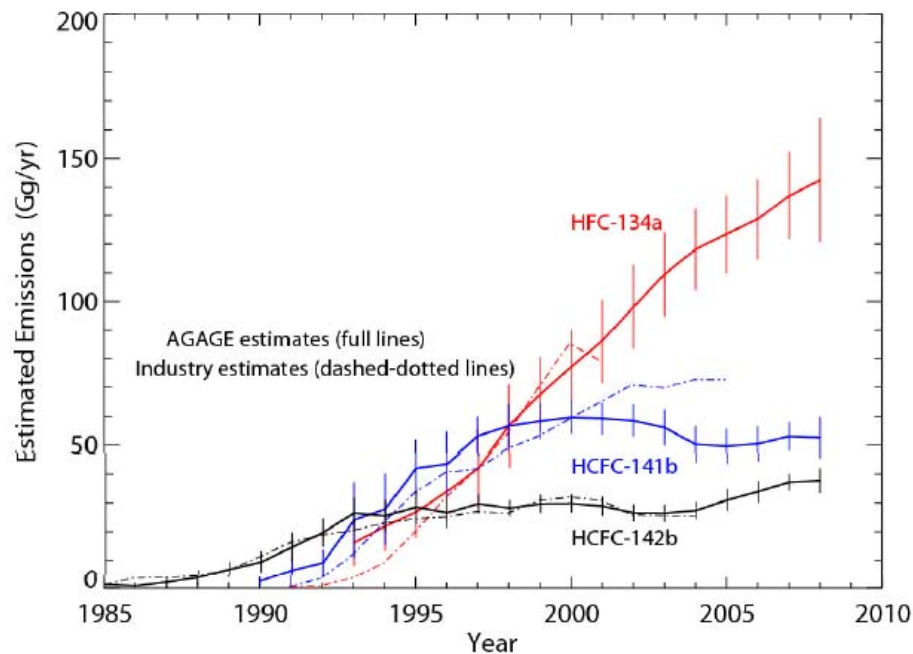
HFC 134a atmospheric lifetime ~14 years



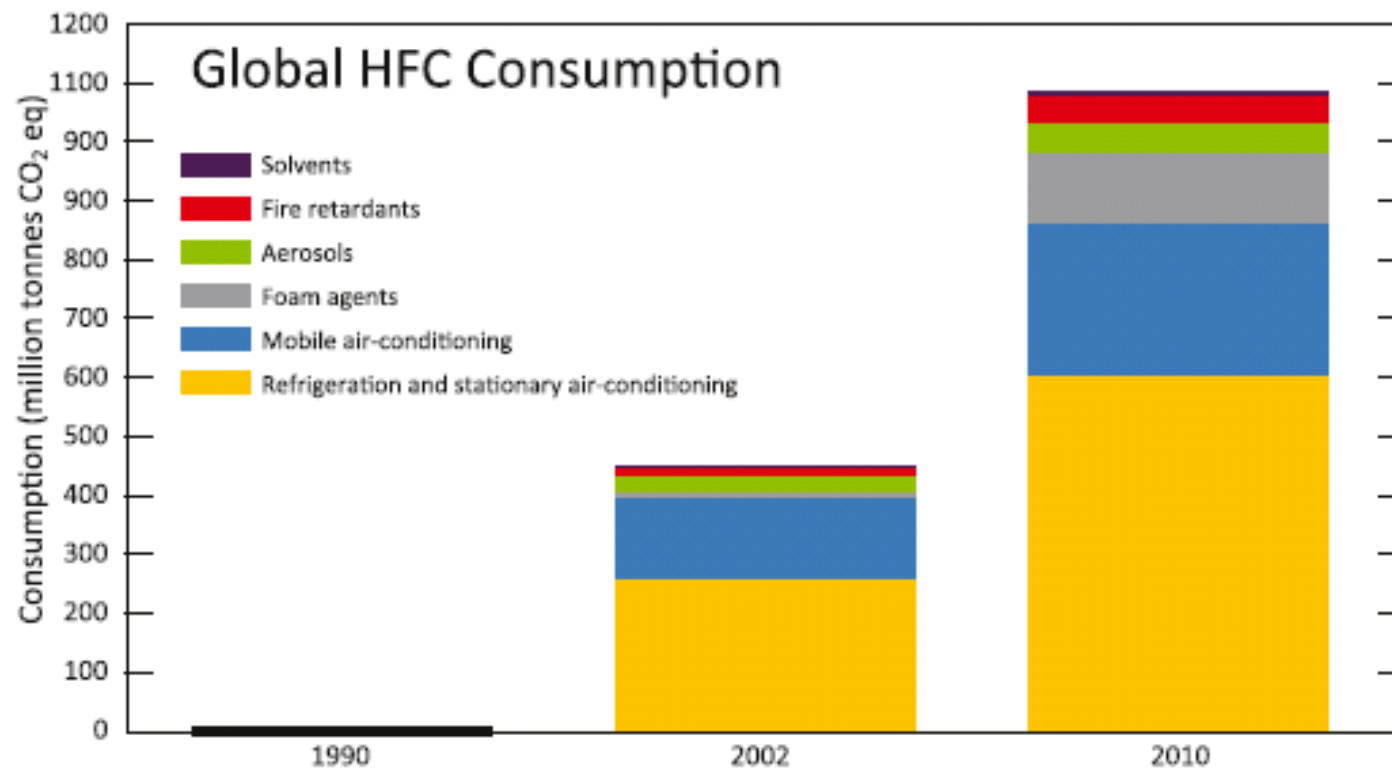
