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BELGIAN NATIONAL DEBATE ON CARBON PRICING

WORKSHOP ON NON-ETS INDUSTRY, AGRICULTURE, WASTE AND F-GASES

SESSION II – FLUORINATED GASES

Brussels, 30/03/2018

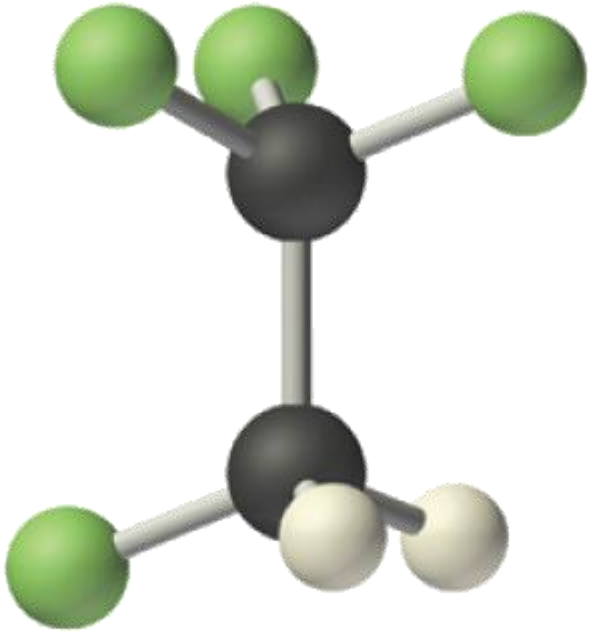
Climate Change Service
Federal Public Service Health,
Food chain safety and Environment

2050.be

TOWARDS A
LOW CARBON SOCIETY

OUTLINE

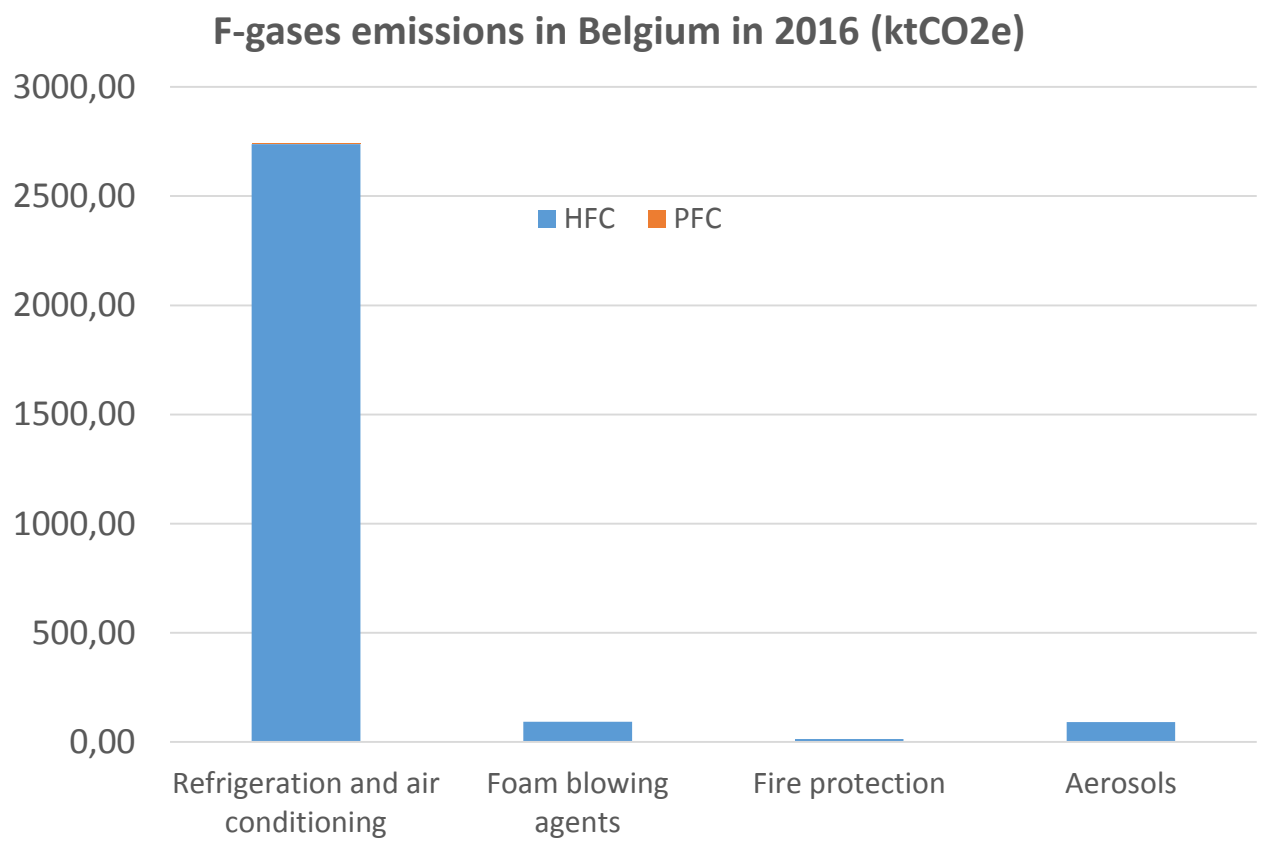
1. Context
2. Prices and taxes
3. Options for discussion



