



## Evaluation and Impact Assessment for amending Regulation (EU) No 517/2014 on fluorinated greenhouse gases

**Virtual stakeholder workshop**

**6 May 2021, 10.00 – 17.00 CET**

# Agenda

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|--------------|--|
| <b>10.00</b> | <b>Welcome and keynote speech by Deputy General Director Clara de la Torre: The F-gas review in the context of the European Green Deal (DG CLIMA)</b>              |
| <b>10.10</b> | <b>Introduction to the objectives of the workshop and housekeeping rules (DG CLIMA)</b>  |
| <b>10.15</b> | <b>Findings of the study supporting the evaluation of the F-gas Regulation (Project team)</b><br>– Effectiveness, efficiency, relevance, coherence, EU added value |
| <b>11.00</b> | <b>Overview of policy options analysed in the study supporting the impact assessment (Project team)</b>  |
| <b>11.30</b> | <b>Q&amp;As (All)</b>  |
| <b>12.30</b> | <b>Lunch break</b>   |
| <b>13.30</b> | <b>Modelling approach and presentation of scenarios (Project team)</b>   |
| <b>14.00</b> | <b>Preliminary findings regarding the assessment of impacts (Project team)</b>   |
| <b>14.30</b> | <b>Overview of specific further data needs (Project team)</b><br><b>Q&amp;As (All)</b>   |
| <b>14.40</b> | – Switchgear sector<br>– Cooling sector<br>– Other sectors   |
| <b>16.45</b> | <b>Closing remarks and explanation of next steps (DG CLIMA)</b>  |
| <b>17.00</b> | <b>Close of the workshop</b>   |

## WELCOME ADDRESS

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**Clara de la Torre**

Deputy Director-General  
DG CLIMA

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– Cooling sector  
– Other sectors
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- 17.00** Close of the workshop

DG CLIMA F-gas review team

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Bente Tranholm Schwarz (CHAIR)

Arno Kaschl

Xenia Messariti

## Housekeeping rules (I)

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- All participants will be muted during the workshop, unless given the floor.
- The workshop will not be recorded.
- The high number of participants (~ 450) requires the following procedure for the Q&A sessions:
  - If you have questions and comments you are encouraged to write directly in the chat window. Please be as **concise** as possible. Indicate **'Question:'** or **'Comment:'** and if possible the topic e.g. **'Question/Effectiveness:'**
  - Confine questions/comments to the **presentation topic** and upload **before** the presentation ends.
  - Questions and comments will be reviewed and grouped. During the Q&A sessions they will be read out and answered by DG CLIMA and the project team.
  - You may also request a short oral intervention (ca. 1 min) by writing **'Hand' and a short topic description**.
  - Please note, the high number of participants does not allow for any presentations, oral statements or other long interventions by stakeholders. You can send a written contribution by 17 May.

## Housekeeping rules (II)

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- Questions and requests for the floor must be sent during the presentations only.
- The chat will be closed after the presentations to allow for structuring of the questions by topics.
- When entering questions in the chat: Give a short indication of the topic group addressed in the question at the start of your chat message:
  - **Q&A morning session: 'Evaluation' or 'Policy options'**
  - **Q&A afternoon session:**
    - 'Cooling'
    - 'Switchgear'
    - 'MDIs'
    - 'Foams'
    - 'Fire protection'
    - 'Other'
- Send questions in the chat to **'Everyone'**.

## Objectives of the stakeholder workshop

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- Present the **main findings from the study to support the evaluation** of the Regulation;
- Present the **objectives for the revision** of the Regulation and **envisaged policy options**;
- Present the **approach to assess the impacts** of envisaged policy options for amending the Regulation;
- Provide the **preliminary findings of assessing** the environmental, economic and social **impacts** of envisaged policy options;
- Present **existing data gaps** where further stakeholder input is needed  
... and get **your comments** and **additional input**

## The F-gas review process

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- Commission commissioned **study** to provide background analysis for the Commission's evaluation and impact assessment of policy options
- **Stakeholder consultations** (online, targeted and conference) to ensure a solid analytical basis in the study
- By the end of 2021 the Commission plans to present its **new F-gas proposal**
- The proposal will be accompanied by the Commission's **impact assessment** of policy options with an **evaluation** of the current Regulation in the Annex

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# Findings of the study supporting the evaluation of the Regulation

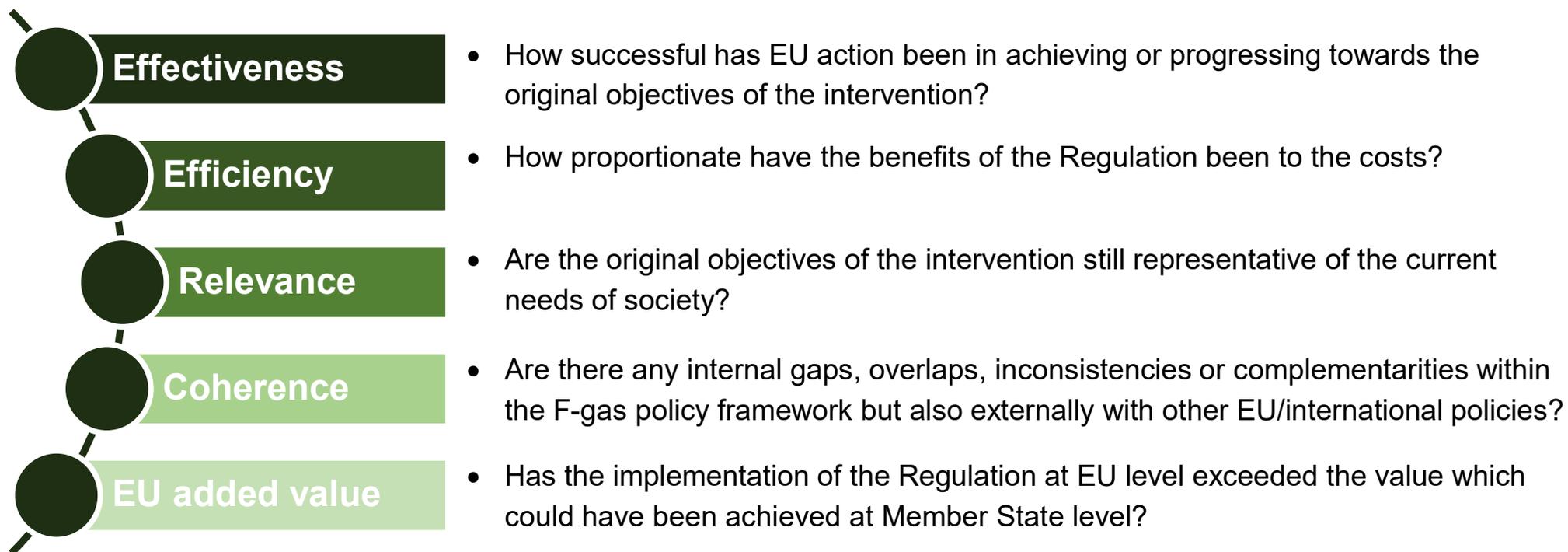
## Study objective

To evaluate the current Regulation following the principles set out in the European Commission’s Better Regulation Guidelines.

## Scope

<b>Legislative coverage</b>	Regulation (EU) No 517/2014 and implementing legislation
<b>Geographical coverage</b>	EU-27 + UK
<b>Sectoral coverage</b>	All sectors using F-gases
<b>Temporal coverage</b>	Adoption (1 January 2015) until present (2020 or year for which latest data is available)
<b>Counterfactual</b>	Scenario that would have occurred without existing policy intervention (i.e. F-gas framework and related national acts) Therefore it essentially represents the effects of the 2006 F-gas Regulation plus MAC Directive 2006/40/EC only

## Evaluation questions on five key criteria



## Effectiveness – original objectives of the Regulation

### General objective

**Contribution to Roadmap 2011: Keep climate change below 2°C of pre-industrial levels by reducing GHG emissions in the EU by 80 to 95 % in 2050 compared to 1990.**

### Specific objectives

Contribute to the achievement of the EU 2050 reduction target by reducing CO<sub>2</sub> eq from F-gases in the EU by:

- Discouraging the use of F-gases with high GWP in the EU where suitable alternatives exist;
- Encouraging the use of alternative substances or technologies when they result in lower GHG emissions without compromising safety, functionality and energy efficiency, and achieving higher market shares for these technologies;
- Preventing leakage from equipment and proper end-of-life treatment of F-gases in applications;
- Facilitating convergence towards a potential future agreement to phase down HFCs under the Montreal Protocol;
- Enhancing sustainable growth, stimulate innovation and develop green technologies by improving market opportunities for alternative technologies and gases with low GWP;
- Creating efficient and proportionate mechanisms for reaching the environmental objectives while limiting any undesirable effects on SMEs and employment, the administrative burden for companies and authorities, the abatement costs per tonne CO<sub>2</sub> eq and preserving the competition in the internal market (to the extent possible).

