EPA & the Supermarket Industry: *Partners in Environmental Protection*
Agenda

- Reasons to Partner with EPA
- Supermarket refrigeration
- GreenChill Advanced Refrigeration Partnership
  - Achievements in 2007/2008
  - Ongoing Projects
EPA Partnership Programs

- More than 80 environmental partnership programs
- Voluntary participation
- No membership fee
- Non-regulatory
- Gives you a friendly face at the EPA
Partners for the Environment

- www.epa.gov/partners
- Achievement Through Partnership: A Progress Report Through 2000
- Boosting Your Bottom Line
- Guide to EPA Climate Partnership Programs
Supermarket Refrigeration

- R-22 is primary refrigerant
  - Harms the ozone layer (ODP of .055)
  - Contributes to climate change (GWP of 1810)
  - Phase-out in 2010 of R-22 production for new equipment; Limited production allowed until 2020 to service existing refrigeration equipment

- DX systems are the dominant technology
  - Lg. refrigerant charges (ave. spmkt. = 4000 lbs.)
  - High leak rates (ave. 20-25% = about 1000 lbs. of refrigerant emitted PER SUPERMARKET per year)
GreenChill Advanced Refrigeration Partnership

- An EPA cooperative alliance with the supermarket industry
- Promotes the adoption of advanced refrigeration technologies, strategies, and practices
- Reduce charges & emissions of ozone-depleting substances (potent greenhouse gases)
- Help protect the ozone layer and protect against global warming
GreenChill Priorities

- Shift from DX systems to advanced refrigeration systems
- Shift from HCFC-22 to substitute refrigerants
- Promote reduced refrigerant charges
- Promote equipment leak tightness
  - At production
  - At installation
  - Preventative maintenance
Why Advanced Refrigeration Technology?

- Montreal Protocol’s goal is ozone layer recovery – reduces ozone-depleting substances (CFCs & HCFCs)
- Substitute refrigerants (HFCs) are ozone-safe, but they are greenhouse gases
- Leaking 1000 pounds of greenhouse gas instead of 1000 pounds of ozone-depleting gas is substituting one environmental disaster for another
Benefits of Joining GreenChill

- Benchmarking to evaluate progress
- Recognition for actions beyond regulatory requirements
- Build brand equity
- Tools to attain corporate environmental stewardship and sustainability goals
- Prepare for HCFC phaseout and other deadlines
- Access to latest information on state-of-the-art refrigeration technologies, alternative refrigerants, and best practices
- Networking & information sharing among partners
Supermarket Partner Responsibilities

- Commit to using only non-ozone-depleting refrigerants in both newly constructed stores and major remodels
- Report a baseline of corporate-wide refrigerant stocks and emissions
- Commit to an annual emissions reduction goal
- Develop a corporate Refrigerant Management Plan and emissions reduction strategy
- Report annual aggregate corporate-wide refrigerant stock and emissions
GreenChill and Small Retailers

- Requirements are the same
  - Track your stocks and emissions
  - Reduce emissions

- Benefits are also the same
  - Greater need for information?
  - Fewer resources?
  - Greater need for benchmarking?
Achievements in 2007/2008

- Official launch end Nov. 2007
- 10 founding partners
  - Food Lion
  - Hannaford
  - Publix
  - Hill Phoenix
  - DuPont
  - Giant Eagle
  - Harris Teeter
  - Whole Foods
  - Kysor Warren
  - Honeywell
Manufacturers of Advanced Refrigeration Systems
Chemical Manufacturing Partners

INEOS Fluor

Dow

DUPONT

ARKEMA

Honeywell

The world is our inspiration
GreenChill Supermarket Partners

- Acme Markets
- Albertsons Intermountain West
- Albertsons/Lucky Southern California
- bigg's
- Cub Foods
- Farm Fresh Food & Pharmacy
- Food Lion
- Giant Eagle
- Hannaford
- Harris Teeter
- Hornbacher's
- Jewel/Osco
- King’s
- Mr. Z’s
- Price Chopper
- Publix
- Shaw's/Star Markets
- Shop 'n Save, St. Louis
- Shoppers Food & Pharmacy
- Supervalu Inc.
- Weis Markets
- Whole Foods
# GreenChill Supermarket Partners

