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# “Fluorocarbons: Balanced Solutions For Society”

## Producing HFCs...Meeting Societal Needs With Environmental Stewardship

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### A Worldwide Perspective

The Montreal Protocol’s mandated CFC and HCFC phaseouts posed a daunting challenge to fluorocarbon producers. The aggressive phaseout timetables presupposed that safe, cost effective and environmentally acceptable alternative products could be rapidly developed and manufactured. New product development and commercialization – from product formulation and plant construction to toxicology and environmental impact screening – had to be completed in incredibly short time frames to avoid significant societal disruption.



Industry responded with unprecedented creativity and innovation. Individual fluorocarbon producers rapidly increased resources – people, time and money – toward alternative product development and commercialization. Industry partnerships under the **Programme for Alternative Fluorocarbon Toxicity Testing (PAFT)** allowed resource pooling to screen likely candidates. Potential environmental impacts were studied through the **Alternative Fluorocarbon Environmental Acceptability Study AFEAS** group. (AFEAS continues to publicly report data today.)

Industry’s huge undertaking resulted in safe, non ozone-depleting, high performance, cost effective compounds that are in widespread use around the world today – HFCs. These compounds were extensively studied before their introduction, with over \$41,000,000 spent in PAFT and AFEAS studies alone. (Industry continues to investigate new HFCs for different applications.)

### High Value Products for High Value Uses

The unique properties and performance of CFCs, led to widespread use. With the CFC and HCFC phaseouts, HFCs and other options are being considered as replacement products. HFCs enjoy widespread use because of



their overall effectiveness and attractive properties. However, non-fluorocarbon alternatives are also being used in applications such as refrigerants, propellants, foam expansion agents and solvents, presenting different options and tradeoffs in terms of cost effectiveness, safety and energy efficiency. All alternatives require chemical processing, whether hydrocarbons, ammonia, CO<sub>2</sub> or HFCs.

HFCs offer the highest overall value in many applications. Producers advocate an approach of “Responsible Use” predicated on the concepts of highest-value applications, safety, total environmental impact, emissions reduction/control, energy efficiency and total system cost. This ensures that both industry and consumers have options, societal needs are met, innovation is encouraged, and

environmental impact is minimized. The HFC producers have published a Responsible Use Guide for emissions control during manufacture.

### Cleaner, More Advanced Manufacturing

HFC production requires longer, more complex processes and more sophisticated technology than the simple CFCs manufacturing processes. Many products, such as propellants used to deliver drugs for the treatment and control of asthma, or refrigerants, must meet stringent quality and purity standards. Producers have developed and installed new, more efficient systems to minimize operational and process emissions. Modern

HFC plants have sealed systems and closed loop transfers for both internal transfers and loading and delivery of bulk customer shipments. Leaks from HFC processes are limited to about 0.1% of total production, resulting in negligible environmental impact from handling.



Worldwide, industry has invested well over \$40 billion to replace ozone-depleting CFCs with safe, effective, high performance HFCs. Industry continues to invest in new technologies today.

### Industry Principles for Product Stewardship

Fluorocarbon producers are stewards for the products they make and sell. These products need to be safe to manufacture, transport, store, use and either dispose of or recover. HFCs are unique since they can be used and recovered multiple times. While individual companies have specific policies and goals, common general principles for product stewardship include:



- Fluorocarbon production includes systems that ensure worker and community safety;
- Product transport in both bulk and containers must comply with all transportation regulations. Transport and storage must ensure product safety;
- Plant design targets zero fugitive emissions;
- Coproduct formation and/or release must be cost effectively minimized;
- Producers will promote customers' cooperation to recover, recycle and or destroy fluorocarbons;
- HFC use in applications where emissions are limited or there is overwhelming societal value offsetting potential emission environmental impact;
- Fluorocarbon production and sales data published to support global modeling of atmospheric concentration profiles.

**Balanced Solutions for Society...Fluorocarbon production is a perfect example of proactive, responsible chemicals management, allowing societal benefits from these applications while limiting their environmental impact.**

The Alliance for Responsible Atmospheric Policy is a leading industry voice which coordinates industry participation in the development of reasonable international and U.S. government policies regarding ozone protection and global climate change.

 <p><b>The Alliance</b> <i>for Responsible Atmospheric Policy</i></p> <p>The Alliance for Responsible Atmospheric Policy 2111 Wilson Blvd., 8th Floor · Arlington, VA 22201 Phone : (703) 243-0344 · Fax: (703) 243-2874 E-mail: <a href="mailto:alliance98@aol.com">alliance98@aol.com</a></p>	 <p><b>AFCAM</b> Association of Fluorocarbon Consumers and Manufacturers</p>	 <p><b>HRAI</b> Heating, Refrigeration, Air-Conditioning Institute of Canada</p>
 <p><b>JICOP</b> JAPAN INDUSTRIAL CONFERENCE FOR OZONE LAYER PROTECTION</p>	 <p><b>ARI</b> AIR-CONDITIONING &amp; REFRIGERATION INSTITUTE</p>	 <p><b>EPEE</b> European Partnership for Energy and Environment</p>