R22 phase out time
Contents

• Montreal protocol (R22 phase out)
• Potential Solutions
• Choosing the proper Refrigerant
• Retrofit Services
Montreal Protocol (1987) in force with different phase-out timetable for:

- Developed Countries
  (Non-Article 5 countries)

- Developing Countries
  (Article 5 countries)
R22 phase out timetable for
Developed Countries

2020
Total Ban of R22 *

2015
90% Reduction in supplies of R22

2010
75% Reduction in supplies of R22

2004
35% Reduction in supplies of R22

1996
Start freeze on 1989 level consumption plus extra allowance

1987
Montreal Protocol In Force

* Upto 0.5% of base level consumption can be used till 2030 to service existing equipment – subject to review in 2015
R22 phase out timetable for
Developing Countries

- **1987**: Montreal Protocol In Force
- **2013**: Start freeze at a base level of average 2009 and 2010
- **2015**: 10% Reduction in supplies of R22
- **2020**: 35% Reduction in supplies of R22
- **2025**: 67.5% Reduction in supplies of R22
- **2030**: Total Ban of R22 *

* Upto 2.5% of base level consumption can be used till 2040 to service existing equipment – subject to review in 2025
R22 phase out timetable for European Community countries (accelerated plan as per EC 2037-2000 regulation)

- **1987**: Montreal Protocol In Force
- **2002**: No new systems using R22
- **2004**: 70% Reduction in supplies of R22
- **2008**: 75% Reduction in supplies of R22
- **2010**: Virgin R22 ban for servicing systems. Recycled R22 to be used only
- **2015**: Total Ban of R22
Article 5 parties
Developing countries (147 in total)

• Algeria, Argentina, Bahamas, Bahrain, Bangladesh, Brazil, Chile, China, Colombia, Costa Rica, Croatia, Cuba, Dominican Republic, Ecuador, Egypt, India, Indonesia, Jamaica, Jordan, S. Korea, Kuwait, Lebanon, Malaysia, Mexico, Morocco, Oman, Pakistan, Panama, Paraguay, Peru, Philippines, Qatar, Saudi Arabia, Singapore, South Africa, Sri Lanka, Syria, Thailand, Trinidad & Tobago, Turkey, UAE, Uruguay, Venezuela, Vietnam

• All African countries and other countries as well
Supplies at the EC ports

- Vessels registered under 3rd country flag, can be supplied at EC ports with virgin R22 from 01.01.2010 - subject to special export procedures. EC committee remains to clarify technical details for this.

- Vessels under EC country flag, can be supplied only with recycled/reclaimed R22 at EC ports.
Potential Solutions

1. Keep the existing system with R22

2. Drop-in, replacement of R22 only with alternative HFC
   R417a, R422d etc

3. Replacement of R22 refrigerant with HFC refrigerant
   R407c, R404a, R502 etc

4. Replacement of R22 system with new HFC system
   R407c, R404a, R507 etc

5. Change over to a “natural” refrigerant
   Ammonia, CO2
1. Keep the existing R22 system

• No short term costs

• Unknown yet price after 2009 in EC

• Unknown yet availability in EC

• Ozone depleting substance
2. Drop-in Replacement Solution
(R417a, R422d)

- Low change-over cost, minor system intervention
- Reduced availability WW
- High price of refrigerant
- Global Warming Potential material
3. Replacement of R22 with HFC refrigerant
   (R407c, R404a, R507)

- Medium change-over cost, system needs modifications
- Widely available refrigerants
- Reasonable price of refrigerant
- Global Warming Potential material
4. Replacement of R22 with New HFC system (R407c, R404a, R507)

- Higher change-over cost, investment cost
- Widely available refrigerants
- Reasonable price of refrigerant
- Global Warming Potential material
5. Change over to “natural” refrigerant system

Ammonia, CO2

- Highest change-over cost, investment cost
- Low maintenance cost
- No ODS – GWP impact
RETROFIT SERVICES

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- MARI CHEM MARI GASES WORLDWIDE SERVICES, is offering retrofit services at main ports all over the world.

- Contact your local sales agent or the European Administration office for more details