HFC-134a, CH_2FCF_3

1. CONTEXT

F-GASES EMISSIONS IN BELGIUM AMOUNTED TO ALMOST 3 MTCO2eq IN 2016



Note: Emissions presented here are emissions from product uses as substitutes for ODS; process emissions from industry are dealt with under part I devoted to 'non-ETS industry'

Source: NIR (2018)

F-GASES IN GENERAL (1/3)

Fluorinated Gases (F-Gases) are man-made Gases that are produced by the chemical industry.

These products are:

- Produced
- Sold
- Used
- Reused
- Should be recovered, recycled or reclaimed and
- Should be destroyed at the end of life

This means they keep a commercial value during their whole lifetime.

F-GASES IN GENERAL (2/3)

F-Gases have all a GWP in a broad range from 12 to 22 800.

They are used in refrigeration, air-conditioning and heat pumps applications, as fire extinguisher, solvent, foaming agent…

They are currently accounting for +/- 2-3% of the GHG emissions but raising rapidly globally (may reach 20% in 2050).

First developed as replacement refrigerant for the Montreal Protocol controlled substances (CFC and HCFC), the predominant HFC have been recently included in the scope of the Montreal Protocol via its **Kigali amendment**.

F-GASES IN GENERAL (3/3)

This context requires preliminary remarks :

- Montreal Protocol considers **Production** and **Consumption** (when the substance is used) and not directly **Emissions** (used in UNFCCC)
- The gases “consumed” in applications are often not emitted at the same time, meaning that there are **stocks that may last for a long time**
- Consequently, if actions are taken at a specific moment, it should be consistently applied for a **long period**
- Further action should and can be taken in order to deal with those **stocks** and avoid any release in the atmosphere

