



REFRIGERANTS, NATURALLY!

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Pepsi Co

Our Cooler sustainability is part of our larger Performance With Performance Agenda



Human

Nourishing our consumers with a range of fun and healthy products, and making the healthful choice an easier choice.

Environment

Water

Energy & Greenhouse gasses

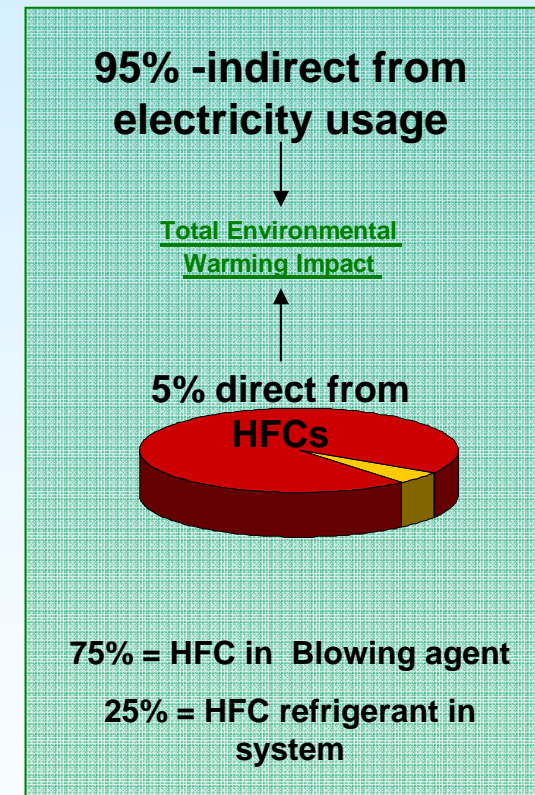
Packaging & Waste

Talent

Cherishing our employees, and making PepsiCo the most desirable place for people of all backgrounds to establish personal and professional growth.

Significantly improve marketing equipment impact on the environment through design and process changes targeted to reduce green house gas emissions

- Marketing Equipment impacts the environment through the use of electricity and refrigerants
- Since 2004 primary focus has been to reduce energy usage in Coolers and Vending. Significant progress has been made :
 - 58% reduction on coolers
 - 55% reduction on Venders
- Began field trials of HC and CO2 coolers in 2006 and will continue to evaluate both options globally to determine best performance, cost and availability for each market.
- Mandated HFC-free Blowing agent (BA) in all PepsiCo approved equipment: 100% compliance by the end of 2007



Results to date: 65% reduction in GHG emissions!

Alternative Refrigerant Progress



- ❑ Significant progress in 2007 and 2008
 - Expand alternative refrigerant Initiative to more suppliers
 - Engage stake holders: Bottlers, customers
- ❑ Increase the numbers of the units in the field
- ❑ Expand field test units globally: Europe, China and US
- ❑ Working on three different systems design: CO₂, R600a and R290
- ❑ Target wide range of equipment: Counter top cooler, Single door, open air cooler and venders
- ❑ Compliant with EU regulation for HC system for home appliances
 - We target <150g of refrigerant charge
- ❑ Qualifying units in the system and beyond field test application

CO2 Refrigerant Information



- Has higher energy efficiency than R134a
- Has better COP than R134a
- high volumetric refrigeration capacity
- Smaller compressor

CO2 Advantage	CO2 Drawback
<ul style="list-style-type: none">• Non-flammable/Non-toxic• No limitation on charge• Refrigerant cost is low• High heat transfer• Very clean refrigerant• ODP=0• GWP=1	<ul style="list-style-type: none">• System has high pressure and as much as 10 times of R134a• System cost is high• Additional challenges with Service due to new components and components

Refrigerant Characteristics

- Lower pressure than R134a
- Higher COP than R134a
- Smaller compressor than R134a
- Better performance than R134a

	Operating pressure @ 38 deg C	Volumetric capacity	COP
R134a	10 bar	1,78	2,72
R600a	5 bar	1	2,84

HC (R600/R290) Advantage	HC (R600/R290) Drawback
<ul style="list-style-type: none"> • Less charge than R134a/R404a (25%) • Lower pressure than current baseline • ODP=0 • GWP=3 	<ul style="list-style-type: none"> • Flammable • Max charge <= 150G • Impact on service infrastructure

CO2 System Energy Consumption

Suppliers	Model	Energy KWh/d R134a/R404a	Energy KWh/d CO2	Energy Reduction
Vestfrost	Single door cooler	2.82	2.49	12%
Frigoglass	Open air cooler	33.74	24.9	26%

Test conditions: 24C & 45% RH

- ❑ Split system or modular system design
- ❑ Capillary tube metering device
- ❑ Suppliers: Vestfrost, Frigoglass, Sanden Danfoss and Embraco
- ❑ Market: Europe and Japan
- ❑ Working to expand field test in US market

HC System Energy Consumption



Suppliers	Model	Energy KWh/d R134a	Energy KWh/d R600a	Energy Reduction
Vestfrost R600a	Single door cooler	2.82	2.05	27%
Kelon (R290)	Single door cooler	4.49	3.49	24%

Test conditions: 24C & 45% RH

- ❑ Market: Europe and China
- ❑ Split system and modular system design
- ❑ Capillary tube metering device
- ❑ Low-e double layers glass with Argon gas
- ❑ Vestfrost, Kelon, AHT, Danfoss or Embraco

Alternative Refrigerant Field Test Plan - 2008

System	Country	Equipment
CO2	China	Cooler
	Japan	Vender
	Denmark	Cooler
	Greece	Cooler
R600/R290	China	Cooler
	Denmark	Cooler
	Poland	Cooler
	Spain	Cooler
	Turkey	Cooler
	Hungary	Cooler
	Czech- Rep.	Cooler
	Germany	Cooler
	Italy	Cooler
	France	Cooler
	Baltic	Cooler
	Norway	Cooler

- ✓ **Elimination of HFC is a logical next step in our sustainability journey, but there are still questions to be answered**
- ✓ **Therefore we are testing around 1400 units in the period 2006-2008 (we expect to double this amount by the end of 2008)**
- ✓ **Based on the experience of the field tests, we will decide on further steps**

- No failure reported on R600a units in the field
- Tear down analysis from the field for CO2 compressor → no issue with components, oil.. etc
- One unit electronic thermostat mal-function - CO2 system
- One unit demand defrost heater was not working probably
- One leakage on one CO2 units at brazing joint