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Folder Title:
Clean Air Act - CFC [Chlorofluorocarbons] Phaseout

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WHITE HOUSE CORRESPONDENCE TRACKING WORKSHEET

rec'd 2/25
5:00 PM

☐ O - OUTGOING☐ H - INTERNAL☐ I - INCOMINGDate Correspondence
Received (YY/MM/DD) 1 1Name of Correspondent: E. Fred Singer☐ MI Mail Report

User Codes: (A) _____ (B) _____ (C) _____

Subject: Early phaseout of CFC's

ROUTE TO:

ACTION

DISPOSITION

Office/Agency	(Staff Name)	Action Code	Tracking Date YY/MM/DD	Type of Response	Code	Completion Date YY/MM/DD
	<u>cuofc</u>	PD ORIGINATOR	<u>921024</u>			<u>1 1</u>
	<u>cuot17</u>	PD Referral Note:	<u>920224</u>		<u>S</u>	<u>9202</u>
	<u>cuator</u>	PD Referral Note:	<u>1 1</u>		PD	<u>1 1</u>
	<u>cugray</u>	PD Referral Note:	<u>1 1</u>		PD C	<u>1 1</u>
		Referral Note:	<u>1 1</u>			<u>1 1</u>
		Referral Note:				

ACTION CODES:

A - Appropriate Action
C - Comment/Recommendation
D - Draft Response
F - Furnish Fact Sheet
to be used as Enclosure

I - Info Copy Only/No Action Necessary
R - Direct Reply w/Copy
S - For Signature
X - Interim Reply

DISPOSITION CODES:

A - Answered
B - Non-Special Referral
C - Completed
S - Suspended

FOR OUTGOING CORRESPONDENCE:

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Code = "A"
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Comments: NRN. get 2/28/92

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SCIENCE AND ENVIRONMENTAL POLICY PROJECT

S. Fred Singer, Ph.D., Director

February 18, 1992

Mr. Boyden Gray
The White House
1600 Pennsylvania Avenue, NW
Washington, D.C. 20500

Dear Mr. ~~Gray~~: *Boyden*

Many atmospheric scientists are concerned about the accelerated phaseout of CFCs, announced last week by the White House, following a widely publicized NASA press release. In our view, the available scientific evidence does not support such hasty action.

We are not opposed to the phaseout of CFCs on a reasonable time schedule, provided that affordable and effective substitutes are available, which are safe for human health.

We urge, however, that you give due weight to scientific views beyond those that advised this action--not only for the case of CFCs but also for the more far-reaching issue of regulating the emissions of carbon dioxide.

The enclosed "Update" details, point by point, some of our scientific concerns regarding the ozone issue.

Together with my colleagues, I am fully prepared to defend these statements in any scientific forum. I would urge you to arrange such an opportunity, not only for the sake of science but also to protect the American public from the economic consequences of unneeded environmental action.

Yours sincerely,



S. Fred Singer

Atmospheric physicist, University of Virginia.

Formerly: Director, U.S. Weather Satellite Service; Deputy Assistant Administrator, EPA; Chief Scientist, DOT; Dean, School of Environmental and Planetary Sciences, University of Miami.

SCIENCE AND ENVIRONMENTAL POLICY PROJECT

ISSUES UPDATE: STRATOSPHERIC OZONE

WASHINGTON, D.C., FEBRUARY 19, 1992----The announcement on Feb. 3 that NASA researchers had observed a peak concentration of reactive chlorine in the northern stratosphere--and the subsequent move by the White House, just a few days later, to accelerate the phaseout of CFCs--has raised a number of concerns and questions among atmospheric scientists.

- The phrasing of the NASA press statement led many journalists to report ozone depletion or an ozone "hole" over the Arctic. In fact, no such claim was made; the statement only suggests the possibility, which is dependent upon unique meteorological conditions. Chlorine atoms cycle back and forth between reactive and inactive forms, depending on the presence of stratospheric ice particles, which in turn depend upon temperature.
- Principal project scientist James Anderson (in *Science News*, 2/8/92) could only vaguely predict the development of a "hole" during some year in the near future, perhaps in the "decade to come."
- The chlorine peak was observed on Jan. 20; presumably readings both before and after that date were lower. Without additional information, it is impossible to assess the significance of the peak nor to explain its occurrence. The announcement came well before the completion of the October to March suite of measurements.
- NASA reported similar high chlorine values in its last Arctic experiment in 1989. No polar ozone thinning developed at that time.
- It is impossible to tell the source of a chlorine atom; one looks pretty much like another. The NASA press release claimed that the chlorine came mainly from CFCs. No estimate was given of the contribution from Mount Pinatubo's volcanic eruptions, now producing a temporary ozone depletion over the tropics.
- For the past four years, the U.N. Ozone Trends Panel has been reporting a *global* depletion of ozone, with each report announcing a depletion that is more rapid and larger than expected. But natural variations of ozone are many times larger than the reported trends. In addition, two Belgian scientists, de Muer and de Bakker, have just published a startling paper in *The Journal of Geophysical Research*, pointing out that sulfur dioxide pollution interferes with ozone measurements. Correcting for changes in SO₂ **cancels the reported ozone depletion trend.**

MORE...



AIR-CONDITIONING
& REFRIGERATION
INSTITUTE

CAA / CFC phaseout

Representing Manufacturers
of Heating, Ventilating,
Air-Conditioning and
Refrigeration Products

April 3, 1992

John P. Schmitz, Esq.
Deputy Counsel to the President
The White House
1600 Pennsylvania Ave., NW
Washington, D.C. 20500

RE: Meeting with the Air-Conditioning and Refrigeration Institute

Dear Mr. Schmitz:

Mr. Braswell and I were disappointed that you were unable to meet with us on Wednesday, March 25 to discuss the phaseout of CFC and HCFC refrigerants. We did appreciate however meeting with Gene C. Schaerr of your staff on this matter. We presented him with information concerning our concerns about a premature phaseout of HCFC-22 refrigerants, a problem of particular importance for the U.S.. We are concerned, that either through the Montreal Protocol or through EPA's response to petitions filed with it by environmental groups, that HCFC-22 refrigerants might be phased out before it makes sense to do so from a total environmental and energy efficiency standpoint. I enclose a copy of the information for your use.

Because of the preparatory meeting in Geneva next week for the protocol parties, we were anxious to speak with you regarding the U.S. role at that meeting. We understand that a working group chaired by the President's science advisor has met to lay out a strategy for the U.S. at this meeting. We are hopeful that bracketed control dates for HCFC-22 refrigerants that come out of the Geneva meeting are not biased against a sound decision for eventual mandatory control dates.

Mr. Schaerr indicated that your office will continue to follow this issue, particularly during development of the Notice of Proposed Rulemaking that EPA will issue in response to the petitions for accelerated phaseouts under the Clean Air Act. He suggested we continue to keep your office informed through Mr. Holmstead. We will be sure to do this.

Sincerely,



Joseph M. McGuire
Senior Vice President

Enclosures

cc: Gene C. Schaerr (without enclosures)
Jeffrey Holmstead (with enclosures)



AIR-CONDITIONING AND REFRIGERATION INSTITUTE
1501 Wilson Boulevard
Suite 600
Arlington, Virginia 22209
phone 703/524-8800
fax 703/528-3816

**IMPORTANCE OF REFRIGERATION
AND
AIR CONDITIONING**

The economic impact of refrigeration technology is much more significant than generally believed. While the yearly investment in machinery and equipment may approach US \$100,000 million, the value of the products treated by refrigeration will be ten times this amount.

***- Report of the Refrigeration, Air Conditioning
and Heat Pumps Technical Options Committee
for the 1991 Montreal Protocol Assessment***

COMMERCIAL AND INDUSTRIAL REFRIGERATION

- supermarkets
- restaurants
- food processing plants
- convenience stores
- medical facilities
- manufacturing plants

AIR CONDITIONERS AND HEAT PUMPS

- homes
- apartments
- businesses

AIR CONDITIONING (WATER-COOLED SYSTEMS)

- office buildings
- hospitals
- schools
- apartments

TRANSPORT REFRIGERATION AND AIR CONDITIONING

- 75% of food chain
- trucks
- ships
- rail containers

TIMING OF HCFC-22 ELIMINATION

■ **NO PROVEN SUBSTITUTES YET**

- Industry now searching. Cooperative program.
- Will move as fast as possible.

