



# Presentation to SCEME

Spring Meeting

By

**Barry J Lyons F. Inst. R**

Business Development Manager

**BOC Refrigerants**

**1) ODS Legislation - Refresh and Update**

**2) Retrofit Alternatives**

**3) F- Gas/ODS March '09 January '10 Legislation - Refresh and Update**

# Is it an ODS, F-Gas or a NIK ??

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Refrigerant
R22
e.g. R408A
R134a
e.g. R404A
R407C
R410A
Ammonia
CO <sub>2</sub>

# Is it an ODS, F-Gas or a NIK ??

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Refrigerant	Type	EC F Gas Regulation	EC Ozone Regulation
R22	HCFC	✘	✓
e.g. R408A			
R134a			
e.g. R404A			
R407C			
R410A			
Ammonia			
CO <sub>2</sub>			

# Is it an ODS, F-Gas or a NIK ??



Refrigerant	Type	EC F Gas Regulation	EC Ozone Regulation
R22	HCFC	✗	✓
e.g. R408A	HCFC + HFC Blend	✓	✓
R134a	HFC	✓	✗
e.g. R404A	HFC Blend	✓	✗
R407C	HFC Blend	✓	✗
R410A	HFC Blend	✓	✗
Ammonia	Natural	✗	✗
CO <sub>2</sub>	Natural	✗	✗

Source: F-Gas Support Information Sheet RAC2-Usage

Retrofit alternatives fit here too

# Is it an ODS, F-Gas or a NIK ??



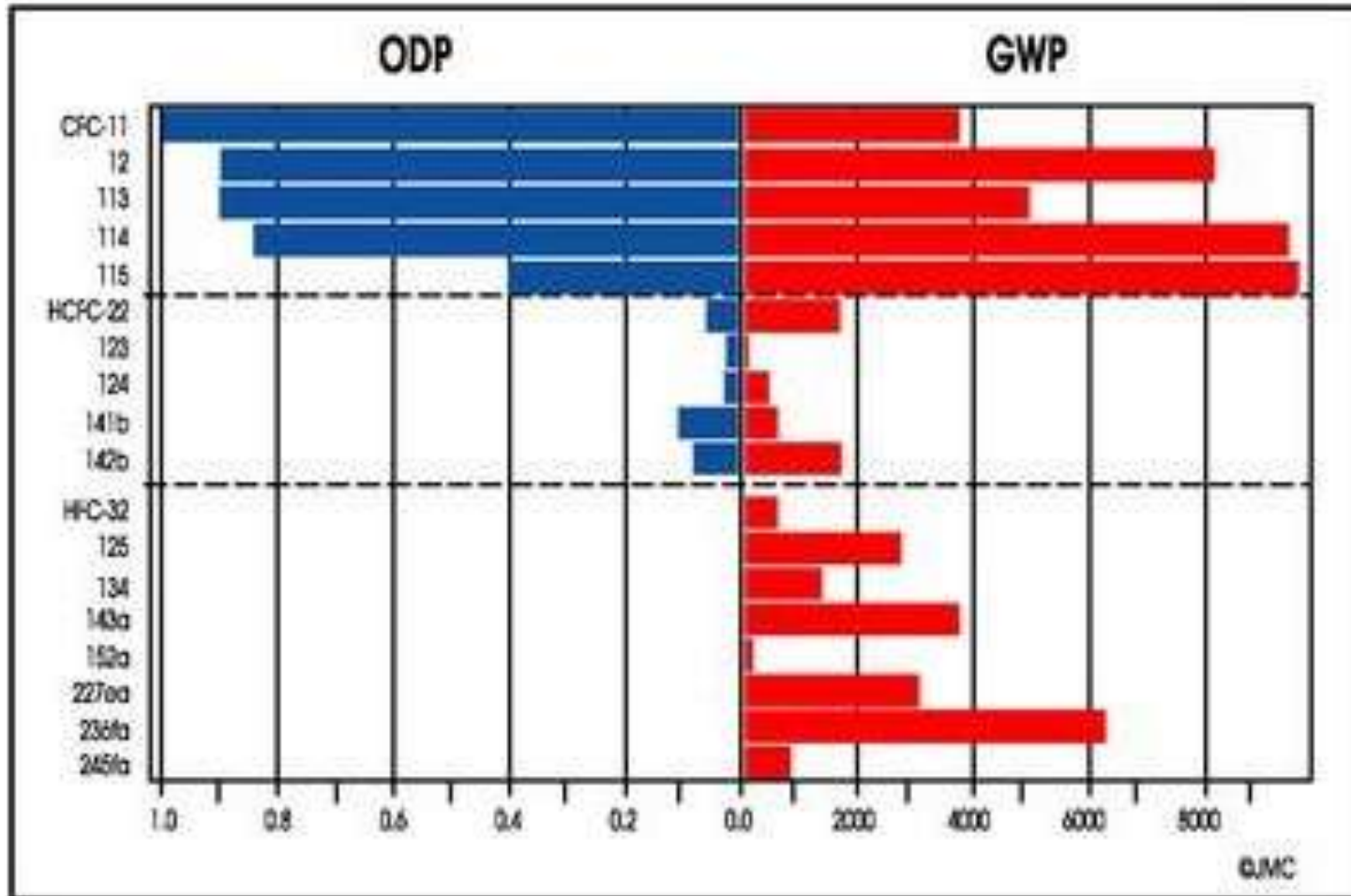
- ODS      Ozone Depleting Substances , covered by Montreal protocol
- CFCs eg R12 - banned from early 1990's
  - HCFCs eg R22 – production limited to 1995 level and reduces to Zero at end 2009
- use ban from 1<sup>st</sup> Jan 2010
- F-Gas      Fluorinated Gases, covered by the Kyoto protocol
- EC plans for 20% reduction in GHG emissions by 2020
  - EU legislation imposes controls on HFCs to ensure proper use
- NIKs      'Not in Kind' or 'natural' gases used as refrigerants
- Ammonia, CO<sub>2</sub>, Hydrocarbons

