

Recent developments in the European F-gas regulations and implications for the refrigeration servicing sector

Paramaribo, Suriname
9th April 2014

Marco Buoni

VicePresident, AREA

Air Conditioning & Refrigeration European contractors' Association

(www.area-eur.be)

Secretary General Italian Association of Refrigeration Technician, ATF

(www.associazioneATF.org)



AREA

The indisputable voice of European RACHP contractors



- Funded in 1988 in Brussels, Belgium
- Represents RACHP contractors
- AREA in figures:
 - 20 national member associations
 - 18 countries from EU and beyond
 - > 9,000 companies (mainly SMEs)
 - +/- 125,000 work force
 - +/- € 20 bn annual turnover



Design, installation, maintenance and repair of all **Refrigeration, Air Conditioning and Heat Pumps** RACHP systems

AREA Priorities



General mission statement

"support and initiate activities to promote the industry and its high standards of quality, in order to serve users' interest in a safe and uninterrupted usage of efficient refrigeration, air conditioning and heat pump equipment, and to create and maintain a favourable business climate for European refrigeration, air conditioning and heat pump contractors, in terms of quality, safety, employment, fair competition and profitability".

General objectives

Harmonisation of education & training / certification

Promotion of technical evolutions

Environmental protection / tackling climate change / energy efficiency

Recommendations on and promotion of professional techniques & high-level standards

Key issues

Regulatory aspects

- F-Gas Regulation implementation and review
- Monitoring of Ozone Depleting Substances
- Energy efficiency - Climate change
- Eco-design of energy-related products

Professional standards

- Heat pump installation
- F-gas certification and education

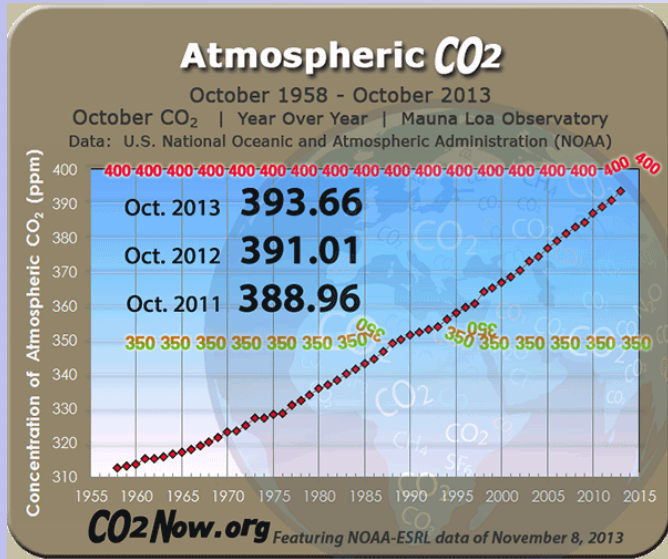
Professional guidance

- Low GWP refrigerants, certification and education



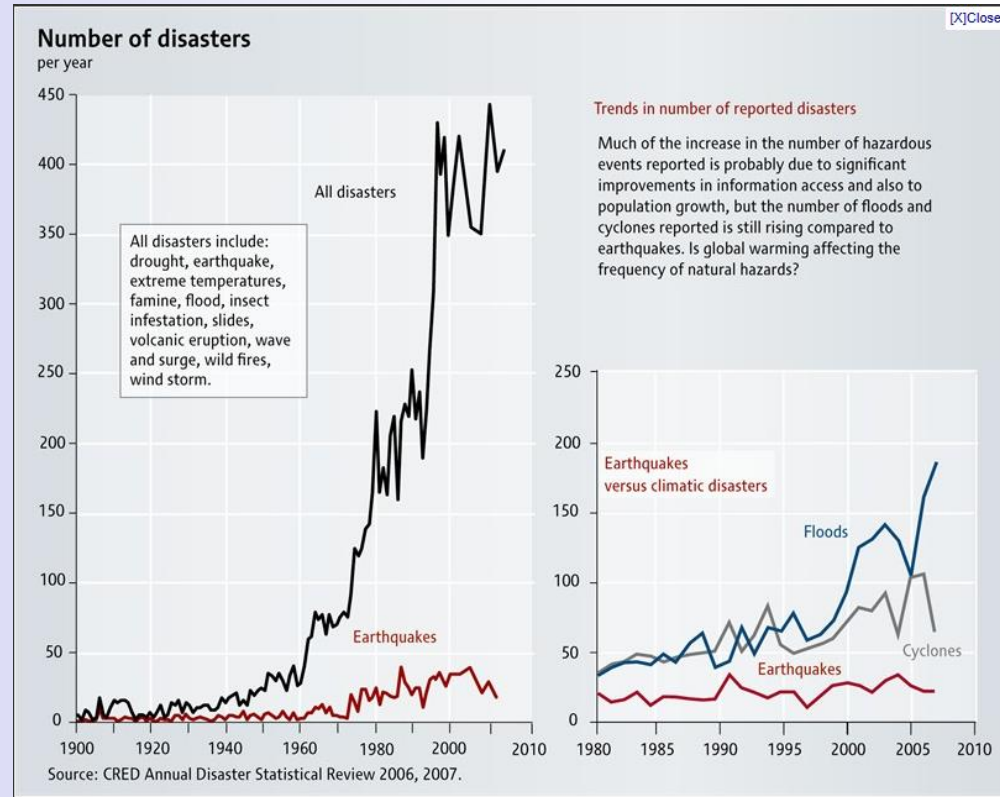


The Environment



Currently, global temperature is around 0.8 degrees Celsius higher than in the pre-industrial era. Without climate policy, this increase will rise to around 2 degrees by 2050, and to between 2.5 and 6 degrees by the end of this century.