■ **GLOBAL WARMING AND ENERGY IMPACTS POTENTIALLY SIGNIFICANT**

- Refrigeration and air conditioning: 35% of electric power consumption.
- HCFC-22 an efficient refrigerant (DOE/AFEAS Study).

■ **PREMATURE PHASEOUT DISCOURAGES TRANSITION FROM CFCs**

- Acknowledged in UNEP report.

■ **RUSH TO JUDGMENT ON ALTERNATIVES HAS RISKS**

- Possible bad products.
- Possible lock-in to non-optimum solutions.

■ **NO SIGNIFICANT GAIN IN OZONE PROTECTION**

- CFCs and other chemicals dominate.
- EPA overestimates HCFC-22 growth.

■ **U.S. RELIANCE ON REFRIGERATION AND AIR-CONDITIONING GREATER THAN ANY OTHER COUNTRY**

- 50% of world air conditioning use; 30% of world refrigeration use
 - 42 million central air conditioners and heat pumps installed (HCFC-22)
 - 45 million room air conditioners installed (HCFC-22)
 - number of HCFC-22 chillers and commercial refrigeration units growing
- Positive trade balance.
- Disruption would have serious consequences.

ADMINISTRATION DECISIONS:

- **RESPONSE TO PETITIONS**

- NOPR by June
- Final Rule, year end

- **MONTREAL PROTOCOL AMENDMENTS**

- April preparatory meetings in Geneva
- July preparatory meetings, Nairobi
- November decisions, Copenhagen

ARI REQUEST:

- Choose HCFC control dates that balance ozone depletion, efficiency, and safety
- Don't bias decisions in Geneva
- Properly define boundaries for control dates
- EPA approach to interagency group is flawed

**RECOMMENDED ACCELERATED
PHASEOUT DATES**

COMPARISON OF OPTIONS

HCFC-22

	<u>Protocol</u>	<u>NRDC</u>	ARI/ <u>ALLIANCE</u>	<u>CAA</u>	<u>EPA</u>
Stop use in new equipment	-	2000	2010	2020	[2000-2010]
					should be: [2000-2020]
Stop production of chemical	2020-2040	2005	2020	2030	[2010-2020]
					should be: [2010-2030]

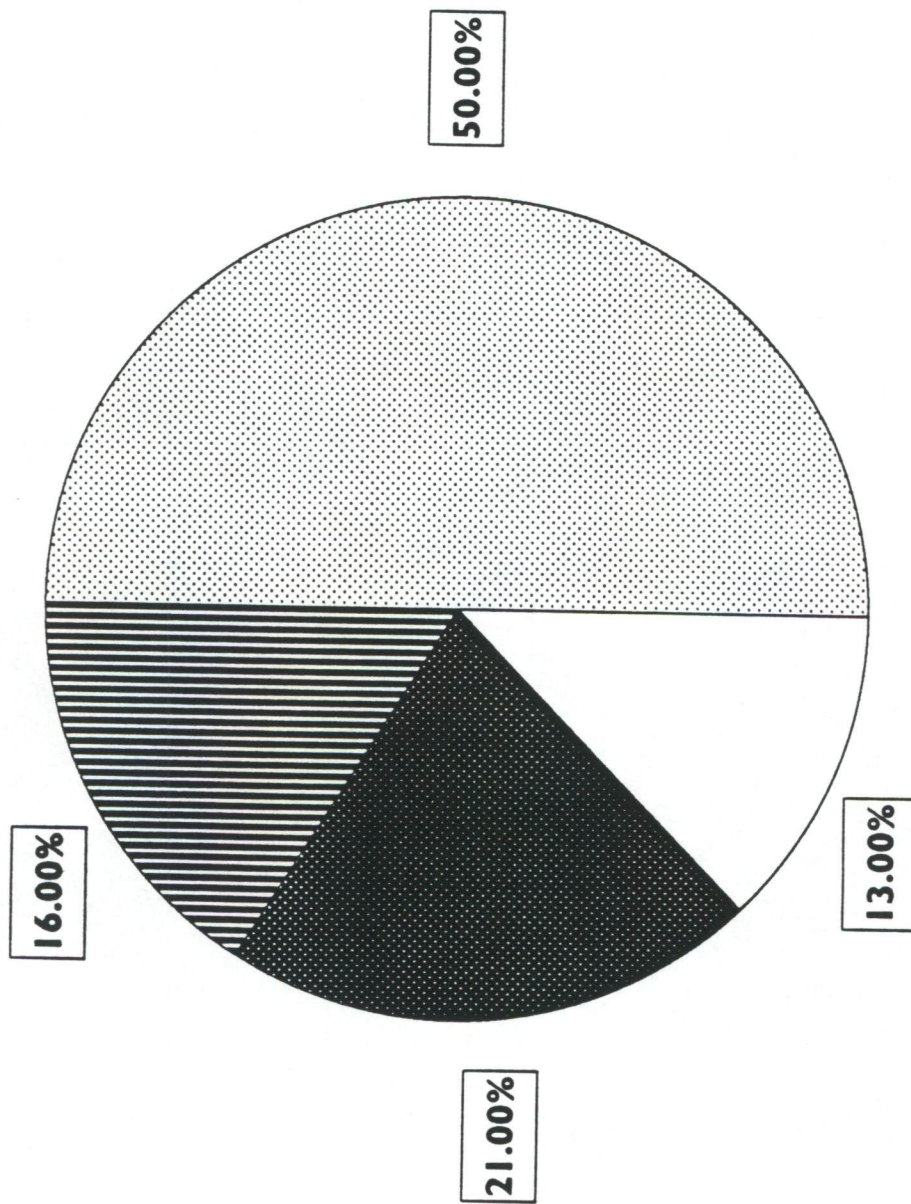
HCFC-123

Stop use in new equipment	-	2020	2020	2020	2015/2020*
Stop production of chemical	2020-2040	2030	2030	2030	2030

* - Clean Air Act stops new equipment production for all but refrigeration/air conditioning in 2015. Refrigeration and air conditioning new equipment is banned in 2020.