# What's it all about

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Figure 1: ODP vs GWP for common refrigerants and candidates.



# The HCFC Problem

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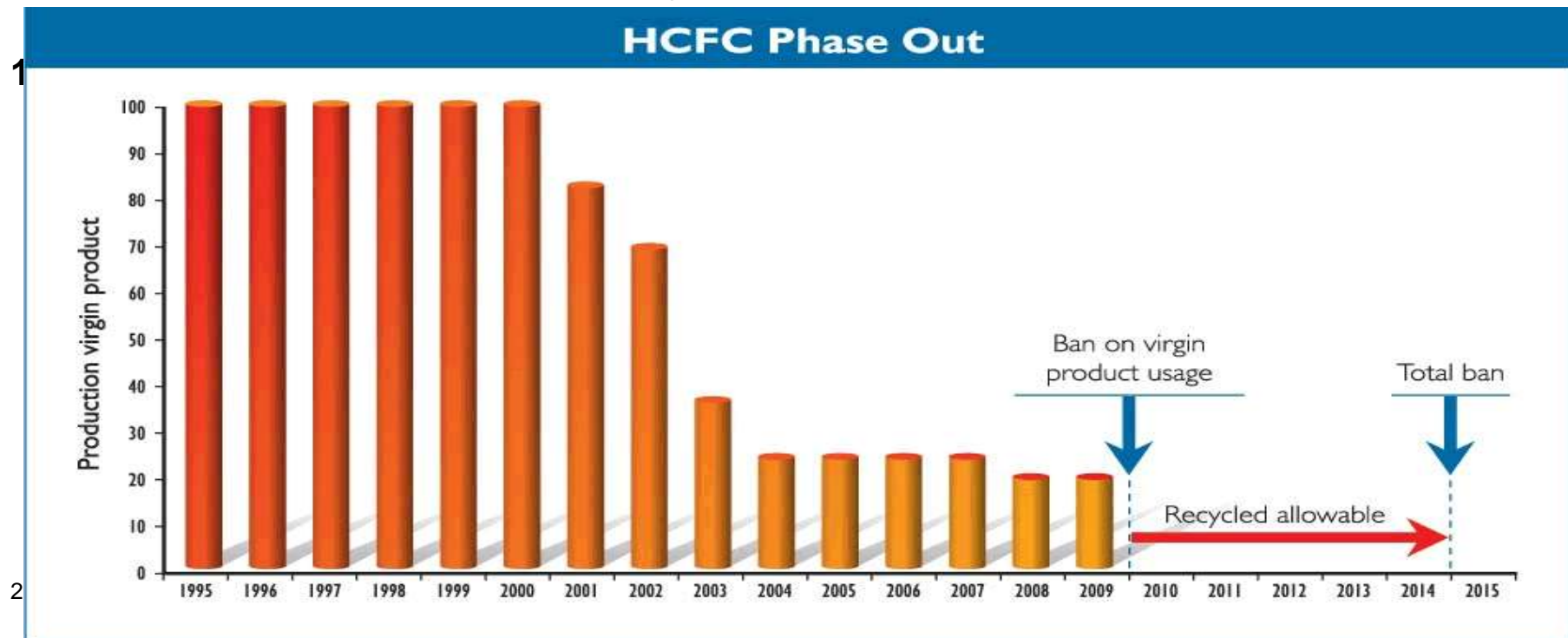
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R22, and all other HCFC refrigerants, has been subject to phase out for many years. In 2007, 2008 and 2009 it remained the most widely used/sold refrigerant.