CHARACTERISTICS

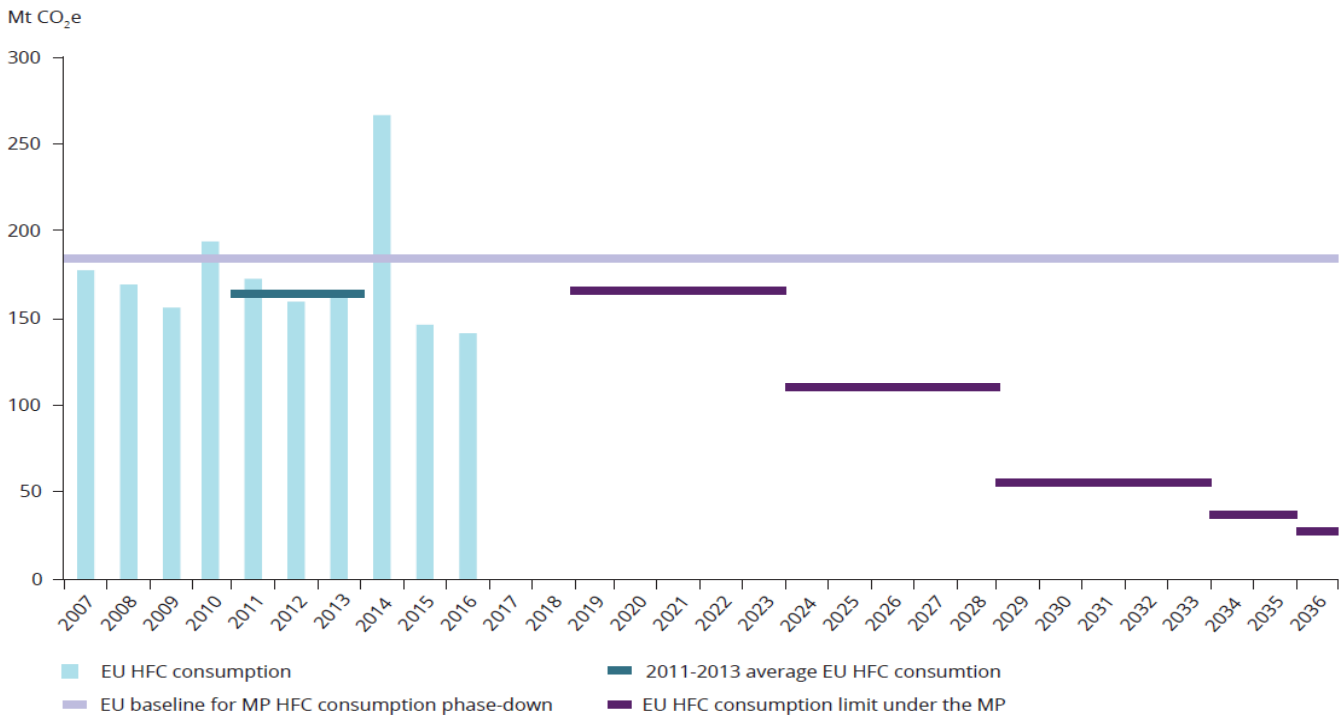
Characteristics of F-Gases:

- Substances have a (high) commercial value
- Substances are (very) potent GHG – actions is “concentrated”
- Substances are mainly used in non-emissive uses (RACHP)
- Substances can be recovered, recycled, reclaimed and destroyed (RRRD) – Cost and income
- Technologies are evolving rapidly (under impulse of EU regulation or Kigali Amendment) towards either new F GASES with much lower GWP or Natural refrigerants or Not-in-Kind technologies
- Other aspects and windfall profits for users (Energy Efficiency, Upgrade)
- …

INTERNATIONAL CONTEXT – MONTREAL PROTOCOL

The Kigali Amendment (KA) foresees a phase down up to 2047 of consumption and production as well as a licensing system (imports-exports) in 2019, prohibitions of trade with non-Parties and specific schedules and support for developing countries.