# Effectiveness

## How successful has EU action been in achieving or progressing towards the original objectives of the Regulation?

### Key findings (I)

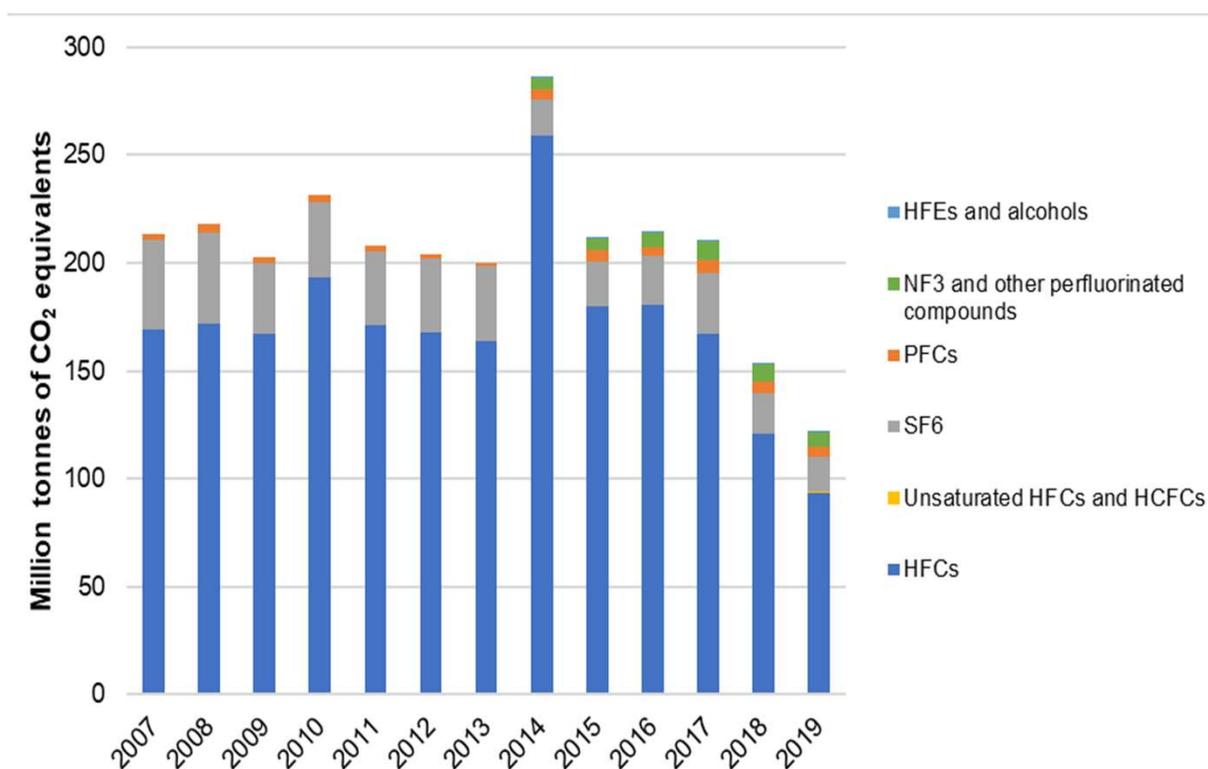
#### Effects

- The **supply of HFCs has declined** by 37 % in tonnes and 47 % in terms of CO<sub>2</sub> eq from 2015 until 2019.
- Key component has been a **switch to F-gases with lower GWP**. Average GWP of HFCs in total EU supply decreased by ~ 17 % between 2015 and 2019.
  - Alongside growth in supply of unsaturated HFCs and HCFCs (climate-friendly HFC substitutes) and **a significant uptake of natural refrigerants**.
- The **HFC phase-down obligation has in general been implemented effectively**.
  - HFC prices have risen in response as expected to incentivise green technologies, while prices of natural alternatives have not seen any price increases.
  - Reclamation of F-gases has shown low, but steady increase.
- **Placing on market and control of use prohibitions were implemented successfully** – prohibitions have been **easily understood** by industry and end-users.
- **Emissions have reduced by 8% from 2015 to 2018**, a decade-long upward trend until 2014 has been reversed, and emissions have been falling year on year since then.

That said, **forward modelling indicates that the original climate goals set for 2030 may not be fully reached**, i.e. the 2030 emission reduction target will be exceeded by ca. 9 Mt CO<sub>2</sub> equivalents.

## EU supply of F-gases placed on the market

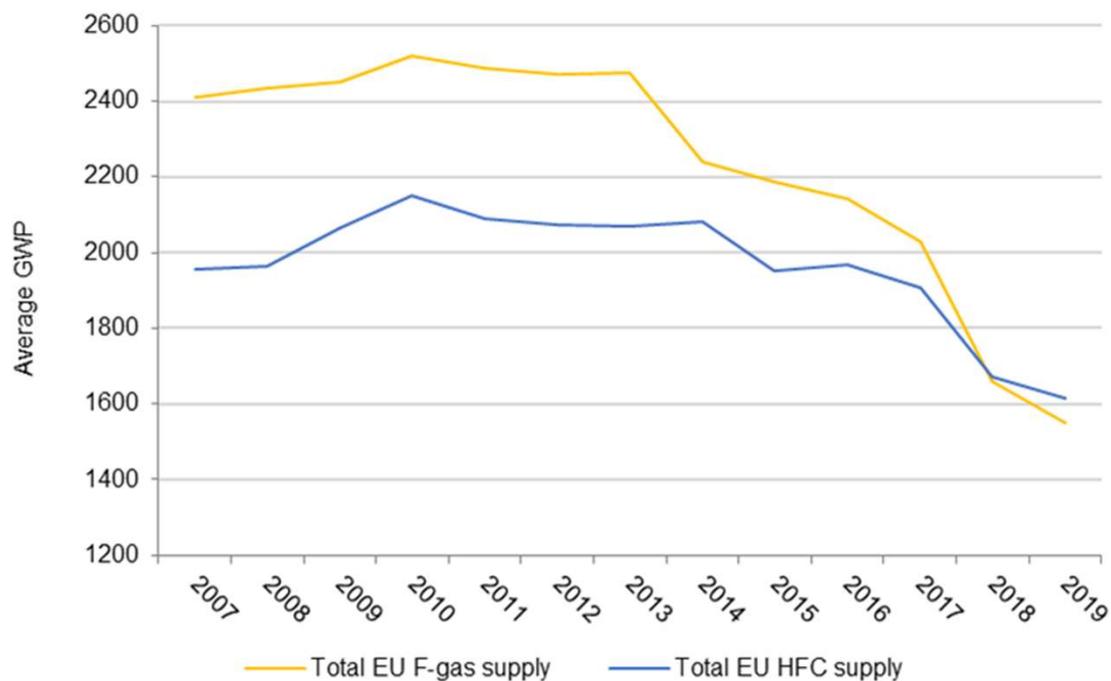
- The supply of HFCs has declined by 37 % in tonnes and 47 % in terms of CO<sub>2</sub> equivalents from 2015 until 2019.



