Energy & Store Development Conference

E+SD 2012

September 9-12, 2012
JW Marriott Desert Ridge Resort
Phoenix, Arizona

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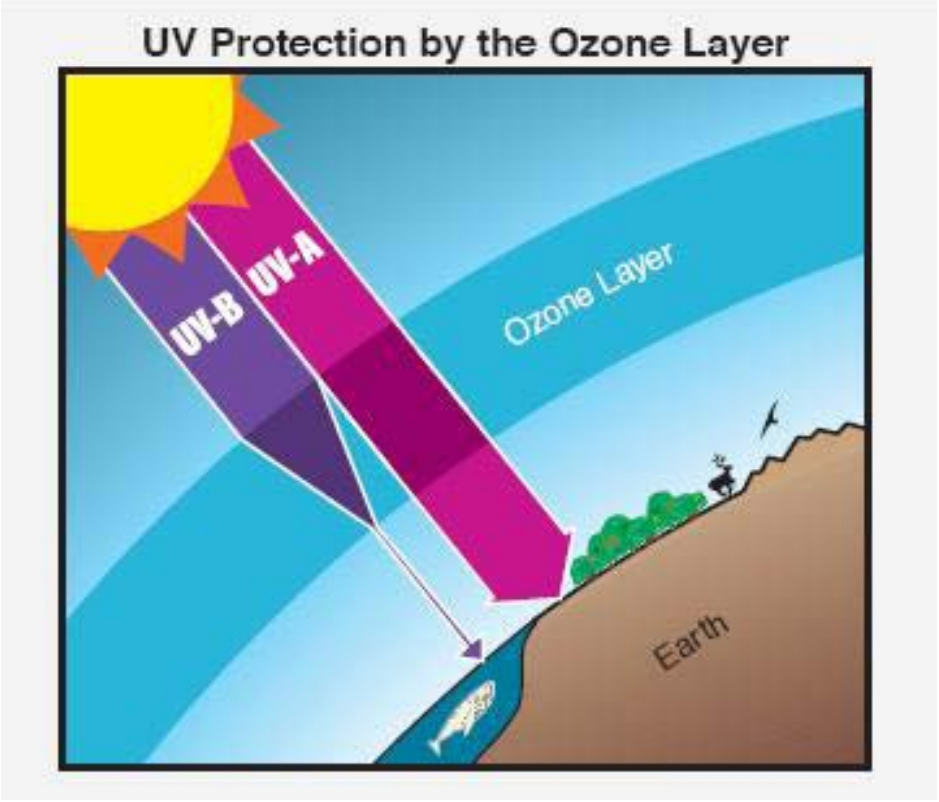
THE VOICE OF FOOD RETAIL

Presentation Outline

- Ozone Layer & Public Health
- EPA Regulatory Topics
  - R-22 Phaseout & Supply
  - R-22 Use
  - New Refrigerants & Trends – SNAP Program
  - Section 608 Leak Repair
  - Future Actions
- EPA Tools & Resources for the Supermarket Industry
- GreenChill Environmental Achievement Award Winners

