FGas Regulation Revision : Industry Impact

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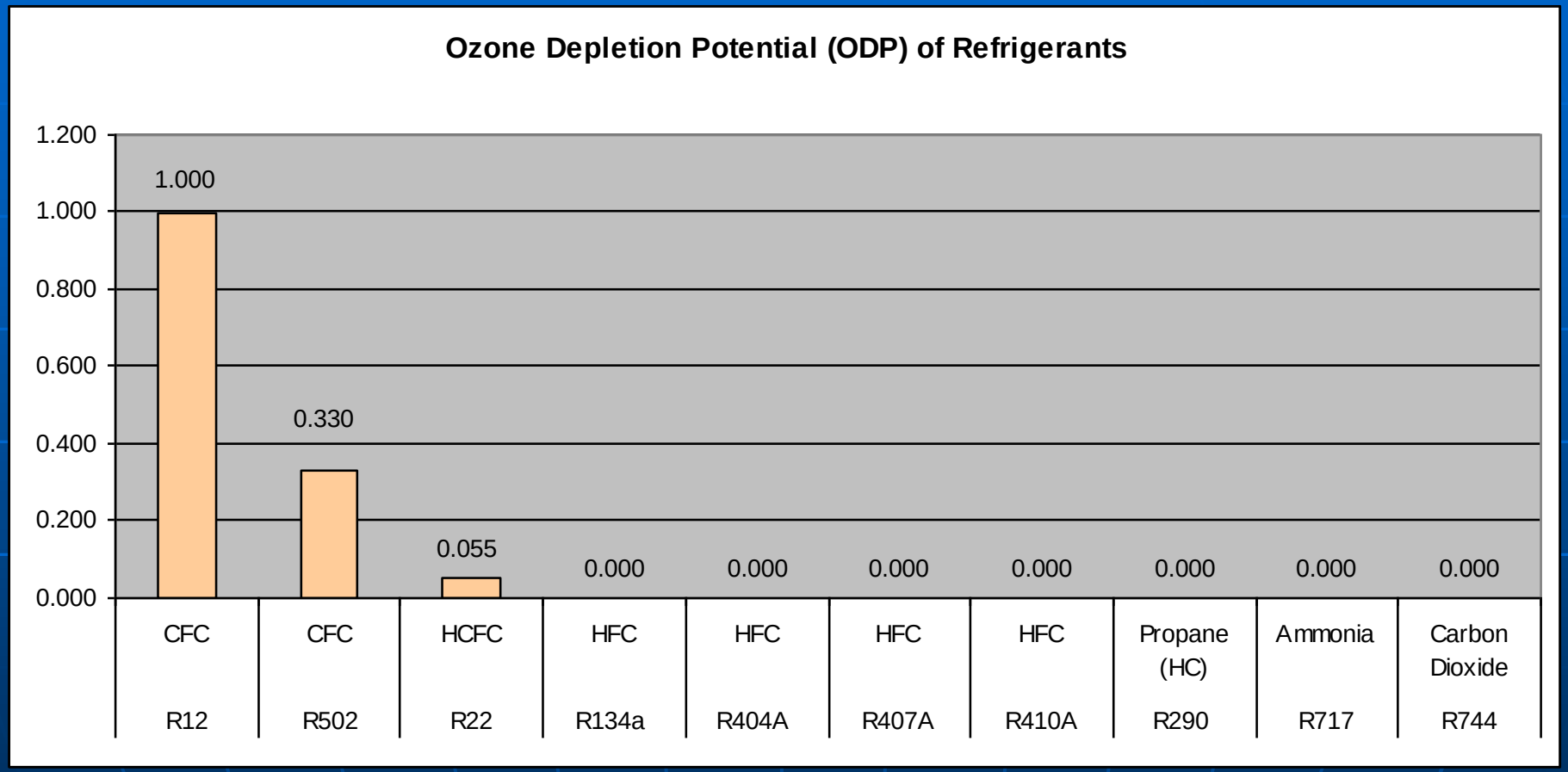
FGas Regulation Revision : Industry Impact

