

Energy & Store
Development
Conference

E+Sc²⁰¹¹



Carbon Reduction & HFC-Free Refrigerant Conversion Story





Coca-Cola System Commitment to Sustainability

- Live Positively Platform
- Environmental Initiatives
 - Energy Conservation and Climate Change
 - Water Stewardship
 - Sustainable Packaging / Recycling



In a world where populations are growing, where natural resources are stressed, where communities are forced to do more with less, and where consumers' expectations are expanding, sustainability is core to our business continuity and survival."

- Muhtar Kent

Supplier Sustainability Summit, 2009

Environment

Beverage Benefits

Active Healthy Living



Delivering quality you
can trust all the time



Raising the standards of physical fitness globally through encouragement, sponsorship, and grass-roots programs



Committing to
the needs of our
communities, with
wide-ranging programs
in every community
where we do business



Fostering open environments, as diverse as the markets we serve, where workplace rights are respected and people are inspired to create superior results and make a positive difference



Growing the business,
but not the carbon in our
manufacturing operations

Improving energy efficiency and reducing emissions of greenhouse gases in cold drink equipment



Creating a world
in which our packaging
is no longer seen as
waste, but as a valuable
resource for future use



Safely returning to nature an amount of water equivalent to what we use in all of our beverages and their production

Coca-Cola is committed to creating a culture that enhances our environmental sustainability



Environment: Climate Protection

Climate Action is Good Business

Doubling our business in a carbon constrained world requires us to cut waste and innovate new solutions



Grow the Business; not the Carbon

Stabilizing emissions in our manufacturing offers a real return on investment of the Coca-Cola system - and the planet. Coca-Cola operates the largest hybrid electric vehicle fleet in the world, heavily reducing fuel use and emissions.

Clever and Cool Refrigeration Equipment

We are taking action to improve energy efficiency and reduce emissions of potent greenhouse gases



Additional information available at
www.theCocaColaCompany.com>Sustainability>Energy Efficiency & Climate Protection



Discussion Points

1. Profile carbon footprint of Coca-Cola cold drink machines
2. Tactics to reduce equipment energy use
3. Conversion to HFC-free refrigerants

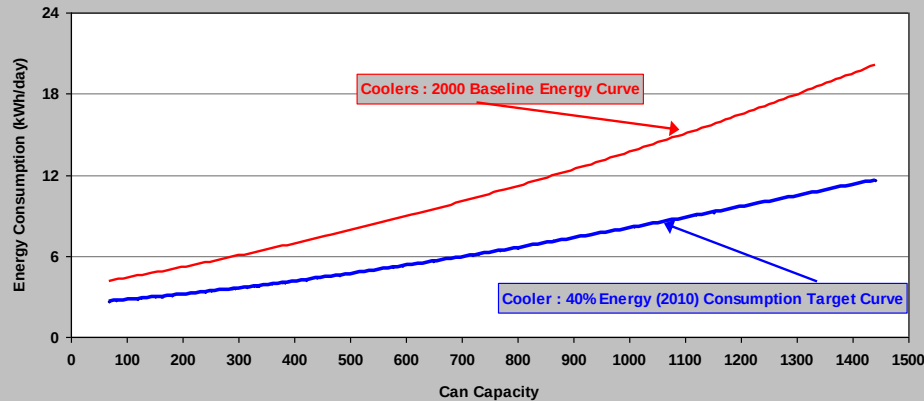


Cold Drink Equipment Energy Efficiency

Environmental Policy for Cold Drink Equipment

“We will require suppliers to significantly improve the energy efficiency of the cold-drink equipment they sell our system, making it 40-50 percent more energy-efficient by the end of this decade.” *Doug Daft - June 27, 2000*

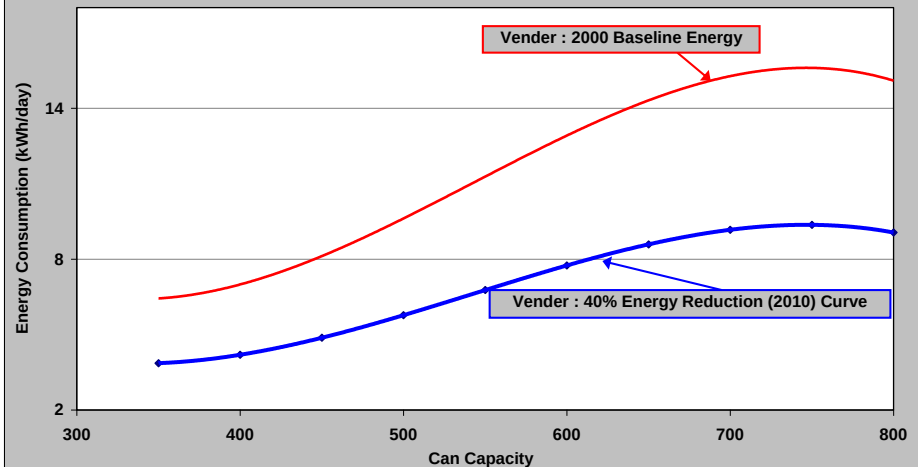
Cooler Energy Consumption In Steady State @ Condition C
For Can Capacity 50 to 1500



We modeled the energy use profile of the cold drink machines we were purchasing.