Figure ES.2 Approaching the Montreal Protocol HFC phase-down



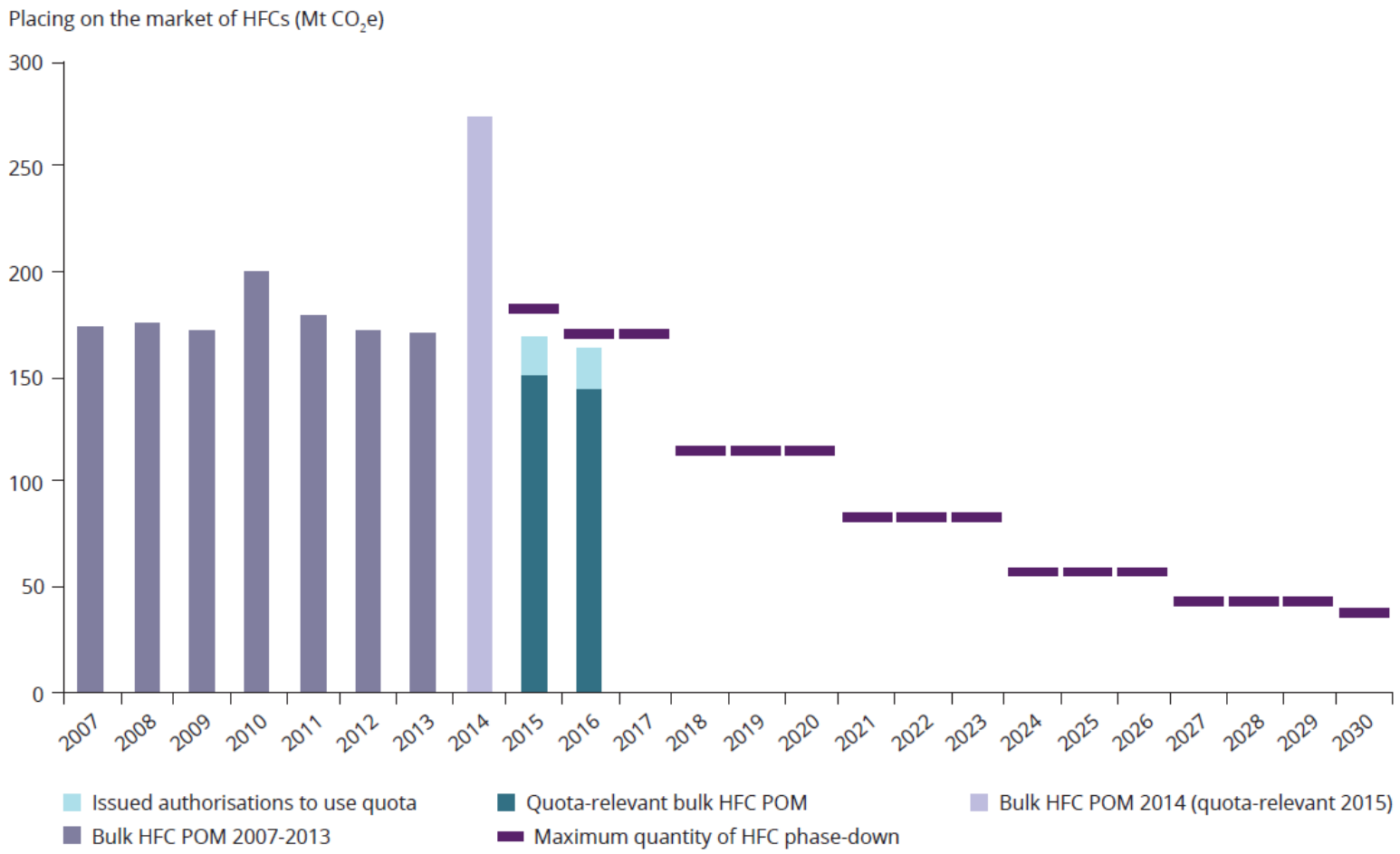
Source : EEA Report 2017 :
Data reported by companies on the production, import, export and destruction of fluorinated greenhouse GASES in the European Union, 2007-2016

EUROPEAN CONTEXT

- In the European Union, there is a Regulation (EU) N° 517/2014, a directive for Mobile AC (Dir 2006/40/CE) and a set of implementing acts;
- This Regulation introduces a stricter phase-down going up to 2030, has a broader scope (HFCs, PFCs, SF6), imposes containment and recovery, training and certification of persons handling those gases, labelling, controls the amounts through a quota system, bans of uses and prevents emissions;
- The regulation is also evolving either to adapt to the KA or to adjust the regulation to the 2050 objectives (and beyond);
- The intention is to allow a foreseeable timetable for the industry to adapt, improve and develop alternatives, either with new fluorinated chemicals (blends and/or HFOs) or using alternative refrigerant and technologies (like natural refrigerants such as Ammonia (NH3), Carbon dioxide (CO2) or Hydrocarbons (HC)

F-GASES IN EUROPE (1/5)