Source: EEA F-gas Report 2020

## Development of the average GWP of the F-gas and HFC supply

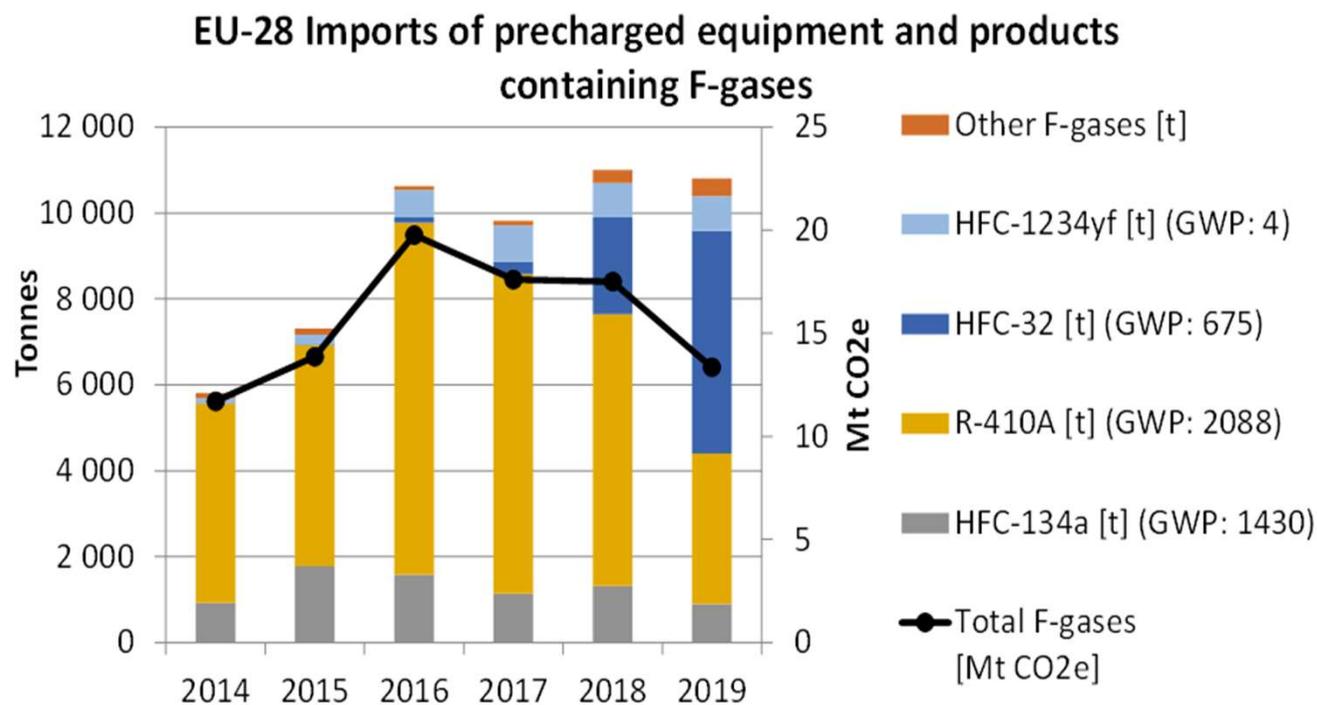
- Average GWP of HFCs in total EU supply decreased by ~ 17 % between 2015 and 2019.



**Source:** Own illustration based on EEA F-gas Report data

## Use of F-gases in imports of pre-charged products and equipment

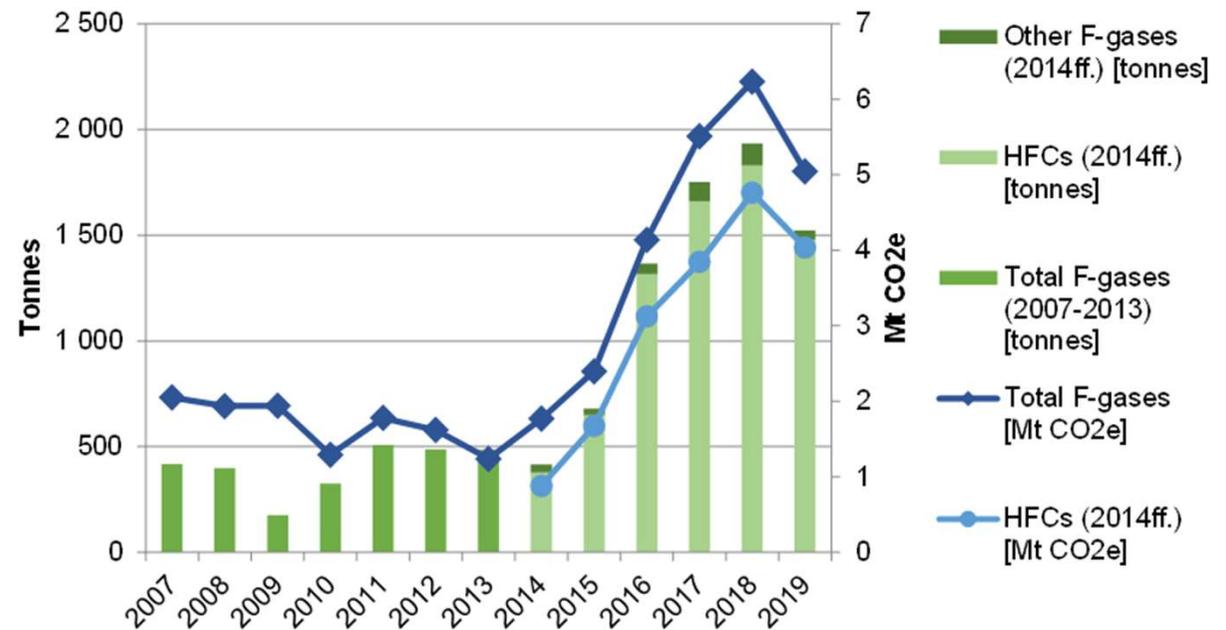
- Clear shift to lower GWP alternatives in imported pre-charged products and equipment



Source: [EEA 2020 confidential dataset], own calculations

## EU-28 reclamation of F-gases

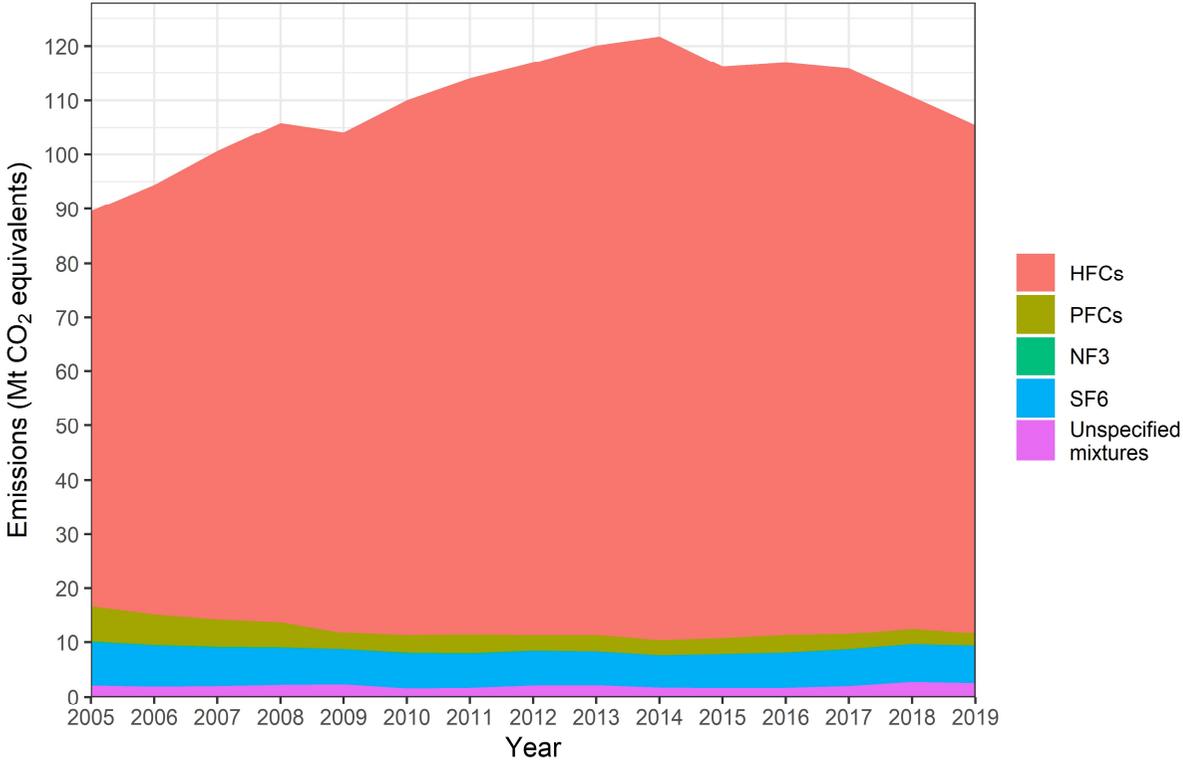
- Although there has been a fluctuation in reclamation of F-gases in the EU, there was a steady increase between 2014 and 2018, applied particularly to R134a, R404A, R407C and R410A.
- The decrease in reported amounts for 2019 is due to incomplete reporting.
- For R404A, reclaimed quantities made up 25 % of the total supply of R404A in 2019, underlining the effectiveness of existing prohibitions.