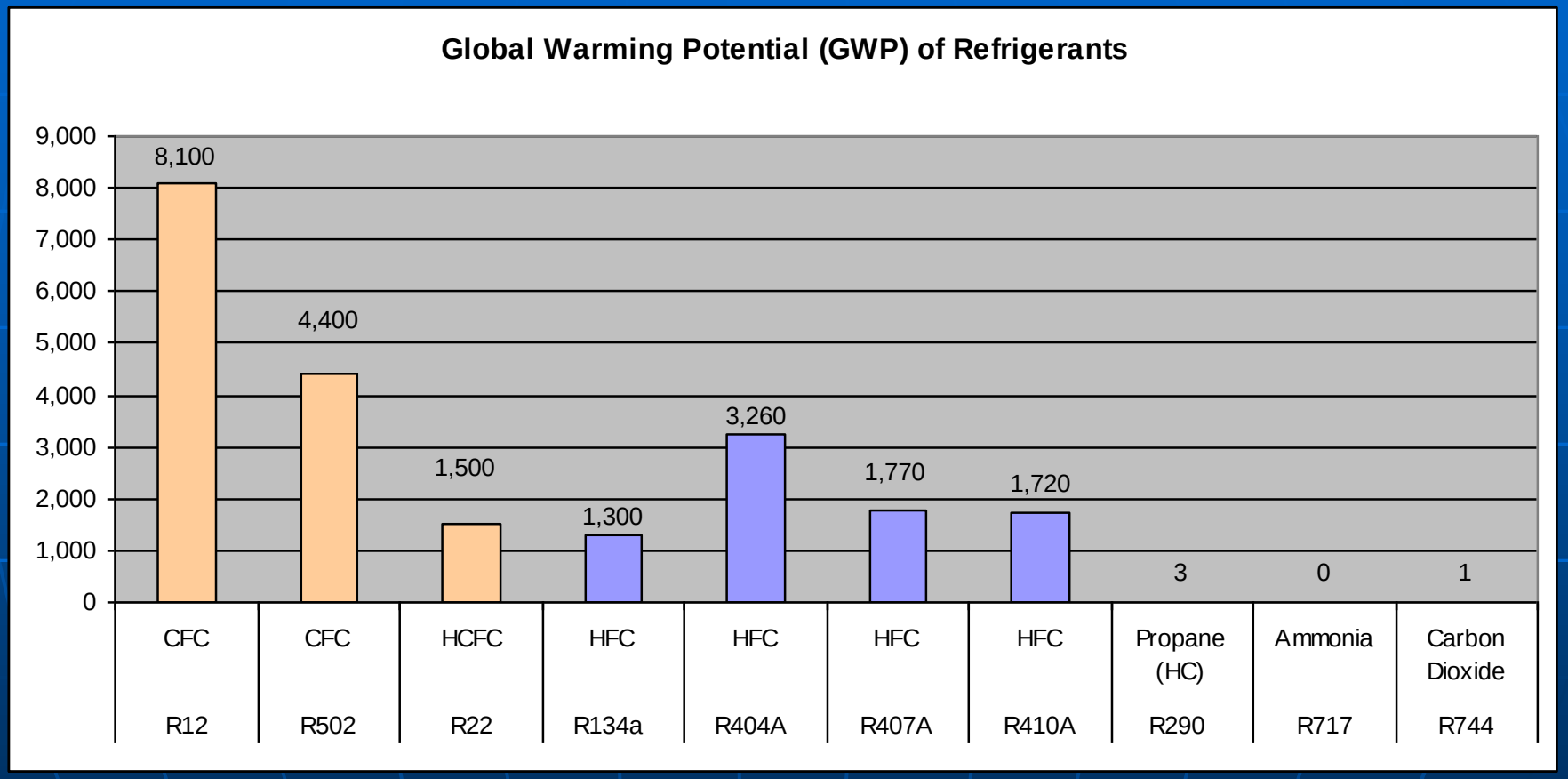
- Reminder on terminology:
- CFC : R12, R502, R11
- HCFC : R22, R123, R142b, R408A
- HFC : R134a, R125, R23, R32
- HFC Mixtures : R404a, R507, R407a
- HC : R290, R600
- HFO : R1234yf (A2L),AC5, AC6
- Natural Refrigerants : C02, NH3 (Ammonia)
- Others Low GWP

ODP



Thanks to Declan Fitzmaurice for table

GWP



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Current Regulations

- ODS Regulations
- F-Gas Regulations

Impact on Irish Refrigeration Industry?

- Containment measures
- Leak Check Thresholds and frequency
- GWP expressed in CO2 equivalent
  - Leak Checks
  - Labelling
- Equipment Bans
- Servicing Bans
- Training and Certification
- Record Keeping
- HFC Phase Down

Impact on Irish Refrigeration Industry?

- Alternative Refrigerants
  - R22 alternatives
    - R422A, R422D, R417
  - R404A alternatives
  - Short term alternatives
- Long Term Alternatives
  - NH3, CO2, R718,
  - R290, R600, R1270
  - R1234yf, R32, AC5, AC6, HFO's
- Energy Usage

Impact on Irish Refrigeration Industry?

- Containment measures (Art 3)
  - The leak must be repaired without undue delay
  - As before repair leak to be checked within 1 month
  - Both operatives and companies to take precautionary measure to prevent leakages

Impact on Irish Refrigeration Industry?

