



GreenChill Advanced Refrigeration Partnership



Environmental Best Practices for Retrofits



Retrofit Webinar Presenters

- ▶ Keilly Witman – U.S. EPA
- ▶ Nick Strickland – DuPont
- ▶ Craig Thomas – Arkema
- ▶ Ron Vogl - Honeywell
- ▶ Sean Cunningham – Ineos Fluor



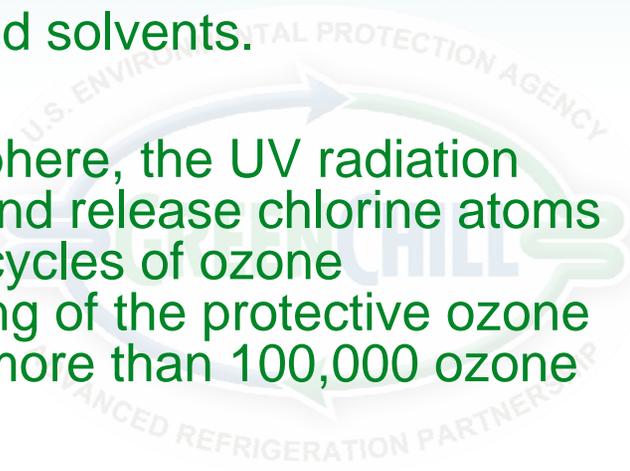
Webinar Agenda

- ▶ 2:00 – 2:10 Intro/Ozone Layer Protection/R-22 Phaseout – Keilly
- ▶ 2:10 – 2:20 Business Case for Retrofits – Nick
- ▶ 2:20 – 2:30 Range of Retrofits/Leak Tightness Improvements – Craig
- ▶ 2:30 – 2:40 Factors to Consider when Assessing Retrofit Options – Ron
- ▶ 2:40 – 2:50 Retrofit Best Practices – Sean
- ▶ 2:50 - 3:00 R-22 End of Life – Nick
- ▶ 3:00 – 3:15 Q&A



The Ozone Layer

- ▶ Ozone layer protects us from ultraviolet radiation from the sun
- ▶ A thinner ozone layer allows more radiation to reach the Earth's surface
 - ▶ skin cancer
 - ▶ cataracts
 - ▶ weakened immune systems
 - ▶ reduced crop yields
 - ▶ disruptions in the marine food chain
- ▶ Ozone layer thinning/ozone holes caused by the release of chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), and other ozone-depleting substances, which were and are used widely as refrigerants, insulating foams, and solvents.
- ▶ When these substances reach the stratosphere, the UV radiation from the sun causes them to break apart and release chlorine atoms which react with ozone, starting chemical cycles of ozone destruction that results in significant thinning of the protective ozone layer. One chlorine atom can break apart more than 100,000 ozone molecules.



Ozone Layer Protection

- ▶ **Montreal Protocol**
 - ▶ International treaty signed by the U.S. & 179 other countries, developed & developing nations
 - ▶ purpose is to repair and protect the earth's ozone layer so we remain safe from the harmful effects of ultraviolet (UV) radiation
 - ▶ mandated the complete phaseout of CFCs
 - ▶ Gradual phaseout of HCFCs started in 2004 according to a schedule agreed upon by the signing parties, including the USA.
- ▶ The U.S. incorporated the Montreal Protocol requirements into Title VI of the United States Clean Air Act
 - ▶ Title 40, Part 82 of the Code of Federal Regulations contains EPA's regulations to protect the ozone layer
 - ▶ EPA's Stratospheric Protection Division manages these programs
- ▶ Outstanding environmental and health benefits
 - ▶ 6.3 million U.S. skin cancer deaths prevented by 2165