Source: EEA F-gas Report 2020

# F-gas emissions in the EU-27 + UK by substance group

- F-gas emissions reduced by 13% from 2014 to 2019.



Source: UNFCCC (April 2021 submission, EU Convention), figure by Öko-Recherche

# Effectiveness

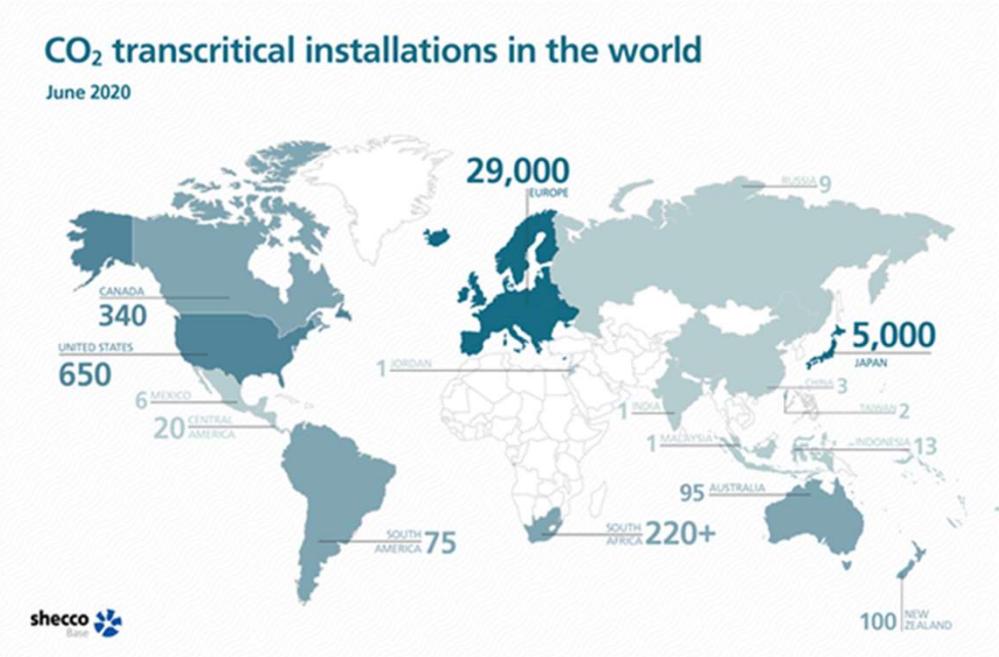
## Key findings (II)

### Effects

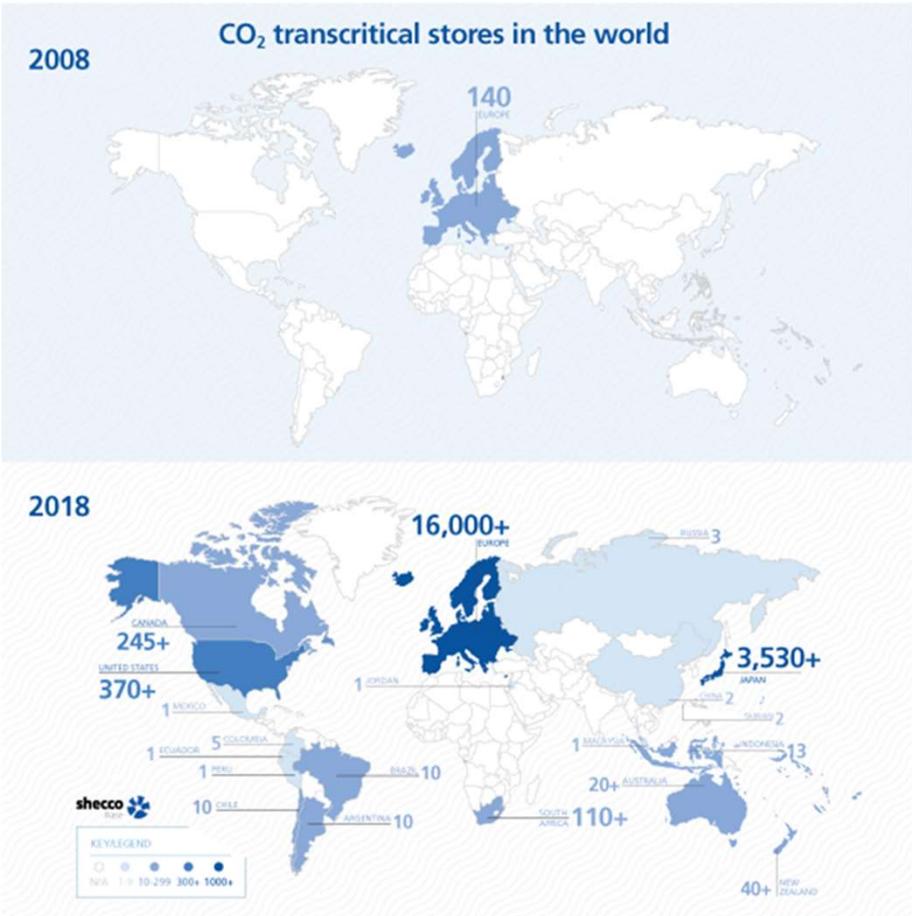
- The Regulation has **continued to address prevention of leakage** from equipment and the provision of proper end-of-life treatment.
- Data available from surveys in a number of EU Member States have shown the **positive impact of regular leakage checks and associated servicing activities**, especially in the commercial refrigeration sector.
- However, current emission prevention requirements **only concern Annex I gases** and **only apply to the use of bulk gases**, but not to their manufacturing, storage and transport.
- The Regulation has **helped facilitate convergence towards a potential future agreement** to phase down HFCs under the Montreal Protocol and was the basis for the EU consensus for making an amendment proposal in 2015.
- The Regulation was regarded by others as the “gold standard”, **prompting action outside the EU** (in Japan, Canada, Australia, the U.S.,...).
- The **HFC phase-down has been a strong trigger for innovation**, with the Regulation successful in enhancing sustainable growth and the development of green technologies.
  - **New blends**, especially mixtures consisting of HFCs and unsaturated HFCs, have entered the EU market, the **number of companies working with natural refrigerants has increased**, as well as the level of R&D investments.

# Number of transcritical CO<sub>2</sub> systems in retail in the EU and worldwide in 2008, 2018 and 2020

- EU as market leader for climate-friendly alternatives: massive market uptake of transcritical CO<sub>2</sub> systems in retail in the EU and worldwide since 2008



Source: Shecco



# Effectiveness

## Key findings (III)

### Challenges

- **Unjustified barriers** to the use of climate-friendly alternatives posed by **safety codes** ► Stakeholder input on national or sub-national (regional) safety legislation and building codes needed!
- **Insufficient number of service personnel qualified to install equipment with climate-friendly alternatives**
- Evidence of **illegal imports of HFCs outside the quota system**
- A strong **multiplication of “new entrants”** in the quota system (and with no links to the gas business)
- **Divergent penalties across the EU** for the same infringements and lack of transparency about the size and effectiveness of the penalties
- **Potential undesirable environmental effects of HFC alternatives** that are not currently monitored
- Regulation has been **less effective for F-gases other than HFCs** (PFCs, SF<sub>6</sub>)
- **Reporting and verification requirements are not sufficiently strong enough** to support compliance checking
  - **Data collected for reclamation** of F-gases was found to be **incomplete**
- **Lack of measures to promote enforcement and compliance with containment and leakage checks**

# Efficiency

How proportionate have the benefits of the Regulation been to the costs?

## Key findings (I)

### Benefits

- A **significant decrease in F-gas emissions** of 44 million tonnes of CO<sub>2</sub> eq has been achieved.
- No significant negative (and possibly positive) impact on **competitiveness of EU businesses and employment**.
- **Increased R&D investment by industry** and the **wide range of new alternatives** is representative of the high levels of innovation driven by the Regulation.
- A **small level of energy savings** as a result of the transition to alternatives, especially in new installations.