We used current state-of-the-art technologies to bring us to our 40% improvement in energy efficiency.

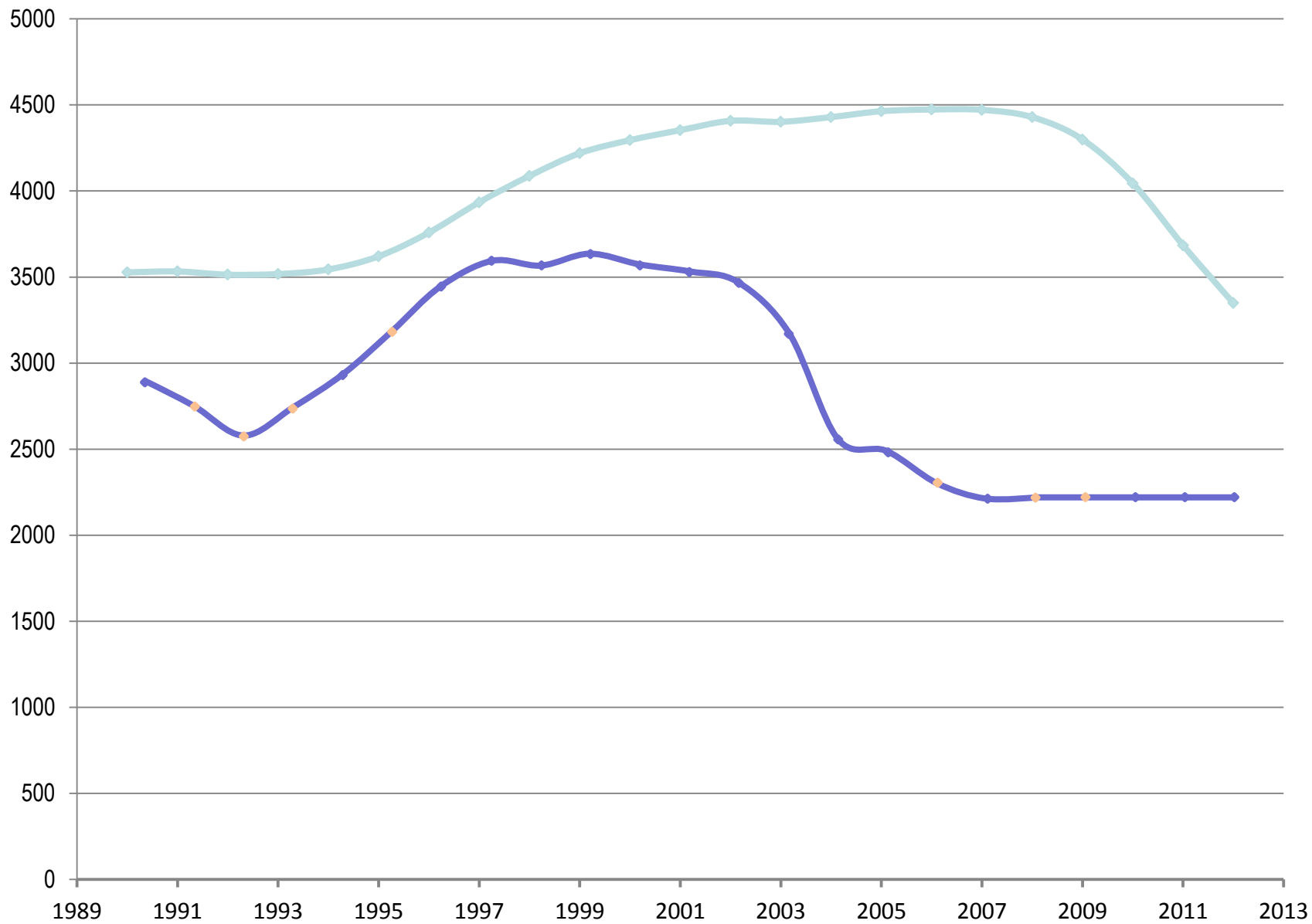
Vender Energy Consumption In Steady State @ Condition C
For Can Capacity 300 to 800

