PFAS Restriction Proposal - focus on fluorinated gases

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KEMI Swedish Chemicals Agency
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Environmental Protection Agency

Restriction proposal - content

- **REACH = Registration, Evaluation, Authorisation and restriction of CHemicals**

- **Restriction proposal:**
  - ✓ Chemical identity
  - ✓ Hazards, risks, effects
  - ✓ Applications
  - ✓ Availability of alternatives
  - ✓ Socio-economic analysis – impact assessment
  - ✓ Restriction entry

«Forever chemicals»

- **All PFASs in scope of this restriction proposal are either persistent themselves or degrade to other persistent PFASs**
- **Persistence due to strength of the carbon-fluorine bond**
- **Applies also for fluorinated gases that are PFAS**

Concerns

Properties

- **Very high persistence**
- Long-range transport potential
- Mobility
- Accumulation in plants
- Bioaccumulation potential
- (Eco)toxicity
- Endocrine activity

Concerns related to combinations of properties

- High potential for ubiquitous, increasing and irreversible exposures of the environment and humans;
- Difficulty to decontaminate raw water for drinking water, low effectiveness of end-of-pipe RMMs and difficulty to treat contaminated sites;
- High potential for human exposure via food and drinking water;
- Potential for intergenerational effects and delay of effects;
- Potential for causing serious effects although those would not be observed in standard tests;
- Estimation of future exposure levels and safe concentration limits is highly uncertain;
- Global warming potential.

Justification for EU-wide measure

- PFASs manufactured, imported and used in EU
- Global market with growing volumes (e.g., fluorinated gases and fluoropolymers)
- Large variety of emission sources (across life cycle stages)
- Ubiquitous presence and increasing levels in environment
- No (cost) efficient remediation possible
- PFASs are mobile and cross borders
- EU internal market: level playing field

EU-wide risk reduction measures: Implement control efficiently and uniformly

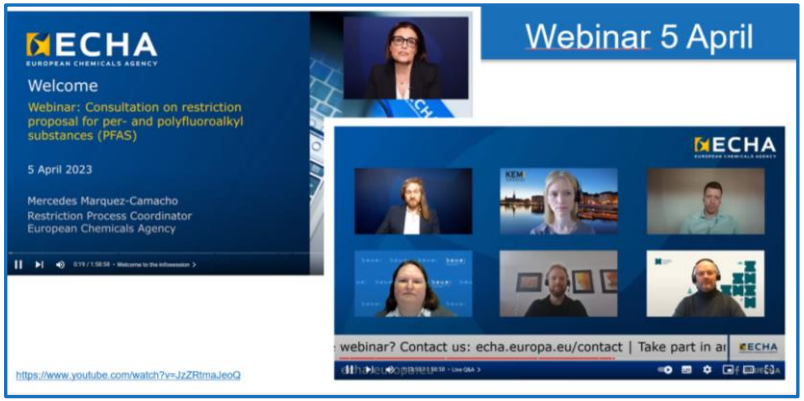
Grouping approach

- Grouping based on two aspects:
  i) Chemical structure (i.e. in line with OECD 2021 PFAS definition)
  ii) Persistence
- Equivalent hazards and risks are covered
- Justified to avoid regrettable substitution
- Prevention of future exposures of PFAS which are not currently in use.

Restriction process – next steps

- **Public Consultation, 22 March – 25 September 2023**

ECHA webinar 5 April
https://www.youtube.com/watch?v=JzZRtmaJeoQ



ECHA's UPFAS consultation
https://echa.europa.eu/nl/restrictions-under-consideration/-/substance-rev/72301/term

Sectors/uses of PFASs

Rainwear

Non-stick coating

Cosmetics

Medical equipment

- Industrial processes
- Firefighting foams
- TULAC
- Food contact materials (incl. packaging)
- Metal plating/metal products
- Consumer mixtures
- Ski wax
- Transport

- **Applications of fluorinated gases**
- Electronics and semiconductors
- Energy sector
- Construction products
- Lubricants
- Petroleum and mining
- Medical devices
- Cosmetics
- Other uses

