

Voluntary Efforts To Increase Refrigerator Foam Recovery

Energy Star Appliance Partner
Meeting
October 2004

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Proper Appliance Recycling Offers Important Environmental Benefits

- Raw materials can be recovered and recycled, saving energy and natural resources
- Older appliances can contain chemicals harmful to human health and the environment
- Majority of refrigerators made before 2003 contain ODS

2003 Ozone Hole- Second Largest Ever



<http://www.gsfc.nasa.gov/topstory/2003/0925ozonehole.html>

A Healthy Ozone Layer Protects Human Health and the Environment

- A depleted ozone layer allows more UV light to reach the earth
- Overall, EPA's ozone program will prevent:
 - 6.3 million skin cancer deaths
 - 300 million cases of non-fatal melanoma
 - 27.5 million cases of cataracts
 - Plant and marine life damage

Foam From Refrigerators Built before 1994 are Expected to Release CFCs

- CFCs in Refrigerators
 - Foam: CFC-11
- Disposed foam from 2005-2010 will contain 45,000 tonnes of CFC-11
 - = 57 MMTCE

Accelerated Retirement and “Best Practices” Recycling of Old Refrigerators Saves Energy and GHG Emissions

Energy Savings

- Successful programs have reached 2%-10% of households
 - = 5,060-25,300 GWh, 0.9-4.2 MMTCE

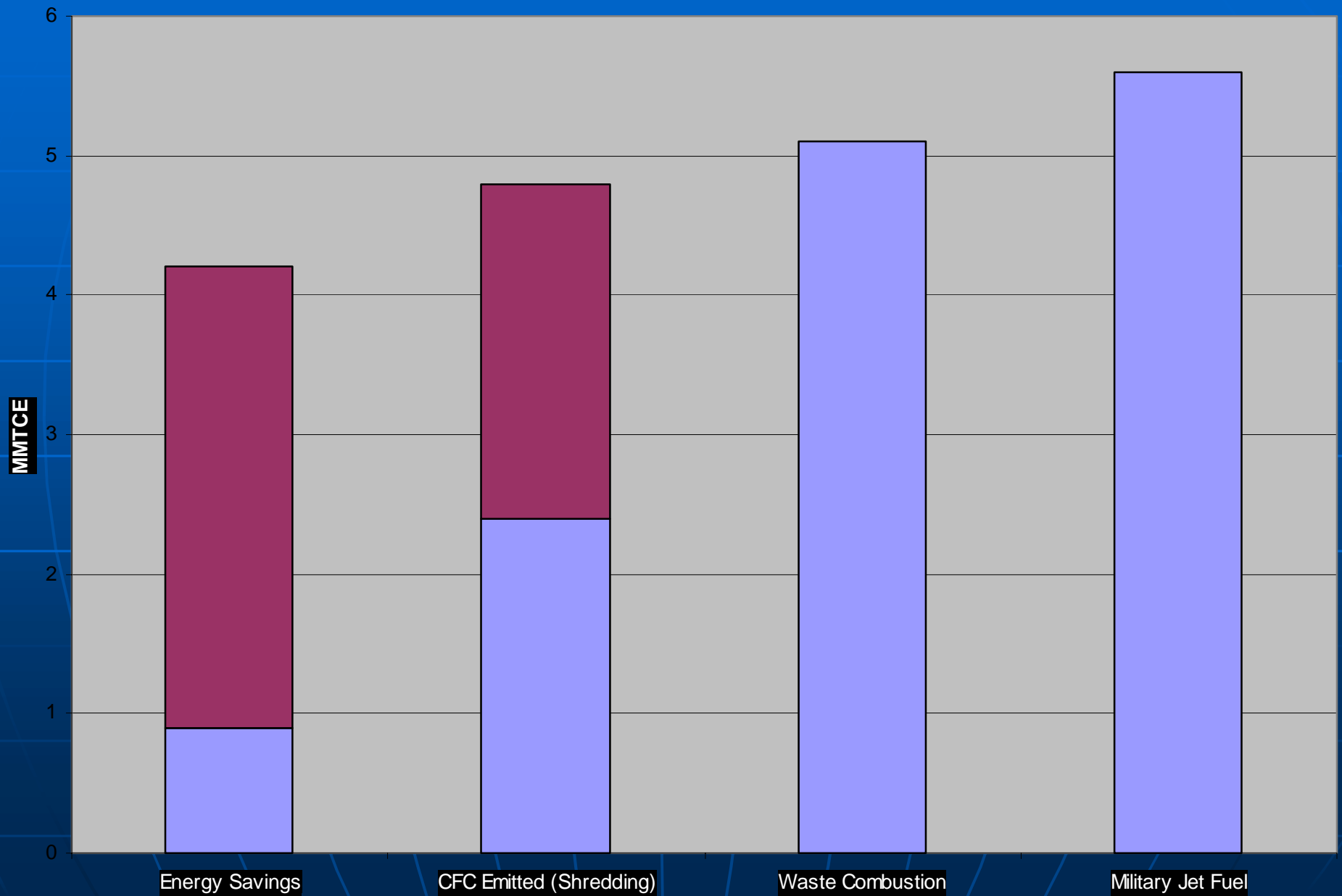
Increasing Consumer Participation in Reducing Greenhouse Gases
Pew Center on Global Climate Change (2000)