- Leak Check Thresholds and frequency
  - Based on CO2 equivalents
    - Leak checks depending on GWP and kgs

Fluorinated greenhouse gases	Frequency of leak checks	
	No Leakage detection system	Leakage detection systems
5 tonnes CO_2-eq	12 months	24 months
50 tonnes CO_2-eq	6 months	12 months
500 tonnes CO_2-eq	3 months	6 months

- However, **<u>until 31 December 2016</u>**, equipment that contains less than 6kg of fluorinated greenhouse gases and hermetically sealed equipment containing less than 10 tonnes of CO2-eq of fluorinated greenhouse gases and labelled such will not be subject to leakage checking requirements.

Impact on Irish Refrigeration Industry?

- Leak Check Thresholds and frequency
  - Based on CO2 equivalents
    - Leak checks depending on GWP and kgs

Refrigerant	GWP	5 tonnes CO_2-eq (kg)	50 tonnes CO_2-eq (kg)	500 tonnes CO_2-eq (kg)
R32	675	7.407	74.074	740.741
R134a	1430	3.497	34.965	349.650
R245fa	1030	4.854	48.544	485.437
R404a	3922	1.275*	12.749	127.486
R407A	2107	2.373*	23.73	237.304
R407C	1774	2.818*	28.185	281.849
R407F	1850	2.703*	27.027	270.27
R410A	2088	2.395*	23.946	239.464
R422D	2729	1.832*	18.322	183.217
R437A	2550	1.961*	19.608	196.078
R507A	3985	1.255*	12.547	125.471
R1234yf	4	1,250	12,500	125,000
R1234ze	7	714.286	7,142.857	71,428.571

* Regular leak checks applicable only from 1 January 2017 onwards (see explanation below)

Impact on Irish Refrigeration Industry?

- Leak Detection Systems (>500T, mandatory)
  - "calibrated mechanical, electrical, electronic"

Refrigerant	GWP	Minimum charge (kg)
R32	675	740.741
R134a	1430	349.65
R245fa	1030	485.437
R404a	3922	127.486
R407A	2107	237.304
R407C	1774	281.849
R407F	1850	270.270
R410A	2088	239.464
R422D	2729	183.217
R437A	2550	196.078
R507A	3985	125.471
R1234yf	4	125,000
R1234ze	7	71,428.571

Impact on Irish Refrigeration Industry?

- GWP expressed in CO2 equivalent
  - Leak Checks
  - Labelling
    - **From 1st January 2017 the quantity expressed in weight and in CO2 equivalent of F gas or the quantity of F gases for which the equipment is designed and the GWP of those gases**
  - Labelling
    - All equipment
    - **Reclaimed and recycled F gases**
    - **F gases placed on the market for destruction**
    - **F gases placed on the market for direct export**
    - **F gases placed on the market for military use**

Impact on Irish Refrigeration Industry?

- Equipment Bans (HFC's)
  - Domestic GWP≥ 150, Jan 2015
  - Commercial GWP≥2500, Jan 2020
  - Commercial GWP≥ 150, Jan 2022
  - Movable GWP≥ 150, Jan 2020
  - Split AC GWP≥ 750, Jan 2025
    - (less than 3kg) R32

Impact on Irish Refrigeration Industry?

- Service Bans (HFC's)
  - Equipment ≥ 40T CO2 equivalent and
  - ≥2500 GWP

The table below summarises the minimum charge size corresponding to 40 tonnes CO_2-equivqlent for the most common refrigerants ≥ 2500 GWP used in refrigeration

Refrigerant	GWP	Minimum charge size (kg)	
		Calculated figures	Proposed rounded up figures
R404A	3922	10.199	10.2 alt 10.0
R422D	2729	14.657	14.7 alt 15.0
R437A	2550	15.686	15.7 alt 16.0
R507A	3985	10.038	10.0

Impact on Irish Refrigeration Industry?

- Service Bans (HFC's)
  - Execptions :
  - Reclaimed/Recycled GWP≥2500, Jan 2030
    - Note : no recycling facility in Ireland

Impact on Irish Refrigeration Industry?

- Equipment/Service Bans (HFC's)2020
  - Impact: (eg R404a, R422D) and 10kg$_{approx}$
  - Availability
  - Price
  - Retrofit Alternatives
    - R407A or R407F
    - Flooded systems
  - New system HFC alternatives
    - R407A, R134A, R410, R407C, R32

Impact on Irish Refrigeration Industry?