2007 Imported and sold to UK industry - 1,925 tonnes of R22

2008 Imported and sold to UK industry - 2,206 tonnes of R22

2009 imported and sold to UK industry - >2,500 tonnes of R22



# So What gases will be available from 1<sup>st</sup> Jan 2010?

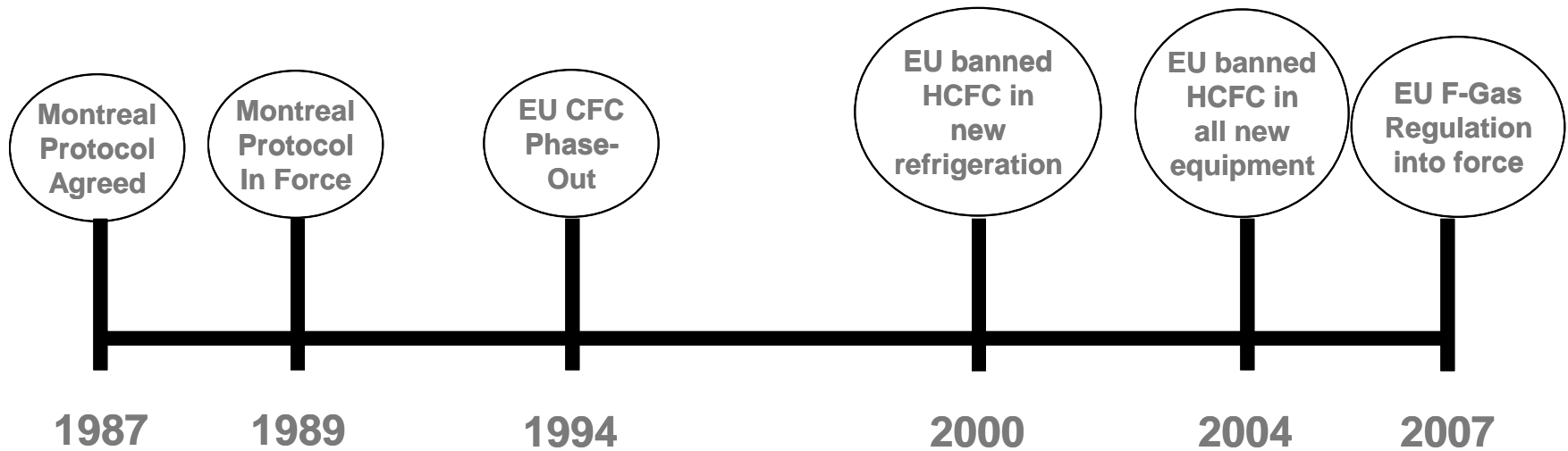


<h2>HCFCs</h2> <ul style="list-style-type: none"> <li>• High ODP</li> <li>• High GWP</li> <li>• ODS Regs phase out</li> </ul>	<h2>HFCs</h2> <ul style="list-style-type: none"> <li>• Zero ODP</li> <li>• High GWP</li> <li>• Under F-Gas control</li> </ul>		<h2>Natural (NIK)</h2> <ul style="list-style-type: none"> <li>• Some safety issues</li> <li>• Zero ODP</li> <li>• Low/Zero GWP</li> </ul>
<p align="center"><b>R22</b></p>			
<p align="center"><b>Reclaimed R22</b></p>			
<p>R401B (Suva MP66)                      R401C (Suva MP52)                      R402A (Suva HP80)                      R402B (Suva HP81)                      R403A (Isceon 69S)                      R403B (Isceon 69L)                      R408A (FX10)                      R409A (FX56)                      R409B (FX57)                      R411B</p>	<p>R134a                      R404A                      R407A                      R407C                      R410A                      R507</p> <p>R508A, B                      R23                      R32                      R125                      R143a                      R152a                      R407A,B,C                      R236fa                      R245fa</p>	<p><u>RETROFITS</u>  <u>Isceon 9 series</u>                      R422A (MO79)                      R422D (MO29)                      R413A (MO49)                      R417A (MO59)                      R438A (MO99)                      MO89</p> <p><u>RS Series</u>                      R434A (RS45)                      R426A (RS24)                      R424A (RS44)                      R428A (RS52)</p> <p><u>Arkema</u>                      Forane R427A</p>	<p><b>R717 (Ammonia NH3)</b></p> <p>R744                      (carbon dioxide, CO2)</p> <p>Hydrocarbons                      'Care' range:                      Care 10 - R600a Isobutane                      Care 30 - Propane/Isobutane                      Care 40 - R290 Propane                      Care 45 - R1270 Propene                      Care 50 - Ethane/propane</p>

