

Will the HVAC Refrigerant Phase-out Bust Your Budget

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Refrigerant Phase-Out History



Refrigerant History

- ▶ Refrigerants = the working fluid used to absorb and transfer heat from one part of HVAC/R system to another
- ▶ Throughout history - ongoing search for better refrigerant
- ▶ New Alternatives must balance performance efficiency & environmental impact



Refrigerant History - Early Years

- ▶ Primary Focus - simply finding a refrigerant to provide effective cooling
- ▶ Early refrigerant was effective, but not safe
- ▶ Significant Safety Hazards: Toxicity & high flammability potential



Refrigerant History - 1930's & 1950's

1930's

- ▶ Chlorofluorocarbon (CFC) refrigerants introduced as safe alternatives
- ▶ CFC's dominated refrigeration, then later HVAC - safe and efficient

1950's

- ▶ Hydrochlorofluorocarbons (HCFC) added to portfolio of refrigerant alternatives
- ▶ Both CFC's and HCFC's contain chlorine

Refrigerant History - 1970's

- ▶ 1970's Environmental Concerns come into play
- ▶ Scientists determine CFC's and HCFC's were damaging the Ozone Layer
- ▶ CFC's are more harmful to Ozone Layer than HCFC's



Montreal Protocol

- ▶ Global concern regarding the depletion of Earth's Ozone Layer
- ▶ This issue brought together a meeting of leaders throughout the world
- ▶ International Treaty was established called Montreal Protocol
- ▶ Phase out dates established to eliminate use and production of ODS (Ozone Depleting Substances)
- ▶ Into effect in 1987 - First targeting CFC's, then HCFC's



Montreal Protocol

- ▶ CFC's were replaced with HCFC's (lower Ozone Depleting Potential)
 - ▶ Or replaced with HFC's (zero Ozone Depleting Potential)
- ▶ CFC Phase-out completed in 1996
- ▶ HCFC set phase-out at later dates 2004-2030 (2040 for developing countries)



Kyoto Protocol

- ▶ 1990's- concerns grew HCFC's (low ODP) contributed to global warming
- ▶ Global Warming Potential (GWP) in refrigerants becomes a factor
- ▶ These concerns led to Kyoto Protocol in 1997
- ▶ Kyoto set reduction targets for greenhouse gases, including HFC's
- ▶ Kyoto did not cover CFC's or HCFC's - already covered under Montreal Protocol

Montreal and Kyoto Protocols

- ▶ Set dates to ensure long term availability
- ▶ Allows time for recovered, recycled and stockpiled supplies to continue
- ▶ Each country controls the reduction to meet compliance regulations
- ▶ United States - EPA issued regulations under the Clean Air Act
- ▶ EPA covers production and import of CFC's and HCFC's

Clean Air Act

- ▶ (USA) Established to control areas of concern regarding air quality
- ▶ Grouped by Titles
 - ▶ Title I: Air Pollution
 - ▶ Title II: Emission Standards for Mobile Sources
 - ▶ Title III: General Provisions
 - ▶ Title IV: Acid Deposition Control
 - ▶ Title V: Permits
- ▶ 1990 - amendment to the Act added a sixth title
 - ▶ Title VI: Stratospheric Ozone Protection

Clean Air Act - Title VI

- ▶ Regulations phase out production and import of Ozone Depleting Substances (ODS)
- ▶ Consistent with Montreal Protocol
- ▶ US Phase-out reduces amount of ODS legally produced or imported
- ▶ Over time, adjustments are made to phase-out schedule of Montreal Protocol
- ▶ EPA has accelerated phase-out in US under Clean Air Act authority

