GreenChill Advanced Refrigeration Partnership

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

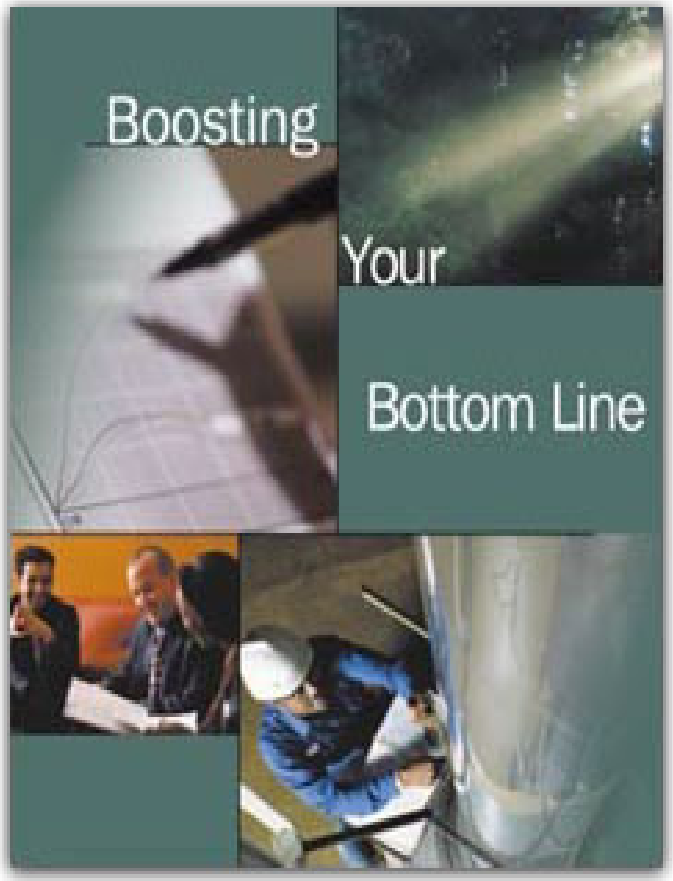
EPA Partnership Programs

- 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

GreenChill Supermarket Partners

Manufacturers of Advanced Refrigeration Systems

HUSSMANN®

ZERO ZONE®

KYSOR WARREN®

Hill PHOENIX®
EXCELLENCE
A DOVER™ COMPANY

Chemical Manufacturing Partners

INEOS Fluor

DOW

DUPONT

ARKEMA

The world is our inspiration

Honeywell

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

Supermarket	# of stores	Sales ($bil)	Area
Food Lion	1300	28.15	DE, GA, MD, PA, TN, WV, FL, KY, NC, SC, VA
Giant Eagle	222	7.1	PA, OH, WV, MD
Hannaford	165	Not available	ME, NY, MA, NH, VT
Harris Teeter	174	3.64	NC, SC, VA, GA, TN, FL, MD, DE, DC
Price Chopper	116	Not available	NY, CT, MA, NH, PA, VT
Publix	938	23	FL, GA, SC, AL, TN
Supervalu, Inc.	2552	44	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
Whole Foods	200	6.6	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
Weis Markets, Inc.	157	2.32	PA, MD, NJ, NY and WV
TOTALS	**5824**	**~115+**	**In 46 of 50 states + DC!**

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 p. 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

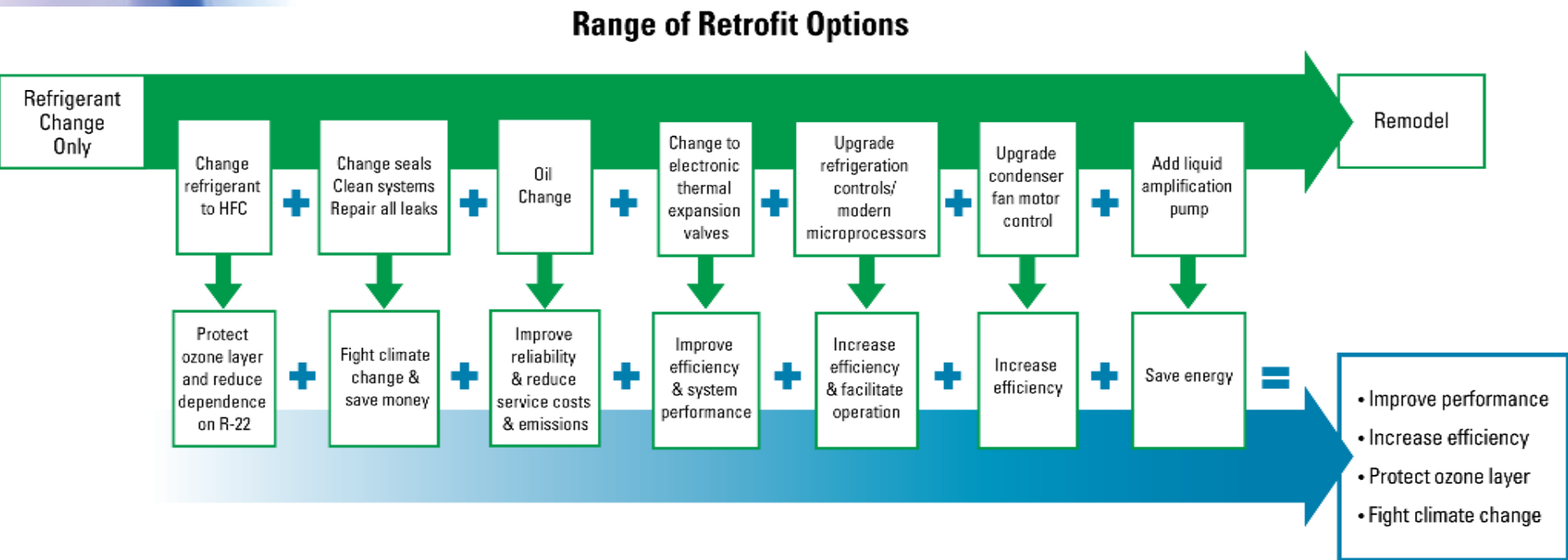
- Retrofits = most widespread strategy to prepare for HCFC-22 phaseout in existing stores
- Opportunity to reduce leaks
- GreenChill Retrofit Best Practices Guidelines
  - Leak tightness improvements during retrofits
  - Conversion checklists
  - Best practices for handling recovered HCFC-22
  - Case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



Retrofit Best Practice Guidelines - Contents

- 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
  - Compressor Suction Gas Temperature
  - 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**

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- **Supermarket News Webinar – the GreenChill Advanced Refrigeration Partnership**

Michael Garry – Supermarket News
Wayne Rosa – Food Lion
George Ronn – Supervalu
September 18th at 2pm

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SUPERMARKET NEWS