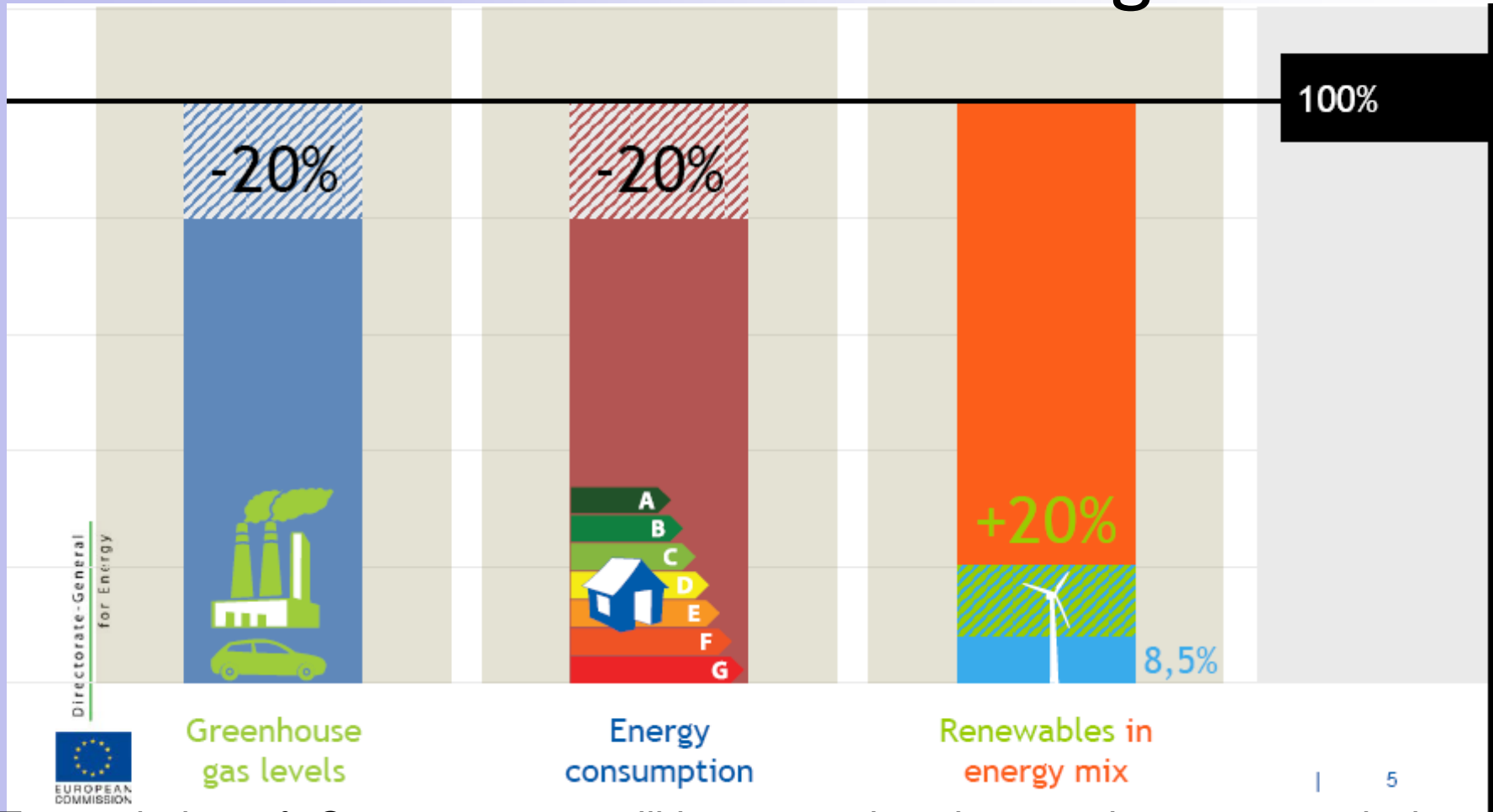
They have been rising ever since, and today are about 394 ppm. A level of 450 ppm has generally been associated with an average global temperature rise of 2 degrees C



Source UNEP United Nations Environment Programme

Europe: The current political context

The EU 20 – 20 – 20 target



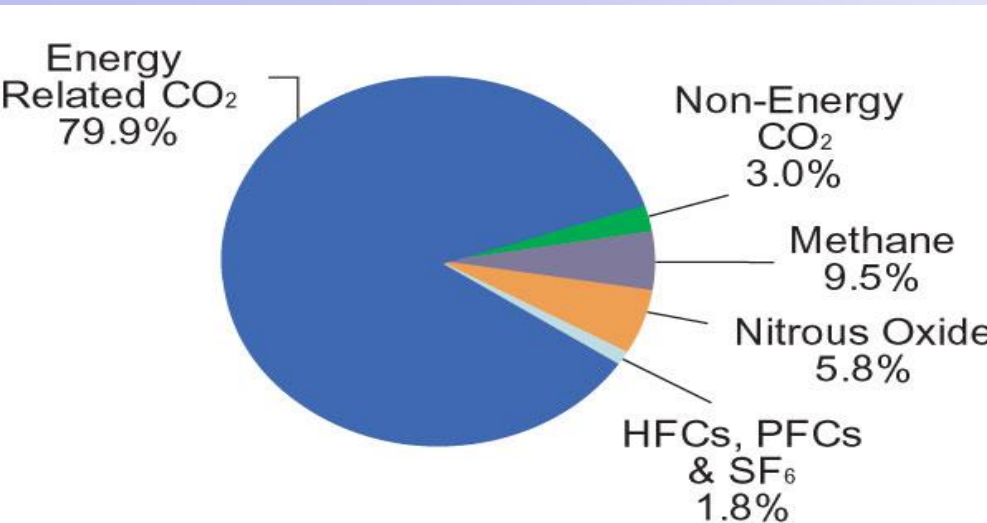
To stay below 2° C every country will have to reduce its greenhouse gas emissions (GHGs), but developed countries will need to take the lead by targeting a cut of 80-95% below 1990 levels by 2050.(1)

(1) EU Commission Climate Action - FAQ

Impact of refrigeration, air conditioning and heat pumps – and refrigerants



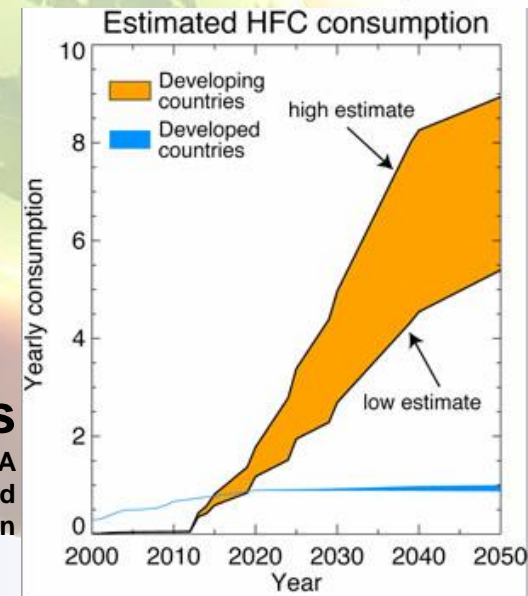
Air-conditioning, refrigeration and heat pump equipment is using 15 to 20% of the electrical energy globally.