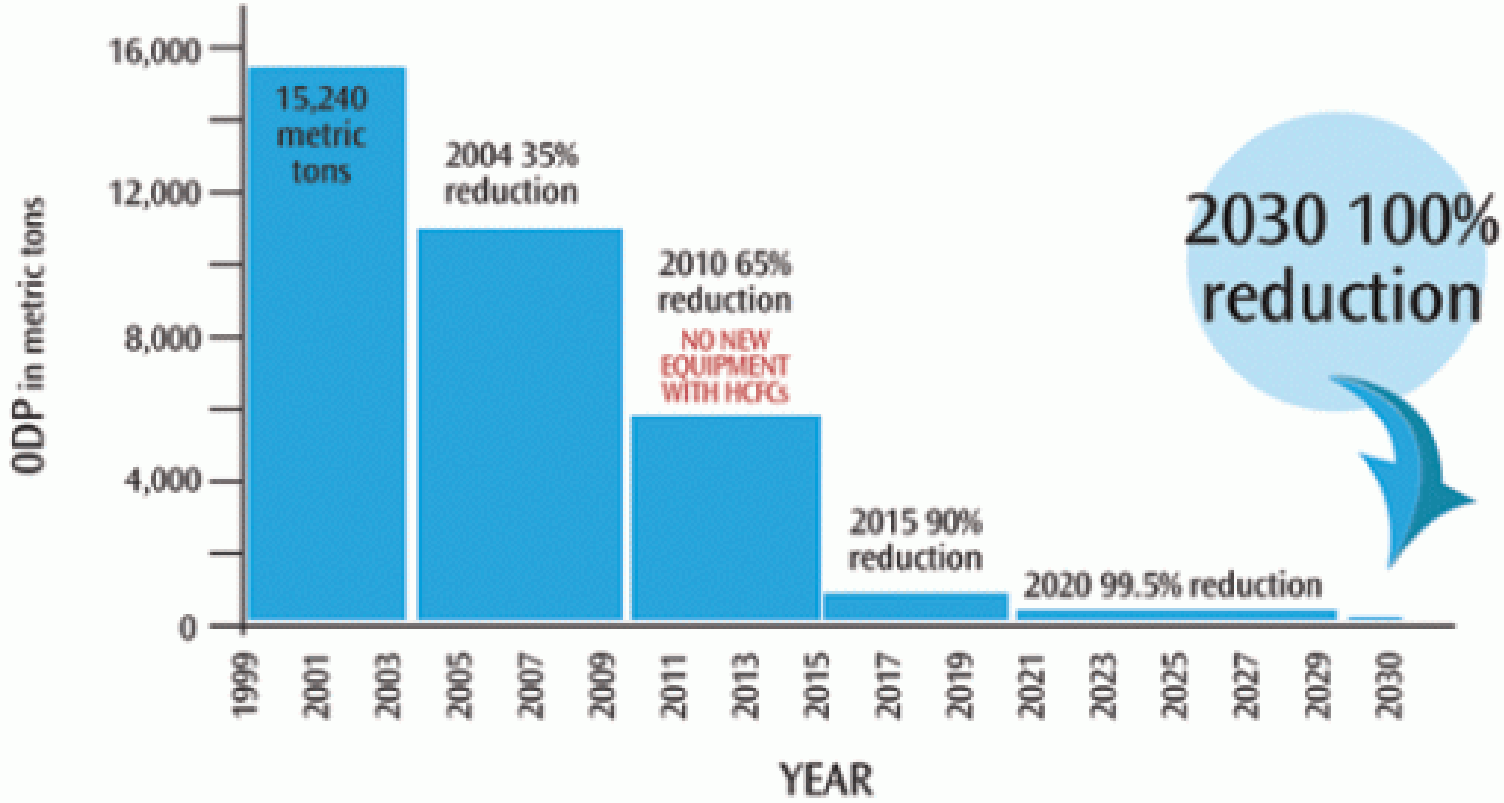


Clean Air Act - ODS Classifications

- ▶ US - Ozone Depleting Substances are regulated as Class I or Class II controlled substances
- ▶ Class I: Primarily CFC's; higher Ozone Depleting Potential (ODP); already phased-out, with a few exceptions
- ▶ Class II: Primarily HCFC's; were transitional substitutes for CFCs; being phased-out now (R-22)

Phasing-out of Ozone Depleting Chemicals

Montreal Protocol HCFC Phase-out Requirement



HCFC Phase-out Timeline

- ▶ 2003 - Supplies of HCFC were restricted to holders of consumption (35% reduction)
- ▶ 2010 - No production or import of R-22, except for use in equipment made before 1/1/2010. Virgin R-22 or R-22 blends only used in existing equipment (65% reduction)
- ▶ 2015 - further reduction of R-22 eliminating broad market availability (90% reduction)
- ▶ 2020 - no production or import of R-22. Only recycled/reclaimed or stockpiled quantities available to service existing equipment (99.5% reduction)
- ▶ 2030 - no production or import of ANY HCFCs (100% reduction)



