

LASTING IMPACT OF MONTREAL PROTOCOL ON AIRCONDITIONING & REFRIGERATION SYSTEMS

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Before 1980:
Choice of Refrigerant in
A/C & R systems
focused on
application more than actual
refrigerant



Commercial : R12 & R502

A/C : R22

Domestic : R12

Car A/C : R12

Industrial : NH_3 (Ammonia)

Mine Cooling: R11



- In 1970 Awareness of Depletion of ozone layer
- Nitrous Oxides from supersonic aircraft and fertilizers appeared to be primary source
- Vienna Convention signed in March 1985 by 28 countries
- Undertaking of co-operation to research the depletion of ozone layer and its harmful impact



Further research and recordings identified man made CFC's as a major contributor to depletion of the ozone layer



1986 Usage of CFC's in South Africa

Aerosols	6 000
Foam Blowing	3 000
Solvent	} 3 500
A/C & R	
TOTAL	12 500 tonnes

1% - global usage

90% - Africa usage



Montreal Protocol Signed
16 Sept 1987
43 Nations

Phase out of production of
Ozone Depleting Substances (ODS)



Explosion in Available Refrigerants

R134a

R404A

R41A

R507F

69S

69L



R134a - A/C & commercial

Wider Use of R22 in refrigeration

Big Increase in HCFC's

Blends – R404A, R407F

Drop Ins – R422A

Marginal increase in ammonia



South Africa signs M P on

5 January 1990 as a developed
country (non article 5)

> 0,3kg/capita



- Shut Down Polifin plant
R11, R12 & R502 (R115)
- Import Control by permits
- Import Levy : 1991 10cents/kg
: 1992 R1-00/kg
: 1993 R5-00/kg
- Ban on import of CFC's from 1 January 1996



Industry Associations & Government Collaborate to form working groups

- A/C & R
- Aerosols
- Foam Blowing
- Fire fighting



ACRICSA Founded

- Reduce emission of ozone depleting refrigerants
- Uplift hands on skills
- Common challenges to A/C & R



- Self imposed regulation:
Registration in Safe Handling of Refrigerants (SHOR)
- Synthetic : 10 November 2002
Ammonia : 12 November 2004
- Ended in April 2009 : Total 3 300
- Validity – 3 years
- April 2009 – 1 300 valid



New Buzz Words:
CFC Free
Environmentally Friendly
Green Refrigeration



- Awareness of impact of Green House Gases on Global Warming
- Increase in global temperature
- Kyoto Protocol



- Global acceleration in phase out of HCFC's
- ALL HCFC's have ODP
- Consumption of HCFCs in SA – R22 & R141b



South Africa
Re-classified as a
developing
(Article 5) country
in December 1997



South Africa
to get assistance from
Multi-lateral fund.
UNIDO as implementing agency
gets involved



HPMP Formulised
(HCFC Phase Out Management Plan)
Government Gazette 37621
8 May 2014



- Pressure Equipment Regulation
PER of 8 July 2009
Effective October 2009
- Registration in competency in skills
to work on pressurised A/C & R
systems – Legal Requirement
(Systems above 50kpa)



- Crisis in grid power supply in SA directs attention to Energy Usage
- Choice of refrigerant and power usage becomes a priority



Considered Factors:

- Sustainability in refrigerant supply
- Capital cost of installation
- Safety requirement

ASHREA 34 Safety Class

Toxicity & Flammability

SANS10147 Clause 4



Considered Factors:

- Required hands on skills

SANS10147 – Annex D

SAQCC Gas Registration

- Life cycle costs
- Carbon Footprint
- TEWI



- SA nett importer of refrigerants
- Extensive Choice

HCFC's

HFC's

HC

HFO's

Natural



Phase down of HFC's to be
incorporated in MP

Kigali Meeting of 16 October 2016

SA to ratify?



Secondary impact of MP

- Recovery
- Recycling
- Reclaiming
- Use of disposable cylinders



Secondary impact of MP

- Revival of CO₂ as refrigerant
- Wider use of ammonia
- Advanced training centres
- Reduction in leakages



Secondary impact of MP

- Stricter Import Controls
- Training of Custom Officials
- Green scorpions
- Carbon footprint important feature in Corporate Profiles



Of all the changes in technologies & innovations the MP directly and indirectly has had greatest impact on A/C & R in the last century and will continue for decades to come



Questions?



Thank you!