Actual contribution

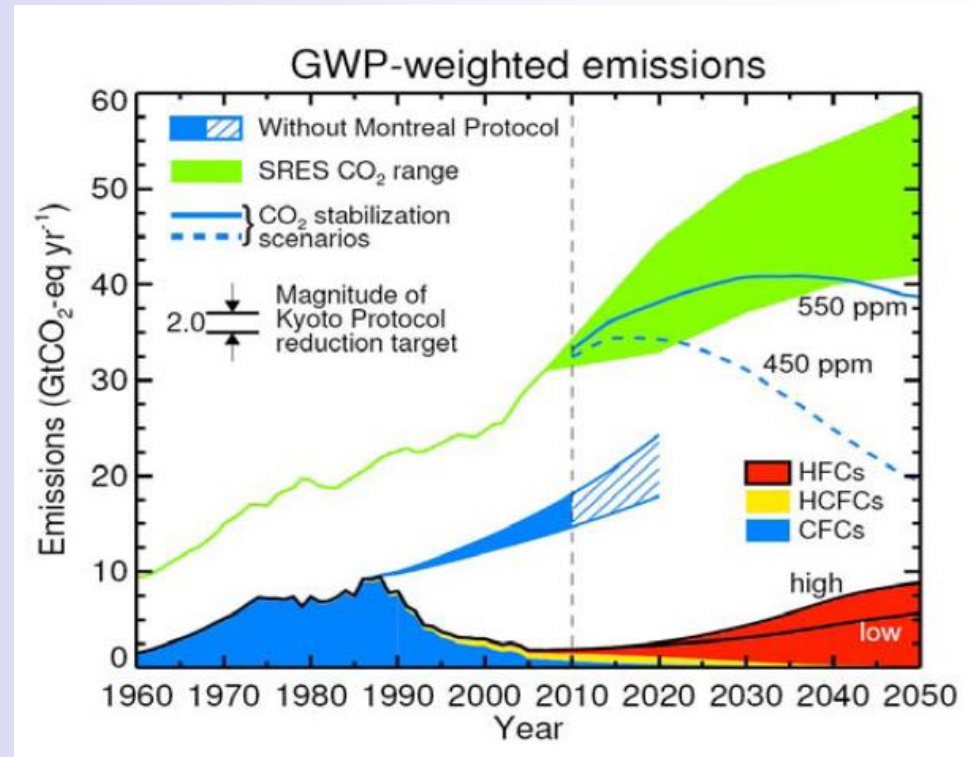
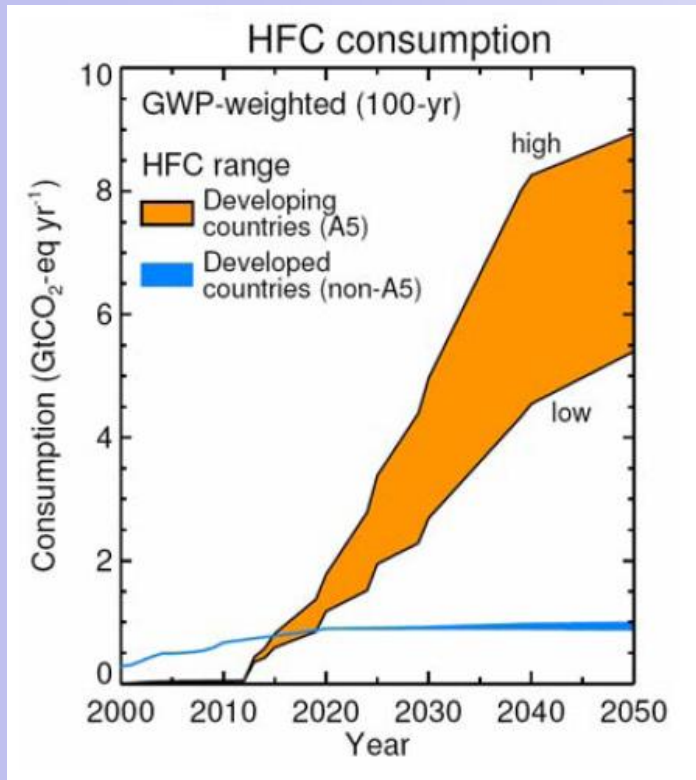
Source US
Similar in all developed countries