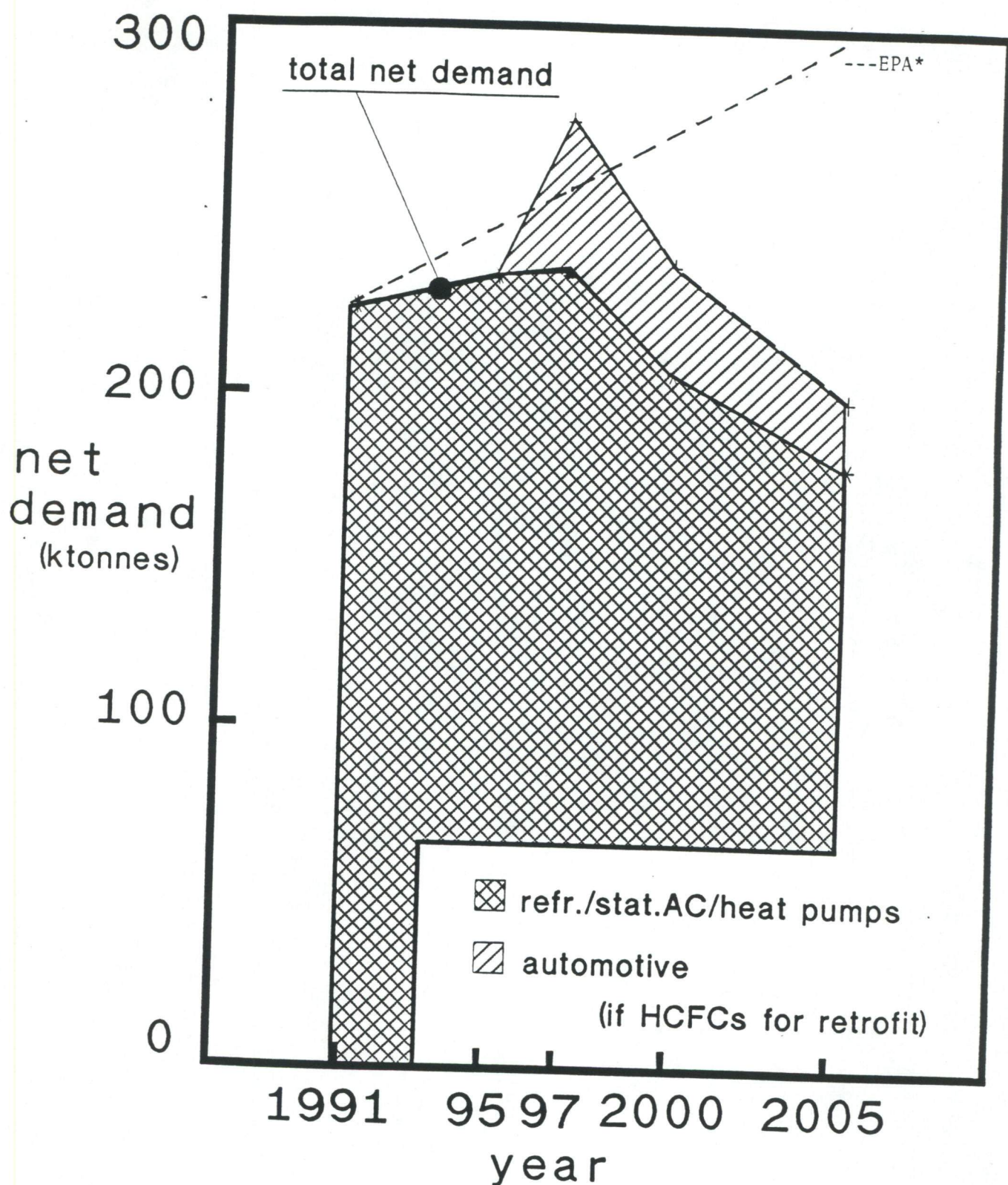
IMPORTANCE OF HCFC-22

World Use of HCFC-22 -- 1991



Source: ARI

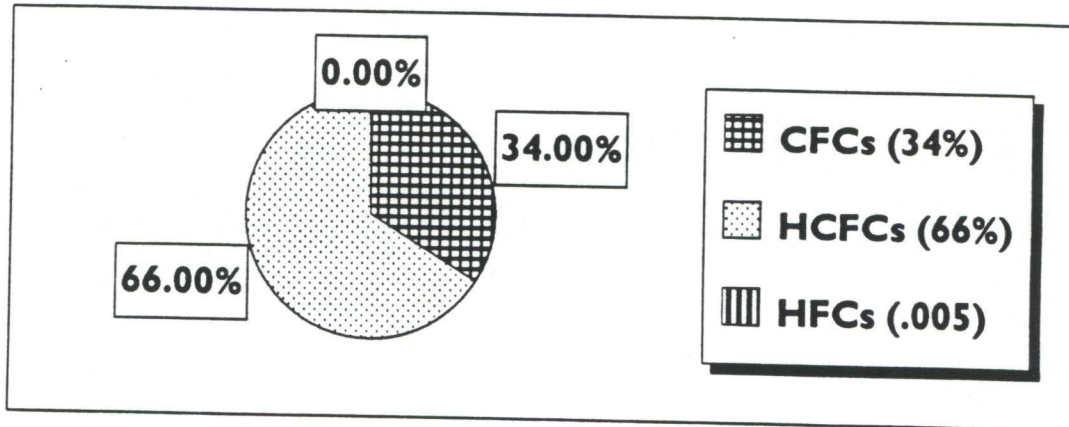
FORECAST WORLD HCFC-net DEMAND 1991-2005



*--EPA forecast for HCFC-22 growth (excluding new uses)

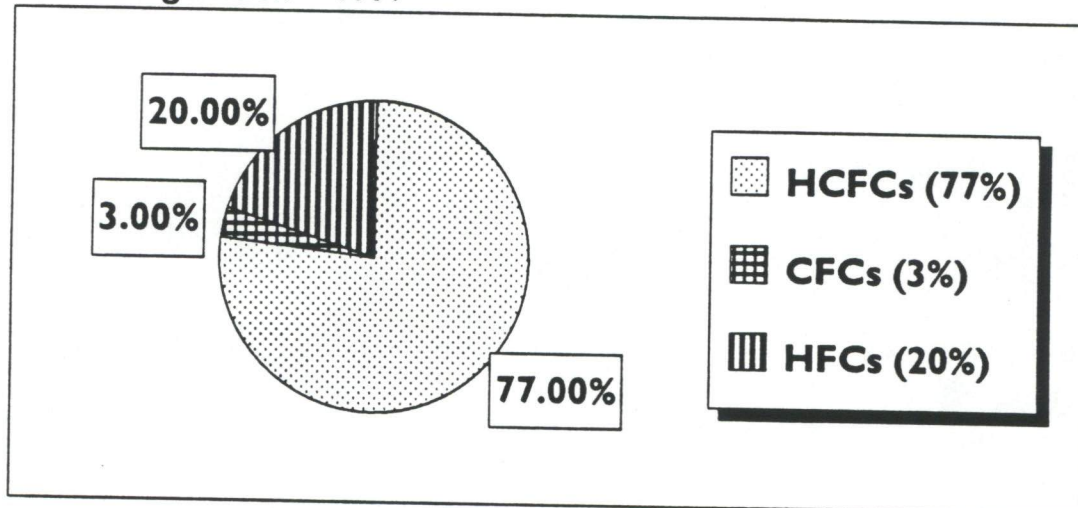
SOURCE: UNEP, EPA

Net World Refrigerant Use in Stationary Air Conditioning and Refrigeration -- 1991



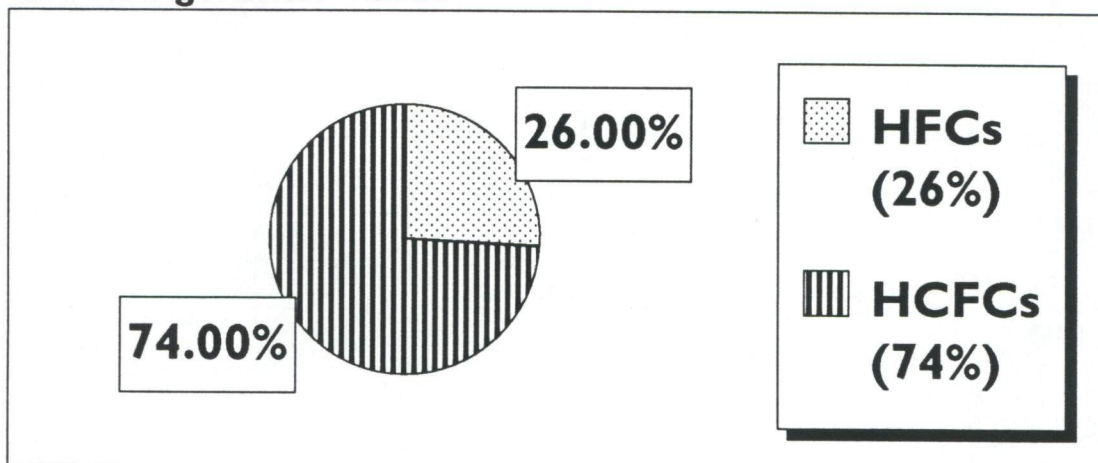
Total: 338,000 tonnes. Source: UNEP

Net World Refrigerant Use in Stationary Air Conditioning and Refrigeration -- 1997



