

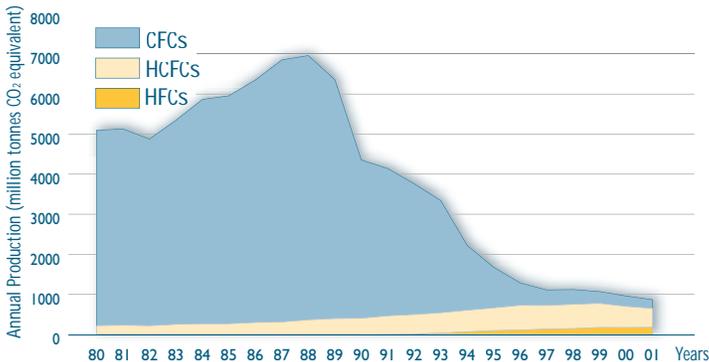


## GREENHOUSE GASES EMISSIONS:

What has led to  
their most significant  
reduction?

# The replacement of CFCs! With a key role played by hydrofluorocarbons (HFCs)

- ▼ CFCs, banned because of their impact on the ozone layer, are not included in the Kyoto Protocol although they are powerful greenhouse gases. Much more powerful than hydrofluorocarbons (HFCs).
- ▼ Meanwhile, an HFC emission is thus equivalent to much less CO<sub>2</sub> than the same emission of CFC.
- ▼ Also much less HFCs than CFCs are needed in their applications for the same service.



In 1990, CFCs represented 25% of greenhouse gas emissions. In 2010, the HFCs replacing them will represent only 2%. This achievement represents about 4 times the objectives of the Kyoto Protocol.

# HFCs belong to the family of F-gases...(\*)

F-gases comprise hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF<sub>6</sub>)



Preserving food and medicines in refrigeration appliances



Providing comfortable and safe living via air-conditioning in offices, houses hospitals, shops cars....



Saving energy as blowing agent for high performance thermal insulation foams

(\*) In the frame of the Kyoto Protocol, "F-Gases" are HFCs, PFCs and SF<sub>6</sub>. It excludes CFCs and HCFCs covered by the Montreal Protocol.

# ...often vital to our daily life

HFCs and PFCs are hydrocarbons containing fluorine atoms that give them their exceptional properties



Allowing production of semiconductors and electronics as precision cleaning solvents



Increasing safety as electrical insulation gases for high voltage equipment ( $\text{SF}_6$ )



Saving lives and goods property as waterless fire extinguishers



Treating asthma as propellant for medical aerosols inhalers

# F-gases are greenhouse gases that can reduce the greenhouse effect!

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In their many applications, F-gases contribute to significantly lower CO<sub>2</sub> emissions



On average 80 % of the climate impact of applications (like refrigeration or air conditioning) is caused by the CO<sub>2</sub> emissions associated with their energy consumption

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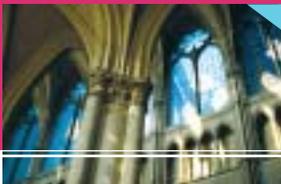
## **ENERGY EFFICIENCY or why HFCs are part of the solution**

Over the lifetime of an application, the reduction in climate impact resulting from the improved energy efficiency obtained by using an HFC is more important than the impact of emitting the HFC itself (\*). Energy efficiency improvements from using HFCs and the impact of their emissions through the lifetime of the equipment should thus be considered before imposing use restrictions and bans.

(\*) this is supported for some applications by verified life cycle analysis available on request

# So why such a debate on F-gases?

30% of the CO<sub>2</sub> emitted at the time of the cathedral builders of the XII century is still with us!



Wrongly, the debate is focused solely on the conversion factor between F-gases and CO<sub>2</sub> emissions - the "Global Warming Potential" (GWP)

## Equally important are:

- ▶ THE QUANTITIES OF GAS EMITTED: compared to the huge amounts of CO<sub>2</sub>, methane or nitrous oxide the F-gases are minor contributors to the climate impact;
- ▶ THE REAL LIFETIME OF THESE GASES IN THE ATMOSPHERE: HFCs, the main F-gases used, are essentially degraded in the atmosphere within decades; in contrast, CO<sub>2</sub> emissions persist for centuries.

## On its own, GWP cannot describe the climate impact

Global Warming Potential (GWP) is a number that is specific to each gas. It is the conversion factor that enables an emission of the gas to be expressed in terms of an emission of CO<sub>2</sub> to provide a means of comparing emissions of greenhouse gases. On its own, GWP cannot describe the climate impact.

CARBON DIOXIDE,  
NITROUS OXIDE, METHANE

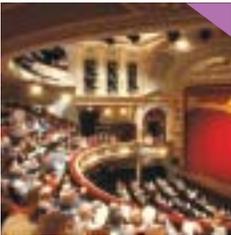


HFCs

# Used responsibly, F-gases are sustainable in many applications

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## for public safety reasons



- Compared to potential alternatives, F-gases are low in toxicity and low in flammability.
- This is essential for many large applications such as those used in public places like theatres, supermarkets, transportation, tall buildings...

## for technical and cost reasons



- F-gases are in their applications often the most reliable and preferred technical solution.
- The safety measures imposed by the use of more dangerous alternatives can represent an extra cost of 30% - This money could be better spent on reducing energy consumption.

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*Improved performance, better maintenance, efficient and safe recycling:*  
in general, these measures mean that emissions of F-gases will be substantially further reduced.

# F-gases: beyond the appearances

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- ▶ they play a major role in CFC elimination
- ▶ they have low global climate *impact*
- ▶ their emissions can be easily contained
- ▶ they contribute to decreased CO<sub>2</sub> emissions



Used responsibly, F-gases represent a unique opportunity to contribute significantly to the objectives of the Kyoto Protocol. It should not be missed!

*The challenge of the E.U. F-gases Regulations is to achieve this opportunity by ensuring within the EU the harmonization of requirements on monitoring, containment, marketing and sustainable uses of fluorinated gases.*



To know more about fluorocarbons and SF<sub>6</sub>, contact  
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See also: [www.fluorocarbons.org](http://www.fluorocarbons.org)