# Where have we come from ?

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Source: Courtesy of Dupont

**Estimated Bank of R22 in UK = 10,000 tonnes**

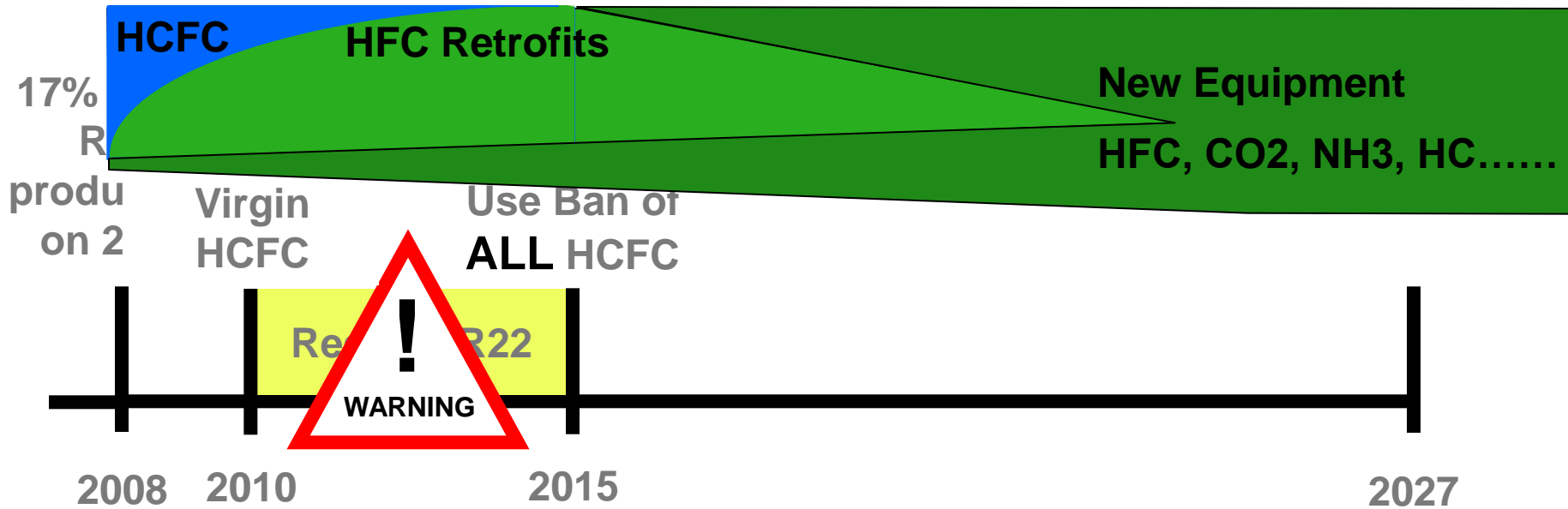
**Current demand for R22 in UK = >2,000 tonnes / year**

**Latest UK figures indicate ~10% of demand being recovered**

**Price** ↑

Recycled product cost are likely to be high & storage capacity is very limited.

↓ **Availability**



Source: Courtesy of Dupont

## Does industry understand the problem ?



Legally, virgin R22 won't be available from end of 2009

Any virgin product in 'stock' after 31<sup>st</sup> December 2009 will have to be incinerated

There will be some Reclaimed R22 available in 2010, but :

- No one knows how much there will be.
- No one knows how long it will last.
- The price is expected to rocket.

There will be NO other HCFCs available as reclaimed

SO WHAT WILL THEY DO WHEN THE PLANT/SYSTEM LOSES GAS ?

- STOP WORKING
- STOP PRODUCTION
- STOP COOLING

## **Do nothing**

What happens when equipment breaks down?