<table>
<thead>
<tr>
<th>Supermarket</th>
<th># of stores</th>
<th>Sales ($bil)</th>
<th>Area</th>
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<tbody>
<tr>
<td>Food Lion</td>
<td>1300</td>
<td>28.15</td>
<td>DE, GA, MD, PA, TN, WV, FL, KY, NC, SC, VA</td>
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<tr>
<td>Giant Eagle</td>
<td>222</td>
<td>7.1</td>
<td>PA, OH, WV, MD</td>
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<tr>
<td>Hannaford</td>
<td>165</td>
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<td>ME, NY, MA, NH, VT</td>
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<td>Harris Teeter</td>
<td>174</td>
<td>3.64</td>
<td>NC, SC, VA, GA, TN, FL, MD, DE, DC</td>
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<tr>
<td>Price Chopper</td>
<td>116</td>
<td>Not available</td>
<td>NY, CT, MA, NH, PA, VT</td>
</tr>
<tr>
<td>Publix</td>
<td>938</td>
<td>23</td>
<td>FL, GA, SC, AL, TN</td>
</tr>
<tr>
<td>Supervalu, Inc.</td>
<td>2552</td>
<td>44</td>
<td>CA, DC, DE, IA, ID, IL, IN, KY, MA, MD, ME, MN, MO, MT, ND, NC, NH, NJ, NV, OH, OR, PA, UT, VA, VT, WA, WI, WV, WY</td>
</tr>
<tr>
<td>Whole Foods</td>
<td>200</td>
<td>6.6</td>
<td>AL, AR, AZ, CA, CO, CT, DC, FL, GA, IA, IL, KS, KY, LA, MA, MD, MI, MN, NC, NE, NJ, NM, NY, NV, OH, OK, PA, RI, SC, TN, TX, UT, VA, WA, WI</td>
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<td>Weis Markets, Inc.</td>
<td>157</td>
<td>2.32</td>
<td>PA, MD, NJ, NY and WV</td>
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<tr>
<td><strong>TOTALS</strong></td>
<td><strong>5824</strong></td>
<td><strong>~115+</strong></td>
<td><strong>In 46 of 50 states + DC!</strong></td>
</tr>
</tbody>
</table>
Achievements in 2007/2008

- First round of partner reporting
- Benchmarking data
- Developed quantifiable goals for equipment manufacturers & chemical manufacturers
- Designed a range of in-store marketing ideas
- GreenChill Advanced Refrigeration System Certification for retailers
- Important ongoing projects
Benchmarking to Measure Progress

- Compare leak rates to previous years
- Compare leak rates to GreenChill average
- Compare leak rates to nationwide average
Equipment Manufacturing Partner Data Reporting

- Equipment leak tightness at production
- Equipment leak tightness at installation
- Shipments of DX systems vs. advanced refrigeration systems
- Refrigerant used in all refrigeration systems shipped
Chemical Manufacturing Partner
Data Reporting

- Baseline year and annual reporting of supermarket HCFC-22 and HFC recovery and reclamation
- Annual goal to increase supermarket HCFC-22 and HFC recovery and reclamation
  - Best practices for recovery and reclamation
  - Chemical manufacturer “Corporate Recovery & Reclamation Plan”
- HCFC-22 end-of-life guidelines
- Safety information
GreenChill Advanced Refrigeration System Certification

- Sets standards for store recognition for “GreenChill Certified” advanced refrigeration technology
  - Gold Level Certification & Silver Level Certification
  - Reduced Refrigerant Charge (lbs. of refrigerant per 1000 BTUs/hr.)
  - Low Emissions Rate
  - No Ozone-Depleting Refrigerants
  - Only allowed to use refrigerants found acceptable for retrofits by EPA’s SNAP Program
GreenChill Projects 2008

- Retrofit Best Practice Guidelines
- GreenChill Advanced Refrigeration System Certification
- Advanced refrigeration technology guidelines
- Best Practice Guideline Installation Leak Tightness
- Service Tech & Contractor Environmental Best Practices Certification Program
- Energy Efficiency Theoretical Study
Retrofit Best Practice Guidelines

- Retrofits = most widespread strategy to prepare for HCFC-22 phaseout in existing stores
- Opportunity to reduce leaks
- GreenChill Retrofit Best Practices Guidelines
  - Leak tightness improvements during retrofits
  - Conversion checklists
  - Best practices for handling recovered HCFC-22
  - Case studies
GreenChill’s Retrofit Best Practice Guidelines

- Retrofits = most widespread strategy to prepare for R-22 phaseout in existing stores
- Opportunity to tighten up and improve the system!
- Complete, objective information source