Figure ES.1 Progress of the EU HFC phase-down



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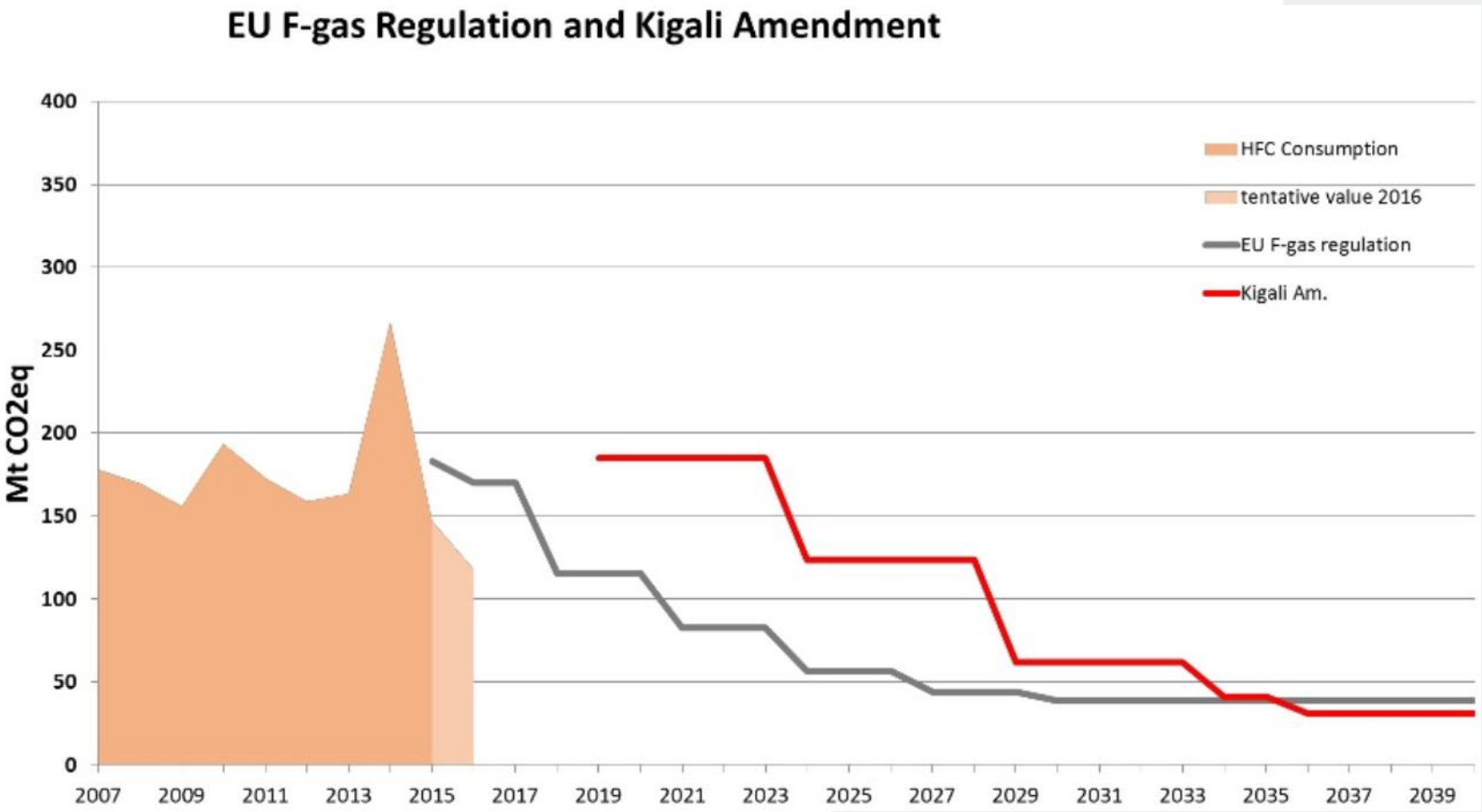
F-GASES IN EUROPE (2/5)



F-GASES IN EUROPE (3/5)

Quota system : The maximum quantity of HFC quotas available in 2015 corresponds to 100% of the annual average demand during 2009-2012, approximately 182.5 million tonnes (Mt) CO2e, which is also referred to as the “baseline.”