PFAS restriction – fluorinated gases

Photo: Audun Heggelund

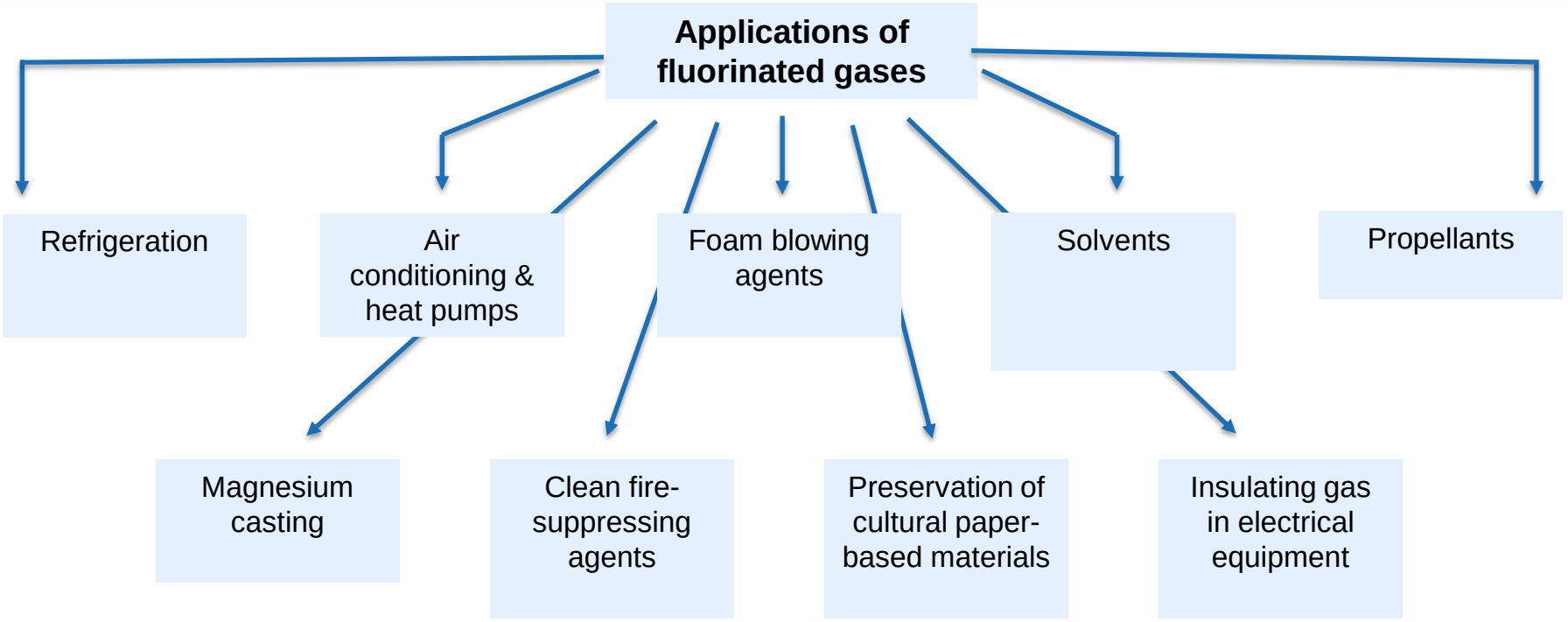
Most F-gases are within the scope of the PFAS restriction

(out of scope: e.g., HFC-23, HFC-32, HFC-152a)

Assessed in restriction proposal:

- Applications divided in 9 main groups
- Alternatives (availability)
- Risks to human health and environment
- Socio-economic aspects (costs and benefits)

Fluorinated gases: applications



Annual emissions of fluorinated gases in the EU/EEA: 39 000 tonnes

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Fluorinated gases – atmospheric degradation and concerns