Trends
Source NOAA
National Oceanic and Atmospheric Administration



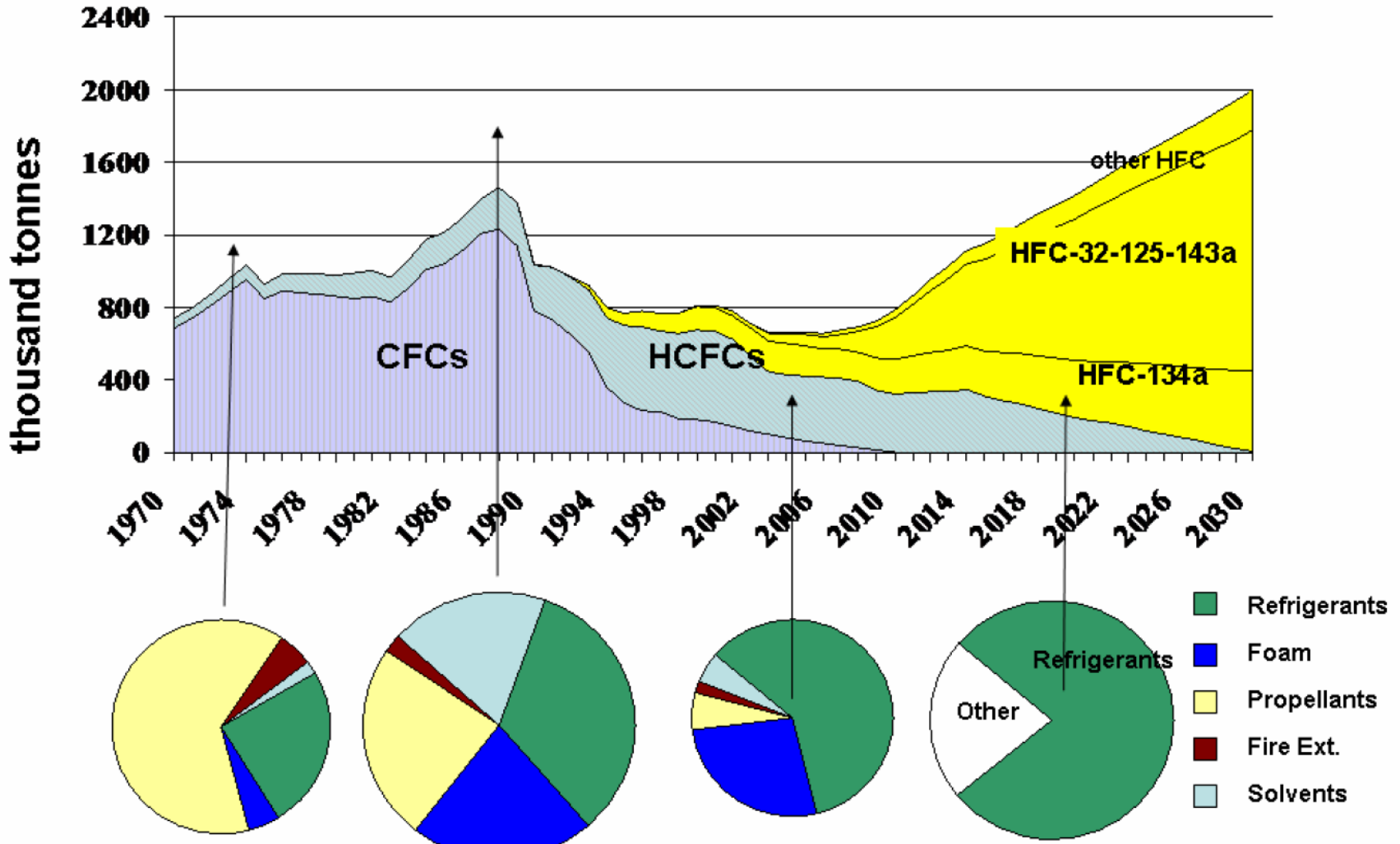
HFC future consumptions 2050

Source Nature: Published by Guus J. M. Velders, David W. Fahey, John S. Daniel, Mack McFarland, Stephen O. Andersen



Refrigerants trends

Global Market of Halocarbons
1970-2006 and 2006-2030 (business-as-usual)



Source: AFEAS until 2006, 2030 projection by Öko-Recherche.

Conclusions of EU commission

Public consultation



In the context of the overall EU objective to cut emissions by 80–95 % by 2050, the stabilisation of F-gas emissions at today's levels is not adequate and the analysis shows that

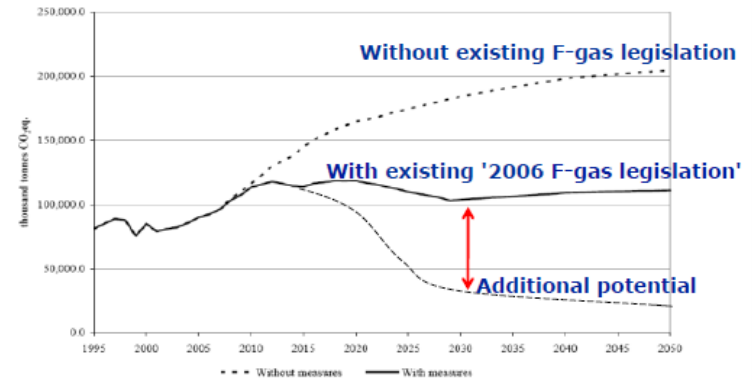
already available or emerging low-GWP technologies are technically feasible and can be cost effective in many application areas



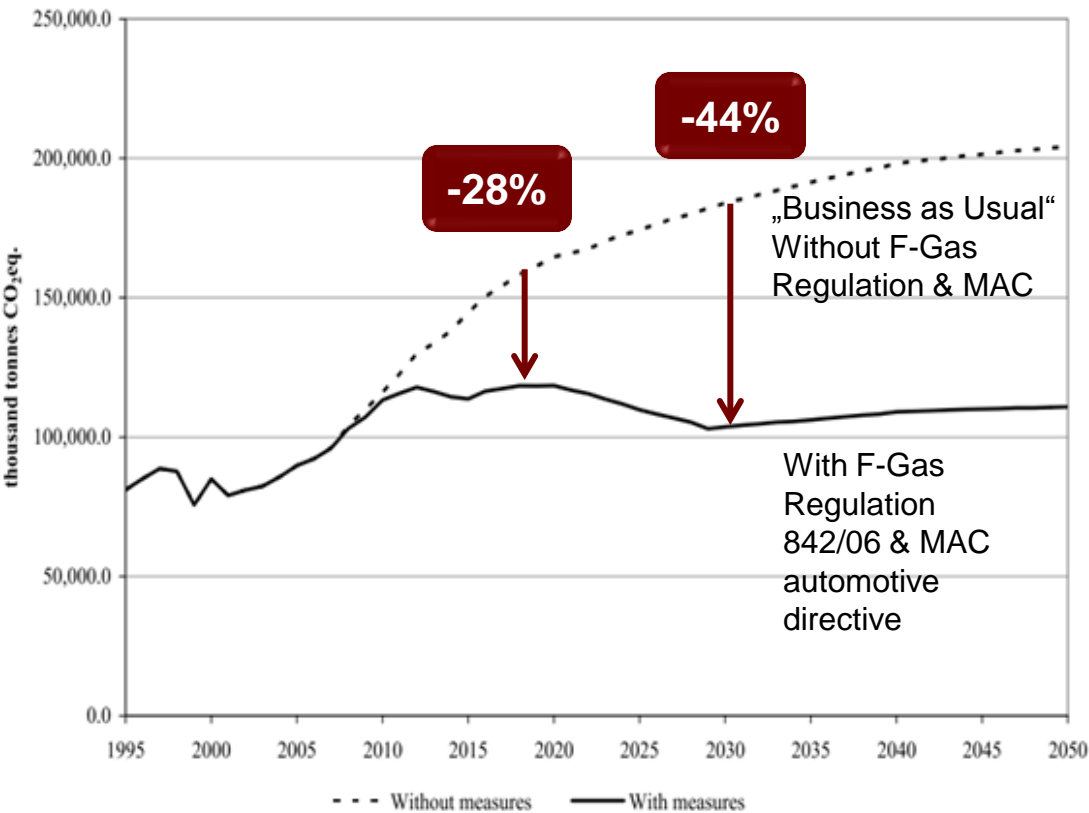
European HFCs emissions present and future



