



**GREENPEACE**

Cool Technologies: Working Without HFCs  
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ATMOsphere 2010  
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Brussels

global warming is happening now



2010 Pakistan floods

global warming is happening now



2010 Pakistan floods



global warming is happening now



2010 Pakistan floods

global warming is happening now



2010 Pakistan floods

global warming is happening now



2010 Pakistan floods



global warming is happening now



2010 Pakistan floods

global warming is happening now



2010 floods in India



global warming is happening now



2010 fires in Russia

global warming is happening now



2010 fires in Russia

global warming is happening now



2010 fires in California



global warming is happening now



2010 fires in California

global warming is happening now



February 2010: Huge iceberg ( 78 kilometers long, 2,500 sq. km, breaks of from Antarctica.

# nature's messages

- Nature is constantly sending us direct messages, telling us that the climate is changing: droughts, floods, fires, hurricanes, sea levels rising, melting snow packs and glaciers, spread of new diseases.
- The ozone crisis should have taught us that it is much easier to tip nature's balance than to restore it.
- 75 years from the onset of the ozone crisis in the early 1970s till the time the ozone layer is expected to almost recover around 2050.
- NASA reports 2010 has been the hottest year on record: 2010, 2005, 1998, 2003, 2006, 2009



# the precautionary principle

- Basic axiom of ecology is that everything is interconnected and if one factor is changed, all others are affected
- No substance should be released into the environment until it is proven to be benign
- The polluter should pay for the damage
- We either learn to live within nature's limits or we shall perish

# Fluorocarbons are not sustainable

- CFCs and HCFCs are potent ozone depleting substances
- CFCs, HCFCs and HFCs are super greenhouse gases
- HFCs must not replace HCFCs.

# HCFC consumption

- CFC consumption in developing countries peaked in 1995 at approximately 180 kt per year.
- HCFC consumption in developing countries will peak in 2013 at approximately 566 kt per year: or 3.14 times the peak CFC consumption.
- Global HCFC emissions in 2007 (at .78 Gt CO<sub>2</sub> eq.) were 30% more than average HCFC emissions during 2000-2004.



## Accelerated HCFC phase out

- The accelerated HCFC phase out could reduce cumulative emissions of 21 billion tons of CO<sub>2</sub> equivalent greenhouse gases.
- But if HCFCs are primarily replaced by HFCs the climate benefits will be greatly diminished.
- The most commonly used HCFC is R-22 with a GWP of 1700. The most likely HFC replacement is HFC-410a with a GWP of 1890.

# Climate impact of HFCs

- The consumption of HFCs in developing countries by 2050 is projected to be 8 times greater than in developed countries.
- That will mean that the global consumption of HFCs will be 3.5 times higher than the combined peak consumption of CFCs and HCFCs in 1989.
- If we only reduce CO<sub>2</sub> emissions and do nothing about HFCs, they will be responsible for between 28% and 45% of carbon-equivalent emissions by 2050.

# HFCs are obsolete

- Emerging consensus within the Montreal Protocol – though no agreement on what action to take
- Increasing number of cooling equipment manufacturers and users are looking for HFC-free technologies to meet their long term corporate sustainability targets.



# Natural refrigerant solutions

- Greenpeace report *Cool Technologies : Working Without HFCs* presents many examples from around the world of companies working with natural refrigerants:
  - Domestic refrigeration and air-conditioning
  - Commercial refrigeration and air-conditioning
  - Industrial production
  - Mobile air-conditioning
  - Insulation foam blowing

# Long term cooling solutions

- Natural refrigerants: HC, CO<sub>2</sub>, ammonia, water.
- Natural foam blowing agents: HC, CO<sub>2</sub>, water
- Dessicant, evaporative, absorption, adsorption cooling
- District cooling
- Co-generation cooling
- Innovative architectural designs

# Greenfreeze

- Greenpeace developed and placed in the public domain the Greenfreeze hydrocarbon domestic refrigerator technology in 1993.
- There are over 400 million Greenfreeze fridges in the world today.
- Nearly 40% of global fridge production is Greenfreeze (soon to come to North America)
- TEAP 2010 projects that 75% of global fridge production will use hydrocarbons by 2020.