# Replacement with HCFCs and HFCs



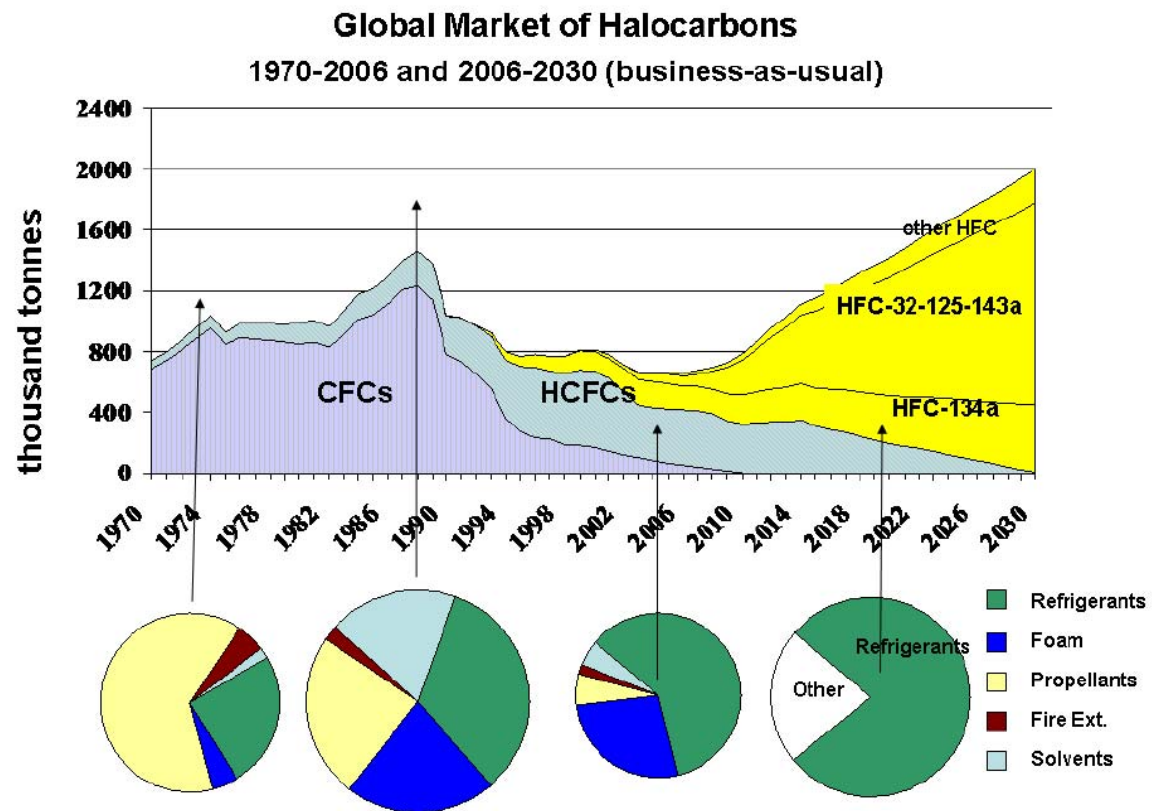
Annual Emissions of the CFC Replacement Gases