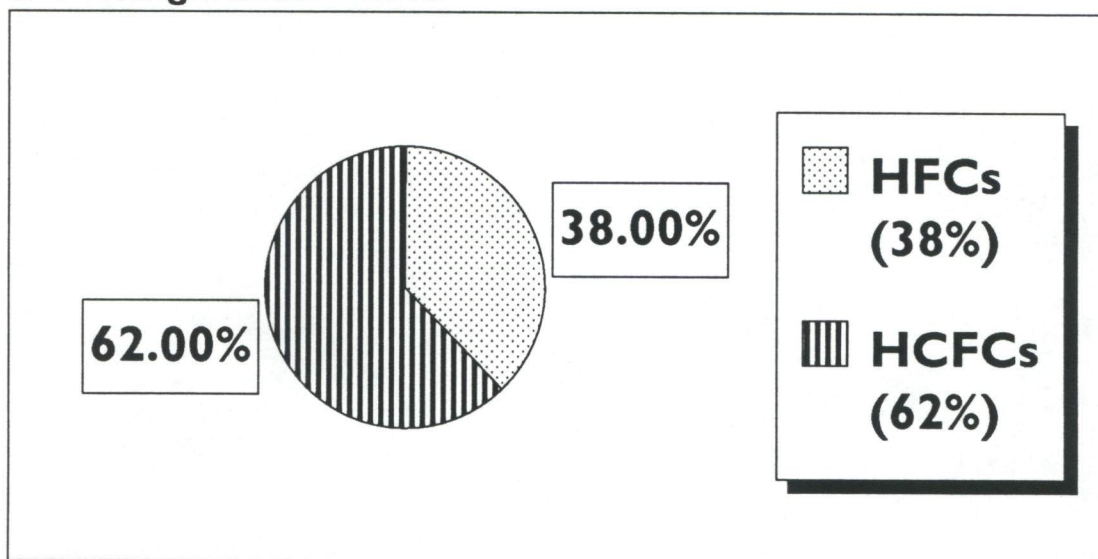
Total: 307,000 tonnes. Source: UNEP.

Net World Refrigerant Use in Stationary Air Conditioning and Refrigeration -- 2000



Total: 281,000 tonnes

Net World Use in Stationary Air Conditioning and Refrigeration -- 2005



Total: 291,000 tonnes

THE SEARCH FOR HCFC-22 SUBSTITUTES

- **COOPERATIVE MANUFACTURER TESTING PROGRAM**

- **INTERNATIONAL EFFORT**

- **TEN CANDIDATES IDENTIFIED**

- Some single compounds, some mixtures
- None contain chlorine
- Toxicity studies complete on none
- One is flammable (propane)