# Efficiency

## Key findings (II)

### Costs

- The **cost of technological change leading to emissions savings** was 0.2 billion € per year.
  - **This translates to abatement costs that are < 1 €/CO<sub>2</sub> eq.** The original impact assessment expected 16 €/CO<sub>2</sub> eq.
  - **Higher HFC prices**, due to the phase-down, **implied higher gas cost to (a large number of) end-users** that were still using HFCs.
  - Total compliance cost to F-gas using industries in the EU in the evaluation period is 1.9 billion EUR/year, of which 1.5 billion EUR/year is linked to higher HFC prices.
  - But costs offset by profits in the HFC supply chain (distributional effects).
- According to stakeholders, **prohibitions and HFC quota system have presented the highest costs** for businesses (but were seen also as the main drivers for achieving the emission savings and level of innovation)
- Small administrative burden for Member State competent authorities.
- More information is needed on the administrative burden for businesses related to the individual measures.

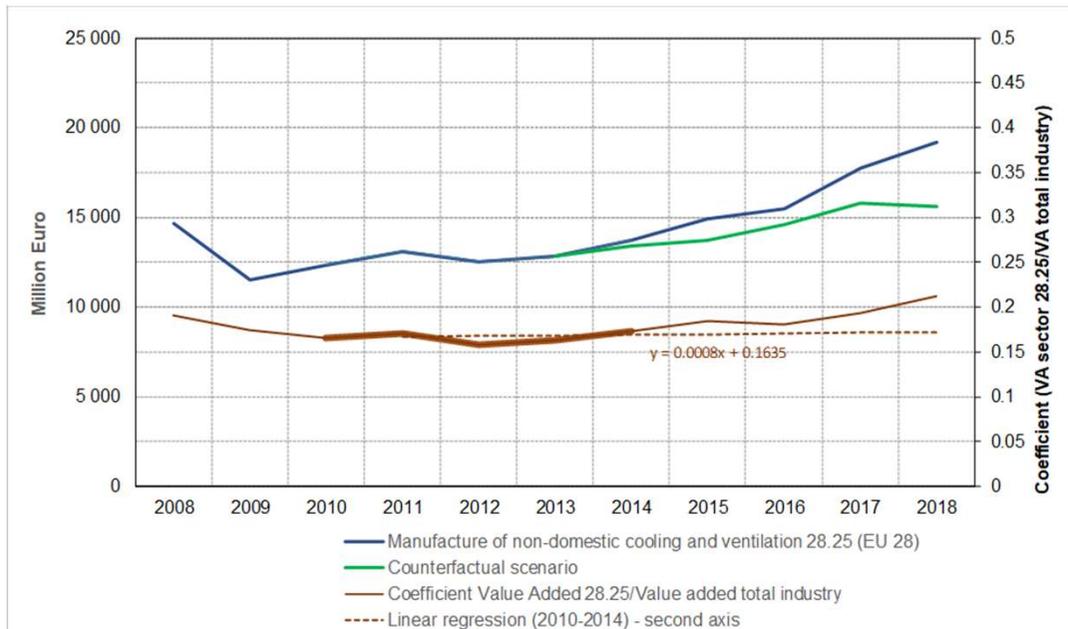
# Efficiency

## Key findings (III)

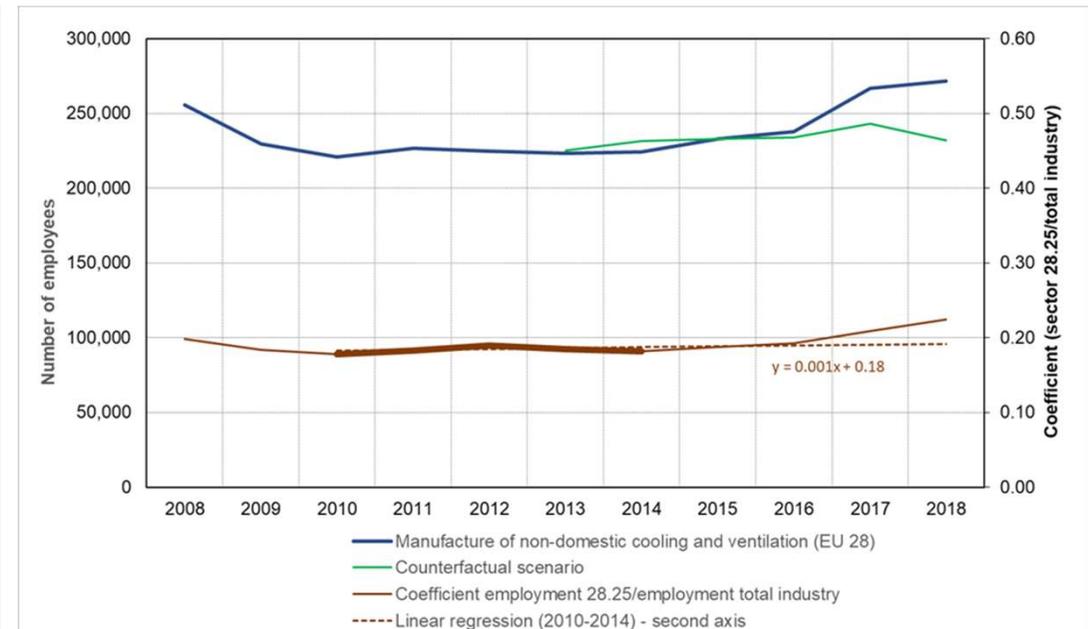
- **The Regulation has resulted in significant emission savings at very low abatement costs linked to technological change.**
  - Emission reduction costs calculated as the average ratio of the annualised technological cost relative to the lifetime-averaged emissions savings were overall on average below 1 €/t CO<sub>2</sub> eq, representing a cost effective solution.
  - But cost of action varies significantly across sectors.
- Stakeholder feedback did not signal that for any of the individual components that the costs outweighed the benefit.

Unlikely that Regulation had a negative effect on the sector, and could have had a positive effect

**Value Added (VA) – Manufacturing of non-domestic cooling and ventilation equipment – actual development and counterfactual scenario (EU-28)**



**Employment – Manufacturing of non-domestic cooling and ventilation equipment – actual development and counterfactual scenario (EU-28)**



Note: non-domestic = non-residential applications

Source: Own calculation based on annual detailed enterprise statistics for industry (Eurostat)

# Administrative burden

- Evidence gathered predominantly through stakeholder engagement (OPC and targeted interviews)
  - Total annual costs for all **Member State competent authorities** and across all measures estimated to be 11.2 million € (with further small one-off costs)
    - Most significant costs associated with: *‘conducting national inspections or checks’* (e.g. linked to emission prevention and leakage)
  - Only very limited data could be collected regarding administrative burden to **businesses**
    - At this point it is not possible to produce representative quantitative estimates
    - OPC offers qualitative insights:
      - Views on [total] costs of most measures were mixed – suggesting all measures carried some degree of costs which varied for different businesses
        - Responses were more convergent for: *‘labelling’* (only marginal costs), *‘restrictions on use and equipment’* and the *‘quota system’* (both comparatively expensive)
      - Across all measures majority of businesses agreed that costs were justified to achieve the objectives, i.e. that the benefits of action had outweighed the costs.
    - Some further qualitative insights were gathered from targeted interviews
      - These identified where ‘no change’ or additional actions (and hence costs) were associated with different measures
- ▶ *Please provide data on administrative and compliance costs for current measures of the Regulation, see Annex 4 to the Briefing Paper*

# Relevance

**Are the original objectives of the intervention still representative of the current needs of society?**

## Key findings

Continued relevance	Limitations
<ul style="list-style-type: none"><li>• The Regulation <b>remains very relevant as it is targeting EU's climate goals.</b></li></ul>	<ul style="list-style-type: none"><li>• Although relevant, given more ambitious EU climate objectives (55% by 2030 and carbon neutrality by 2050), the <b>Regulation no longer fully responds to the ,needs' of the EU.</b></li></ul>
<ul style="list-style-type: none"><li>• The Regulation is the <b>main policy tool through which the EU's compliance with international commitments</b> related to HFCs under the Montreal Protocol are safeguarded.</li></ul>	<ul style="list-style-type: none"><li>• The <b>Regulation needs to be better aligned with the Montreal Protocol</b>, notably long term, and could benefit from built-in flexibility to allow alignments with new developments under the Protocol.</li></ul>
<ul style="list-style-type: none"><li>• HFCs are still the most important group of F-gases, both in terms of quantity in tonnes and CO<sub>2</sub> eq.</li><li>• The <b>Regulation continues to capture the most important F-gases and the sectors they are used in.</b></li></ul>	<ul style="list-style-type: none"><li>• Questions have been raised around the <b>appropriate coverage of emerging substances</b>, and the <b>coverage of substances by different measures.</b></li></ul>

# Coherence

**Are there any internal gaps, overlaps, inconsistencies or complementarities within the F-gas policy framework but also externally with other EU/international policies?**

## Key findings (I)

### External coherence

- In general, the Regulation **was found to be externally consistent and coherent** with other interventions that have similar objectives.