Scenarios EU F-gas emissions



Source: Schwarz et al., 2011



EU Revision of Fgas regulation (2014/.../EC)



Two strategies to reduce emissions

Prevent leakage and emissions

- Emission prevention and leak checks
- Control of by-production
- End of life treatment of products and equipment
- Training and qualification
- Information for users (labelling, product infos)

Avoid the use of F-gases

- Training and qualification
- Ban on new applications
- Ban on uses
- **Phase-down of HFC supply**



Approved by
EU Parliament and Council

To prevent HFCs emissions In Europe:

→ F-gas regulation and certification

REGULATION (EC) 842/2006 and revision 2014

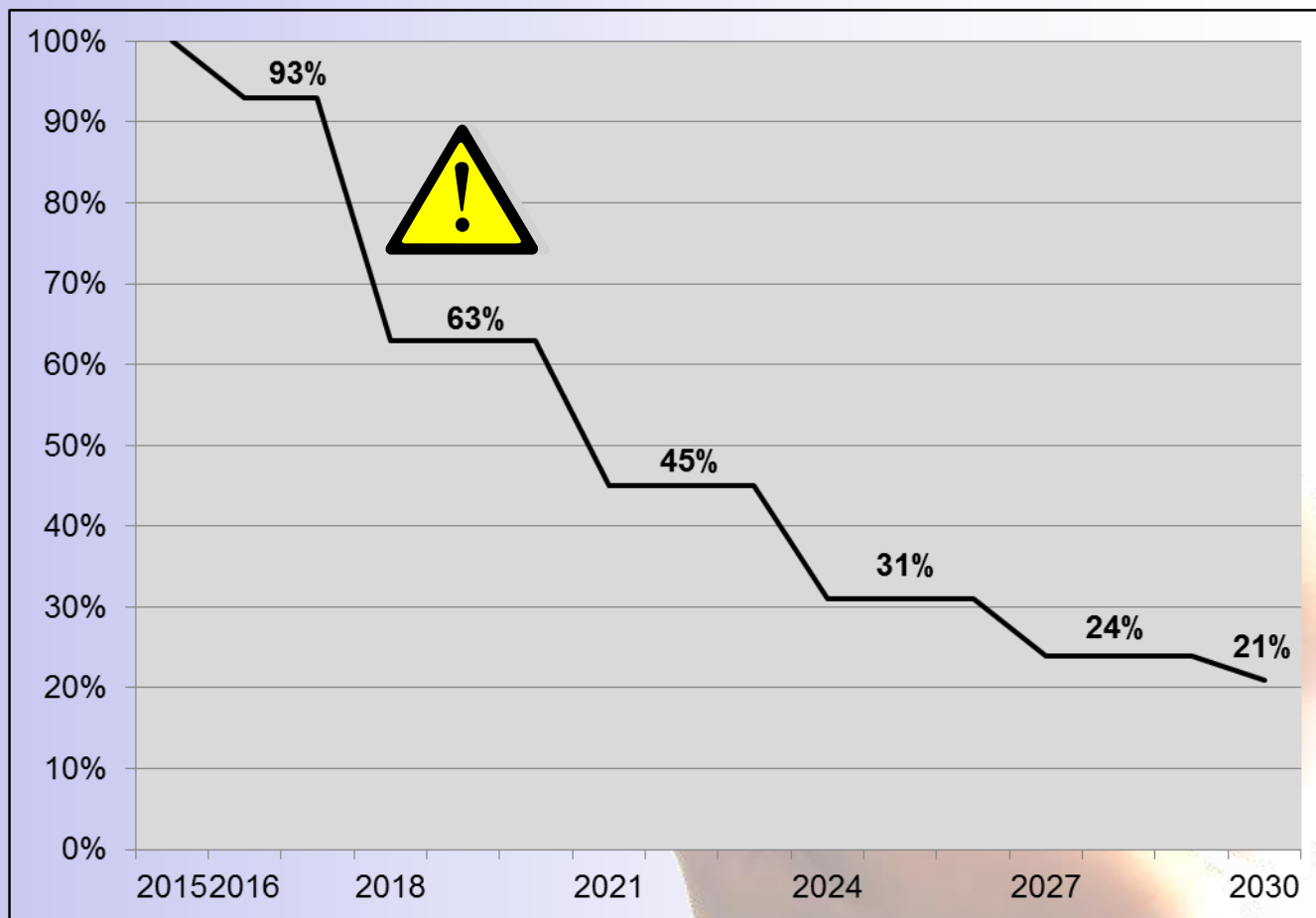
In synthesis the Refrigeration, Air Conditioning and Heat Pumps systems with HFCs should have:

- Logbook for each unit above the threshold (5 ton eq.CO₂)
- Periodical inspections (3,6,12 months)
- Tasks:
 - Installation, servicing, maintenance
 - Repair
 - Decommissioning
 - Leakage checking
 - Recovery
 - **only by certified craftsmen**



