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Refrigerants Now And Into The Future



30th August 2012

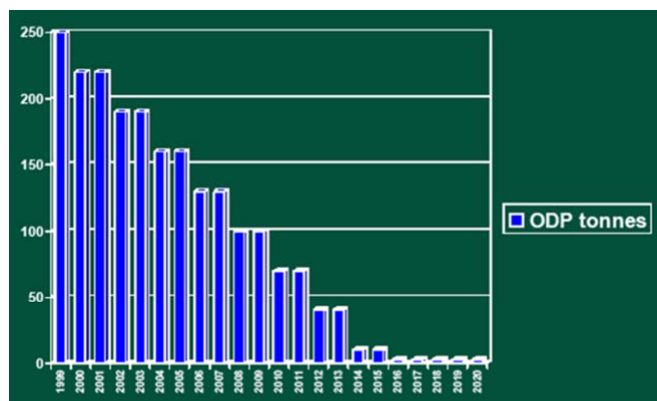
Agenda

- HCFC Phase-out Schedule
- Availability of R22, alternatives and future
- HFC Refrigerants quantities and future
- CO2 system use today & future
- R717 system use today & future
- New developments in refrigerants

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• HCFC Phase-out Schedule

Under the Ozone Protection Act, HCFC imports, including R22 will be totally phased out by the year 2020



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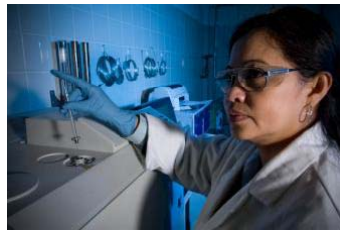
Availability of R22, alternatives and future

- Due to lack of summer over the last few years carry over stock from previous years have alleviated market shortages of R22
- Next phase down of HCFC's is 1st January 2014
- Issue is not with new equipment, but with existing bank of HCFC equipment which still needs to be serviced
- There are currently HFC "drop in" replacements for R22 systems – R438A, R434A, R424A, R427A, etc.
- In general some system modifications are required to convert current HCFC systems to HFC replacements

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Availability of R22, alternatives and future

- A-Gas (UK) current reprocess HCFC refrigerants returned from the market and return back to ARI specification for resale
- A-Gas (Australia) are currently reviewing this in house technology and pending Government decision on recycling, this may be an option for Australia



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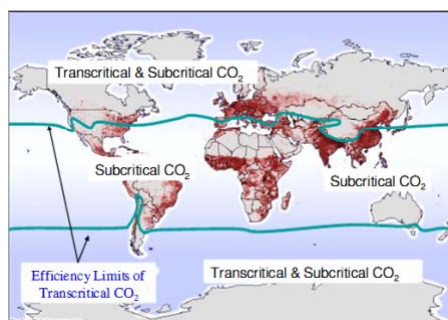
HFC Refrigerants - quantities and future

- In Australia there is currently no volume restrictions on the importation of HFC refrigerants
- Due to environmental concerns regarding these refrigerants there is talk about a phase down of these refrigerants over time (similar to HCFC phase out structure)
- At present Government strategy is to levy HFC refrigerants based on its GWP to improve maintenance practices and leak prevention
- Industry is currently developing low GWP refrigerants, however this will take time

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CO2 system use today & future

- Due to environmental levies on refrigerant, the trend to natural refrigerants with low or zero GWP is building pace & interest
- Due to CO2 high pressure characteristics, and Australia high ambient temperatures applications for CO2 systems thus far have been Subcritical cascade systems



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CO2 system use today & future

- Transcritical applications in Australia are feasible, however system efficiencies and TEWI factors come into question
- Future for Subcritical systems will be the transformation of HFC cascade medium to R717 or HC medium in supermarket and industrial refrigeration applications



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CO2 system use today & future

- Transcritical applications in Australia are feasible, however system efficiencies come into question
- Future for Subcritical systems will be the transformation of HFC cascade medium to R717 of HFC medium in supermarket and industrial refrigeration systems



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R717 (Ammonia) system use today & future

- Only natural refrigerant in continuous use today for industrial refrigeration applications mainly food / beverage processing and storage
- System efficiencies in focus around improved heat exchangers and VSD and control components / microprocessors
- Low charge R717 chillers now beginning to appear in the marketplace which may open up different applications



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New developments in refrigerants

- Whilst naturals have a low GWP factor and have excellent thermodynamic properties, there are “issues” with these refrigerants
 - CO₂ – new systems only, extremely high pressure
 - R717 – Toxic
 - HC’s – Highly flammable
- In response to the F-Gas regulations a new synthetic chemical composition refrigerant has been developed – HFO
- HFO1234yf – GWP approximately 4 is designed for automotive application to replace R134a (GWP1300)
- HFO1234ze – GWP approximately 7 is designed for previous R134a stationary equipment
- HFO refrigerants will not be available in the Australian market for at least 2 years

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New developments in refrigerants

Barriers to introduction

- Investments Costs
- Lifecycle Costs
- Complexity
- Risk Awareness
- Education & Training
- Technical Ability
- Standards & Legislation

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**THANK YOU
FOR LISTENING**