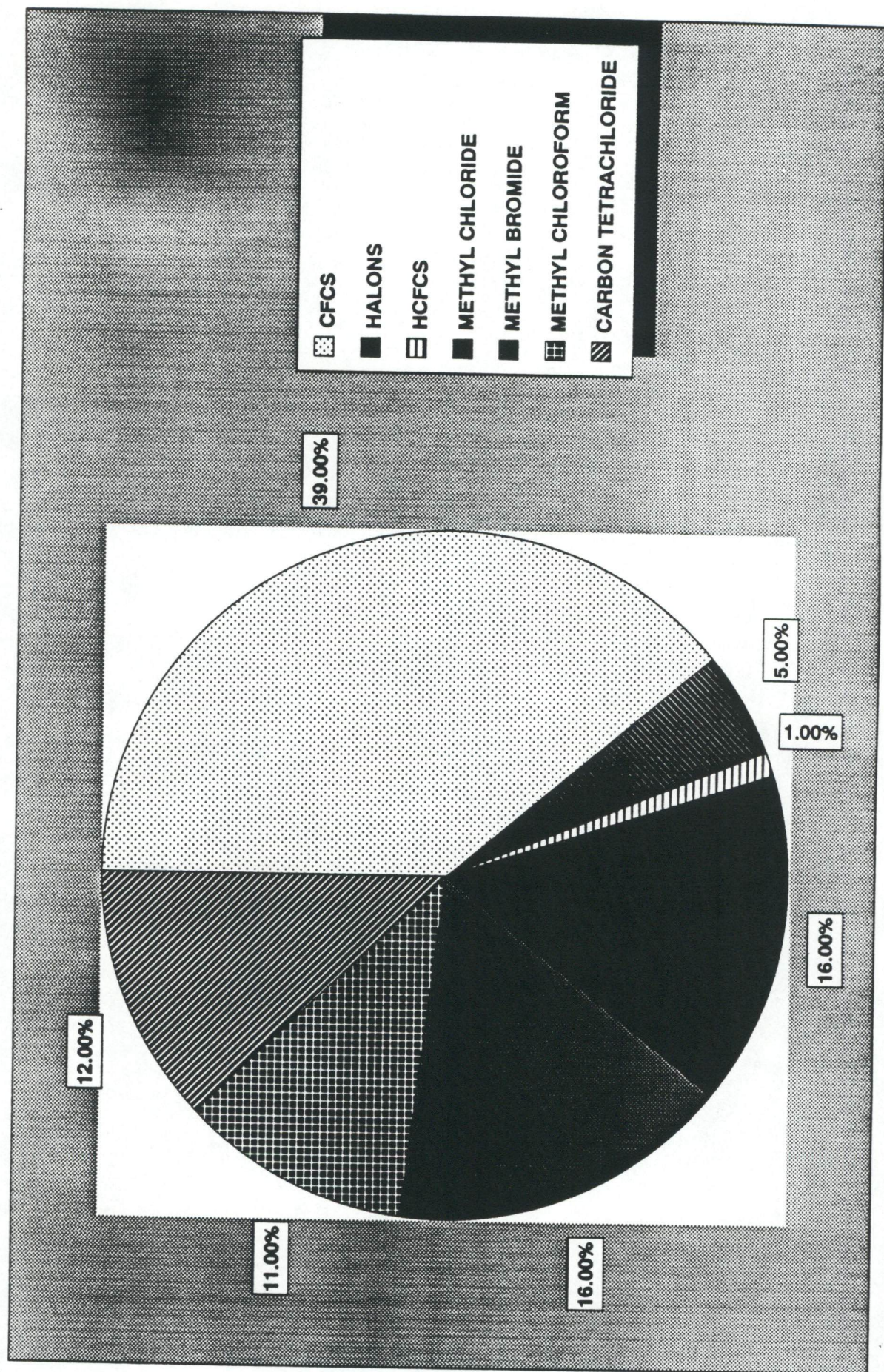
- **PURPOSE: PUBLISH PERFORMANCE DATA**

- Permits manufacturer decisions

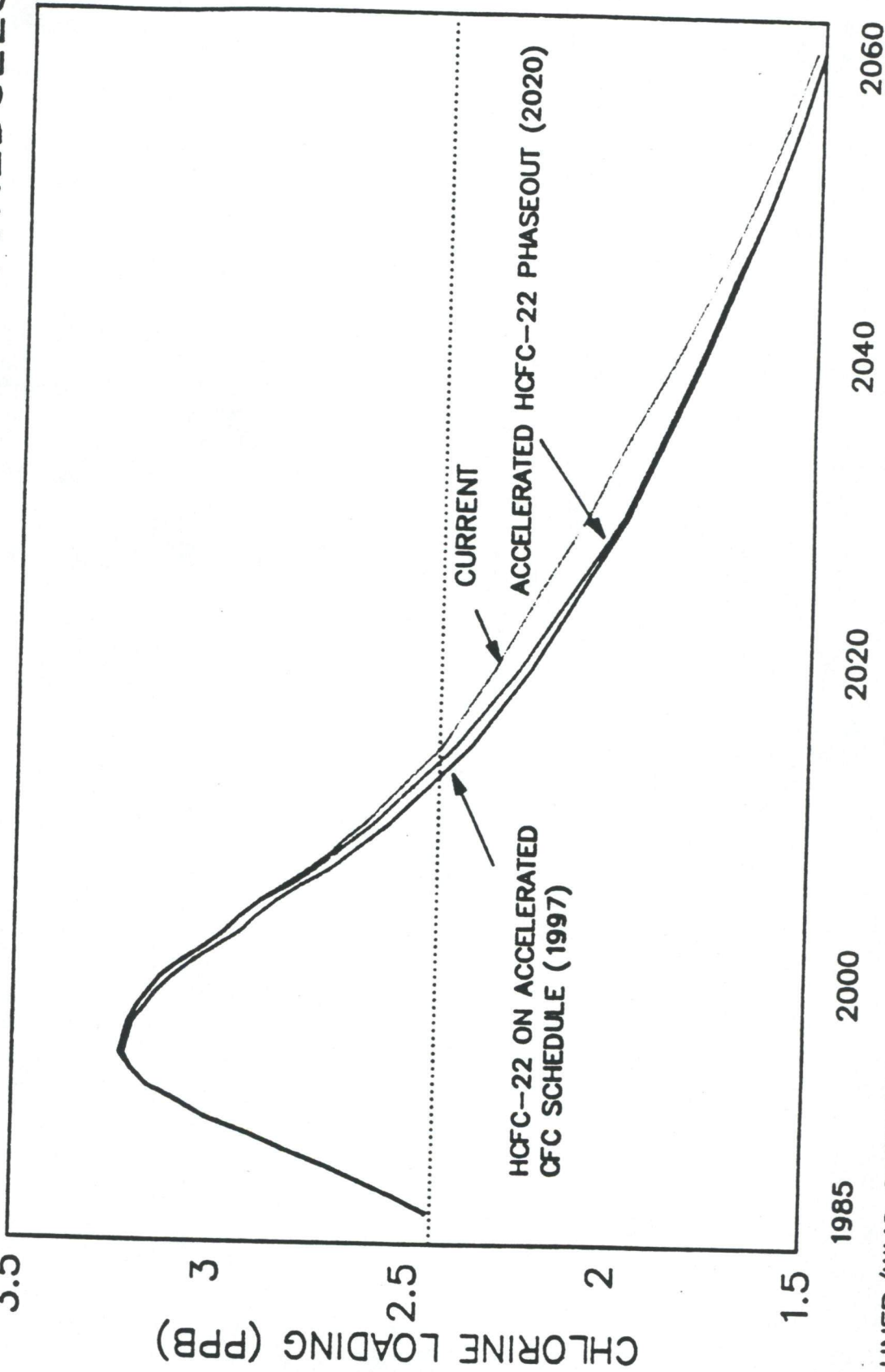
- **ADDITIONAL CANDIDATES MAY BE INCLUDED**

**HCFC OZONE DEPLETION EFFECT
IN PERSPECTIVE**

Sources of Stratospheric Chlorine and Bromine That Can Contribute to Ozone Loss



STRATOSPHERIC CHLORINE LOADING (EXISTING COMPOUNDS - ACCELERATED SCHEDULES)



UNEP/WMO SCENARIOS

Time scale does not account for 3 to 5 year delay for chlorine to reach stratosphere, e.g., 1985 = 1988 → 1990.

IMPORTANCE OF EFFICIENCY

Commercial Refrigeration

"HCFC-22 is the most common replacement refrigerant in new equipment. In some cases HFC-134a, ammonia and alternative technologies like absorption, resorption, and air cycles are also being studied. However, application of HFC-134a forms no realistic option in low temperature applications. It may be possible to retrofit existing commercial refrigeration systems for use with HCFC-22 and blends containing HCFC-22."

Air conditioners and Heat Pumps

"Unitary air-cooled air conditioners and heat pumps, ranging in capacity from 2.0 kw to 420 kw, comprise the majority of air conditioning equipment sold worldwide."

"Significant reductions in HCFC-22 usage can be anticipated if stringent changes in service practices, along with mandatory recovery and recycling, are enforced. A possible elimination of HCFC-22 in this sector will directly depend on the acceptability and availability of an alternative, which has not been clearly identified."

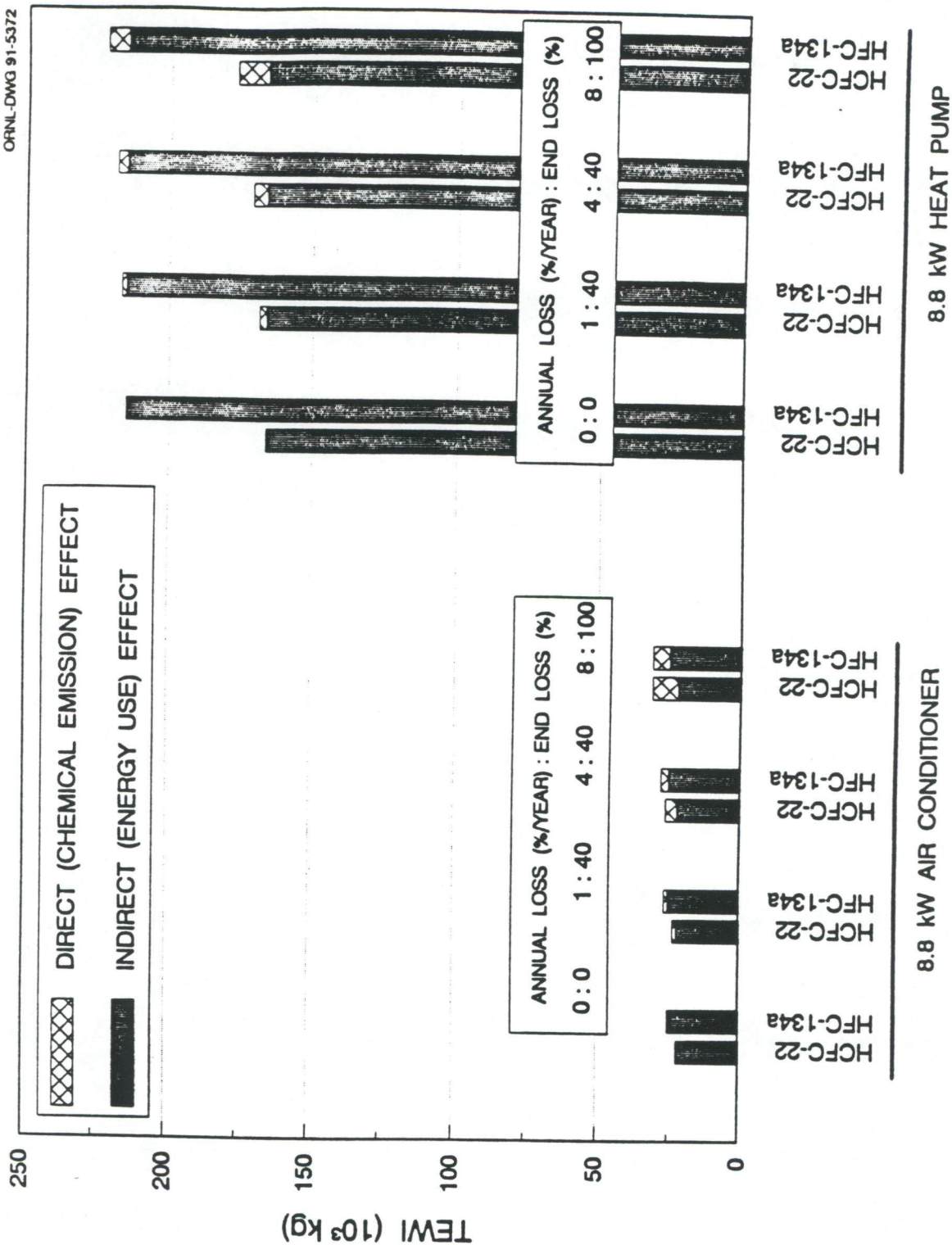
Air Conditioning (Water Cooled Systems)

"HCFC-22 is the most economically acceptable fluid presently available for use in positive displacement compressor water chillers and is used in very large centrifugals. HCFC-22 water cooled chillers are commercially available up to 4,200 kw, as are centrifugal chillers above 1,000 kW. At this time, no substitute for HCFC-22 is known for use in existing equipment."

"The combination of long equipment life (more than 25 years), large base of installed equipment, high capital investment required from the building owner, and increasing concerns about greenhouse warming make it particularly difficult to develop an orderly, cost effective refrigerant transition plan for this equipment category."

TOTAL EQUIVALENT WARMING IMPACT FOR UNITARY HEATING AND COOLING
EQUIPMENT USING 100 YEAR GWP VALUES

ORNL-DWG 91-5372

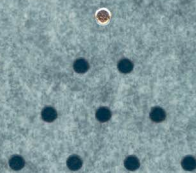


HCFCs are critical to permit the most rapid transition away from CFCs in this sector. Restrictions on the production of new chillers which use HCFCs as refrigerants would undermine this goal. Such restrictions may discourage both developing and developed nations from making an early transition from CFCs to HCFCs. The result will be to prolong CFC usage while the search continues for "perfect refrigerants."