In detail: the phase-down steps

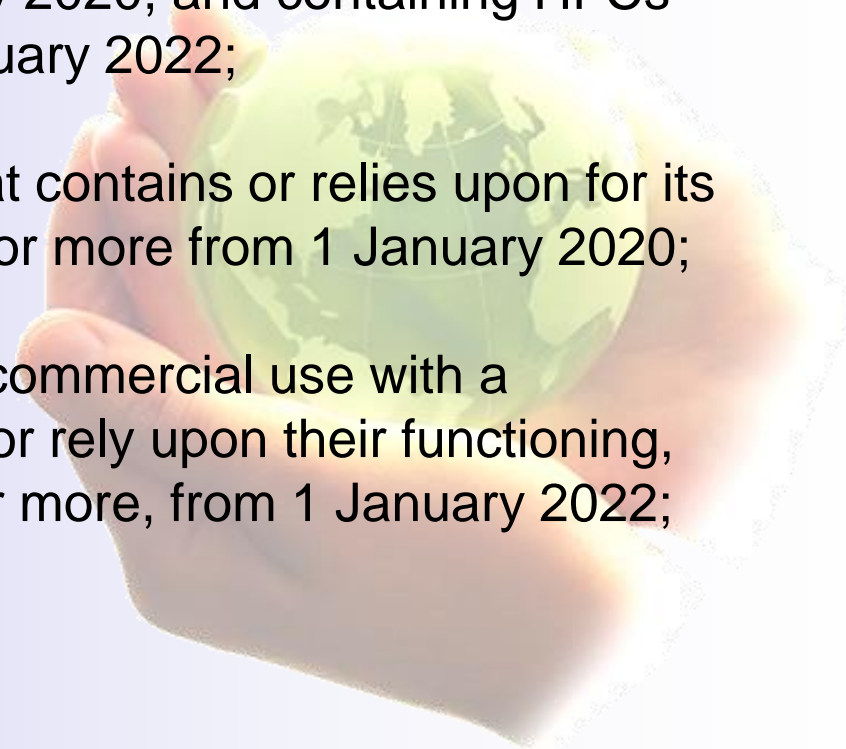
Year	Reduction by
2015	100% (Freeze)
2016-17	93%
2018-20	63%
2021-23	45%
2024-26	31%
2027-29	24%
2030	21%



Revision of the F-Gas Regulation (1)

Bans on the placing on the market of the following products:

- domestic refrigerators and freezers containing HFCs with a global warming potential (GWP) of 150 or more as from 1 January 2015;
- refrigerators and freezers for commercial use containing HFCs with a GWP of 2500 or more from 1 January 2020, and containing HFCs with a GWP of 150 or more from 1 January 2022;
- stationary refrigeration equipment that contains or relies upon for its functioning HFCs with a GWP of 2500 or more from 1 January 2020;
- centralised refrigeration systems for commercial use with a capacity of 40kW or more that contain or rely upon their functioning, fluorinated gases with a GWP of 150 or more, from 1 January 2022;



Revision of the F-Gas Regulation (2)

- movable room air-conditioning appliances that contain HFCs with GWP of 150 or more from 1 January 2020;
- single split air-conditioning systems containing less than 3 kg of F-gases that contain F-gases with a GWP of 750 or more from 1 January 2025;(1)

The first ban is the much-touted service and maintenance ban on high-GWP refrigerants, over 2500 GWP, which is planned to come in 2020 (2)

The Regulation will apply from 1 January 2015.

(1) Source: COUNCIL OF THE EUROPEAN UNION

Brussels, 18 December 2013 17963/13 (OR. en) PRESSE 593

(2) Source: Racplus.com 16 December 2013



Everything based on ton eq. of CO2

- Threshold

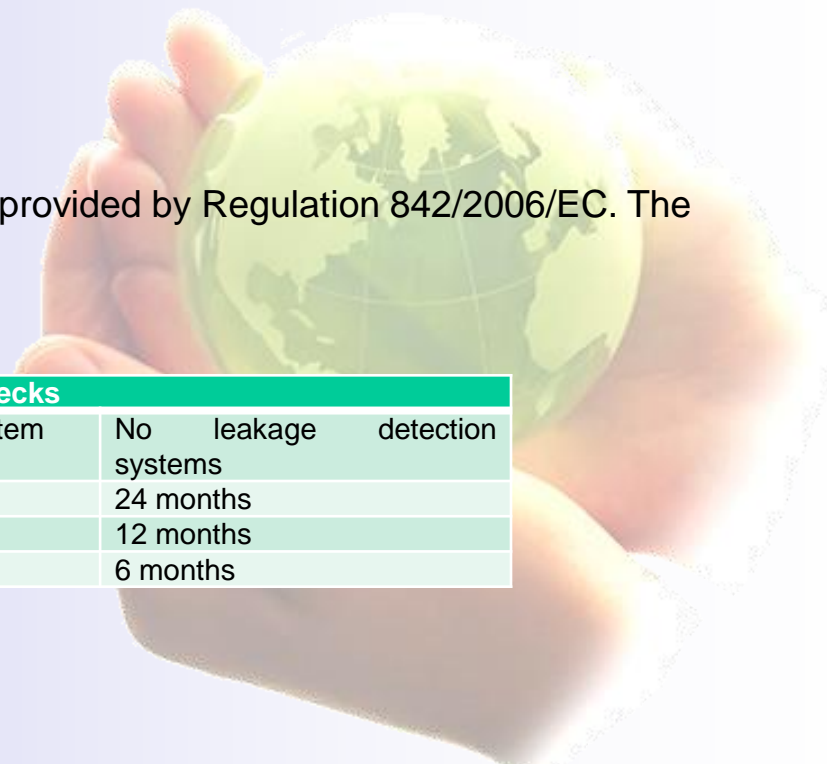
Leak checks based on CO₂-equivalent quantities of fluorinated greenhouse gases

The new Regulation replaces thresholds expressed weight of fluorinated greenhouse gases by thresholds expressed in tonnes of CO₂-equivalent quantities. Article 2, § 7 defines ‘tonnes of CO₂-eq as “a quantity of greenhouse gases expressed as the product of the weight of the greenhouse gases in metric tonnes and their global warming potential”.

Frequency of the leak checks

Leak checks remain based on the same frequency as provided by Regulation 842/2006/EC. The table below summarises the situation.