F-gas regulation

Global warming

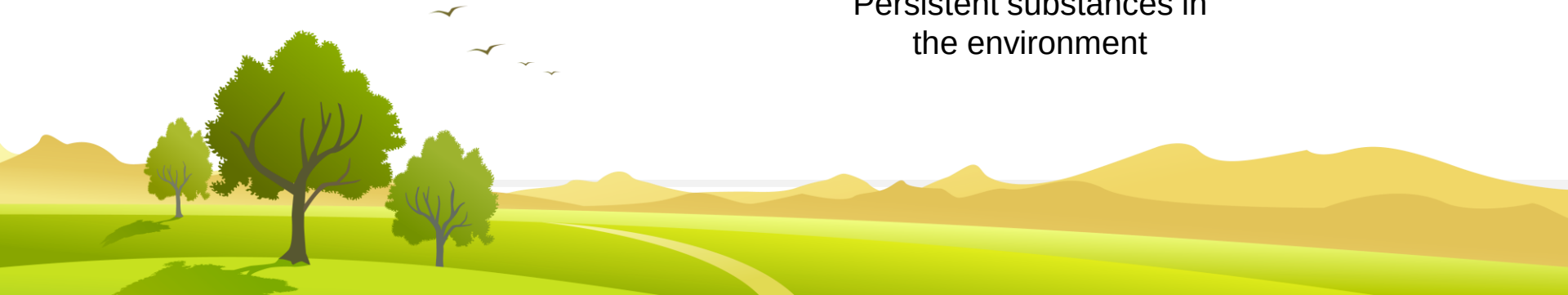
Fluorinated gases

Degradation

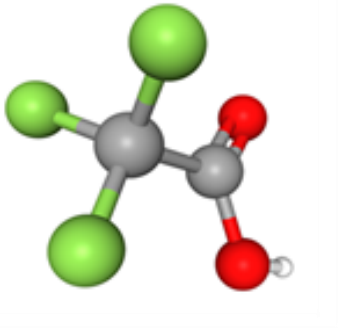
TFA ++

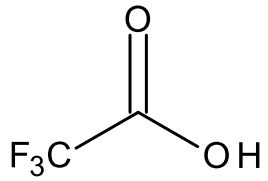
REACH

Persistent substances in the environment



Trifluoroacetic acid - TFA





TFA

- **Fully fluorinated version of acetic acid**
- **Colorless liquid, boiling point 72 °C**
- **Relatively strong carboxylic acid**
- **Used in various industrial applications**
- **Harmonized Classification: H412 - harmful to aquatic life with long lasting effects (Aquatic Chronic 3)**
- **Microalgae *Raphidocelis subcapitata* most sensitive organism i freshwater**
- **Persistent in the environment – mobile in water → vPvM**
- **Difficult to remove in purification**

Sources of TFA in the environment[1]

- **More than 10 000 different PFAS – 1 may have natural sources**
- **Potentially natural sources in the ocean (200 ng/L) – deep-sea vents[2]**
- **Industrial uses of TFA (100 - 1000 t/y)**
- **Degradation of fluorinated gases from e.g. refrigerants**
- **Degradation of pharmaceuticals, biocides and plant protection products**
- **Degradation of other substances containing C-CF_3**
- **Incineration of PFAS, including fluoropolymers**

1. Freeling & Björnsdotter (**2023**), *Current Opinion in Green and Sustainable Chemistry*, 41, 100807.
2. Frank et al. (**2002**), *Environmental Science & Technology*, 36, 12-15.

F-gas regulation

- **Regulation (EU) No 517/2014 (F-gas regulation) – currently under revision**
- **Adresses global warming from F-gases**
- **Gradual phase-down of the F-gases' total contribution to global warming**
- **Measures volumes in CO_2-equivalents based on the individual gases' GWP value**
- **Does not address persistent substances in the environment**
- **Contains list of prohibitions on specific applications of HFCs and PFCs, often over a given GWP**

Restriction Options (ROs) assessed

RO1

Full ban of all uses

- Transition period: 18 months

RO2

Ban with use-specific derogations

- Transition period: 18 months
- Duration of derogation:
  - 5 years (based on set criteria relating to alternatives)
  - 12 years (based on set criteria relating to alternatives)
  - Time-unlimited derogations (specifically justified)

Approach to derogations

5 years (+ 18 month transition period)

- Non-existence of feasible alternatives on market at EiF, but alternatives already identified
- Alternatives not available in sufficient quantities
- Alternative cannot be implemented by company before transition period ends

12 years (+ 18 month transition period)

- No feasible alternatives identified so far
- Certification/approval of alternative cannot be achieved within 5-year derogation period

Conclusions

- **RO1: Could be proportional in medium and long-term**
  - Likely progressive increase in societal costs of continued use, which will eventually outweigh societal costs of the restriction option

- **RO2: Also proportional, and most appropriate**
  - Balancing trade-offs between short-term and long-term

Cost of restriction	vs	Societal costs of continued use

Consultation – more information needed

- **Information needed on alternatives**
- **Users of fluorinated gases may focus on difficulty to transition to non-PFAS alternatives**
  - Info needed on availability of alternatives, including necessary transitioning time to alternatives (steps and timelines)
- **Public RCOM documents show arguments against alternatives**
  - E.g., RCOM part 15, 4339: CO_2 and NH_3 refrigerant cannot be used onboard ships
- **Substantiated information and comments can be taken into account during scientific scrutiny by RAC and SEAC**

Consultation – where to go?

- **Website of ECHA : Submitted restrictions under consideration - ECHA (europa.eu)**
  - Dossier incl. annexes
  - RCOM documents
  - Access to consultation
- **Specific questions for consultation: https://echa.europa.eu/documents/10162/aea5537d-b698-3b75-4b67-0cadd0fd11d3**

Summary and next steps

- **Restriction for PFAS, including fluorinated gases, proposed**
- **Information on alternatives for fluorinated gases is important**
- **Public Consultation 22 March – 25 September 2023**