Transport Refrigeration and Airconditioning

"Air conditioning and food stores on ships and railcars are expected to convert to HCFC-22 for new equipment. Container refrigeration units and truck refrigeration units are expected to become available in due course for use with either HCFC-22 or HFC-134a, are air conditioning for buses and coaches."

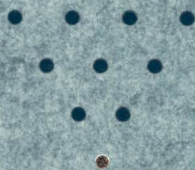
"For a fast phaseout of CFCs a secure mid term future for the availability of HCFC-22 is needed. Without this, the necessary economic incentives for development and purchase of new equipment will not exist."



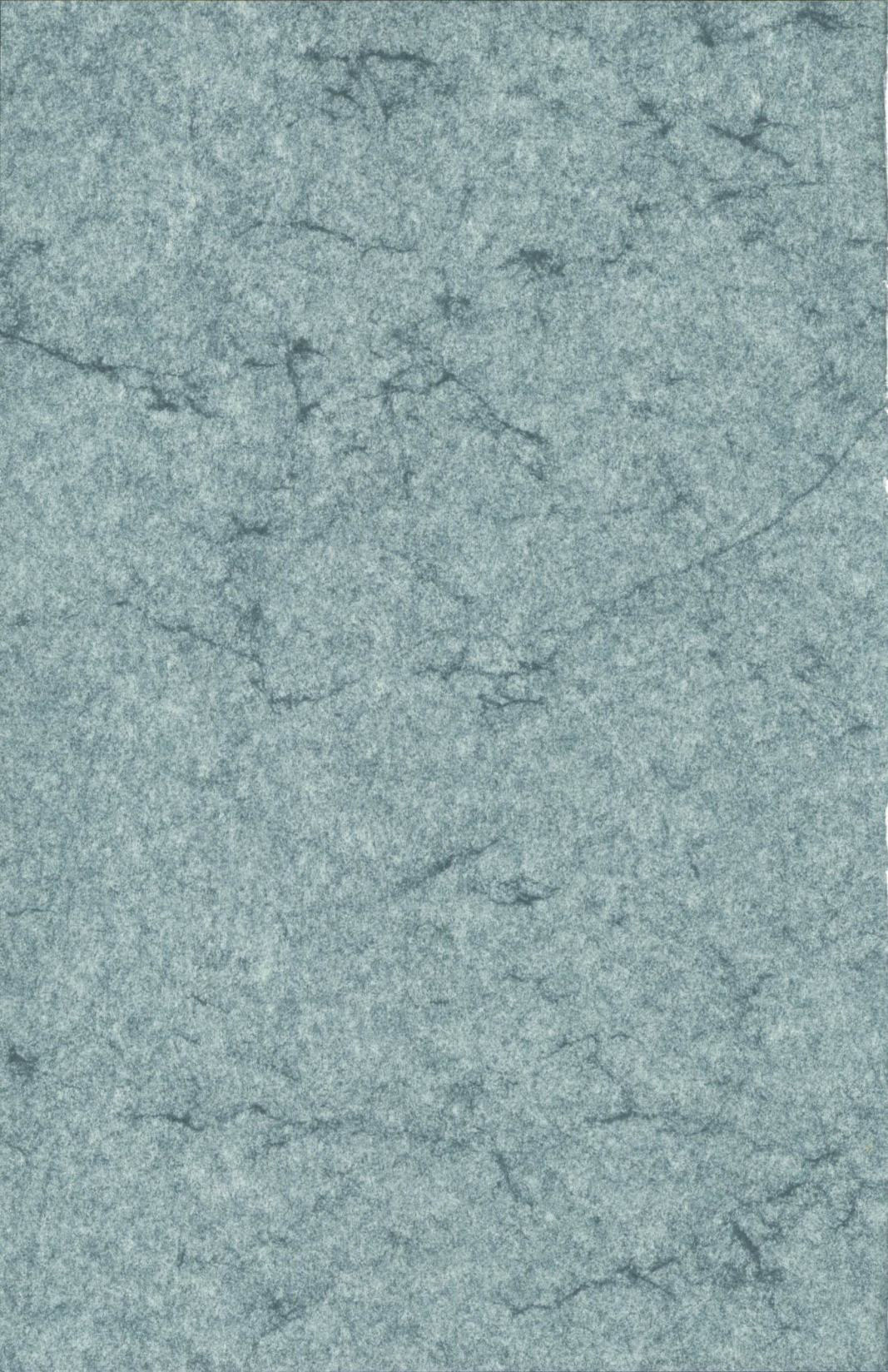
POLICY RECOMMENDATIONS



ON CFC & HCFC CONTROLS



AIR-CONDITIONING
&
REFRIGERATION
INSTITUTE



EXECUTIVE SUMMARY

- Global policies to limit HCFC use and production should take into account the true effects of HCFCs on ozone depletion, weighing this against their important role as efficient transition compounds, the lack of proven satisfactory alternatives, the amount of testing and demonstration necessary prior to commercialization of alternatives and the economic implications of abandoning the existing stock of HCFC equipment before it can be efficiently replaced.
- Policies aimed at HCFCs must take account of their energy efficiency value. Since efficiency greatly affects carbon dioxide emissions and thereby global warming, premature elimination of HCFC refrigerants in the name of ozone protection may actually be environmentally counterproductive by increasing global warming.

EXECUTIVE SUMMARY

- Stratospheric ozone protection policies should take into account scientific information and the societal and economic effects of such policies.
- Ozone protection policies should balance efforts to protect the ozone layer with concerns about global warming and energy efficiency.
- Accelerating the global phaseout of CFCs for newly produced products from 2000 to 1997 may be technically feasible, but some CFC production beyond 1997 to service the vast stock of existing equipment may still be needed.
- Global policies should be adopted to require and facilitate refrigerant recovery, recycling, and reclamation to limit emissions and service existing equipment.
- Developing nations currently have an additional 10 years beyond 2000 to use CFCs. Policies should be adopted to encourage developing nations to shift away from CFCs more rapidly.

BACKGROUND

CFCs (chlorofluorocarbons) are chemical compounds widely used as refrigerants for air conditioning and food refrigeration because they are efficient, non-flammable, non-toxic, cost-effective, and readily producible.

There are several different compounds in the CFC family, each with a different proportion of carbon, chlorine, and fluorine. Related to the CFC family are two different chemical families also usable as refrigerants, the hydrochlorofluorocarbons (HCFCs) and hydrofluorocarbons (HFCs).

The international agreement for the protection of the stratospheric ozone layer is the *Montreal Protocol on Substances that Deplete the Ozone Layer*. The protocol, as amended in June 1990, will phase down and eliminate use of newly produced CFCs by developed nations by 2000 because of their ozone depletion characteristics.

The protocol also contains a nonbinding declaration urging elimination of HCFC production by 2040 (2020 if possible). HCFCs are considered transitional substances in the replacement of CFCs because of their relatively low ozone depletion potential (ODP). According to the protocol:

- HCFCs should be limited to applications where more environmentally

suitable alternative substances or technologies are not available.

- HCFCs should be selected to minimize ozone depletion and meet other environmental, safety, and economic considerations.
- Emission control systems and recovery and recycling should be employed to the greatest extent possible to minimize emissions.

In 1990, new scientific information indicated that ozone depletion in the northern hemisphere during winter and spring was almost twice that previously believed. In 1991, additional data indicated that depletion in northern latitudes extended to summertime.

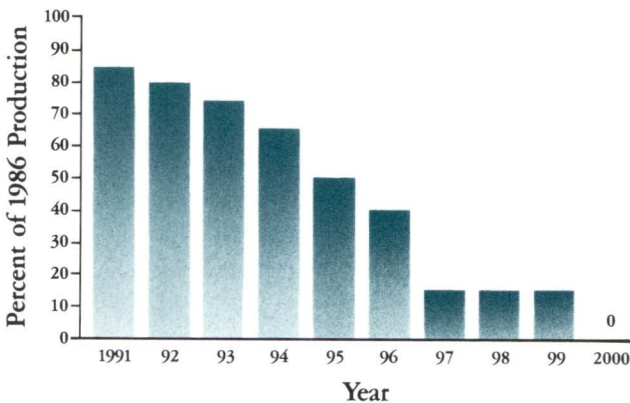
In 1991, the Montreal Protocol Parties (signatory countries) conducted assessments of the protocol's control requirements based on scientific, economic, and technical data. Any amendments to the protocol will be based on these assessments and will be considered by the parties in November 1992. It is possible that an accelerated CFC phaseout will be considered as well as a mandatory HCFC phaseout.

