

# **U.S. Transition from HCFCs to Zero ODP and Low-GWP Alternatives**

**OZONE OFFICERS NETWORK REGIONAL MEETING  
PARAMARIBO, SURINAME APRIL 7-11**

**Elizabeth Whiteley, Environmental Scientist**

Stratospheric Protection Division

U.S. Environmental Protection Agency



# Transitioning to Low-GWP Alternatives

- U.S. Climate Action Plan
- North American Proposal
- SNAP – Significant New Alternatives Policy
  - Low-GWP options and commercialized technology
  - Considering status of high-GWP HFCs
- U.S. Voluntary Programs



**SNAP**





- **Continue International Diplomacy on HFCs**
  - Lead negotiations under the Montreal Protocol to phase down HFCs
  - Work with partners in the *Climate and Clean Air Coalition to Reduce Short-Lived Climate Pollutants* to promote climate-friendly alternatives to high-GWP HFCs, address standards, & reduce emissions from HFC use
    - 34 Partners, including 13 A5 Countries
- **And at the same time...**





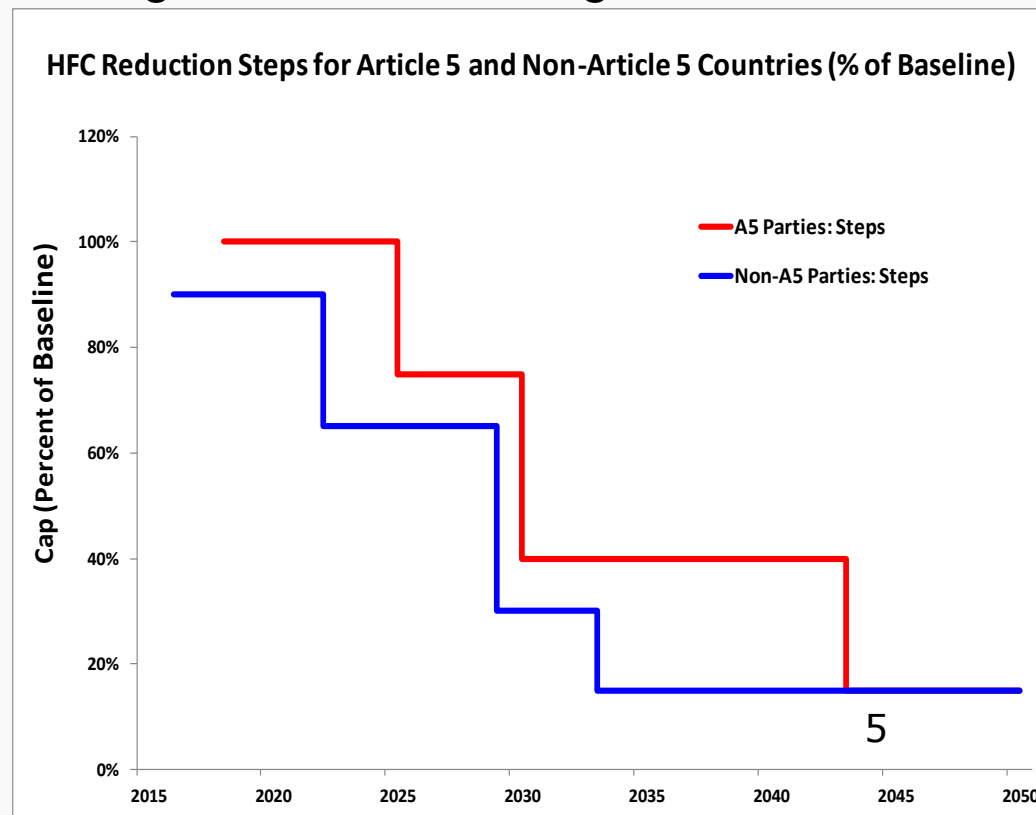
- **Address HFCs through Domestic Actions**
  - Use existing Clean Air Act authority for ***Significant New Alternatives Policy (SNAP) Program*** to approve climate-friendly chemicals, prohibit some uses of most harmful
  - Provide federal leadership by *purchasing cleaner alternatives to HFCs* whenever feasible and by *transitioning to equipment using safer, more sustainable alternatives*



# North American Proposal



- Proposed amendment would:
  - Control HFC Production and Consumption
  - Phasedown, not Phaseout of HFCs
  - Control By-Product Emissions of HFC-23 excluding CDM projects
  - Complements but Leaves Unchanged UNFCCC Obligations
    - Supports Global Efforts to Reduce GHGs
    - Leaves HFC Emissions in UNFCCC Basket
- Why the Montreal Protocol?
  - 20+ Years Experience With These Sectors
  - Existing appropriate support structure: Multilateral Fund, TEAP, SAP



# HFC Actions in Every Region



- 24 countries & EU have existing/proposed HFC policies
  - Represents ~60% 2010 HFC emissions, smaller fraction of 2020 & 2030 predicted emissions
- Economic and market-based incentives
  - Tax, fee for HFCs or HFC-containing products, refunds, destruction
- Prohibition/authorization
- Required practices & labeling
- Import/export licensing/reporting/recordkeeping