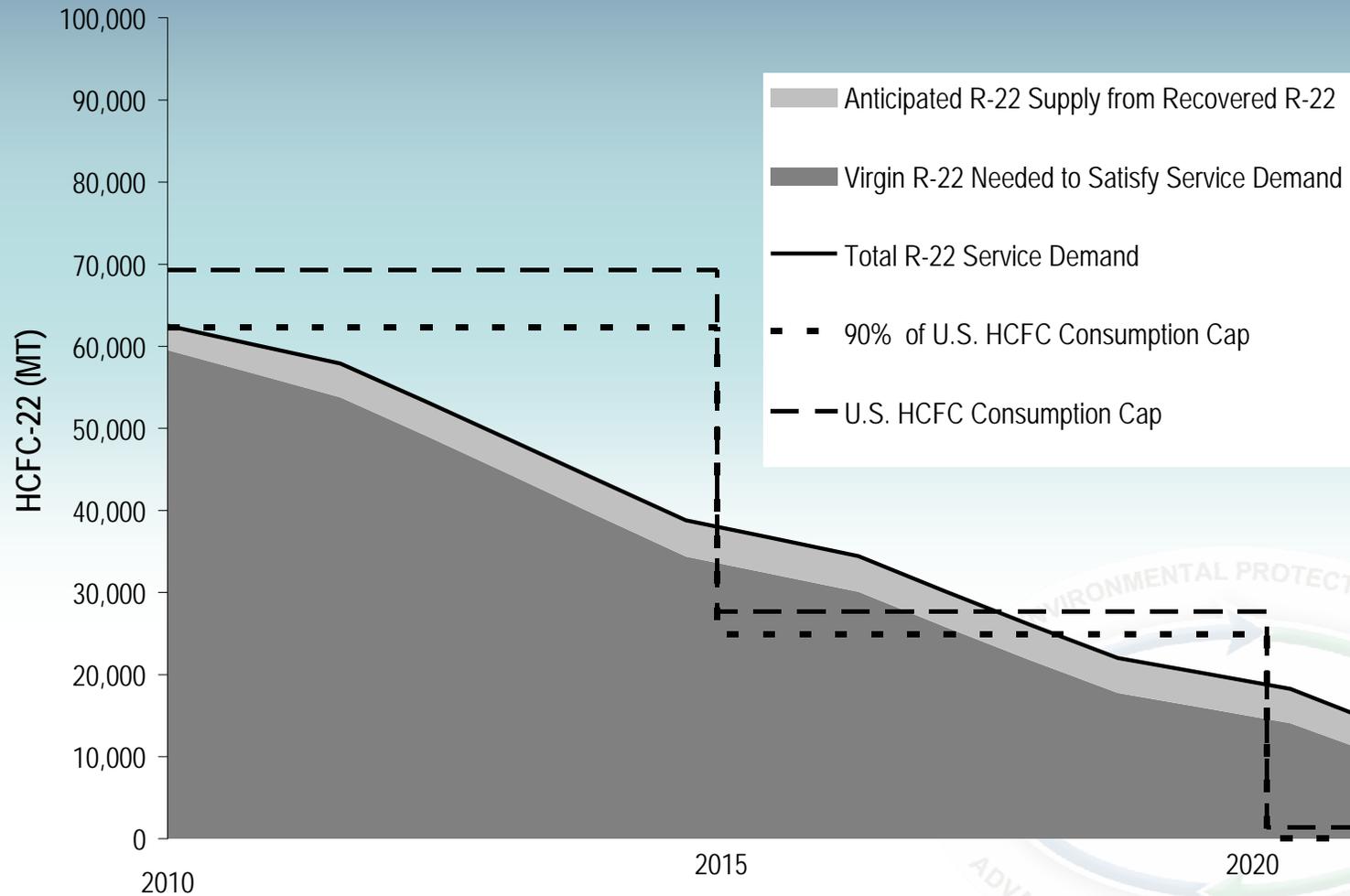


EPA ODS Phaseout Plan

Montreal Protocol		United States	
Implementation Year	% Reduction in Consumption and Production Using the Cap as the baseline	Implementation Year	Implementation of HCFC Phaseout through Clean Air Act Regulations
2004	35%	2003	No production and no importing of HCFC 141b
2010	75% (Reduced in 2007 from 65%)	2010	No production and no importing of HCFC 22 and HCFC 142b except for use in equipment manufactured before 1/1/2010 (no new production or importing for NEW equipment using these refrigerants)
2015	90%	2015	No production and no importing of any HCFCs except for use as refrigerants in equipment manufactured before 1/1/2020
2020	99.5%	2020	No production and no importing of HCFC 142b and HCFC 22
2030	100%	2030	No production and no importing of any HCFCs



HCFC-22 Supply and Demand



Source: EPA's Vintaging Model (VM IO file_2007_11-12-07)

Estimated R-22 Supply and Demand

Equipment Type	2010	2015	2020
Total AC	41,700	25,900	11,300
Total Refrigeration	20,800	12,800	7,000
Estimated Demand of R-22	62,500	38,800	18,200
Estimated Supply (90% of cap for R-22)	62,345	24,938	0



Servicing Existing HCFC-22 Appliances after 2010

- ▶ In 2015, HCFC-22 needs will exceed the 2015 cap by more than 10,000 metric tons
- ▶ Recovery and reuse needed to provide room under the cap and meet demand for all HCFCs
- ▶ What can you do?
 - ▶ Improve service practices (recover, recycle, reclaim)
 - ▶ Fix leaks
 - ▶ Retrofit/Replace where economical



During the Transition Period

- ▶ **Businesses have three options:**
 - ▶ Convert existing system to alternative refrigerant
 - ▶ Buy a new system that uses an alternative refrigerant
 - ▶ Continue to operate existing system
- ▶ **Establish a plan to replace/repair leaking equipment**
- ▶ **Recover and reuse refrigerant from equipment that is discarded**
- ▶ **Begin to transition to alternative refrigerants**
 - ▶ Many businesses have started to switch
 - ▶ Consider amount of time needed to convert



GreenChill Best Practices Guideline Commercial Refrigeration Retrofits

- ▶ Mission: provide food retailers with fact-based, neutral information on best practices for every aspect of the HCFC-22 conversion process
- ▶ Retrofit Guideline is at <http://epa.gov/ozone/partnerships/greenchill/downloads/RetrofitGuidelines.pdf>



Contact Info – Phaseout and Regulatory

▶ **Phaseout: Cindy Newberg,**
newberg.cindy@epa.gov, 202-343-9729

▶ **For Sec. 608: Julius Banks,**
banks.julius@epa.gov, 202-343-9870

▶ **Additional Info:**
[http://www.epa.gov/ozone/title6/phaseout/class
two.html](http://www.epa.gov/ozone/title6/phaseout/class_two.html)

<http://www.epa.gov/ozone/title6/allowance.html>



Contact Information – Retrofit Guidelines

- ▶ **US EPA - Keilly Witman**

- ▶ 202-343-9742
- ▶ witman.keilly@epa.gov

- ▶ **GreenChill Advanced Refrigeration Partnership**

- ▶ www.epa.gov/greenchill

- ▶ **GreenChill Partners – Retrofit Team**

- ▶ Arkema – Craig Thomas 215-419-7938
- ▶ DuPont – Nick Strickland 302-999-2709
- ▶ Honeywell – Ron Vogl 716-827-6205
- ▶ INEOS Fluor – Sean Cunningham 225-642-6235