### External incoherence

Some areas of **incoherence with the Montreal Protocol**:

- Lack of continuation of the EU HFC phase-down after 2030
- Lack of a HFC production phase-down
- HFC phase-down exemptions
- Exemptions and thresholds for placing on the market and reporting

Further potential for synergies, overlaps and coherence were found.

- Ensuring full alignment with customs controls and making full use of the EU „Single Window Environment for Customs“
- Incoherence with the Waste Electrical and Electronic Equipment Directive 2012/19/EU (treatment of foams)

# Coherence

## Key findings (II)

### Internal coherence

- The Regulation **has generally been found to be consistent and coherent** internally and across its implementing acts.

### Internal incoherence

- There is a lack of clarity regarding some definitions.
- A number of further definitions which should be added.
- There exists some inconsistencies with respect to the thresholds applied to the obligations of importers of pre-charged products and equipment.

## EU added value

**Has the implementation of the Regulation at EU level exceeded the value which could have been achieved at Member State level?**

### Key findings

#### EU added value

- Successfully implemented co-ordinated action at EU level to ensure compliance with the Montreal Protocol and the EU climate goals.
- Implementation at Member State level would not be feasible under the rules of the EU Internal Market.
- Co-ordinated action has increased the effectiveness of the policy to reduce F-gas demand and emissions.
- Supported the creation of a more efficient and less burdensome regulatory environment for the EU F-gas industry, helping to minimise costs and to creating a level playing field.

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# Overview of policy options analysed in the study supporting the impact assessment

## **OBJECTIVE A:**

**Raising ambition in line with the EU Green Deal**

- A1: Increase HFC phase-down ambition
- A2: Prohibit F-gases in products or equipment, where these gases are no longer needed

## **OBJECTIVE B:**

**Seeking alignment with the Montreal Protocol**

- B1: To achieve full alignment, add new phase-down steps beyond 2030
- B2: To achieve full alignment, remove some exemptions and thresholds not foreseen by the Montreal Protocol
- B3: To achieve full alignment, make separate phasing down of HFC production
- B4: Add flexibility to be able to align with future Montreal Protocol decisions
- B5: Other

## **OBJECTIVE C:**

**Improving implementation and enforcement**

- C1: Certification of technicians to include skills on the use of low-GWP alternatives
- C2: Include detailed rules to empower customs and surveillance authorities in the EU Member States and facilitate the use of the EU Single Window environment for customs
- C3: Strengthen obligations of economic operators to prevent illegal trade
- C4: Limit the market players to legitimate participants
- C5: More comprehensive monitoring

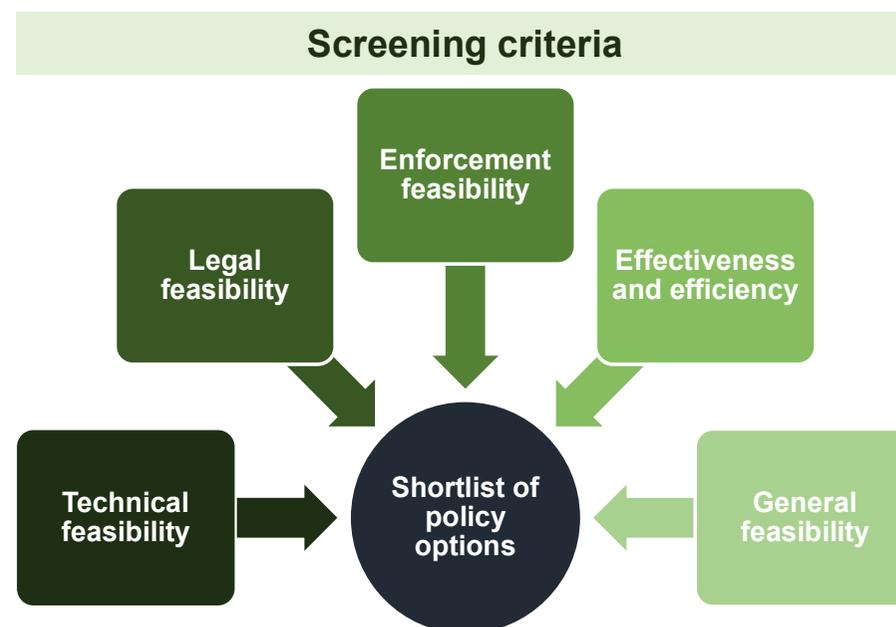
## **OBJECTIVE D:**

**Other improvements and clarifications**

- D1: Other improvements and clarifications

## Identification of policy options

- **First long list of specific options** for the different policy option groups were identified based on
  - Issues identified in the evaluation
  - Stakeholder feedback on the Commission's Inception Impact Assessment (IIA)
  - Stakeholder feedback received through
    - the open public consultation (OPC) that run from September to December 2020
    - the targeted interviews, which were conducted from January to March 2021
  - Input from market and technical experts
  - Other F-gas policy related projects (EC reports, studies commissioned by the EC),
  - Practical experience from the implementation of the Regulation



► „Shorter list“ of policy options subject to further analysis, see Annex 1 to the Briefing Paper

## Short-listed policy options (I)

### **Objective A:**

**Raising ambition in line with the EU Green Deal**

#### **A1: Increasing HFC phase-down ambition**

- Before 2030: Increase ambition of the remaining HFC phase-down steps
- After 2030: Increase ambition of future HFC phase-down steps beyond reduction required by the Montreal Protocol

#### **A2: Prohibiting F-gases in products or equipment, where these gases are no longer needed**

- New POM prohibition for stationary AC and HP equipment containing or relying on HFCs (Annex III)
- New POM prohibition for stationary refrigeration (small hermetic units for commercial and household use) containing or relying on HFCs (Annex III)
- Remove exemption for stationary refrigeration below – 50 °C (Annex III No 12)
- Remove exemption for servicing and maintenance of refrigeration equipment with a charge size below 40 tonnes of CO<sub>2</sub> eq (Article 13 (3))
- New POM prohibition for refrigeration and AC which use PFCs and blends containing PFCs (Annex III)
- Additional use prohibition for servicing and maintenance of refrigeration equipment with recycled or reclaimed F-gases after 2030 (Article 13 (3))

## Short-listed policy options (II)

### **Objective A:**

**Raising ambition in  
line with the EU  
Green Deal**

#### **A2: Prohibiting F-gases in products or equipment, where these gases are no longer needed (continued)**

- New POM prohibition for fire protection equipment containing or relying on HFCs and PFCs except when required to meet national safety standards (Annex III)
- New POM prohibition for personal care products containing F-gases (Annex III)
- New POM prohibition for electrical switchgear (MV switchgear for primary and secondary distribution and HV switchgear) (Annex III)
- New prohibition for the use of some inhalation anaesthetics containing high GWP HFEs/HCFEs (Annex III)
- Apply requirements for prevention of F-gas emissions to substances listed in Annex II (Article 3) and manufacturing, storage and transport of bulk gases (Article 3 (2), (3))

## Short-listed policy options (III)

### **Objective B:** Seeking alignment with the Montreal Protocol



#### **B1: To achieve full alignment, add new phase-down steps beyond 2030**

- Introduce HFC phase-down steps for 2034 and 2036 in alignment with the Montreal Protocol (Annex V)

#### **B2: To achieve full alignment, remove some exemptions and thresholds not foreseen by the Montreal Protocol**

- Remove exemptions from the HFC phase-down for semiconductors and MDIs (Article 15 (2))
- Remove threshold for placing HFCs on the market (100 tonnes of CO<sub>2</sub> eq) (Article 15 (2))
- Remove reporting thresholds (Article 19 (1)-(3))

#### **B3: To achieve full alignment, make separate phasing down of HFC production**

#### **B4: Adding flexibility to be able to align with future Montreal Protocol decisions**

#### **B5: Other**

- New prohibition for exports of bulk HFCs from the EU to any country not party to the Kigali Amendment as of 2033

## Short-listed policy options (IV)

### **Objective C:** Improving implementation and enforcement

#### **C1: Certification of technicians to include skills on the use of low-GWP alternatives (Art. 10)**

- Certification requirement for unsaturated HFCs and H(C)FCs and other alternatives
- F-gas certification programmes also to include practical training on all alternatives
- Adding energy efficiency issues to be part of training
- Installations/servicing/maintenance/repair only by certified personnel for alternatives