Ozone Layer & Public Health



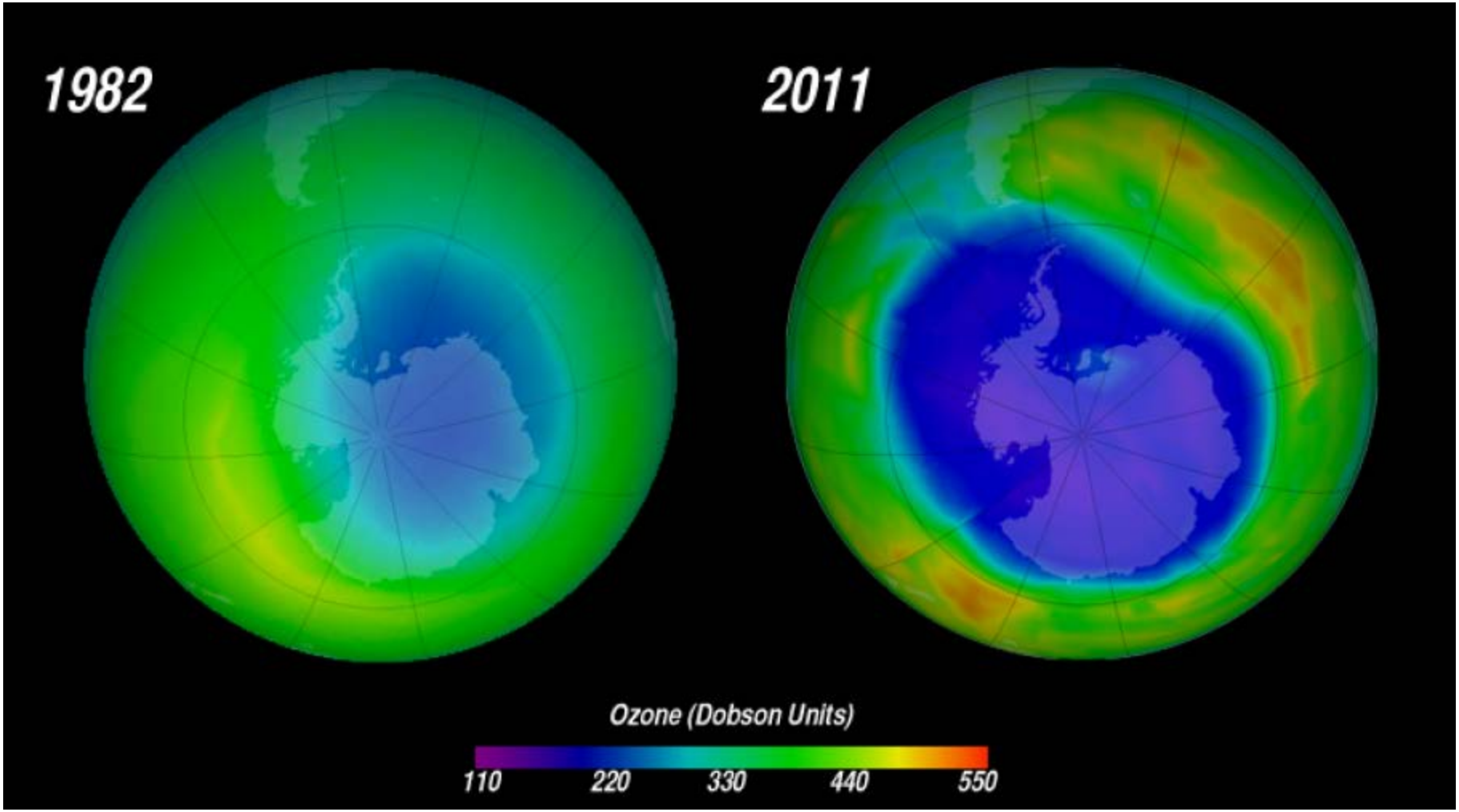
- Ozone layer is Earth's "sunscreen": protects people, plants and animals from too much ultraviolet radiation
- Ozone-depleting substances (ODS) destroy stratospheric ozone, allowing more UV radiation to reach Earth, where it can cause skin cancer
- Because of ODS phaseout, ozone layer will recover – but not until approx. 2065

- Meanwhile, skin cancer incidence rising—now the most common cancer
- High cost of treatment, lost productivity due to Malignant Melanoma

Lifetime risk of developing melanoma

1960:	**1986:**	**2009:**
1/800	1/150	1/50

Ozone Layer on Track to Recover



Figures: NASA

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EPA Regulatory Update

Keilly Witman, U.S. EPA

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R-22 Phaseout & Supply

- Goal = transition away from R-22 by phasing out production in gradual steps
- 2010-2011: 2010 decreased amount of R-22 allowed to be produced or imported for domestic use. 2011 decreased again
- 2012-2014: phaseout continues with proposed annual decreases
  - EPA considering 55-90 million lb limit for 2012
  - Current 2012 limit is 55 million lbs until the final amount is set
  - Goal is to increase recycling, promote better refrigerant management, and support transition
- 2015: Production of all HCFCs cannot exceed 10% of baseline Further reductions of R-22
- 2020: Phaseout of all production and import of R-22

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R-22 Use in Supermarkets

- Virgin R-22 is only allowed for maintenance and repair (i.e. servicing) of existing systems
- Changes to an existing R-22 system that **expand the system (increase the cooling capacity)** are not considered regular servicing/maintenance
  - Virgin R-22 may not be used
  - Whole system must now use recovered or reclaimed R-22
- EPA encourages stores to keep detailed records of refrigerant used when expanding a system
- Fact sheet available at http://www.epa.gov/ozone/title6/phaseout/Supermarket%20Q&A%20for%20R-22.html

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New Refrigerants – SNAP Hydrocarbon Rule