In November 1990, the Clean Air Act Amendments were enacted in the United States. The amendments phase down CFC production on

a similar but more accelerated timetable than the protocol and eliminate HCFC production by 2030. HCFC production is frozen in 2015 and restricted to use only as a refrigerant in equipment made prior to 2020. The U.S. Environmental Protection Agency (EPA) is granted authority to direct the transition to non-ozone-depleting, environmentally safe compounds.

**U.S. CLEAN AIR ACT OF 1990
PERMITTED PRODUCTION**

CFCs



Policy makers must now determine what additional steps to limit ozone depletion are truly necessary and will contribute in a significant way without creating or exacerbating other imposing problems.

RECOMMENDED ACCELERATED PHASEOUT OF CFCs AND HCFCs

The Air-Conditioning and Refrigeration Institute (U.S.), together with the Heating, Refrigerating and Air Conditioning Institute of Canada, the Japan Refrigeration and Air Conditioning Industry Association, the European Committee of Air Handling and Air Conditioning Equipment Manufacturers, and the European Committee of Refrigeration Equipment Manufacturers recommends the following accelerated phaseout schedule for CFCs and HCFCs. Provisions of the current Montreal Protocol and the U.S. Clean Air Act are shown for comparison.

CFCs

(% of 1986 baseline production permitted)

	Protocol	U.S. Clean Air Act	ARI Proposal
Jan. 1 - Dec. 31, 1992	100	80	60
Jan. 1 - Dec. 31, 1993	100	75	50
Jan. 1 - Dec. 31, 1994	100	65	40
Jan. 1 - Dec. 31, 1995	50	50	25
Jan. 1 - Dec. 31, 1996	50	40	0*
Jan. 1 - Dec. 31, 1997	15	15	0*
Jan. 1 - Dec. 31, 1998	15	15	0*
Jan. 1 - Dec. 31, 1999	15	15	0*
Jan. 1 - Dec. 31, 2000	0	0	0

* Production of CFCs for new equipment, and production of new equipment would be banned. Production of a limited amount of CFCs to service essential existing refrigeration and air-conditioning equipment would be permitted.

HCFC-22, 141b, 142b**

(Phaseout dates)

	Current Protocol	U.S. Clean Air Act	ARI Proposal
New equipment & HCFCs for its use	2040*	2020	2010
Existing equipment & HCFCs for its use	2040*	2030	2020

* Non-binding. 2020 if possible.

** Clean Air Act control dates for HCFC-123 would remain in effect (2020 for new equipment, 2030 for existing equipment).

POLICY RECOMMENDATIONS

Stratospheric ozone policies must take into account societal and economic consequences as well as scientific information. Refrigeration is essential for food preservation, acceptable living and working environments, and many modern industrial processes:

- Over 75 percent of the food we eat is refrigerated at some point in preparation or distribution.
- Air conditioning allows businesses and residents in warm climates to thrive.
- The use of large chillers makes possible modern office buildings and shopping malls.
- Buses, trucks, cars, subways, trains, airplanes, and ships all rely on air conditioning.
- Hospitals require air conditioning and refrigeration to help reduce the spread of bacteria and infections and provide a healthful environment for patients.
- In the U.S. alone there is more than \$135 billion in existing CFC air-

conditioning and refrigeration equipment and over \$200 billion in HCFC air-conditioning and refrigeration equipment.

- Manufacturing capacity to replace this equipment in a compressed timeframe may not be available.

Explore accelerated CFC phasedown where feasible.

Policy makers should strive for the most rapid global transition from CFCs without discouraging investment in transitional substances. One example would be to accelerate the 50 percent CFC phasedown requirement from 1995 to 1994. Industry has made substantial progress in the transition from CFCs. The Air-Conditioning and Refrigeration Institute (ARI) fully expects manufacturers of refrigeration and air-conditioning products to have new CFC-free products available before 1997.

Policy makers should also avoid prematurely jeopardizing the stock of existing equipment designed for CFCs. Existing installed CFC equipment in the United States is valued at more than \$135 billion and will need refrigerant for servicing for up to 30 years in some cases.

Limited production of CFCs may be needed after 1997 to service this equipment. If CFC production ends completely, servicing must be supplied by recycled or reclaimed refrigerants. Significant emphasis will be placed on recycling and reclaiming in the United States, but no one knows whether the refrigerant supply will be adequate.

Another alternative is to replace or retrofit the existing equipment to use non-CFC refrigerants. Although it is technically feasible to retrofit some equipment, the cost is significant. It will also take years to retrofit or replace all installed CFC equipment.

ARI urges the United States and all parties to the protocol to consider the servicing needs of existing equipment before deciding whether to advance the CFC phaseout date.

Support measures for developing nations to accelerate their CFC phasedown.

The single most effective way to limit further ozone depletion would be to require developing nations to eliminate CFC use by 2000, as is the current requirement for the developed nations. Developing nations are allowed an additional ten years to produce and use CFCs because

of their growth requirements. Advances made in new technologies should allow these nations to make the transition much more rapidly. The protocol parties should look at policy measures and special incentives to insure an earlier transition.

HCFCs present a major opportunity for developing nations to shift from CFCs, but, if HCFCs are banned too soon, these nations will have fewer alternatives and may insist upon using CFCs until final substitutes are found. For example, why would a developing nation switch to HCFCs if they were to be phased out in 2010 or earlier while the country was allowed to use CFCs until 2010?

Insure that the timing of HCFC controls allows time to develop safe, workable alternatives and protects existing equipment.

Not only are HCFCs promising transitional refrigerants for many current CFC uses, HCFC-22 is the primary refrigerant in virtually all residential and many commercial air-conditioning systems used for essential heating and cooling. While industry is aggressively pursuing non-ozone-depleting refrigerants and equipment,

there are currently no proven substitutes available for HCFCs that provide adequate product performance and that satisfy relevant safety, environmental, and efficiency concerns.

While the latest science information confirms ozone depletion year-round, it does not necessarily require more drastic actions to eliminate HCFCs earlier than the dates specified in the Clean Air Act. Using the control dates for HCFCs in the Clean Air Act as a starting point, ARI believes advancement can only be justified if the following conditions are satisfied:

- Sufficient time must be allowed for alternative refrigerants to clear all necessary environmental and safety testing.
- Alternative refrigerants must be proven efficient and compatible in new product designs.
- Sufficient time must be allowed for development of production plants for new refrigerants and for products to be ready for commercial production.
- Manufacturers must be given adequate time to recoup investments in new product lines designed for alternative refrigerants.

- Sufficient time must be allowed for existing products to be serviced for their expected useful lives or until they can be practically replaced.

These conditions recognize critical areas where manufacturers must feel comfortable that they can offer new products without putting themselves or their customers at risk. Determination of whether a substitute is "safe" or "acceptable" is made through a consensus process by which compounds and products become widely accepted by those people most affected by them, i.e. manufacturers, service technicians, and consumers. The determination must not be made by a government finding absent this consensus.

HCFCs have been strongly promoted by the world's leading atmospheric scientists as the key bridging solution between CFCs and totally safe compounds. In response, many CFC users are already switching or planning to switch to HCFCs. In our industry, the importance of the HCFCs cannot be overstated. Virtually all residential central and room air conditioners use HCFC-22. HCFC-22 is used in about 80 percent of products produced by the industry. The remaining 20 percent use various CFCs. HCFCs will be an important bridge away from CFCs in many of these uses.

Policies at the international and

national levels to phase out HCFC production and use should be based on substantiated environmental needs and the realities involved with developing and commercializing alternatives to HCFCs. Policies should not be aimed at micro-managing the transition.

Urge aggressive use of refrigerant recovery, recycling, and reclamation.

Emissions of refrigerants will be significantly reduced in the United States in response to the ozone depletion issue and the recent Clean Air Act amendments. Intentional venting of refrigerants will be prohibited by law, and EPA will issue mandatory national rules governing the service, use, and disposal of refrigeration and air-conditioning equipment.