Kigali Amendment - October 2016

- ▶ Rapid growth of HFCs driven by developing countries with growing middle class and hot climates
- ▶ Amendment to the Montreal Protocol
- ▶ Provides exemptions for countries with high ambient temps to phase down HFC's at a slower pace
- ▶ Countries agreed to provide adequate financing for HFC reduction
- ▶ Grants for research and development of affordable alternatives to HFCs are priority



Significant New Alternatives Policy (SNAP) Program

- ▶ Environmental Protection Agency (EPA) continues to evaluate refrigerant alternatives
- ▶ Purpose: allow smooth and safe transition from ODS
- ▶ Identifying substitutes with lower risks to human health and environment
- ▶ Lists acceptable and unacceptable substitutes for ODS in commercial and industrial sectors
- ▶ Industrial sectors:
 - ▶ Adhesives/Coatings/Inks; Aerosols; Fire Suppression and Explosion Protection; Foam Blowing Agents; Cleaning Solvents



Refrigerant Supply

- ▶ The Supply Chain must be aware of the source of their refrigerant
- ▶ Increase likelihood for illegally imported or counterfeit refrigerant
- ▶ Add that to tainted, contaminated and false substitutes
- ▶ Vital for purchasers to know and trust who they buy from
- ▶ Impact of illegal or sub-par product threatens an already dwindling supply



Refrigerant Supply

- ▶ Refrigerant manufacturers will limit supply of R-22 to each wholesaler
- ▶ Contractors will need to rely on the suppliers to communicate available supply
- ▶ Larger wholesalers/contractors will have greater access than smaller companies
- ▶ Smaller outfits will need to mitigate R-22 use now with other alternatives
- ▶ At some point, all contractors will need to depend on alternatives
- ▶ Well-informed contractors are in better position to help their customers



Price Perspective R-22

- ▶ 2014 - 2015 = 54% Jump
- ▶ 2015 - 2016 = 95% Jump
- ▶ Since Introduction: 395% Jump
- ▶ What's Next?



What Are My Options?



Drop-Ins

Pros:

- ▶ Less Expensive
- ▶ Good option for Non-Warranty situations

Cons:

- ▶ Not approved by any major manufacturers (will void warranty)
- ▶ Energy efficiency is not the same as R-22
- ▶ Not good for vertical installations
- ▶ Some have high GWP, so likely to be phased out in future
- ▶ Ease of Retrofit (some require oil change. TXV reset)

Replace Equipment

Pros:

- ▶ New equipment will be more efficient
- ▶ Will avoid the high cost of R-22 repairs

Cons:

- ▶ Price to install new equipment

Stay with R-22 Until it is Gone

Pros:

- ▶ It's what the equipment was designed for
- ▶ No drop off in energy efficiency
- ▶ Necessary for warranty situations
- ▶ Less expensive option than replacing equipment

Cons:

- ▶ Price to repair
- ▶ Availability long term

Additional Drop-In Information

- ▶ Do Your Homework:
 - ▶ What is involved in the Retrofit?
 - ▶ Will it be around long-term?
 - ▶ How close are the properties to R-22?
 - ▶ Flammability
- ▶ Getting paid for reclaimed R-22 can pay for drop-in retrofit (in some cases)



Miscellaneous

- ▶ R-22 availability should not be an immediate issue but will be in time
- ▶ Be careful where you buy:
 - ▶ Theft
- ▶ Reclaim Right:
 - ▶ Higher purity, more \$\$\$
- ▶ What affect will the new administration in Washington have?
 - ▶ None

Going Forward as a Facility Manager



Going Forward as a Facility Manager (FM)

- ▶ Depreciation Schedule
- ▶ Alternative Refrigerants
- ▶ Liquid Chiller Refrigerant
- ▶ Performance Differences
- ▶ Compliance
- ▶ Section 179 Tax Deduction



Going Forward as a Facility Manager: Depreciation

- ▶ HVAC Industry groups want to accelerate phase-out of equipment with HCFCs
- ▶ They support legislation to reduce federal tax depreciation schedule for equipment
- ▶ Current schedule is 39 years
- ▶ Groups want more realistic period of time
- ▶ Current HVAC equipment life span = 10-20 years



Going Forward as a Facility Manager: Alternative Refrigerants

- ▶ Potential HCFC replacements were evaluated for safety & long term viability
- ▶ Leading replacement is R-410A for air conditioning applications
- ▶ R-410A is an HFC (no ODP), energy efficient and non-flammable
- ▶ R-22 equipment should not be retrofitted to use R-410A (different oils/pressures)
- ▶ An attempt to retrofit would lead to compressor and components failing
- ▶ EPA does not test for effectiveness (as part of SNAP)
- ▶ EPA believes market should determine best alternative (from approved list)