- Pay premium for temporary chiller hire
- Pay emergency rate for capable contractor
- Pay premium for reclaimed R22
- Do a retrofit to bridge until new equipment can be fitted

## **Replace Equipment**

Is there a plan and finance budget to complete?

What does operator do if equipment fails before replacement?

- Pay premium for temporary chiller hire
- Pay emergency rate for capable contractor
- Pay premium for reclaimed R22
- Do a retrofit to bridge until new equipment can be fitted

## **Retrofit Alternative - Proven products, comparatively simple and low cost**

Is there a plan and finance budget to complete?

What does operator do if equipment fails before replacement?

- Pay premium for temporary Chiller hire
- Pay emergency rate for capable contractor

# BOC Solutions – Virgin & Reclaimed R22

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**Make sure you fix the leaks and fully comply with F-Gas**



## **Reclaimed R22 from 2010**

A supply of reclaimed R22 will be available from 2010, but the quantity will be dependant on how much we are able to recover and reclaim from the market.

Credits are available for reclaimable R22 above certain quantities. Contact us for details.

# Retrofit Alternatives



- What are they (change)  
HFC blends for easier retrofit into HCFC systems (compatible with mineral oils so no costly oil change)
- Suppliers and products  
Options from DuPont, Refrigerant Solutions and Arkema
- BOC supply and stock policy  
BOC stock all, BOC can supply all
- Experience  
Introduced In 2000, now well proven, products work  
If customer says they don't work it is probably because the retrofit guideline weren't followed properly ??  
If customer wants to trial, it is his contractor that he is trialling not the product !! Suggest he uses a contractor that knows what he is doing!!

## 2) Retrofit Alternatives

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Manufacturers	Dupont	Refrigerant Solutions	Arkema
Product range	Isceon 9 series	RS range	FX range
Products	R422D Isceon MO 29	R426A RS 24	R427A Forane FX100
	R423A Isceon 39TC	R424A RS 44	
	R413A Isceon MO49 and R437A Isceon MO49plus	R434A RS 45	
	R417A Isceon MO59	R428A RS 52	
	R422A Isceon MO79		
	Isceon MO89		
	R438A Isceon MO99		

**A simple selection? Pick anyone from 13 ?**

**Which one do you chose ? Confused ?**

# HCFC Replacement – Application Range

## DuPont ISCEON®

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Original Refrigerant	Application	Replaced by
R12	Centrifugal compressors	<b>ISCEON® MO39</b>
R12	Automotive a/c	<b>ISCEON® MO49plus</b>
R22	Small AC (<15 kW)* (not recommended in water chillers)	<b>ISCEON® MO59</b>
R22	Low & medium temperature refrigeration and larger AC	<b>ISCEON® MO29</b>
R22/ R502	Refrigeration where extra capacity is required**	<b>ISCEON® MO79</b> <small>(Change of TEV required)</small>
R22	***	<b>ISCEON® MO79</b>
R402A/B, R403B, R408A,	Refrigeration	<b>ISCEON® MO79</b>

Multipurpose replacement for R22 in DX equipment

- \* Lower pressure and compressor power than R22 may be an advantage in some specific cases.
- \*\* Change of expansion valve, condenser capacity assessment and pressure rating check required.
- \*\*\* Certain Water Chillers fitted with TXV of limited aperture

# HCFC Replacement – Application Range Refrigeration Solutions



Original Refrigerant	Application	Replaced by
R12	Automotive a/c	<b>RS-24 (R426A)</b>
R22	Small AC (<15 kW)* (not recommended in water chillers)	<b>RS-44 (R424A)</b>
R22	Low & medium temperature refrigeration and larger AC	<b>RS-44 (R424A)</b>
R22/ R502	Refrigeration where extra capacity is required**	<b>RS-52 (R428A)</b> <small>(Change of TEV required)</small>
R22	***	<b>RS-44 (R424A)</b>
R402A/B, R403B, R408A,	Refrigeration	<b>RS-52 (R428A)</b>

**Multipurpose replacement for R22 in DX equipment**

\* Lower pressure and compressor power than R22 may be an advantage in some specific cases.  
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 \*\*\* Certain Water Chillers fitted with TXV of limited aperture

## 4) Regulation Refresh and Update



Two new pieces of legislation came into force on 9<sup>th</sup> March 2009

- Ozone-Depleting Substances (Qualifications) Regs 2009, S.I. 216
- Fluorinated Greenhouse Gases Regs 2009, S.I. 261

Main measures are to define

- Qualification and certification requirements
  - Engineer and company responsibilities
  - Offences and penalties
- ” F-Gas Support is a Government funded team set up to help organisations understand their obligations under the EU Fluorinated Greenhouse Gases and Ozone Regulations. F-Gas Support is also working with Regulators to promote compliance. It is being run on behalf of Defra and the devolved administrations by the Local Authorities Coordinators of Regulatory Services (LACORS) and EnviroS “

# Personnel Certification



All personnel that carry out “refrigerant handling activities” on HFC equipment containing >3kg (including installation, maintenance, leak testing, recovery etc.) must hold a suitable qualification.