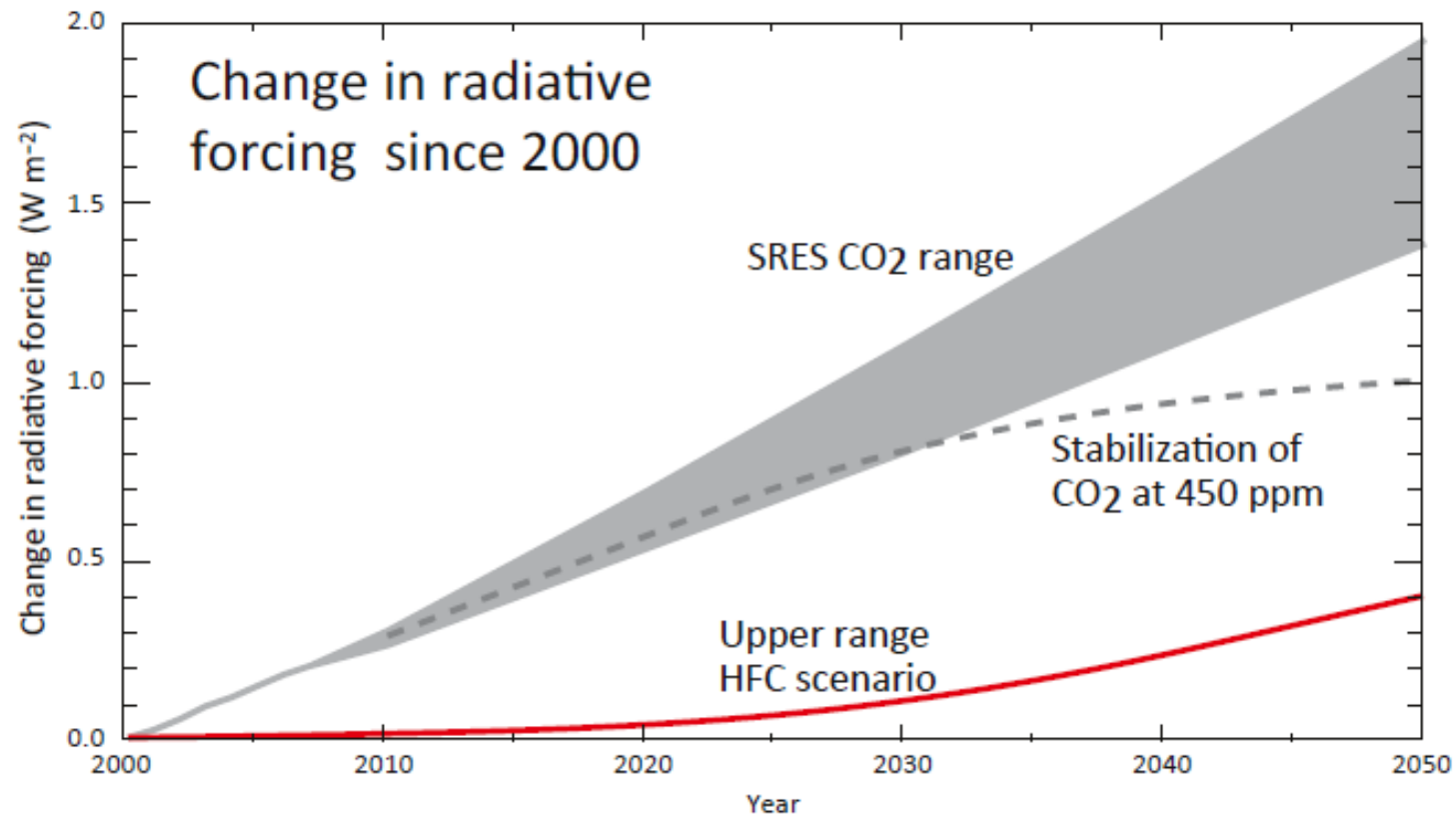
# Global Growth in HFC Consumption



# Projection of HFC Market Growth

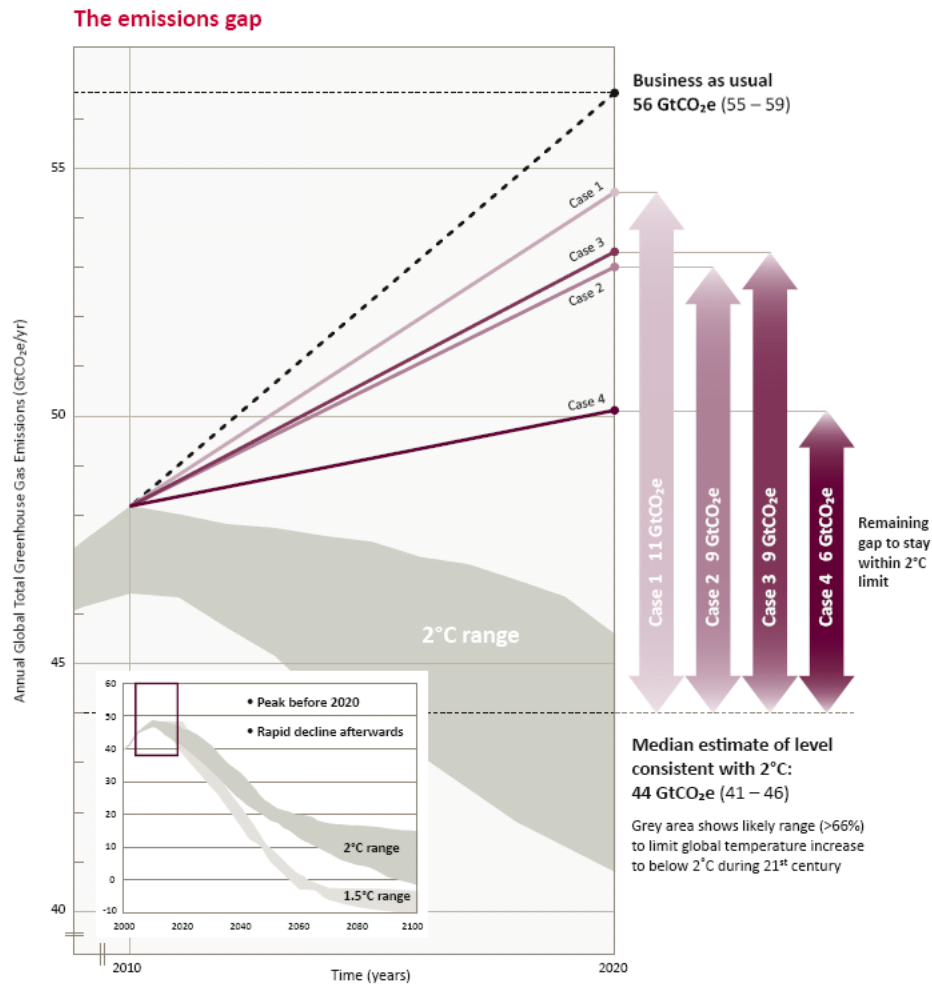


# What does this mean for climate change?



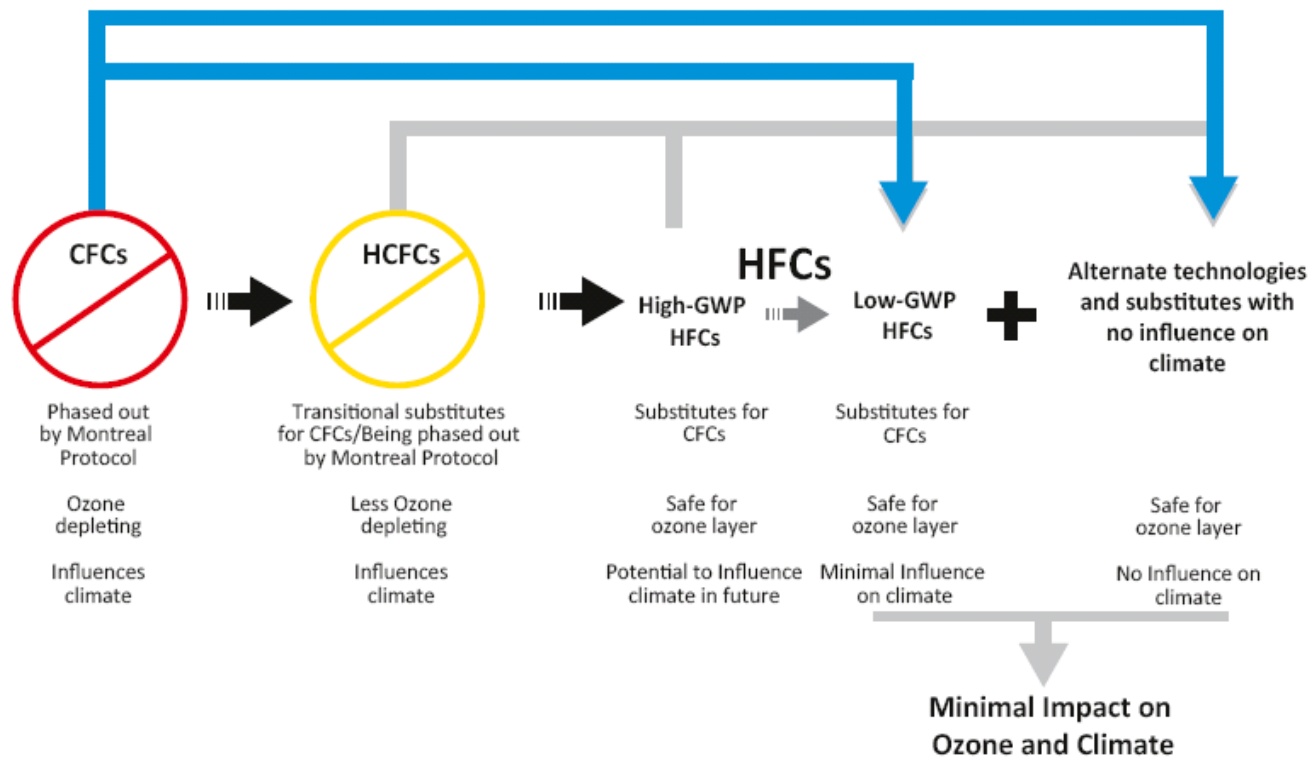
HFCs Projected Up to 27- 40% of Radiative Forcing of CO<sub>2</sub> in 2050

# Closing the Emissions Gap



Global action on HFCs is needed to reduce the emissions gap

# Next Steps:





# Summary

- HFCs are “Super Greenhouse Gases”
- HFCs are building up in the atmosphere, evident from global observations
- BAU projections indicate they will constitute a major component of total Radiative Forcing by 2050
- They need to be addressed at a global level if we are to stay below 2°C limit.
- Steps to do this should start asap



Thank you