# Greenfreeze in China





## Corporations going HFC-free

- Coca Cola: By 2015 100% of all new vending machines will be HFC-free.
- Unilever: Has deployed over 400,000 HC ice-cream freezers.
- PepsiCo has over 8,000 HC and CO<sub>2</sub> vending machines around the world with all new units in Turkey now HFC-free

# HFC-free supermarkets

- Several supermarket chains in Europe & Australia are using natural refrigerants
  - Edeka, Tesco, REWE, Auchan, Sainsbury's, Aldi Sud. Marks&Spencer, Woolworths, Waitrose
  - Natural refrigerants are used in all forms of supermarket equipment: show cases, bottle coolers, freezers, fridges, air-conditioning

## Natural refrigerants in A/Cs

- Companies producing HC room air-conditioners:
  - De Longhi : Italy
  - Elstar : UK
  - Benson & Recom Engineering: Australia
  - Frigadon: Sweden
  - Gree: China: world's largest A/C manufacturer
  - Godrej & Boyce: India : development phase
  - Mayekawa: Japan

# Converting R-22 A/Cs to propane

- HCFC-22 = nearly 90% of the HCFC refrigerant market
- Propane is the optimal replacement for R-22
- Thousands of R-22 units have been converted to hydrocarbons in South East Asia and the Caribbean e.g. University of West Indies
- Proper safety practices are required when doing conversions



# Hydrocarbon MACs

- Over 7 million car air-conditioners have been converted, with drop-in replacement, from CFCs and HFCs to hydrocarbons in Australia, U.S., Canada, Philippines and the Caribbean.
- Hydrocarbons can provide the long term solution to MAC technology in either direct or secondary systems.
- There is no need for HFC-1234yf and other HFOs. They pose environmental, safety and cost problems.

# Mutual but differentiated responsibilities

- Developing countries and industrialized countries have the same interest to avert further climate chaos
- They are dependent on each other to save the planet
- They have mutual and somewhat differentiated responsibilities but both must take action now to eliminate HFCs

# Actions for industrialized countries

- Lead by example: institute an HFC phase-out schedule in your own countries
- Legislate measures to support the uptake of climate friendly refrigerants:
  - Internalize the environmental costs of refrigerants through carbon taxes
  - Establish rigorous efficiency standards for cooling equipment
  - Set rigorous GWP weighted upper limits for refrigerants
  - Review and remove obsolete standards that unnecessarily block natural refrigerants

# Actions for developing countries

- Governments should encourage industries to bypass HFCs as they phase-out HCFCs
  - Facilitate informational outreach programs for target audiences (equipment manufacturers and buyers and consumers)
  - Initiate GWP weighted carbon taxes on refrigerants
  - Establish rigorous efficiency standards for all cooling equipment
  - Review and remove obsolete standards that unnecessarily block the uptake of natural refrigerants.

# Leapfrogging HFCs in developing countries

- Leapfrogging HFCs makes good business sense for developing countries:
  - Natural substances offer the long term environmental solutions
  - Their operating costs are less
  - In most applications they are as or more efficient than HFCs
  - HFCs will have to be phased-out and there won't likely be another round of financial support
  - Export markets for HFC products will shrink as governments of importing countries act against HFCs



## Orderly & strategic HCFC phase-out in developing countries

- With funding from the Multilateral Fund, developing countries should avoid the HFC cul-de-sac: there will not be yet a 3<sup>rd</sup> round of funding to assist developing countries to phase-out HFCs.
- Developing countries can plan for an orderly phase-out of HCFCs : start with sectors (e.g. foams and refrigeration) where HFC-free alternatives are most readily available.
- Many could meet their earliest commitments (freeze by 2013 & 10% reduction by 2015) with an orderly phase-out plan.
- Adequate funding must be provided to enable developing countries to meet their commitments without using HFCs: cheaper to pay now, to pay for prevention.

# Measures to promote uptake of natural working fluids

- Adjust obsolete safety standards to reflect the current safety capacities of equipment using natural refrigerants.
- Internalize the climate impact of all refrigerants through carbon taxes
- Educate policy makers, equipment manufacturers and users and the public = confidence building
- Train technicians in good practices.

We can try to prevent more of this



# Thank you

- We can try to help protect the climate.
- We can try to help protect the future.
- We CAN end the fluorocarbon era.