Year	Max Qty (%)	Reduction (%)
2015	100	baseline
2016	93	-7
2018	63	-37
2021	41	-55
2024	31	-69
2027	24	-76
2030	21	-79

F-GASES IN EUROPE (4/5)

Year	Measure
2017	All filled units imported into the EU need quota. Approx. 11% reduction in available gas this year.
2018	Decrease of 37% for available virgin HFC products available to be placed on the market.
2020	In new stationary systems, ban on refrigerants with CWP>2500 (except below -50°C)
2020	Service ban for existing equipment with virgin refrigerants of GWP>250 where charge size is greater than 40 tonnes of CO2 equivalents.
2022	Ban on the use of virgin refrigerants of GWP>150 in new hermetic and multipack centralized systems (some exceptions).
2025	Ban on the use of virgin refrigerants of GWP>750 for use in single split air con where charge <3kg.

F-GASES IN EUROPE (5/5)

Therefore, to achieve these targets we can move forward in two ways:

- Develop and use different synthetic refrigerants or blends with **lower GWPs**
- Switch to completely **natural alternatives** such as ammonia, carbon dioxide or hydrocarbons which have GWPs less than 150

The solution lies certainly in a mix of both paths

Challenges ahead:

- **Price** of F-Gases on the market
  - Virgins substances
  - RRR (recovered, recycled, reclaimed)
- **Bans** of use
- **Risk** management (flammability (A2L and A3) and toxicity)
- **Evolution** of the F-Gases regulation in Europe
  - Further steps, timing, ambition
  - New constraints (bans, standards, sustainable goals)
  - New opportunities (R&D on substances, technologies)
  - …

F-GASES EMISSIONS

The regulation controls production and consumption -> need for a translation in emissions.

Emissions points :

- At the F-gases production facility
- At the equipment production facility/during installation: equipment can be either filled at manufacturing and (hermetically) sealed or has to be installed and is filled on site. This mainly depends on the size of the installation/equipment
- During operation those equipment are subject to leaks/accidents
- During maintenance/repair/retrofit
- At disposal
- At Recovery, Recycling, Reclamation and Destruction (RRRD) facility :

  decommissioning/recycling of the equipment

F-GASES EMISSIONS IN BELGIUM

Fluorinated Greenhouse Gases Emissions in Belgium (1995 – 2016)

- General Trends
- Gases (PFCs and HFCs)
- Emissions (evolution of the sectors)
- Sources of Emissions
- Emissions by Sectors
- Emissions by Substances and Sectors

2. PRICES AND TAXES

F-GASES PRICES AND AVAILABILITY

- Prices are increasing rapidly
  - In Europe : quotas are limiting the amounts placed on the market
    - R-404A and R-507 prices (GWP >3900) have risen by 225 %
    - R-410A and R-134a prices (GWP of 2088 and 1430, respectively) have doubled, i.e. a 100% increase.
  - In the USA, R22 (an HCFC) will be banned in 2020 , which impacts the HFC market

- Availability decreases rapidly too
  - R-134a, R-404A and R-507 will be hard to find in Europe. Retrofit is possible to R-407F and R-448A or R-452A and R-449A

- Taxes or fees are applied in some European Member States

F-GASES TAXES AND EMISSIONS CONTROL IN OTHER MEMBER STATES AND NORWAY

Several European countries have implemented or will implement taxes or fees to act on F-Gases

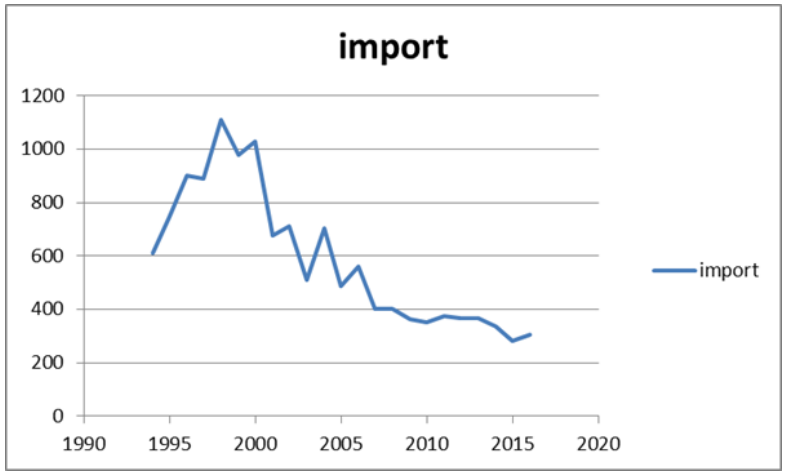
- Denmark
- Spain
- Poland
- Slovenia
- Norway
- France