- Allows R-600a (Isobutane), R-441A (HCR-188C1) use in new household refrigerators & freezers
- Allows use of R-290 (Propane) in new retail food self-contained units
- Use conditions: equipment must meet UL 250/471 standards, charge limit of 57 grams of R-600a and 150 grams of R-290, red-colored servicing ports, labeling
- This rule did not consider rack systems, vending machines, retrofits
- GreenChill webinar on hydrocarbon use in supermarkets at http://epa.gov/greenchill/events.html under Archives

New Refrigerants – SNAP – Carbon Dioxide

- CO_2 is acceptable for use in new vending machines
  - Issued August 2012
- CO2 previously listed as acceptable for all of SNAP's commercial refrigeration end uses

SNAP -Trends in New Refrigerants

- Fluorinated and non-fluorinated alternatives
  - Various stages of review
  - End uses include refrigerants, AC, foams
- Some Flammable:
  - Propane (R-290)
  - R-441A
  - HFO-1234yf
  - HFO-1234ze
  - HFC-32
- Some with low GWPs:
  - CO2 (1)
  - Fluoroketone (1)
  - R-290 (3)
  - R-441A (<5)
  - HFO-1234yf (4)
  - SolsticeTM 1233zd(E)
  - HFO-1234ze (6)

Trends in Refrigerant GWP

CFCs (Phased out)

↓

HCFCs (Being phased out; Partners reducing use)
- Mainly R-22
- ODP=0.04
- High GWP: 1810

↓

High-GWP HFCs (Partners reducing use)
- Mainly R-404A and R-507A (GWPs = 3920, 3990)
- No ODP
- Significantly Higher GWPs

↓

Lower-GWP HFCs (Increasing in use)
- Mainly 407 series: R-407A, R-407C, R-407F (GWPs = 2110, 1770, 1825)
- No ODP
- Lower GWPs than other HFC blends

↓

Low and Zero GWP Refrigerants (Pilots and Emerging)
- CO_2, Ammonia, HFOs, Hydrocarbons
- No ODPs
- Low GWPs (<10)

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Why is SNAP So Busy?

- Montreal Protocol Milestones Help Drive Technology
  - 2010: CFC global phaseout and developed countries reduced HCFCs to 25% of baseline
  - 2013: Developing countries freeze HCFCs
  - 2015: Important reduction steps in both
  - developed and developing countries
- Opportunities to protect ozone layer & climate system
- Climate friendlier solutions being developed and deployed

MONTREAL PROTOCOL 25 1987-2012

Proposed Amendments to §608 Regulations

- Reduce use/emissions of ozone-depleting refrigerants
- Establish similar requirements for owners/operators of comfort cooling, commercial refrigeration, & industrial process refrigeration appliances
- Clarification of definitions & regulatory interpretations
- GreenChill Webinar - EPA's Proposed Amendments to the §608 Leak Repair Regulations
  - http://epa.gov/greenchill/events.html under Archives

Proposed Amendments to §608 Regulations

- Lowers leak repair "trigger rate" from 35% to 20%
- Requires verification & documentation of all repairs
- Requires retrofit or retirement of appliances that cannot be sufficiently repaired
- Allows for flexibility in repair or retrofit timelines
- Requires replacement of appliance components with history of failures
- Mandates recordkeeping of determination of full charge & fate of recovered refrigerant

Future Actions

- Underway:
  - Additional SNAP evaluation of substitute refrigerants & technologies
  - Finalizing rule for 2012-2014 R-22 phaseout
  - Addressing the 608 'no-venting' prohibition for hydrocarbons
- Other planned actions:
  - Address petitions to reconsider HFC 134a and blends
  - Preparing for 2015 labeling requirement, 2015 CAA use restrictions, and 2015-2019 HCFC allocation rule

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EPA Tools & Resources for the Supermarket Industry