- Equipment Bans (HFC's)2022
  - Impact: ≤ 150 GWP Alternatives
  - R404A = 3922
  - R407A = 2107 (R407F = 1705)
  - (R-32,R-125,R-134a, R407A :20/40/40 R407F with 30/30/40%)
  - R410A = 2088
  - R134A = 1430
  - R32 = 675
  - R1234yf = 4, AC5 = <100
  - CO2 = 1
  - NH3 = 0
  - R600a, R1270 and R290 = 0

Alternatives

- R407A/F
  - Retrofit for R404A/R507/R22
  - Energy usage improved
  - Capital/Install cost low
  - Available, cost effective, 20 yrs experience
  - Safety low risk, Training requirement low
  - Blend, flooded systems need design check.
    - Exempt from 2020 but not 2022 equipment ban
    - Exempt from 2020 service ban

Alternatives

- R134A/R410A
  - Retrofit for R404A/R507. New compressors
  - Energy usage improved
  - Capital/Install cost medium
  - New project good choice
  - Available, cost effective, 20 yrs experience
  - Safety Low Risk, Training Requirement Low
  - Chill and air conditioning only (No LT)
    - Exempt from 2020 but not 2022 equipment ban
    - Exempt from 2020 service ban

Long Term Alternatives

- R1234yf$_{(GWP=4)}$ and AC5$_{(GWP\leq100)}$ etc, etc
  - Retrofit for R404A/R134A. New compressors
  - Energy usage improved
  - Capital/Install cost high but decreasing
  - New project good choice
  - Not readily available, 0 yrs experience
  - Safety Medium (Flammable) Risk, Training Requirement Low
  - Blend and limited LT applications
    - Exempt from 2020 and 2022 equipment ban
    - Exempt from 2020 service ban

Long Term Alternatives

- NH3, Ammonia, R717
  - Not suitable for retro-fit
  - Energy usage low (normally evaporative)
  - Capital/Install cost high
  - Available, 50 yrs experience in a small sector.
  - Safety High risk (Toxic)
  - Training Requirement High
    - Less that 5% of Irish Contractors trained,
    - Yes training facility
  - Limited applications, Industrial
    - Exempt from all bans

Long Term Alternatives

- CO2
  - Not suitable for retro-fit
  - Energy usage high in "warm" areas
    - Actual energy usage in Ireland is significantly higher
  - Capital/Install cost high
  - Available, 5 yrs experience in a small sector.
  - Safety High Risk (V.high pressure)
  - Training Requirement High
    - Less that 5% of Irish Contractors trained,
    - No training facility
  - Limited applications
    - Exempt from all bans

Long Term Alternatives

- CO2
  - Energy usage high in “warm” areas
    - Actual energy usage in Ireland is significantly higher
  - On a cascade system R134A or NH3 on high side with CO2 on low temperature side.
    - Exempt from equipment ban
    - Low pressure refrigerant gives energy saving
    - R134a on high side is safer
    - CO2 on low “leaky” side

Long Term Alternatives

- R600, R290, R1270 (Butane, Propane, Propylene)
  - Not suitable for retro-fit generally
  - Energy usage low
  - Capital/Install cost high
  - Available, 5 yrs experience in a small sector.
  - Safety High Risk (Flammable)
  - Training Requirement High
    - Less that 5% of Irish Contractors trained,
    - Training facility in N Irl
  - Limited applications (small plant)
    - Exempt from all bans

Long Term Alternatives

- Sunmedia Oct 2012

Long Term Alternatives

- CNN iReport 2008

Impact on Irish Refrigeration Industry?

- Training and Certification (Art 10)
  - As before for contractors
  - *New :* Refrigerated trucks above 3.5t
  - *New :* AC in Road vehicles
  - *New :* Decommissioning listed under tasks

  - *"Certification and training programmes must now include information on relevant technologies to replace or reduce the use of fluorinated greenhouse gases and their safe handling."*
  - *Access*

Impact on Irish Refrigeration Industry?

- Record Keeping Art 6
  - Quantity and type of FGas
    - Installed, added or recovered
  - Contractor details and certificate numbers
  - Records of decommissioning and disposal
    - Education and change
  - Operator and contractor to keep records
    - 5 years available for inspection by competent authority
  - FGas suppliers to record certificate numbers
  - FGas suppliers to record quantities

Impact on Irish Refrigeration Industry?

- HFC Phase Down
- Schedule: Freeze 2015, first step 2016, reduction of HFC supply by 79% in 2030 (in CO2 equivalent)
- "By 2018 it may be difficult to use eg. R410A or R134A in new installations because of possible leaks in existing high GWP plants"
- Prediction of effect difficult
  - Supply and Demand?
  - Quotas
  - High GWP v(s) Low GWP market
- Availability!

Impact on Irish Refrigeration Industry?

- Main Challenges
  - Is the Refrigeration Industry ready?
    - Training and up-skilling
    - Equipment and materials
    - Safety (High pressure, flammable, toxic)
    - Energy usage
  - Industry ready?
    - Investment and change
    - Safety
    - Timing
  - Availability?

Thank you for listening

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