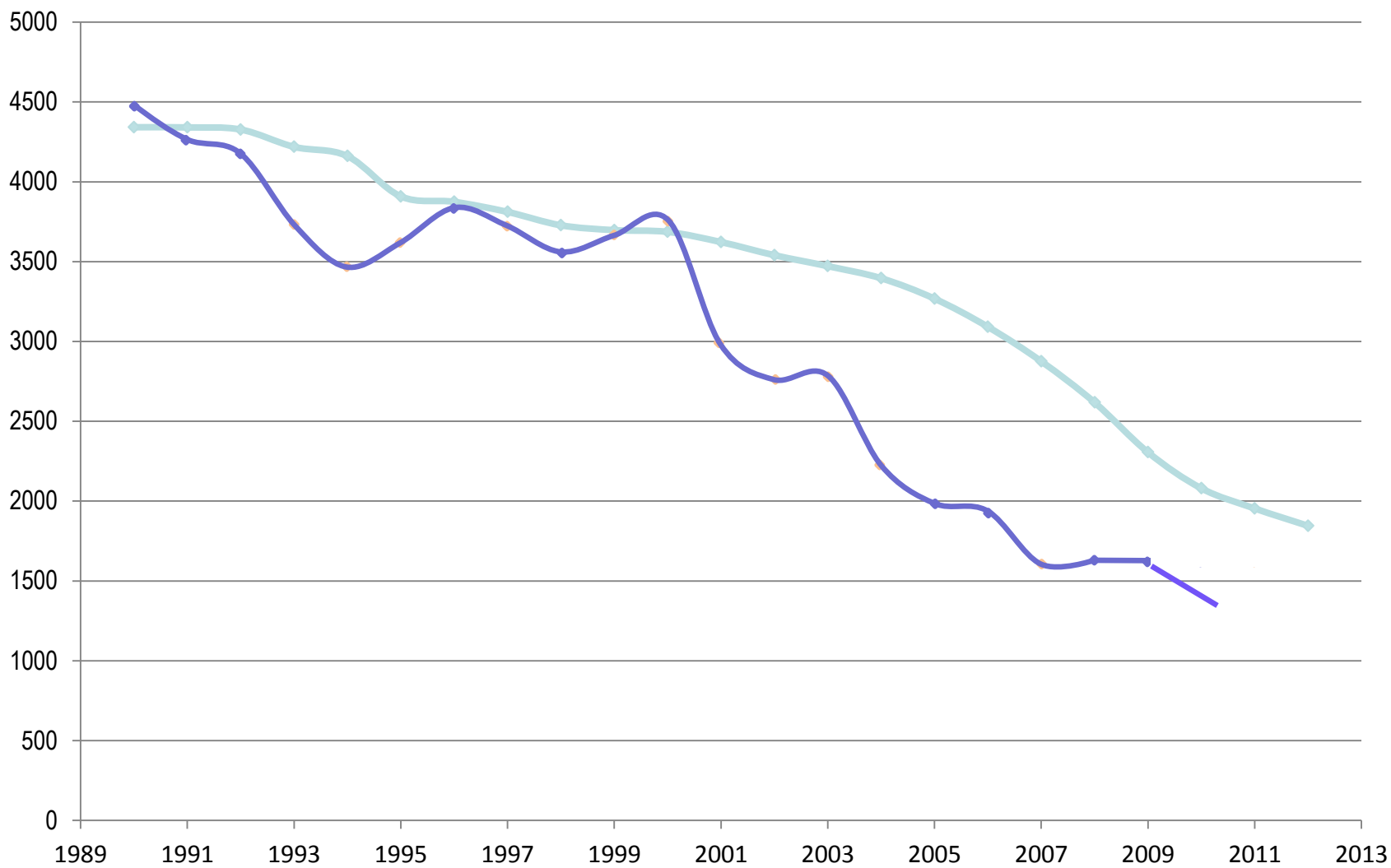




Technologies and Designs for Efficiency Improvements

- Higher Efficiency Compressors
- Liquid Suction Heat Exchangers
- Increased Condenser Surface Area
- Higher Efficiency Condenser Fan Motors
- Variable-Speed Condenser Fan Motors and Condenser Fan Motor Controllers
- Higher Efficiency Condenser Fan Blades
- Higher Efficiency Expansion Valves
- Higher Efficiency Evaporator Fan Motors
- Improved air-movement and heat exchange in cabinet
- Higher Efficiency Lighting
- Higher Efficiency Lighting Ballasts
- Insulation Increases or Improvements
- Vacuum Insulated Panels







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- The average CCNA new cooler purchase is 51% more efficient than year 2000.
- Some cooler models are up to 73% more efficient.
- The average CCNA new vending machine purchased is 57% more efficient than year 2000.
- Some vendor models are up to 63% more efficient.