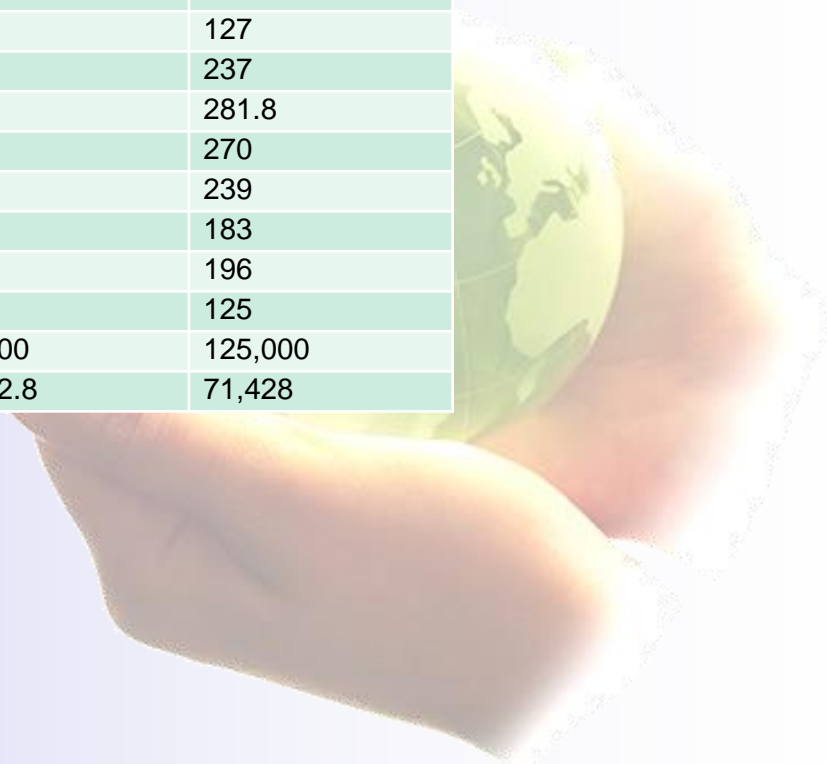
Fluorinated greenhouse gases	Frequency of leak checks		
	Leakage detection system	No leakage systems	detection
5 tonnes CO ₂ -eq	12 months	24 months	
50 tonnes CO ₂ -eq	6 months	12 months	
500 tonnes CO ₂ -eq	3 months	6 months	



Everything based on ton eq. of CO2

Equivalence: refrigerant \leftrightarrow quantity

Refrigerant	GWP	5 tonnes CO ₂ -eq (kg)	50 tonnes CO ₂ -eq (kg)	500 tonnes CO ₂ -eq (kg)
R32	675	7.4	74	740.7
R134a	1430	3.5	34.96	349.6
R245fa	1030	4.85	48.5	485
R404a	3922	1.27*	12.7	127
R407A	2107	2.37*	23.7	237
R407C	1774	2.8*	28	281.8
R407F	1850	2.7*	27	270
R410A	2088	2.39*	23.9	239
R422D	2729	1.8*	18.3	183
R437A	2550	1.96*	19.6	196
R507A	3985	1.25*	12.5	125
R1234yf	4	1,250	12,500	125,000
R1234ze	7	714	7,142.8	71,428



Sell refrigerant Only to certified companies

Refrigerant: for the purpose of installation, servicing, maintenance, repair and decommissioning stationary air conditioning, refrigeration and heat pump equipment, as well as refrigeration units of refrigerated trucks and trailers, fluorinated greenhouse gases can only be **sold to and purchased by** certified undertakings.

Shared responsibility: responsibility for delivering the refrigerant to a certified undertaking is shared by distributors and installers



Possible Implications for service

- Lack of some type of refrigerants especially the high GWP ones (R404a, R507)
- Increase in prices of HFCs refrigerants
- Importance of recovery and recycling
- Selling equipment containing High GWP refrigerant which will be phase down with consequences on the ordinary maintenance and repairing, warranty





Contractors' training with low GWP refrigerants: mind the gap!

If the use of HFCs is legislatively decreased and consequently the use of natural refrigerants is pushed, there will be a gap between training offer and training needs resulting in a shortage of trained contractors



The European Commission has released revision of the F-Gas Regulation that will include measures in favour of a decreased use of HFCs in RACHP equipment. Such measures would, in turn, result in an increased use of alternatives, namely low GWP (global warming potential) refrigerants, and in particular the so-called “natural refrigerants” (CO₂, hydrocarbons and ammonia). Mindful of the key role played by contractors in the safe, efficient and reliable functioning of equipment working with natural refrigerants, AREA sought an overview of the availability and level of training in the EU.



Solution could be starting from the F-Gas certification of personnel adding modules for natural refrigerants



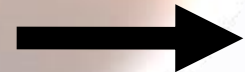
Pros / Cons refrigerants

Refrigerant	HFC	Natural			HFO
		HCs	Ammonia	CO ₂	1234yf
GWP (100 years)	XX R134a 1300 – R410A 1900	✓ 3-5	✓✓ 0	✓✓ 1	✓ 4
Toxicity	✓✓	✓✓	XX	✓	✓✓
Flammability	✓✓	XX	X	✓✓	X
Materials	✓	✓	X	✓	✓
Pressure	✓	✓	✓	XX ¹	✓
Availability	✓✓	✓	✓	✓	XX
Familiarity	✓✓	✓	✓	X	X

Very poor **XX** Poor **X** Good **✓** Very Good **✓✓**

Source: F-gas support Information Sheet - RAC7 alternatives

Every refrigerant has his own application



Some Applications of low GWP alternative refrigerants



Applications	Refrigerant
Industrial Refrigeration	HFO 1234ze (?)*
All kind of Industrial Ref.	Ammonia
Cascade systems	Carbon Dioxide + Ammonia
Secondary fluids	Carbon Dioxide
Commercial Refrigeration	HFO 1234ze*
Cabinets	Hydrocarbons
Bottle coolers	Hydrocarbons
Supermarkets	Carbon Dioxide
Domestic Refrigeration	
freezers	Hydrocarbons
Air Conditioning	R32
Heat Pumps Hot Water	Carbon Dioxide Trans-critical
Large Chillers	Ammonia
Small Monobloc Air Conditioning	Hydrocarbons
Automotive	HFO 1234yf