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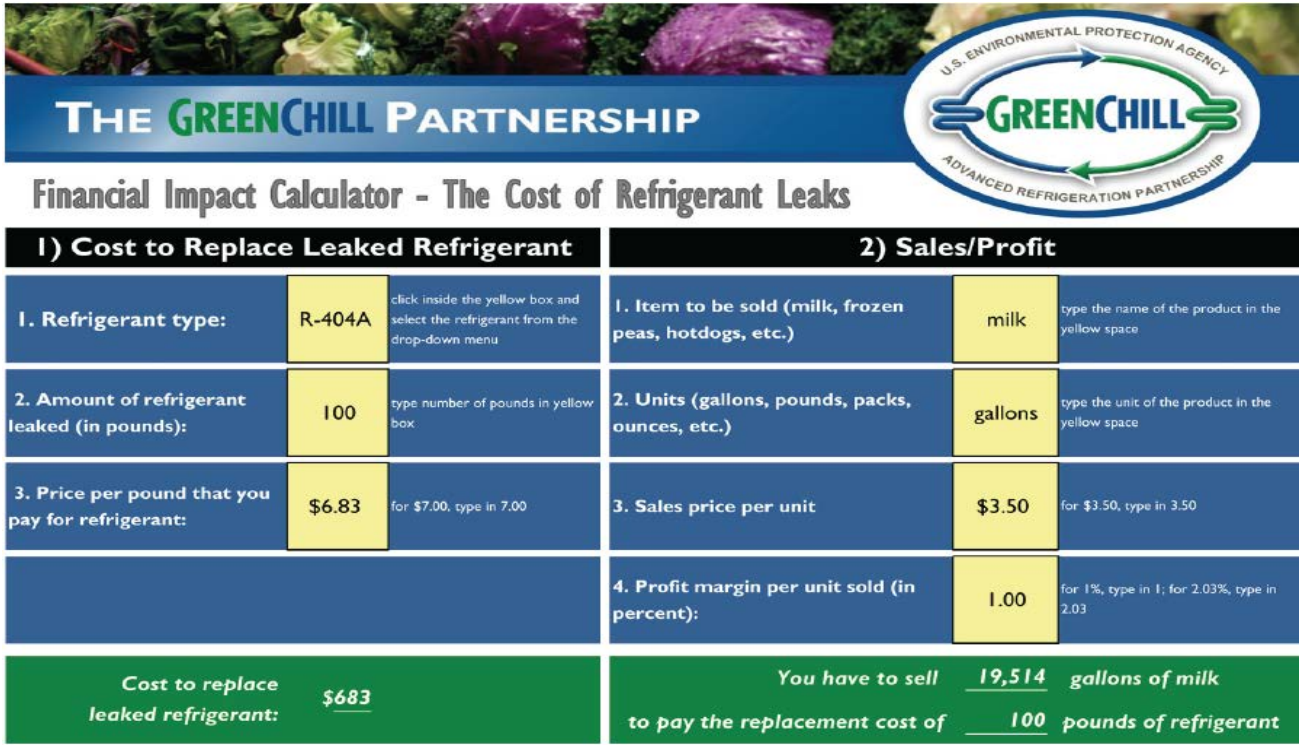
Financial Impact Calculator: Refrigerant Leaks

How much product do you have to sell to pay the replacement cost of leaked refrigerant?



THE GREENCHILL PARTNERSHIP

U.S. ENVIRONMENTAL PROTECTION AGENCY GREENCHILL ADVANCED REFRIGERATION PARTNERSHIP

Financial Impact Calculator - The Cost of Refrigerant Leaks

1) Cost to Replace Leaked Refrigerant		
1. Refrigerant type:	R-404A	click inside the yellow box and select the refrigerant from the drop-down menu
2. Amount of refrigerant leaked (in pounds):	100	type number of pounds in yellow box
3. Price per pound that you pay for refrigerant:	$6.83	for $7.00, type in 7.00
Cost to replace leaked refrigerant:	$683	

2) Sales/Profit		
1. Item to be sold (milk, frozen peas, hotdogs, etc.)	milk	type the name of the product in the yellow space
2. Units (gallons, pounds, packs, ounces, etc.)	gallons	type the unit of the product in the yellow space
3. Sales price per unit	$3.50	for $3.50, type in 3.50
4. Profit margin per unit sold (in percent):	1.00	for 1%, type in 1; for 2.03%, type in 2.03
You have to sell	19,514	gallons of milk
to pay the replacement cost of	100	pounds of refrigerant

You have to sell 19,514 gallons of milk to pay the replacement cost of 100 pounds of refrigerant!

http://www.epa.gov/greenchill/ptnrresources.html

Climate Impact Calculator

Calculate the climate impact of your store or company's electricity consumption & refrigerant leaks

The GreenChill Advanced Refrigeration Partnership

U.S. ENVIRONMENTAL PROTECTION AGENCY GREENCHILL ADVANCED REFRIGERATION PARTNERSHIP

Greenhouse Gas Impact Calculator for Refrigerant Leaks Compared to Electricity Consumption