#### **C2: Including detailed rules to empower customs and surveillance authorities in the EU Member States and facilitate the use of the EU “Single Window environment for Customs”**

- Clear instructions on custom authorities’ and market surveillance authorities’ role
- Treatment of products and equipment illegally placed on the market and illegal containers
- Confidentiality obligations for EU Member States (Article 17 and 19)
- Include minimum penalties for non-compliance (Article 25)



<https://www.coolingpost.com/world-news/in-eu-member-states-must-stop-iph-18-as-enforcement/>

<https://www.gbv.de/de/themen/news/warum-kuenftig-hohe-strafen-bei-datenlecks-drohen-31246>

# Short-listed policy options (V)

## Objective C:

Improving  
implementation  
and enforcement



<https://www.coolingpost.com/world-news/illegal-imports-a-third-of-the-european-f-gas-quota/>

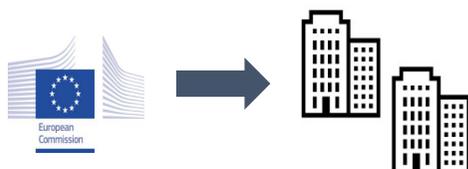
### **C3: Strengthening obligations of economic operators to prevent illegal trade**

- New prohibitions (transport, storage and use of non-refillable F-gas containers, sales and possession of F-gases illegally placed on the market)
- Requirements for transit (T1) procedures
- New obligations for importers
  - Mandatory certification for importers of bulk HFCs
  - Mandatory registration for importers of all pre-charged products and equipment
  - Requirement for non-EU importers of pre-charged products and equipment to mandate an “only representative” and have an EORI
  - Requirement to add the F-gas ID and F-gas quantities expressed in CO<sub>2</sub> eq in customs documents
- New obligations for selling F-gases
  - Mandatory certification for natural persons and undertakings selling bulk F-gases online
  - Mandatory documentation for downstream sales for bulk HFC/F-gases and record keeping
- Other requirements
  - Requirement for producers and importers to hold sufficient quota at the time of release for free circulation/POM
  - Obligation for importers to have quota-exempted quantities labelled during POM
  - Customs role to account for POM quantities in the HFC registry in real-time
  - Strengthen the obligation on destruction of HFC-23 by-production

# Short listed policy options (VI)

## Objective C:

Improving implementation and enforcement



### C4: Limiting the market players to legitimate participants

- Clarify the principle: “one beneficial owner, one quota declaration and one reference value”
- Limit issuing quota authorisations to incumbents only
- Withholding of quotas when allocating quota for certain reasons with a view to distribute it later
- Align the establishment of the annual declaration-based quota allocation with the frequency of the quota allocation based on reference values (i.e. for three years)
- Introduction of a registration and/or quota allocation price

### C5: More comprehensive monitoring

- Labelling requirement for HFOs and  $\text{NF}_3$  and possibly other F-gases
- New reporting obligations
  - Exporters of products and equipment containing F-gases and other fluorinated substances (plus registration obligation)
  - Recipients of quota-exempted HFCs
  - Undertakings performing recycling and reclamation of F-gases
  - Operators of switchgear and electrical equipment with regard to  $\text{SF}_6$  emissions
  - Use of some inhalation anaesthetics

## Short-listed policy options (VII)

### Objective C:

Improving  
implementation  
and enforcement



#### **C5: More comprehensive monitoring (continued)**

- Adjustment of reporting and verification obligations
  - Remove or lower the threshold for verification of bulk HFCs placed on the market
  - Add obligation to submit verification reports for bulk HFCs
  - Align reporting and verification thresholds for placing on the market products and equipment
  - Align reporting and verification dates
  - Add legal basis for electronic verification process
  - Align thresholds for placing pre-charged products and equipment on the market
  - Obligation to provide NIL reports for quota holders
- Encourage EU Member States to use electronic reporting systems for collection of F-gas service intervention, technicians, sale of non-hermetic equipment and emissions data
- Substances
  - Include new substances in Annex I
  - Include new substances in Annex II
  - Move substances from Annex II to Annex I
  - Add flexibility to amend Annex I and II

# Substances

## Include new substances in Annex I

- Perfluorodecalin (C<sub>10</sub>F<sub>18</sub>), but also long-chain PFCs (e.g. C<sub>14</sub>F<sub>24</sub>)
- Sulfurylfluoride (SO<sub>2</sub>F<sub>2</sub>, GWP 4732 (AR5)) → *optional Annex II*

## Include new substances in Annex II

- Sevoflurane (HFE-347mnz1, GWP 216 (AR5))
- Enflurane (HCFE-235ca2, GWP 583 (AR5))
- Cis-1-chloro-2,3,3,3-tetrafluoroprop-1-ene (HCFC-1224yd (Z))
- 2,3,3,3-tetrafluoro-2-(trifluoromethyl)propanenitrile (C<sub>4</sub>F<sub>7</sub>N)
- Perfluorotripropylamine (C<sub>9</sub>F<sub>21</sub>N)
- Perfluoro-N-methylmorpholine (C<sub>5</sub>F<sub>11</sub>NO)
- Perfluorotributylamine (PFTBA, FC43, C<sub>12</sub>F<sub>27</sub>N)
- Sulfurylfluoride (SO<sub>2</sub>F<sub>2</sub>, GWP 4732 (AR5)) → *optional Annex I*
- Fluorinated ethers and alcohols: HFE-7300 (GWP 200); C<sub>4</sub>F<sub>9</sub>OCH<sub>3</sub>, C<sub>4</sub>F<sub>9</sub>OC<sub>2</sub>H<sub>5</sub>
- Fluorinated ketones and fluoronitrile blends:
- FK 5-1-12 (CF<sub>3</sub>CF<sub>2</sub>C(O)CF(CF<sub>3</sub>)<sub>2</sub> GWP <1)
  - CF<sub>3</sub>CF<sub>2</sub>C(O)CF(CF<sub>3</sub>) (GWP ~ 1)
  - Iso-C<sub>3</sub>F<sub>7</sub>CN (GWP 2100)
  - CF<sub>3</sub>C(O)CF(CF<sub>3</sub>)<sub>2</sub> (GWP < 1)

## Move substances from Annex II to Annex I

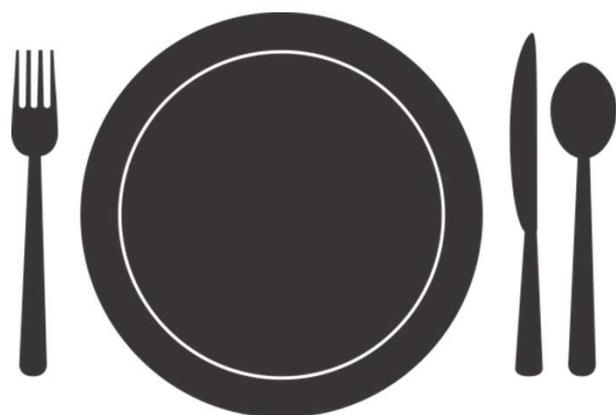
- Unsaturated HFCs (new section in Annex I)
- Nitrogen trifluoride (NF<sub>3</sub>)
- Perfluoro-cyclopropane (c-C<sub>3</sub>F<sub>6</sub>)

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– Switchgear sector  
– Cooling sector  
– Other sectors
- 16.45** Closing remarks and explanation of next steps *(DG CLIMA)*
- 17.00** Close of the workshop



>>> Q&As <<<



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**12.30 – 13.30**  
**Lunch break**

## REMINDER: Housekeeping rules

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### For oral interventions

- You may request a short oral intervention (ca. 1 min) by writing **'Hand'** and a short topic description.