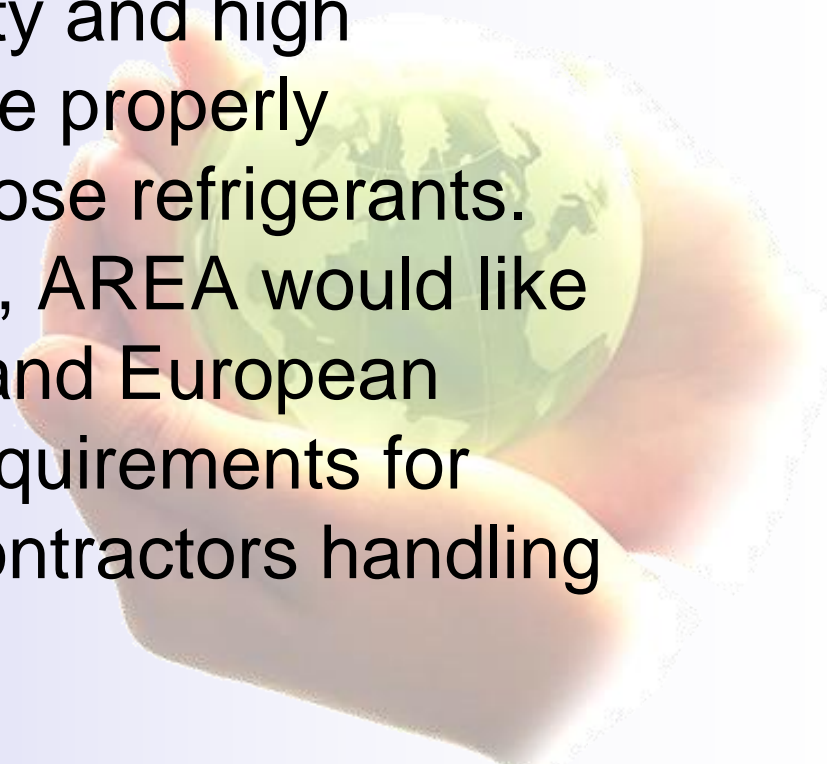
no refrigerant represents the ideal solution in all cases and for every equipment – each cooling application has to be looked at in its own merits and a professional choice must be made taking into account many more factors than simply GWP

 From AREA guidance on LOW GWP refrigerants

*more applications for HFOs and HFO blends will probably be developed with full commercialisation of the refrigerants

AREA position on training and certification of LOW GWP refrigerants (1)

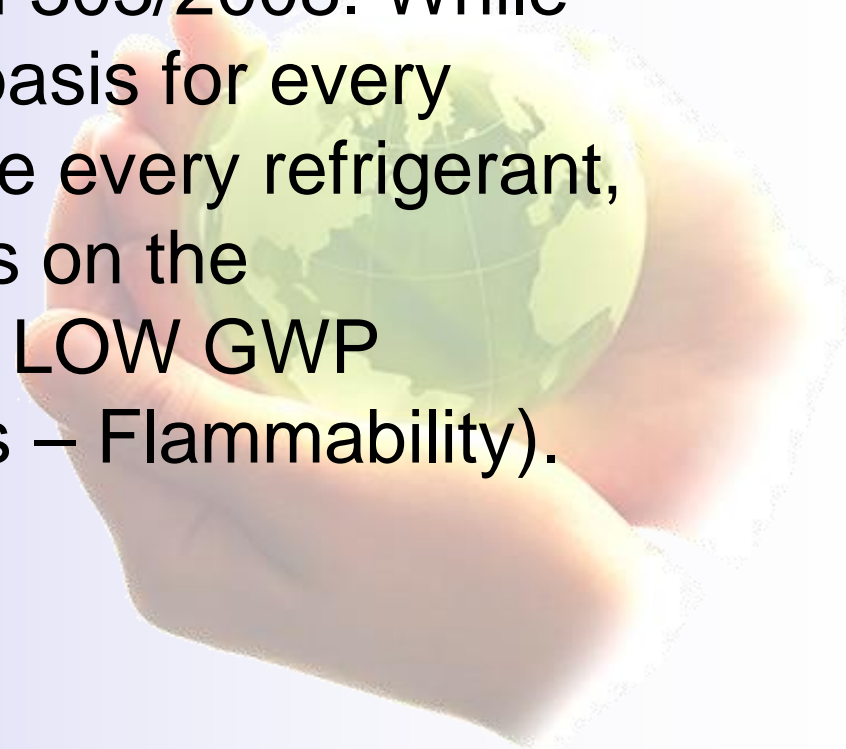
- A future phase-down of HFCs will lead to a higher use of alternative refrigerants / low GWP refrigerants. Low GWP refrigerants have issues on safety, flammability, toxicity and high pressure which will need to be properly considered when handling those refrigerants. With this guidance document, AREA would like to recommend to worldwide and European decision-makers minimum requirements for training and certification of contractors handling low GWP refrigerants.





AREA position on training and certification of LOW GWP refrigerants (2)

- It is not AREA's intention to create a new certification scheme – only to add specific modules to the existing HFCs certification scheme based on Regulation 303/2008. While HFC certification will be the basis for every contractor who want to handle every refrigerant, each added module will focus on the specificities of the respective LOW GWP refrigerant (i.e. Hydrocarbons – Flammability).



Conclusions (1)

The international context

- The new EU F-gas Regulation demonstrates that ambitious measures on F-gases are feasible
- Increasing interest and demand for alternatives to HFCs are likely to trigger innovation and economies of scale also in other markets
- The agreement will result in a more active role of EU internationally

-> Other Developed and Emerging countries will need to come up with steps of a similar level of ambition as the new EU Regulation

-> Developing countries:

- Focus on maximizing climate benefits of the HCFC phase-out (Leap Frog HFCs)



Conclusions (2)

- Industry, manufacturers, contractors needs to act now to avoid shortages (end-users, operators need to be informed)
- Solutions exist to transition to refrigerants with a lower GWP but need to be addressed the problem
- Confinement, leak check, logbook remain a key priority



THANK YOU!

Email: buoni@centrogalileo.it

Marco Buoni

VicePresident, AREA

Air Conditioning & Refrigeration European contractors' Association

(www.area-eur.be)

Secretary General Italian Association of Refrigeration Technician, ATF

(www.associazioneATF.org)

