THE FUTURE OF REFRIGERANTS

Graeme Dewerson – Commercial Manager, A-Gas Australia Pty Ltd
• R22 Phase out update
• Montreal Protocol – HFC phase down
• ODSSGG Act review
• Low GWP alternatives
• Opteon® HFO retrofit gases
The R22 Phase Out

R22 is an Ozone Depleting substance and is subject to phase out under the ‘Ozone Depletion and Synthetic Greenhouse Gas Management Act 1989’
- Based on the framework of the Montreal Protocol

- R22 is going to be available until 2030
  - Import quota for virgin HCFC has hit lowest ‘residual’ level
  - 2016 to 2030 – total import quota = 45 tonnes R22 p/a
  - Recycling and re-use will significantly increase this volume

- Options available to end users
  1. Replace equipment?
  2. Retrofit to an interim product?
     - Drop in type: R438A, R434A, R428A
     - Mainstream HFC: R407F, R407C, R427A
  3. Remain on R22 and put a plan in place around supply/ recycling
The Options Considered

1. Replace equipment?
   - Most expensive option – CAPEX
   - Tangible benefit in improved energy efficiency
   - Choice of new refrigerant important

2. Retrofit to an interim product?
   - Drop in style or mainstream HFC?
   - Capacity
   - Mass Flow
   - Seals (elastomeric)
   - Energy efficiency
   - Oil return

3. Remain on R22 and put a plan in place around supply/ recycling
   - R22 is only expensive if it leaks...
   - Stockpile/ recycling
   - Increased maintenance/ leak checking regime
   - Allows new technology to reach the market allowing future proof retrofit/ new equipment

Retrofit Recommendation
- Air-conditioning = R438A/ R407C
- Medium Temperature = R438A/ R407F
- Low Temperature = R407F
- One to consider = Opteon XP40
Montreal Protocol Update

• 27th Meeting of the Parties to the Montreal protocol – Dubai, UAE 1st to 5th Nov 2015
  • Preliminary agreement by all parties that Montreal Protocol will phase down HFC’s

• Four proposals on the table:
  • USA (North American Amendment) – FAVORITE
  • European Union (in line with F-Gas Directive)
  • India (much slower phase down for Article 5 + financial compensation)
  • Federal States of Micronesia

• Primary agreement reached which has taken 8 years of negotiation!

• The next step is to decide the framework of how to implement
  • Likely to be much faster
  • Most parties have done the work and know exactly what they can achieve

Montreal Protocol could be ratified by the end of 2016
Hon Greg Hunt announced a review of the Ozone Depletion and Synthetic Greenhouse Gas Management Program on the 24th May 2014

- Identify opportunities to reduce ODS and SGG emissions in line with international efforts
- Improve and streamline legislation to reduce compliance cost

Industry feedback submitted to the DOE in Nov 2015 – in response to white paper

Final report to be submitted to Government in early 2016. Due to be tabled and implemented in Winter 2016 – before the election

Likely focus:
- HFC Phase Down starting 2018 (Quota driven)
- HFC equipment bans (new equipment)
- System maintenance requirements (reporting)
- Leak Detection

The clear aim is to bring in local legislation before any international treaty is signed
North American Amendment Proposal

Reduction to 15% of baseline CO$_2^{(EQ)}$ by 2036
Low GWP Alternatives

A Montreal Protocol Phase down of HFCs will produce an economic penalty on high GWP

- R744 likely to surge again in popularity
  - Proven technology
  - High installation cost vs inexpensive gas

- HFO technology - medium sized system and chiller area
  - HFO blends – Flammability / GWP
    - OEM replacements – lowest possible GWP, A2L rated (ASHRAE 34)
    - Retrofit gases – lower GWP than current HFCs, A1 rated (ASHRAE 34)

- R717 will remain strong in industrial application (largest equipment)
  - Proven technology
  - High installation cost vs inexpensive gas

- Hydrocarbons
  - Popular in Europe for small charge systems (domestic refrigerators)
  - Not suitable for retrofitting into A1 rated systems
HFO Retrofit Gases

- HFO gases are now being stocked in Australia
- With legislation round the corner, trialing and considering new gases is recommended

**Opteon XP10 (R513A)**
- R134a retrofit replacement
- Non Flammable (A1 rated)
- GWP = 573 (AR5)

**Opteon XP40 (R449A)**
- R404A retrofit replacement
- Non Flammable (A1 rated)
- GWP = 1397

**Opteon XP44 (R452A)**
- R404A retrofit replacement
- Non Flammable (A1 rated)
- GWP = 2141

**Opteon YF (R1234yf)**
- R134a OEM replacement
- Mildly Flammable (A2L rated)
- GWP = <1

Leads the Market and reacting to change can create opportunity

Market Leadership