  - Developed by team of GreenChill chemical manufacturing partners
  - Peer reviewed by team of compressor manufacturer, systems manufacturers, supermarket representatives, and EPA experts
Retrofit Best Practice Guidelines

- Range of Retrofit Options
  - New Refrigerant Retrofit
  - Retrofitting with New Mechanicals and New Refrigerant
  - Leak Tightness Improvements during Retrofits

Range of Retrofit Options

- Refrigerant Change Only
  - Change refrigerant to HFC
  - Change seals, clean systems, repair all leaks
  - Oil Change
  - Change to electronic thermal expansion valves
  - Upgrade refrigeration controls, modern microprocessors
  - Upgrade condenser fan motor control
  - Add liquid amplification pump

- Remodel

- Benefits:
  - Improve performance
  - Increase efficiency
  - Protect ozone layer
  - Fight climate change
Factors to consider when assessing the available retrofit chemicals on the market

Explanation of factors and watch-outs

- Cooling capacity
- Efficiency
- Mass flow of refrigerant
- Lubricant compatibility
- Compressor manufacturer’s approval
- Estimated retrofit cost
- Store disruption
- Global warming potential
Retrofit Best Practice Guidelines - Contents

- Performance Data on Retrofit Refrigerants vs. R-22

- Global warming potential & ozone depleting potential
- Lubricant
- Glide
- Standard Performance Capacity & Efficiency
- Mass Flow
- Evaporator pressure & temperature
- Degree of Subcooling at TXV Inlet
- Superheat at Evaporator Outlet
- Compressor Isentropic & Volumetric Efficiency
- Condenser Temperature
- Discharge temperature without demand cooling
- Added Subcooling Capacity & Efficiency
Retrofit Best Practice Guidelines - Contents

- Step-by-step list of procedural best practices
  - Changing oil, removing R-22, charging system with new refrigerant, leak testing, adjusting TXV settings, material compatibility watch-outs, etc.

- Differences in retrofit procedures for various substitute chemicals
Retrofit Best Practice Guidelines - Contents

- Value/Cost Calculation
- Best Practices - HCFC-22 End of Life
  - End of Life Options for Refrigerants
  - Best Practices – Recovery, Reclamation
  - Safety Information
- Case Studies for R-422D, R407A, and 427A Retrofits
- Specific Conversion Checklists for each HFC Substitute Chemical
Advanced Refrigeration Technology
Best Practice Guidelines

- Describes and explains advanced alternatives to conventional DX systems
- Factors to consider when selecting an advanced refrigeration option

- Construction costs
- Maintenance costs
- Installation costs
- Reliability
- Refrigerant charge
- Leak rate
- Lifecycle value
- Overall env. benefit
- Viability of future remodels
- Ancillary technologies
Advanced Refrigeration Technology
Best Practice Guidelines

- Selecting primary & secondary refrigerants
- Best practices to reduce refrigerant charge
- Best practices for ongoing leak tightness
- Case studies
Best Practice Guideline
Installation Leak Tightness

» Step-by-step process to ensure newly installed equipment is leak tight
» Best practices for leak tightness testing
Service Tech / Contractor Certification

- North American Technical Excellence (NATE) Exams
  - Commercial Refrigeration Service: 44% pass rate
  - Commercial Refrigeration Installation: 23% pass rate (Beta Test)

- GreenChill/NATE Project to improve Service Tech/Contractor knowledge of environmental best practices in refrigeration service and installation
Service Tech & Contractor Environmental Best Practices Certification Program

- Training & testing on GreenChill best practices

- GreenChill certification for Service Techs / Contractors
  - passing grade on NATE exam
  - Agree to report installation leak tightness statistics to GreenChill
Energy Efficiency Theoretical Study

- Hurdle: supermarket industry fears advanced refrigeration technology uses more energy

- EPA theoretical study compared energy consumption of advanced refrigeration technologies to baseline DX technology

- Draft to be peer reviewed

- Publication as EPA document later in 2008
For More Info

- Keilly Witman
  Stratospheric Protection Division, US EPA
  Tel: (202) 343-9742
  witman.keilly@epa.gov

- Supermarket News Webinar – the GreenChill Advanced Refrigeration Partnership
  Michael Garry – Supermarket News
  Wayne Rosa – Food Lion
  George Ronn – Supervalu
  September 18th at 2pm