From today until July 2011

- City & Guilds 2078, or
  - CITB J01
- 
- From 4<sup>th</sup> July 2011
    - City & Guilds 2079, or
    - CITB J11-14

Four Categories are defined

Category I – leak checking, recovery, installation, service and maintenance of equipment

Category II – installation, service and maintenance of equipment with a charge of less than 3kg, (6kg if hermetically sealed) and leakage checking

Category III – recovery of refrigerant only

Category IV – leakage checking only

Qualifications for personnel working only on systems <3kg include the above and also alternative qualifications

# Company Certification



By 4<sup>th</sup> July 2009 all companies that employ qualified personnel ... must hold a company certificate

Between 4<sup>th</sup> July 2009 and 4<sup>th</sup> July 2011 an Interim Company Certificate will be issued

- Company to prove employees have required qualification
- Interim fee

From 4<sup>th</sup> July 2011 an Full Company Certificate

- Full fee

DEFRA have appointed three companies to undertake the registration they are;

Refcom [www.refcom.org.uk](http://www.refcom.org.uk)

Quidos [www.fgasregister.com](http://www.fgasregister.com)

Bureau Veritas [www.bureauveritas.co.uk/fgas](http://www.bureauveritas.co.uk/fgas)

# Operators Obligations



Applies to users or owner, for systems containing 3kg or more:

- Regular leak checks
- Systems containing 3kg -29kg leak tested once annually
- Systems containing 30kg – 299kg leak tested twice annually
- Systems containing 300kg or more leak tested four time annually
- Keep records for each piece of equipment, detailing leak test, maintenance etc
- Ensure any refrigerant removed is properly recovered to avoid emissions
- Ensure that any of their own personnel working on equipment are properly qualified
- Ensure that any sub-contractors are properly qualified and that their employer holds a Company Certificate

# Contractor Obligations



- Ensure that any of their personnel working on equipment are properly qualified
- Ensure that company holds Company Certificate
- Label new equipment

## Note

It is an offence to purchase, carry out installation, servicing and maintenance on systems using HFC's without company certificate after July 4th 2009.

## 4) F- Gas Refresh and Update

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### - EU perspective

**Continuing pressure to ban HFCs**

**Lobbying for “market controls” that cap CO2 equivalent** (to persuade people to use lower GWP gases)

**Possible tax option**

### - REAL Zero

**Sponsored by BOC, HRP, M&S and Carbon Trust**

**Target at improving leak reduction by improved awareness / training**

## Recycled and Reclaimed R22



The current EU Ozone Regulation allows the use of any HCFC refrigerant recovered from an existing refrigeration systems to be used until the end of 2014.

***Recycled* HCFC** - “recovered HCFC gas that has been subject only to basic cleaning process (this might include mechanical filtering and moisture removal). ***Recycled* HCFC** may only be used by either the undertaking which carried out the recovery (in most cases the refrigerant contractor) or the undertaking for which the recovery was carried out for (the owner). ***Recycled* HCFC** may not be placed on the market – “placing on the market” means the supplying or making available to a third persons within the Community for payment or free of charge. For example, the owner could use the ***recycled* HCFC** in RAC equipment at other sites they operate from but cannot sell ***recycled* HCFC** to a third party.”

***Reclaimed* HCFC** – “recovered HCFC gas that has been chemically reprocessed to a specified standard. ***Reclaimed* HCFC** may be placed on the wider market and used by undertakings other than the original contractor and owner. ***Reclaimed* HCFC** must be held in containers labelled as such, with information on the label stating the batch number and name and address of the reclamation facility.”

## 5) Available information

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### Accessing BOC websites

BOC links are

info) a) [www.bocindustrial.co.uk](http://www.bocindustrial.co.uk) (datasheets, store finder, refrigerants

or

etc) b) [www.gas2010.com](http://www.gas2010.com) (HCFC phase out info, case studies, guidelines

# Final thought...

I am



Thank you

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For further information contact

0800 02 0800

or visit

[www.gas2010.com](http://www.gas2010.com)