All without the use of EMDs



Progress with Energy Efficiency

- Achieved the 2010 goals for energy efficiency
 - All coolers meet the new corporate energy consumption requirement
 - Exceed the goal for coolers by at least 18%
 - DOE vendors and Energy Star coolers will continue to widen the gap
- Committed to improving energy performance of our equipment, and achieving 2020 goals
 - Steadily improving the energy performance for over 10 years.
- Although an EMS is not needed to achieve goals, Coca-Cola is committed to EMDs

EMS-55 Energy Control



Keeps beverages cold when consumers make purchases.

The EMS-55 has the potential to reduce energy consumption up to 45% depending on the machine model it is in, operating conditions, equipment configuration, account activity and beverage throughput.

EMS-55 Energy Control



Keeps beverages cold when consumers make purchases.

- Patented self-learning module of account activity
- Puts machine into energy-saving mode based on learned traffic and/or sales activity
- 35% savings on average in a cooler
- 20% savings on average retrofitted in a vendor



Energy Management System

How does the Coca-Cola EMS-55 work?

The EMS-55 unit will learn the store opening and closing times using a movement sensor, and door switch (on coolers) to put the machine into one of two modes:

- Mode 1: (Normal) Store open:
Machine operates normally, chilling the products to an average of 36°F
- Mode 2: (Stand-by) Store closed:
Machine automatically turns the lights off and raises average product temperature to 45°F
- Once EMS-55 has learned the opening and closing times, the machine will bring all of the products back down to the average of 36°F - cold for when the store opens.

Energy Management System

EMS-55 Motion Sensor - Cooler



Detection
Area

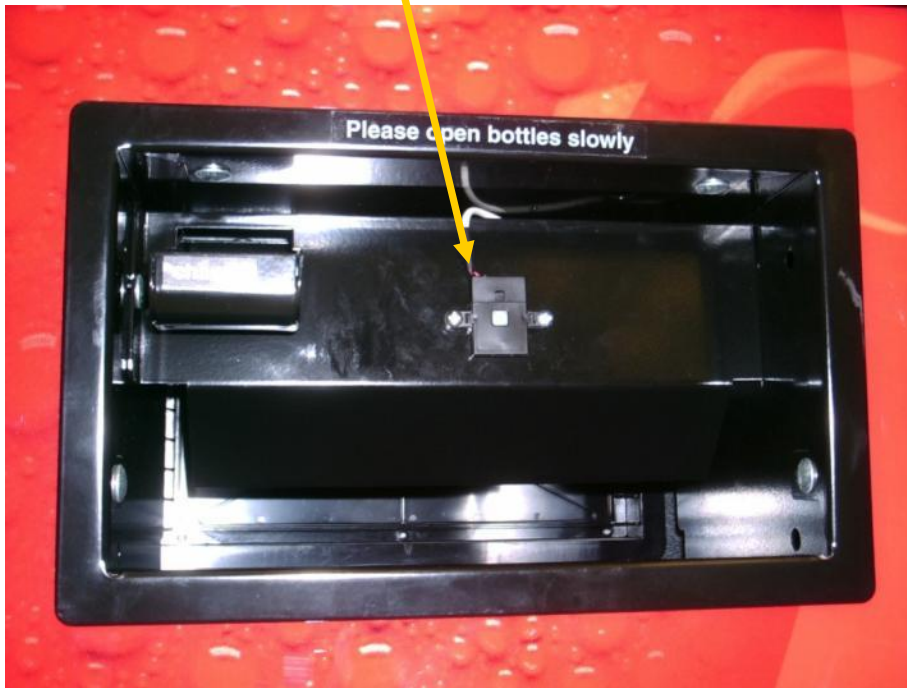


Movement Sensor



Energy Management System

EMS-55 Motion Sensor - Vendor



Following pattern downloaded at 7:09am on April 18, 2007

Following pattern downloaded at 1:34pm on April 27, 2007

Following pattern downloaded at 5:15pm on May 4, 2007

[illegible]



EMS-55 operational approach

Energy Reductions Achieved By:

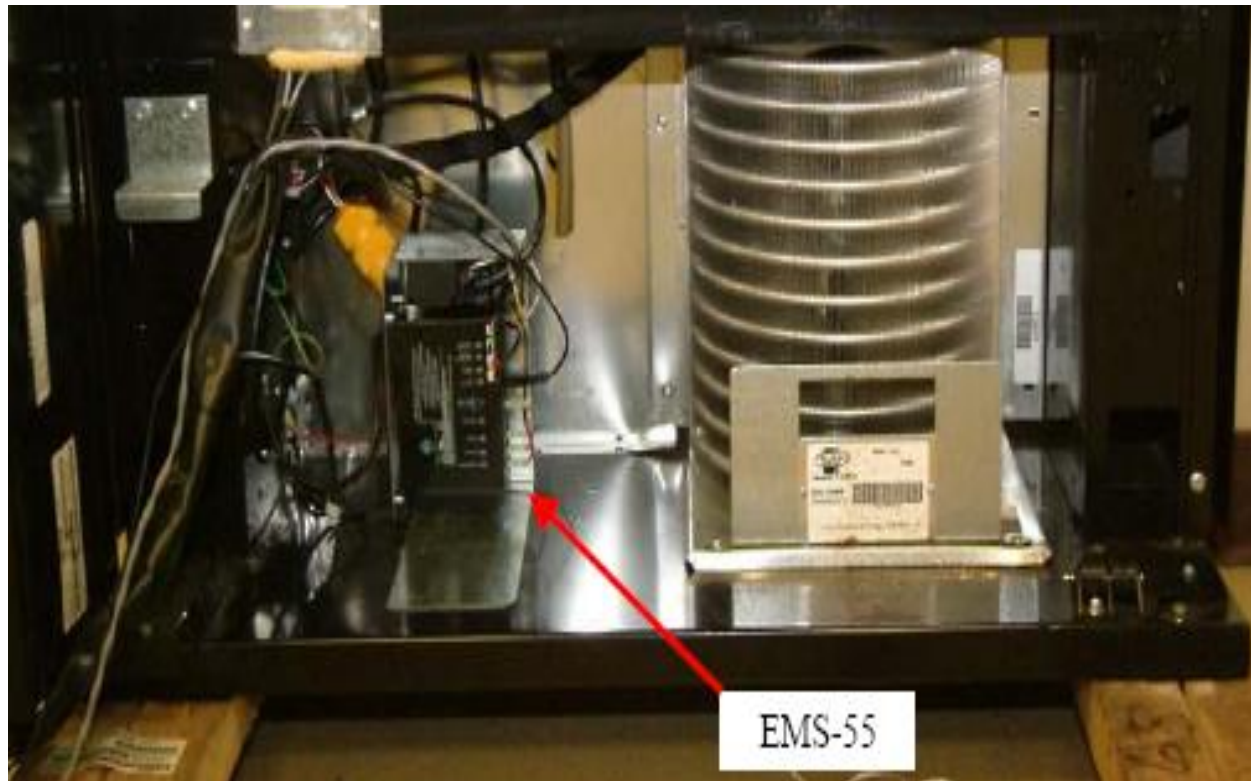
- Monitoring the traffic patterns to learn when the store is open / closed
- Allowing the machine to warm up slightly during hours when the outlet is closed and no sales are possible
- Commencing recovery of the machine to “in spec” temperatures with enough time to ensure that even the first sale is within temperature specs
- Control the lights (and fans in cooler) to reduce unnecessary energy consumption

Reduction In Service and Repair Achieved By:

- Reductions in refrigeration system / lights / fans run time result in longer life
- Monitoring conditions which lead to refrigeration system failure (in coolers), and protect the refrigeration system when harmful conditions are detected
- Track refrigeration system statistics
- Provide diagnostic codes to assist in service and repair efficiency



EMS-55 Vendor Retrofit Kit



- Fast install
- Agency Certified for field installation



Vendor Retrofit Kit Energy Savings



- Average energy savings: 20%
- Overall savings range from 15% to 34% in active accounts
- Daily energy savings up to 45% in active accounts



Vendor Retrofit Kit Operation



- Works well with block timers
- Responds to time and schedule changes.

Field Use (after 5 months)





Without a maintenance-free condenser

The condenser becomes dirty from being placed at ground level and because it is not easily accessed by the operator. Only a technician can do this task properly.

The dirtier the condenser the higher the energy consumption, and the machine's carbon footprint increases dramatically.

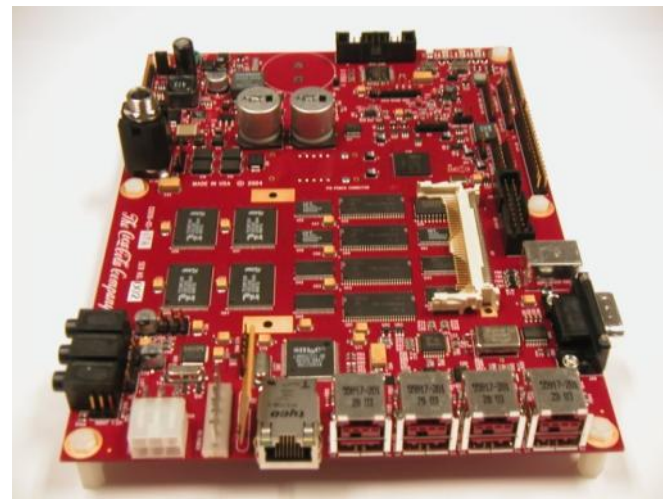




EMD Rollout

EMD Strategy in vending:

- Embed the EMS IP into the vending controller
- Execute with “Envirovend” remanufactured and new stack machines, Glass Front next
- More cost-effective execution than Retrofit Kit



Refrigeration Equipment

- Coolers and vending machines make up the largest component of our System's HFC emissions.
- We have already transitioned to HFC-free insulation for new purchases of refrigeration equipment
 - This new insulation generates 3/4 fewer direct greenhouse gas emissions as compared with traditional equipment
- TCCC has invested \$10 mm to identify and test CO2 as an alternate refrigerant
 - Carbon dioxide technology generates 1/4 fewer direct greenhouse gas emissions from refrigerants

Combined, these technologies will reduce direct and indirect carbon emissions by over 3 tons over the lifetime of each typical machine.





HFCs and the Climate Crisis

- F-gases, primarily used for refrigeration and cooling, represent 17% of the world's current global warming burden.
- The problem was exacerbated by the Montreal Protocol when CFCs were banned and HFCs and HCFCs were sanctioned as "environmental" replacements for CFCs.
- The result has been an increasingly devastating impact on global warming.
- There are feasible replacements for almost all current F-gas uses, but not without cost and challenge.
- U.S. lags far behind much of the world in deploying low-GWP alternatives due to regulatory restrictions and increased investment.
- Movement already underway by Obama Administration to pursue incentives, elimination of barriers and regulation on F-gases and overall Climate Change legislation



European Parliament calls for action to phase down HFCs

A Motion for a Resolution adopted yesterday, 14 September 2011, in the European Parliament urges the European Union to be more pro-active in reducing non-CO₂ climate-relevant gases, especially emissions of fluorinated gases (f-gases).

The Members of the European Parliament (MEPs) have expressed in their Resolution as well as in Tuesday's discussion with the European Commissioner responsible for Climate Action, Connie Hedegaard, that prompt action to phase down hydrofluorocarbons (HFCs) is crucial, as their contribution to total greenhouse gas emissions is mounting.



The author of the Resolution, MEP Theodoros Skylakakis, stressed that "destroying these gases is very important because they will make up 20% of global gas emissions by 2050."

HFC – Free Machines

In February 2000, Doug Daft, Coca-Cola Chairman & CEO, promised Greenpeace and the world that Coca-Cola would stop purchasing cold-drink equipment with HFC refrigerants. HFCs are powerful greenhouse gasses. Cost-effective alternatives were not available when the Company decided to take this direction.

In December 2009, Muhtar Kent, Coca-Cola President & CEO, in a joint press conference with Greenpeace, gave a timetable for Coke conversion to HFC-free refrigerants in cold-drink equipment.

“Let me reiterate, by 2015, we're committed to having 100 percent of all our new cold drink equipment be HFC-free. And by as early as 2012, 50 percent of our new equipment will be HFC-free.”

*Muhtar Kent, Chairman and Chief Executive Officer, The Coca-Cola Company
Media Teleconference with Greenpeace
December 3, 2009*



Technologies explored

2000: Technology Surveys

- ☐ Primary – Stirling, CO₂, HC
- ☐ Secondary – Magnetic, Peltier, Linear Compressor, Cool Chips, Brayton, etc.

2001: Technology Development

- ☐ Stirling
- ☐ CO₂

2002: Technology Development; System Integration

- ☐ Stirling
- ☐ CO₂

2003: System Integration; Assessment

- ☐ Stirling
- ☐ CO₂
- ☐ HC (Olympics Contingency)