Recovery and Destruction of Foam BA

- CFC-11 in disposed foam annually through 2008
 - = 9,500 ODP tonnes/ 12 MMTCE
- 20%-40% emitted annually through 2008
 - = 1,900-3,800 ODP tonnes/ 2.4-4.8 MMTCE

US EPA Vintaging Model

Relative GHG Emissions



Foam Is the Greatest Preventable Source of GHG Emissions From a 1990, Non E-Star Refrigerator

- 900 kWh/y = 2.25 MTCE over 15 yrs
 - replace w/ E-Star 5 years early, save 0.4 MTCE
- Compressor loop: 0.2 kg CFC-12 = 0.6 MTCE
 - recovered
- Foam: 1 kg CFC-11 = 1.2 MTCE
 - eventually emitted

International Actions on Appliance Foam

- European Commission:
 - 2000 ODS must be recovered and destroyed
- Japan:
 - 2001 Manufacturers and retailers responsible for taking back old appliances and recycling them (can charge fee)
 - 2003 ODS must be recovered and destroyed
- Technical and Economic Assessment Panel (TEAP)
 - 2002 Report on Destruction Technologies lists capture and incineration as effective means of removing CFC from the waste stream
 - 2004 Task Force investigating end of life management of foam in appliances and buildings

3 Keys to Increasing Voluntary Foam Recovery in the US

- Key Partners
 - Utilities
 - Retailers
 - Manufacturers
 - Recyclers
- Identify Necessary Infrastructure
 - Foam pulverizers and incinerators
 - Railways/highways
- Determine Regions of opportunity
 - Systems Benefit Charges
 - State or local CO₂ Cap & Trade/Offset rules
 - Large numbers of fossil fuel electricity generators

Existing Foam Recovery Operations in the US

- Appliance Recycling Centers of America (ARCA) Inc
 - Removes foam manually
 - Pulverization with blowing agent recovery
- JACO Environmental
 - Removes foam manually
 - Incinerates foam and BA above 850 C

EPA and AHAM are Working to Quantify the Emissions

- Evaluating HCFC-141b replacements, fate of disposed foam
 - Insulation Technical Advisory Committee (ITAC)
 - Board members include all major manufacturers, EPA participates
- Work to quantify emissions
 - Emissions tied closely to resultant foam particle size (2002)
 - Some portion of landfilled BA may be broken down by microbes (2003)
 - US state of the practice and actual shredding emissions (2005)

Let's Work Together to Protect the Ozone Layer and Save Energy

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