COUNTRY	SCOPE OF THE CARBON TAX					
	Buildings	Transport	Non-ETS Industry	Agriculture (fuel combustion)	Agriculture (non-CO2)	F-gases
EUROPE						
Denmark						
Estonia						
Finland						
France						
Iceland						
Ireland						
Norway						
Poland						
Portugal						
Slovenia						
Spain						
Sweden						
Switzerland						
British Columbia						
Chile						
Japan						
Mexico						
South Africa						

DENMARK

- Tax **on imports (and production)** of CFC, HCFC and HFC, both in bulk or in equipment and products
  - 150 DKK (±20€)/tCO2eq (meaning ±29 € for 1kg of HFC134a (GWP=1430))
  - Ceiling at 600 DKK (±80 €)
- **Refund if exported**

- The effect was an immediate impact (2001), but is also dependent on the cost of the substance in relation to the cost of the final product.
  - Huge impact on foam
  - Less impact in refrigeration
  - Imports dropped rapidly



SPAIN

- **Tax at the end of the chain when filled-in by a certified technician**
  - Applies to HFCs, PFCs and SF6 for all applications and based on €/tCO2eq
  - 20€ but progressive : 1/3 in 2014 = 6 € ; 2/3 in 2015 = 13€ but freed until then
  - Only applicable after the initial filling (in case of leaks)
  - Specific exemptions (fire-fighting, medical applications, insulation foam) : reduced or zero tax
  - Partial reimbursement of the tax at end of life (encourage recovery and stock management)
  - Involvement of the stakeholders in the legislative process

- Results are encouraging:
  - -40% of emissions in 3 years in RACHP (responsible for 90% of the emissions)
  - Promotion of alternative technologies in new installations (improves employment)
  - Retrofit of H-GWP installations
  - Reduction of leakages

POLAND

- Special **emission fee** “for using the environment”
  - Covers HFCs, PFCs and SF6 (as well as CFCs and HCFCs) from companies releasing or emitting
  - Collected once a year from companies releasing or emitting
  - Applied to quantities (kg of substance)
    - POM -> 0,003PLN (0,0007 €)
    - Emissions -> 30,19 PNL (7,15 €)

- Revenues are directed to the Polish State Fund for Environmental Protection and Water Management to be used for managing F-gases, through both the maintenance of reporting databases and other F-gas emission reduction projects;

NORWAY

- Covers **import and production** of HFCs and PFCs
  - Based on the GWP of the substance (NOK/tCO2eq)
  - it has steadily been increased since to 400 NOK (about 42 €) in 2018
  - **Exemption for HFCs for export or re-export**, and very small quantities
- **Refund scheme** from 2014: provides an equivalent **refund when HFCs are destroyed**.

SLOVENIA

- Introduced on the **use** of HFCs (and other F-gases)
- The tax being based on the climate impact (€/tCO2eq)
- The price is set each year; introduced at a level of about €1 per tCO2e, it was gradually increased to a level of about €16/tCO2e in 2013, but then reduced sharply. The 2015 tax rate is €0.003456 per kilogram, multiplied by the GWP of the substance.

FRANCE (FORTHCOMING IN 2019)

- Covers **import and production** of HFC
- Collected at the first placing on the market (producers and importers)
- Based on the GWP of the substance (€/tCO2eq)
- **Follows the trajectory of the global carbon tax** (starts at 40 €/tCO2eq up to about 100€ in 2030)
- Incentivizes the RRRD
- Compensation scheme is also considered to support investments in low GWP or HFC-free alternatives (25% tax credit has been announced)

THANK YOU!

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