1) Estimate of Refrigerant Leaks		
1. Refrigerant type for your store(s) commercial system:	R-404A	
3. Your store(s) commercial refrigeration charge size (in pounds):	3500	lbs
4. Your store(s) CURRENT commercial refrigeration leak rate (in percent):	25	%
5. Your store(s) TARGET commercial refrigerant leak rate (in percent):	5	%
RESULTS - Annual amount of refrigerant leaks avoided (in pounds and percent):	700	lbs
	20	%
RESULTS - GHG reduction from reducing refrigerant leaks	2,745,12	lbs CO_2eq

2) Estimate of Electricity Consumption		
1. Your store(s) location(s) by ZIP code (For stores in multiple areas use a representative ZIP code or leave blank to use the average U.S. emission factor.)		
2. Your store(s) CURRENT annual electricity consumption (in kilowatt hours):	2,300,000	kWh
3. Your store(s) TARGET annual electricty reduction (in percent):	10	%
RESULTS - Your store(s) TARGET annual electricity consumption	2,070,000	kWh
RESULTS - Annual Electricity Saved (in kilowatt hours):	230,000	kWh
RESULTS - GHG reduction from reduced electricity consumption (in pounds and metric	298,922	lbs CO_2eq

http://www.epa.gov/greenchill/ptnrresources.htm

Climate Impact Calculator

- Uses electricity as comparison
- Average supermarket's refrigerant leaks can impact climate as much as the store's entire annual electricity use

To achieve the same CO_2eq of reducing refrigerant leaks by ___700___ *pounds*

you would have to reduce electricity consumption by ___2,112,183___ *kilowatt hours.*

To achieve the same CO_2eq of reducing eletricity consumption by ___10___ *percent*

you would have to reduce refrigerant leaks by ___2___ *percent.*

GreenChill's Monthly Webinar Series

- Past GreenChill webinars included
  - Cascade CO2 Refrigeration Systems
  - Compressors and Compressor Technologies
  - Equipment Controls & Diagnostics: Leak Prevention & Earlier Detection
- Past webinars available at http://epa.gov/greenchill/events.html#archive
- Upcoming webinars include:
  - Impacts of Environment on Refrigeration Equipment and Varying Refrigerant Charges by Season
  - Cascade Systems Using Ammonia/CO2 and/or Glycol
- To receive invitations to GreenChill's monthly webinars email: EPA-GreenChill@stratusconsulting.com.

EPA's Retail Web Portal

- Combines all relevant EPA regulatory, compliance, & sustainability info for retailers in one place
- Go to www.epa.gov/retailindustry
- Webinar recording on EPA's Retail Portal available under Archives at http://www.epa.gov/greenchill/events.html
- Developed together with FMI, RILA, & NRF

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Best Practices Guidelines

- GreenChill Leak Prevention & Repair Guideline
- GreenChill Installation Leak Tightness Guideline
- GreenChill R-22 Retrofit Guideline
- Available at http://www.epa.gov/greenchill/ptnrresources.html

- Early 2013: Green DX Guideline

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THE GREENCHILL PARTNERSHIP

Refrigerant Leak Prevention through Regular Maintenance

Food retail stores can save money and reduce environmental impacts by ensuring that commercial refrigeration equipment is properly maintained. A typical food retail store leaks an estimated 25% of refrigerant, or approximately 1,000 pounds, annually. In addition to being costly, leaks have significant impacts on the environment, because most refrigerants are greenhouse gases and some are also ozone-depleting substances. This fact sheet provides information on the benefits of performing regular maintenance to reduce the likelihood of, and quickly remediate, refrigerant leaks in food retail stores.

Why is Regular Preventive Maintenance Important?

Leaks are expensive

Performing regular preventive maintenance saves money because **preventing refrigerant leaks is always less expensive than repairing them.** The U.S. Environmental Protection Agency estimates that if every food retail store in the country reduced its refrigeration system's leak rate to the GreenChill Partner average, the industry would save approximately $108 million every year on reduced refrigerant costs. GreenChill's Financial Impact Calculator gives food retailers a customizable tool to calculate the amount of product (e.g., gallons of milk) they need to sell to pay the replacement cost of the refrigerant they leak. See the text box for more information.