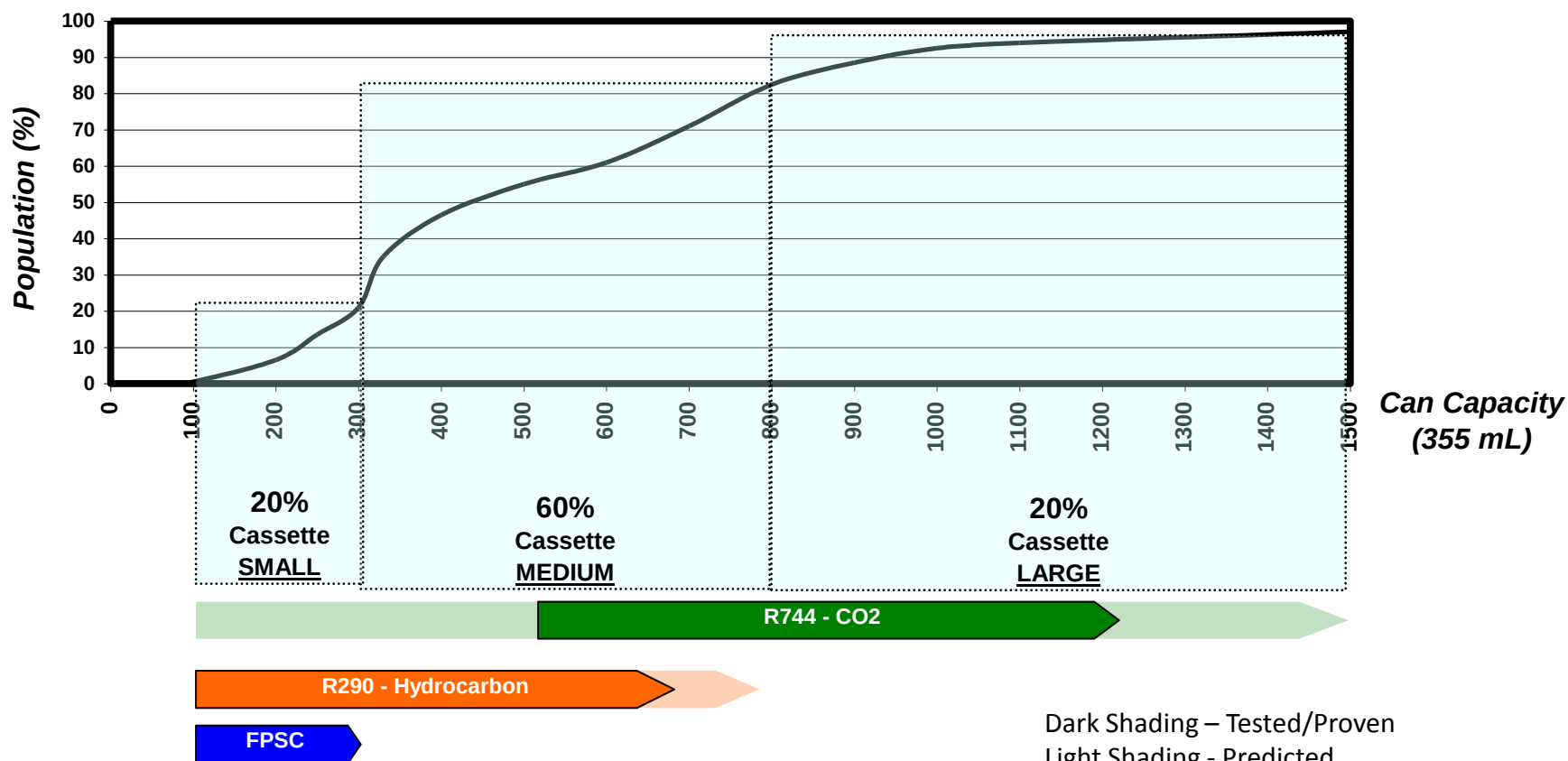
2004: Focus on pre-Commercialization

- ☐ CO₂
- ☐ Cassette

CO₂ Provides Greatest Coverage

Cumulative Population vs. Can Capacity

Global Survey - Top 70% of Equipment



* Not Inclusive of Japan Equipment Population

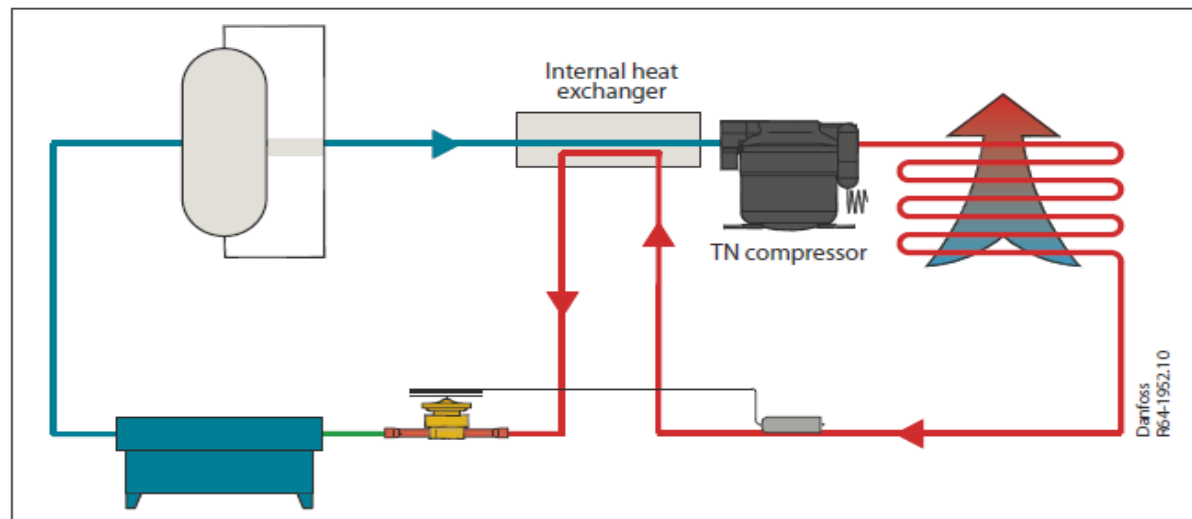
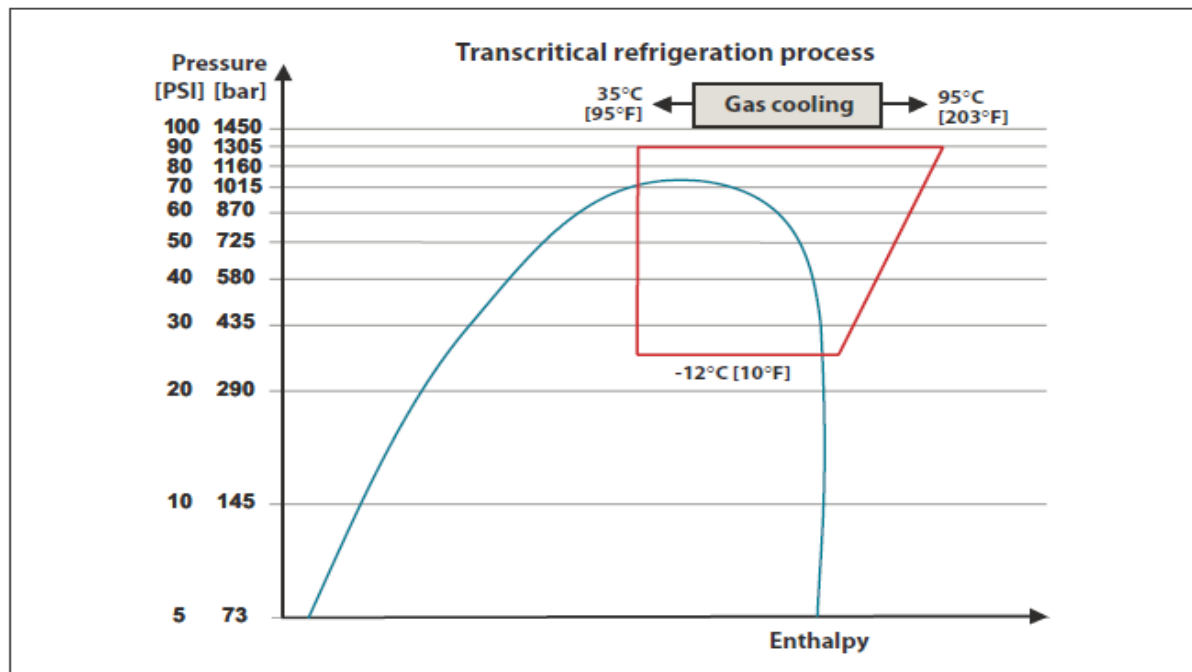


HFC – Free Machines



Approach:

To achieve this HFC-free goal, commercialize cold drink equipment that operate with the HFC-free **CO₂** refrigerant.





HFC-Free Cold Drink Equipment

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- Currently > 1600 HFC-Free machines in North America
- 375 vending machines
- 1281 coolers
- Target: at least 50% of new purchases in 2012



2012-2015 HFC-Free Equipment Conversion

Permitted refrigerants by the U.S. and Canadian governments:

- CO₂ for coolers: fully allowed
- CO₂ for venders: allowed under test exemption; SNAP approval expected next year
- R600a refrigerators: **not allowed; SNAP pending**
- R290 for coolers: **not allowed; SNAP pending**
- R290 for venders: **not allowed**

Coca-Cola Climate Friendly Machines

- Completely HFC-free, and largely uses CO₂, which is 1430 times less potent a greenhouse gas as commonly used R134a. CO₂ is a natural substance. CO₂ is non-flammable, and non-toxic.
- Uses a CO₂ refrigeration system and HFC-free insulation foam. These technologies reduce potential direct equivalent greenhouse gas emissions by almost 100% (approximately 99%).
- The energy efficiency and refrigeration capacity of CO₂ is comparable to R134a, and at lower ambient temperatures, field test results indicate that CO₂ is more efficient than R134a. Data from field tests indicate a 2% - 7% reduction in energy consumption over R134a equivalent machines in equivalent conditions.
- Contains an intelligent energy management system (EMS-55) reducing energy use and indirect carbon emissions by turning off lights when the store is closed.
- Typical Climate-Friendly Machine will reduce direct and indirect greenhouse gas emissions by over 3 tons over the machine's lifetime.



Thank you.