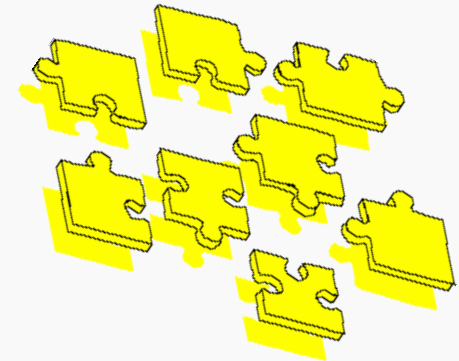
- |                |               |                        |
|----------------|---------------|------------------------|
| ▪ Australia    | ▪ Germany     | ▪ Slovenia             |
| ▪ Austria      | ▪ Italy       | ▪ Sweden               |
| ▪ Belize       | ▪ Japan       | ▪ Switzerland          |
| ▪ Burkina Faso | ▪ Macedonia   | ▪ United Kingdom       |
| ▪ Canada       | ▪ Montenegro  | ▪ United States        |
| ▪ Colombia     | ▪ Netherlands | • <i>US California</i> |
| ▪ Denmark      | ▪ New Zealand | • Yemen                |
| ▪ Egypt        | ▪ Norway      | ▪ European Union       |
| ▪ France       | ▪ Poland      |                        |

# Identifying Safer Alternatives



## Significant New Alternatives Policy (SNAP) Program

- Evaluates substitutes that reduce overall risk to human health & environment in industrial sectors
  - e.g., Refrigeration, A/C, Foams, Solvents, Fire Suppression, Aerosols
- 400+ substitutes considering:
  - ODP, GWP, flammability, toxicity, local air quality, ecosystem effects, occupational & consumer health/safety
- Alternatives are listed as acceptable, unacceptable and acceptable with conditions for use
- Alternatives include:
  - Alternative chemicals/blends
  - Alternative technologies
- Next Generation Alternatives
  - Alternatives for ODS & high GWP-HFCs



# Low-GWP Refrigerant Options



## Low-GWP Acceptable Substitutes\*:

Chemical	GWP	Application(s)
R-290 (propane)	3.3	commercial stand-alone refrigerators and freezers
Ammonia	0	refrigeration, chillers, commercial ice machines
CO2	1	vending machines, retail food refrigeration
HFO-1234ze, 1233zd(E)	4.7 – 7	chillers
R-600a, R-441A	<10	household refrigerators and freezers
Water	0	chillers

\* SNAP lists alternatives as acceptable, acceptable with use restrictions, and unacceptable



# New Listings of Low- GWP Refrigerants



- EPA developing a proposed rule that will add alternatives where current options are limited
- Since these refrigerants are flammable, EPA will propose appropriate use conditions that adopt safety standards

Refrigerant	GWP	End Use and Application EPA is Considering					
		Household Refrigerators	Retail refrigerator stand-alone	Vending	Very Low Temp Ref	Heat Transfer	Home AC-Self-contained
Ethane	6				✓	✓	
Isobutane*	8		✓	✓			
Propane*	3	✓		✓			✓
R-441A* (HC blend)	<5		✓	✓			✓
HFC-32	675						✓

\*listed 12/2011 for other refrigeration applications

# Commercialization of Low-GWP Refrigerants



- Residential AC:
  - HFC-32 AC being introduced in Japan, India and the EU
  - R-290 AC being introduced in India, China
- Commercial Refrigerators:
  - U.S., European manufacturers selling units charged with R-290
- Vending machines:
  - Coca-Cola has installed more than 1 million HFC-free vending machines globally

# SNAP Status Change Rule



- U.S. Clean Air Act directs EPA to list unacceptable substitute substances where there are other substitutes currently or *potentially available* that reduce overall risk to human health & environment
- EPA is developing a proposed rule that would change the status of high-GWP HFCs where alternatives are available or potentially available
  - Considering end uses where low-GWP alternatives are available or potentially available
  - Considering end uses where significant environmental benefits can be achieved and where backsliding to high-GWP HFCs can be avoided

# Current Thinking on Possible Status Changes



- Commercial Refrigeration
  - Vending Machines and Stand-Alone Reach-In Coolers
    - Change the status for HFC-134a and HFC blends with higher GWPs
  - Multiplex Supermarket Systems
    - Change the status for R-507A, R-404A and other HFC blends with high GWPs
    - Retain R-407A , R407F, others
- Motor Vehicle Air Conditioning
  - Change the status for HFC-134a
- Considering changes for some HFCs in foams and aerosols as well



## THE GREENCHILL PARTNERSHIP



- EPA partners with food retailers to reduce refrigerant emissions, lessen impacts on ozone layer & climate
  - Transition to refrigerants with better environmental profiles
  - Lower refrigerant charge sizes & eliminate leaks
  - Adopt green refrigeration technologies/best practices
- Partners are 20% of the U.S. industry, ~8,000 stores
- Partners driving change to new technologies
  - Hannaford: first US supermarket with CO<sub>2</sub> transcritical refrigeration system with water heat recovery and internet-based control of racks & cases.
  - Stater Brothers Market: across all their stores in 2012 reduced leaks to less than 7% of total charge compared to industry average of about 25% leaked per year.

# Summary of U.S. Approaches



- Continue to engage internationally
  - Phase down HFCs under the Montreal Protocol
  - Participate in the Climate and Clean Air Coalition to promote climate-friendly alternatives, address standards, and reduce emissions from HFC use
- Use our domestic authorities to reduce HFC use
  - Use the SNAP program to approve low-GWP alternatives and change the status of high-GWP alternatives
  - Transition to lower-GWP alternatives at government facilities
  - Continue encouraging transition through EPA's GreenChill program in retail food refrigeration

# Contact Information



Elizabeth Whiteley, Environmental Scientist  
U.S. Environmental Protection Agency  
Washington, DC USA  
Whiteley.Elizabeth@epa.gov  
+1 202 343 9310