Leaks harm the ozone layer, contribute to climate change, or both

Most commercial refrigeration systems in the United States use hydrochlorofluorocarbon (HCFC) or hydrofluorocarbon (HFC) refrigerants. When leaked, HCFC refrigerants contribute to ozone depletion. In addition, these refrigerants are very potent greenhouse gases. While HFC refrigerants do not contribute to ozone depletion, they often have greater impacts on climate change than HCFCs. For reference, emitting one pound of the most commonly used HFC refrigerant has the same climate change effects as emitting nearly 4,000 pounds of carbon dioxide.

Waiting until leaks become a problem before addressing them only makes the problem bigger

Leaks in refrigeration equipment will increase in size if left unaddressed. The larger the size of the leak, the more refrigerant is wasted. Regular preventive maintenance measures help ensure that leaks are caught and addressed while they are still small.

Regular preventive maintenance can help reduce other costs associated with equipment operation

Equipment wear and tear reduces energy efficiency. A system that is low on refrigerant must work harder to control desired food temperatures. In addition, there is a greater chance of compressor burnout when equipment is not regularly inspected. Servicing or replacing poorly maintained equipment is expensive and can result in increased impacts on the environment (e.g., due to refrigerant leaks during system repair). Regularly cleaning and inspecting refrigeration equipment helps reduce wear and tear and ensures energy-efficient operation.

Equivalent Costs for a Typical Refrigerant Leak

Question: How many gallons of milk do you have to sell to pay the refrigerant replacement cost of a 100-pound leak?

Answer: For a typical store, the answer is more than 19,000 gallons.

GreenChill's Financial Impact Calculator gives food retailers a customizable tool to calculate the amount of product they need to sell to pay the replacement cost of the refrigerant they leak. You can specify the product type, profit margins, price of refrigerant, etc. to generate store-specific numbers. You can generate these numbers for a specific leak instance, a store's total annual leaks, or all the annual leaks across your corporation.

Source:
http://www.epa.gov/greenchill/downloads/FinancialImpactCalculator.xls

Refrigerant Leak Prevention Through Regular Maintenance

(http://tinyurl.com/cpwgtmh)

Other Useful Flyers

- GreenChill
  (http://epa.gov/greenchill/downloads/GreenChill_PartnershipFlyer081811rev.pdf)
- Store Certification Program
  (http://epa.gov/greenchill/downloads/GC_StoreCertProgram08232011.pdf)
- Refrigerant Receiver Level Chart
  (http://epa.gov/greenchill/downloads/RefrigerantReceiverLevelChart.pdf)
- R-22 Retrofits Fact Sheet
  (http://epa.gov/greenchill/downloads/GChill_Retrofit.pdf)
- Installation Leak Tightness Fact Sheet
  (http://epa.gov/greenchill/downloads/GChill_LeakTightEquipInstall.pdf)
- Greenhouse Gas Impacts: Refrigeration Leaks Compared to Electricity Consumption
  (http://tinyurl.com/cr7j8b5)

2011 Progress Report

(http://epa.gov/greenchill/downloads/GreenChill_ProgressReport2011_09062012.pdf)

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GreenChill Environmental Achievement Awards

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GreenChill Partnership
Corporate Emissions Reduction Program

- Partnership Average Emissions Rate for Commercial Systems <13% for 1st time
- 13.5% in 2010 – 12.95% in 2011
- Majority of Partners below 15%
- 8 Partners <10%
- Challenging economy – less money for competing priorities, copper theft

GreenChill Partnership
Store Certification Program

- 89 certified stores
- 38 newly constructed stores, 51 operational
- 6 platinum, 29 gold, 54 silver
- Average leak rates / charge sizes
  - Platinum: 0.0%, .25 lbs. refrigerant/MBTU p. hr.
  - Gold: 1.2%, 1.03 lbs. refrigerant/MBTU p. hr.
  - Silver: 2.9%, 1.57 lbs. refrigerant/MBTU p. hr.
- Zero leaks - technology for prevention

Emissions Reduction Goal Achievement

Buehler's Fresh Foods

HyVee®

weis

WHOLE FOODS® MARKET

Most Improved Emissions Rate

Buehler's Fresh Foods

Best Emissions Rate

GIANT EAGLE®

Best of the Best

Albertsons
Carpinteria, California

SUPERVALU®

Store Certification Excellence
Supermarket Partner

fresh & easy™
Neighborhood Market

Store Certification Excellence Systems Manufacturer

Hillphoenix®

A DOVER™ COMPANY

Distinguished Partner

SUPERVALU®

Distinguished Partner

David Hinde
Friend and
Mentor