Going Forward as a Facility Manager: Liquid Chiller Refrigerant

- ▶ New Liquid chillers have HFC phase-out date of 2024 (R134a, R410a, R407c)
- ▶ Industry efforts have been unsuccessful to push back another year
- ▶ EPA's SNAP program deems those three refrigerants "unacceptable" on new as of 2024
- ▶ Existing liquid chillers can continue to use those refrigerants for service needs
- ▶ Building owners are hesitant to install new chillers because of unknown future phase-out's over life of equipment



Going Forward as a Facility Manager: Performance Differences

- ▶ R-22 and R-410A operate at different pressures, utilize different oils
- ▶ R-410A systems generally run more efficiently than R-22 systems
- ▶ When replacing systems = noticeable difference in humidity
- ▶ R-410A systems do not eliminate humidity as well as R-22 systems
- ▶ Building owners may want to consider dehumidification systems or install new units with dehumidification capabilities



Going Forward as a Facility Manager: Compliance

- ▶ FMs/Owners of Commercial A/C equipment bear responsibility to comply with EPA refrigerant regulations
- ▶ FM's must comply with EPA during facility inspections
- ▶ FM's must produce any required documentation
- ▶ Two Steps towards Compliance
 - 1) Designate a Facility Refrigerant Compliance Manager
 - 2) Develop a Refrigerant Compliance Management Plan



Going Forward as a Facility Manager: Compliance

- ▶ Recommendations
 - ▶ Require all techs to locate and repair leaks instead of “topping off” leaking system
 - ▶ Prohibit technicians from intentionally releasing any refrigerant during repairs, service or maintenance
 - ▶ Require technicians to recover refrigerant during servicing
 - ▶ Understand difference between: recovered, recycled, and reclaimed



Going Forward as a Facility Manager: Compliance (continued)

- ▶ Recovered Refrigerant - Removed from equipment and stored in external container WITHOUT necessarily being tested or processed in any way. Reuse is restricted to the system it was recovered from, or other systems owned by same owner
- ▶ Recycled Refrigerant - Extracted and cleaned for reuse WITHOUT being tested for compliance with stringent purity specifications. Reuse of recycled refrigerant is restricted to the system its recovered from, or other systems owned by same equipment owner.
- ▶ Reclaimed Refrigerant - Reprocessed and tested to meet purity standards



Going Forward as a Facility Manager: Section 179 Tax Deduction

- ▶ Purpose of Section 179
 - ▶ Motivate American economy to move in positive direction
- ▶ Most small businesses, entire replacement cost can be written off the 2016 tax return (if under \$500,000). Instead of depreciating a little at a time
- ▶ 2016 Deduction Limit = \$500,000 - good on new and used equipment, as well as off the shelf software
- ▶ Limit is only good for 2016. Equipment must be financed/purchased and put into service by the end of the day on 12/31/2016



Going Forward as a Facility Manager: Section 179 Tax Deduction (continued)

- ▶ 2016 Spending Cap on equipment purchases = \$2 million
- ▶ This is maximum amount that can be spent on equipment under Section 179
- ▶ After that amount, the deduction is reduced on a dollar by dollar basis
- ▶ This spending cap makes Section 179 a true “small business tax incentive”
- ▶ Bonus depreciation for 2016: 50% for 2016: New equipment only
- ▶ Bonus depreciation is generally taken after Spending Cap is reached





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- ▶ Comprehensive data hub gives retailers 360* shopper insights that power sophisticated, relationship-building, omnichannel campaigns
- ▶ Retailers trust Listrak to help build personal, customer-centric, campaigns that's drive incremental ROI
- ▶ Important for retailers to present a consistent, personalized experience to their customers across channels



Listrak New Corporate Headquarters

- ▶ Target Completion is Mid-April 2017
- ▶ Optional Tour Available - This is an active job site
- ▶ Paper Directions - Park on West side of building
- ▶ SAFETY:
 - ▶ Hard hats
 - ▶ No open toe shoes
 - ▶ Stay away from: Lifts in operation, work being done overhead, open electrical panels



IFMA - Central PA Chapter

- ▶ First Time Guests - Please consider joining the organization
- ▶ Current Members - Consider active participation
- ▶ Certifications - Take a look at challenging yourself with FMP, SMP, or CFM





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