Industry experts project that the historical refrigerant loss rate from service practices and leakage can be greatly reduced within the next few years; however, the extent to which recovery and recycling of refrigerants can offset demand for new production of CFC refrigerants is unknown. Training and certification of service personnel, regulations requiring recovery and reclamation, and the replacement/conver-

sion/upgrading of aging, leaky equipment will reduce the amount of refrigerants escaping into the atmosphere. Major changes will occur, including creation of an infrastructure to accommodate the transportation of recovered, recycled, and reclaimed refrigerants. We urge policy makers to adopt global policies consistent with U.S. policies as a significant way to reduce emissions.

Integrate ozone protection, global warming, and energy efficiency policies.

The first evaluations of HCFCs and HFCs as alternatives to CFCs focused on their stratospheric ozone depletion potential; however, the selection of refrigerants has important environmental consequences in another area—global warming. While the most recent United Nations Environment Programme (UNEP) science report indicates the net effect of emissions of ozone-depleting compounds and ozone depletion does not add to global warming, the indirect effect of these compounds when used as refrigerants can affect global warming.

The indirect effect refers to the energy efficiency of a refrigerant in an energy-dependent

system (such as an air conditioner whose energy source is electricity or fossil fuels).

The less efficient the refrigerant and system, the more carbon dioxide (CO₂) is emitted by the fuel or power source. Carbon dioxide and other power plant combustion bi-products are the major greenhouse gases.

A study on refrigerants and global warming was recently conducted by Oak Ridge National Laboratory (ORNL) and sponsored by the U.S. Department of Energy and worldwide chemical manufacturers. A draft analysis found that "replacement of CFCs with suitable HCFCs or HFCs yields a dramatic benefit in reducing Total Equivalent Warming Impact [combination of direct and indirect global warming effects] for all CFC end-use applications considered. Reductions in Total Equivalent Warming Impact range from 10 percent to 98 percent, depending on application."

Since production of all CFC refrigerants will ultimately be phased out, the transition to HCFCs and HFCs is environmentally sound in terms of both ozone protection and global warming prevention. The difficult questions for policy makers are in judging the impacts of transitions away from HCFCs. While switching from an HCFC to an HFC will be helpful in terms of ozone

protection, it can increase global warming in some applications. For instance, non-chlorine-containing refrigerant alternatives such as direct gas-fired ammonia/water absorption unitary air conditioners result in severe global warming penalties relative to HCFC-22, according to the draft report. It is therefore prudent that the global warming effects of alternative refrigerants and technologies be fully studied before decisions to eliminate compounds for ozone protection reasons are made.

Our national energy efficiency requirements must also be fully studied before passing final judgment on HCFCs, particularly HCFC-22. The vast majority of unitary air conditioners and heat pumps and all room air conditioners must meet national minimum efficiency requirements in the United States. Removing a refrigerant option that provides efficiency at reasonable costs will be counterproductive from a total environmental standpoint and will be an economic penalty for consumers.

CONCLUSION

ARI urges policy makers to support the following recommendations in developing controls for CFCs and HCFCs:

- Explore accelerated CFC phasedown where feasible.
- Support measures for developing nations to accelerate their CFC phasedown.
- Insure that the timing of HCFC controls allows time to develop safe, workable alternatives and protects existing equipment.
- Urge aggressive use of refrigerant recovery, recycling, and reclamation.
- Integrate ozone protection, global warming, and energy efficiency policies.

The Air-Conditioning and Refrigeration Institute (ARI) is the national trade association representing manufacturers of over ninety percent of U.S. produced central air-conditioning and commercial refrigeration equipment. This excludes household refrigerators and freezers, automobile air conditioners, and window air conditioners.

A R I M E M B E R C O M P A N I E S

Aaon, Inc.
Tulsa, OK

Aerofin Corporation
Lynchburg, VA

Aeroquip Corporation
*Air Conditioning and
Refrigeration Products
Division*
New Haven, IN

AES-NTRON
Exton, PA

Airguard Industries, Inc.
Louisville, KY

Airmax, Inc.
Gilmer, TX

Airtherm Manufacturing
Company
St. Louis, MO

Alcan Rolled Products
Company
Cleveland, OH

Alco Controls Division
Emerson Electric Co.
St. Louis, MO

Allied-Signal, Inc.
Engineered Materials Sector
Morristown, NJ

Allstyle Coil Company, Inc.
Houston, TX

Amana Refrigeration, Inc.
Amana, IA

Americold
*White Consolidated
Industries, Inc.*
Cullman, AL

Ametek
U.S. Gauge Division
Sellersville, PA

Amtrol Inc.
West Warwick, RI

A. O. Smith Corporation
Electrical Products Company
Tipp City, OH

Armstrong Machine Works
Three Rivers, MI

Aspen Manufacturing, Inc.
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ATOCHEM North America
Fluorochemicals Division
Philadelphia, PA

Baltimore Aircoil Company
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Baltimore, MD

Barber-Colman Company
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**Bridgeport-Piedmont
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Brookside Group, Inc.
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Corporation**
Englewood, NJ

Carnes Company, Inc.
Verona, WI

Carrier Corporation
Syracuse, NY

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St. Louis, MO

**Chicago Bridge &
Iron Company**
Oak Brook, IL

Climate Master, Inc.
*A Subsidiary of
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*Division of Emerson
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Smyrna, DE

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The Dometic Corporation
LaGrange, IN

Doucette Industries, Inc.
York, PA

**DRI-STEEM Humidifier
Company**
Eden Prairie, MN

Dunham-Bush, Inc.
West Hartford, CT

**E.I. du Pont de Nemours &
Co., Inc.**
Fluorochemicals Division
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*Automotive & Appliance
Controls Operation*
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Ebco Manufacturing Company
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**Elkay Manufacturing
Company**
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International, Inc.**
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Enterprises, Inc.**
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Westminster, MD

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Motor Division
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FHP Manufacturing Company
Division of Harrow
Products, Inc.
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Furnas Electric Company
Batavia, IL

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Skokie, IL

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Melrose Park, IL

Herrmidifier Company, Inc.
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Honeywell Inc.
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Hoshizaki America, Inc.
Peachtree City, GA

Howden Compressors Inc.
Bloomfield, CT

Hupp Industries, Inc.
Typhoon Air
Conditioning Co.
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Hussmann Corporation
Bridgeton, MO

Hydro Aluminum
Automotive, Inc.
Advanced Engineering Group
Cape Canaveral, FL

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Rockton, IL

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Business Group
Wilmington, DE

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Polo, IL

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Chicago, IL

Inter-City Products
Corp. (USA)
LaVergne, TN

International Environmental
Corporation
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Johnson Controls, Inc.
Control Products Division
Goshen, IN

Kysor/Warren
Conyers, GA

Landis & Gyr Powers, Inc.
Buffalo Grove, IL

LaRoche Chemicals Inc.
Baton Rouge, LA

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Dayton, OH

Lennox International, Inc.
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MagneTek Universal Electric
Owosso, MI

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Wheat Ridge, CO

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Manitowoc, WI

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Denver, CO

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**Mile High Equipment
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Racine, WI

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Garner, NC

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Cleveland, OH

Mortex Products, Inc.
Ft. Worth, TX

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Port Huron, MI

National Comfort Products
King of Prussia, PA

**National Refrigeration
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Bensalem, PA

Nepco, Inc.
Monroeville, PA

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OEM Division
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St. Louis, MO

Nortec Industries, Inc.
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Company, Inc.**
Two Rivers, WI

**Parker Refrigeration
Components Group**
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Recold Division
*The Marley Cooling
Tower Company*
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**Standard Refrigeration
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Westfield, MA

Sunroc Corporation
Glen Riddle, PA

Superior Coils, Inc.
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Washington, PA

Technical Chemical Company
Dallas, TX

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Incorporated
Attleboro, MA

ThermaFlo
Springfield, MA

Thermal Energy Storage, Inc.
San Diego, CA

Thermal Engineering
Company
Toledo, OH

Thermo King Corporation
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TITUS
Richardson, TX

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St. Louis, MO

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Division of American
Standard Inc.
Niles, MI

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Wheeling, IL

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Fort Wayne, IN

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Division of Watsco, Inc.
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