### For written interventions

- Write questions and comments directly in the chat; be as concise as possible.
- Send questions/comments to the presentation topic and upload BEFORE the presentation ends. The chat will be closed after the presentations to allow for structuring of the questions by topics.
- When entering questions in the chat: Give a short indication of the topic group addressed in the question at the start of your chat message:
  - Indicate **'Question:'** or **'Comment:'** and, if possible, the topic e.g. **'Question/Modelling'**
  - For the Q&A afternoon session also add the sector: **'Cooling'**; **'Switchgear'**; **'MDIs'**; **'Foams'**; **'Fire protection'**; **'Other'**

**Please do not provide comments or questions via email.**

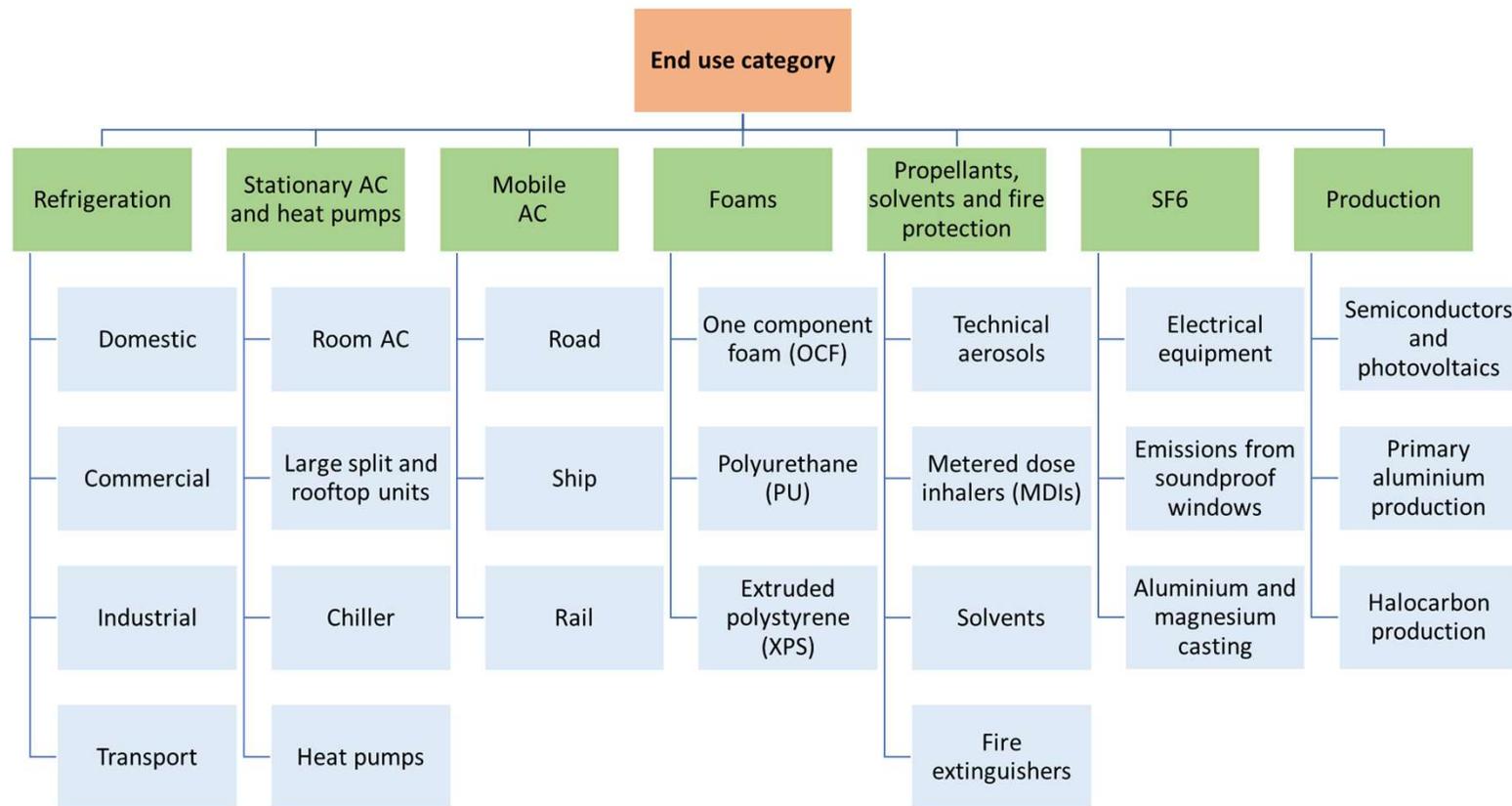
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# Modelling approach and presentation of scenarios

## - Sectors covered by the AnaFgas model -



Source: Öko-Recherche (own illustration)

# Modelling approach and presentation of scenarios

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## Three scenarios

### 1. Counterfactual

- Only 2006 F-gas Regulation and MAC Directive in force
- No 2014 F-gas Regulation

### 2. Baseline

- 2014 F-gas Regulation & its implementing acts in force (plus MAC Directive)

### 3. Maximum substitution

- Immediate transition away from high-GWP technologies where technically feasible
- Economic burden not considered

# Modelling approach and presentation of scenarios

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## **Assumptions**

### Sources:

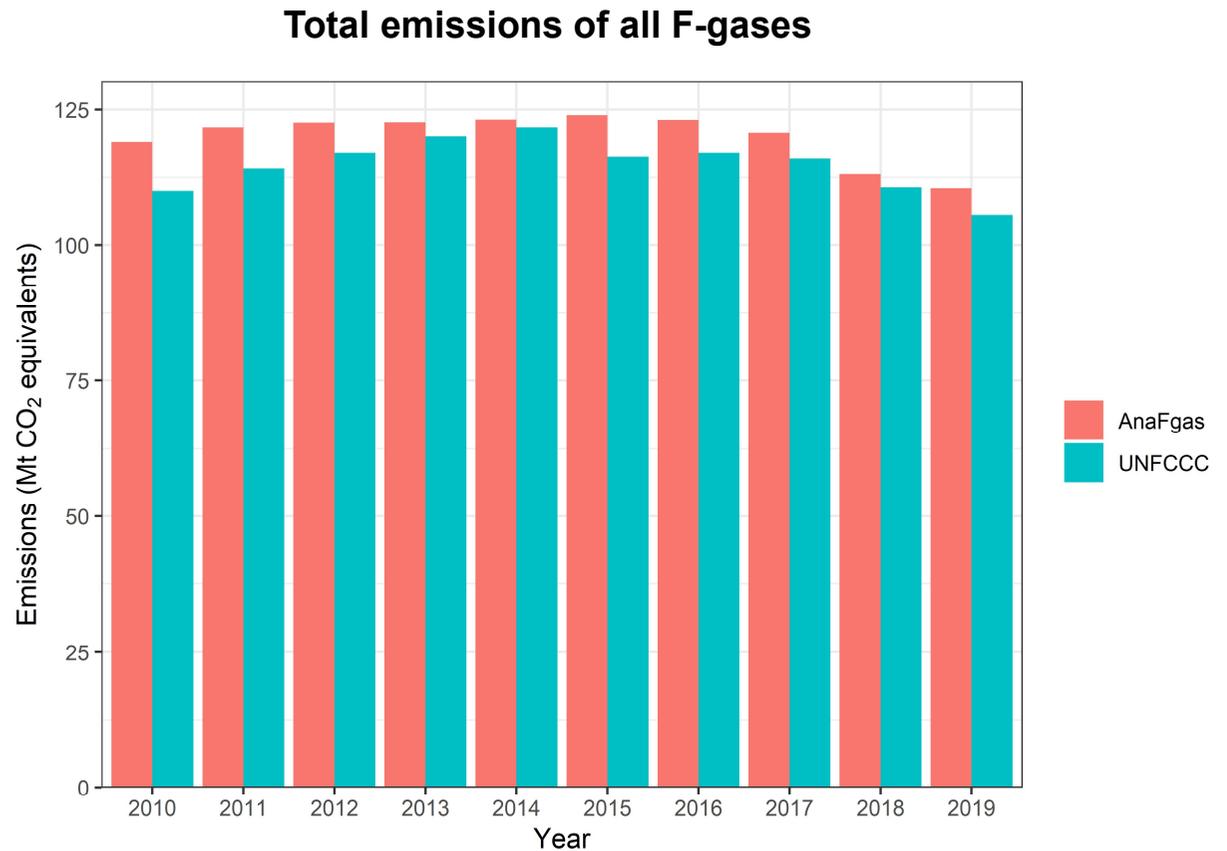
- Original AnaFgas model
- UNFCCC (National Inventory Reports)
- Business reports and statistics (e.g. for sales data)
- Eurostat
- EU F-gas reporting
- EEA (European Environment Agency)
- Industry experts

# Modelling approach and presentation of scenarios

## Validation (I)

Comparison of modelled baseline emissions (AnaFgas) and emissions reported under UNFCCC (EUA submission, 14 Apr 2021)

- Average deviation:
  - from 2010 to 2019: - 5%
  - from 2014 to 2019: - 5%



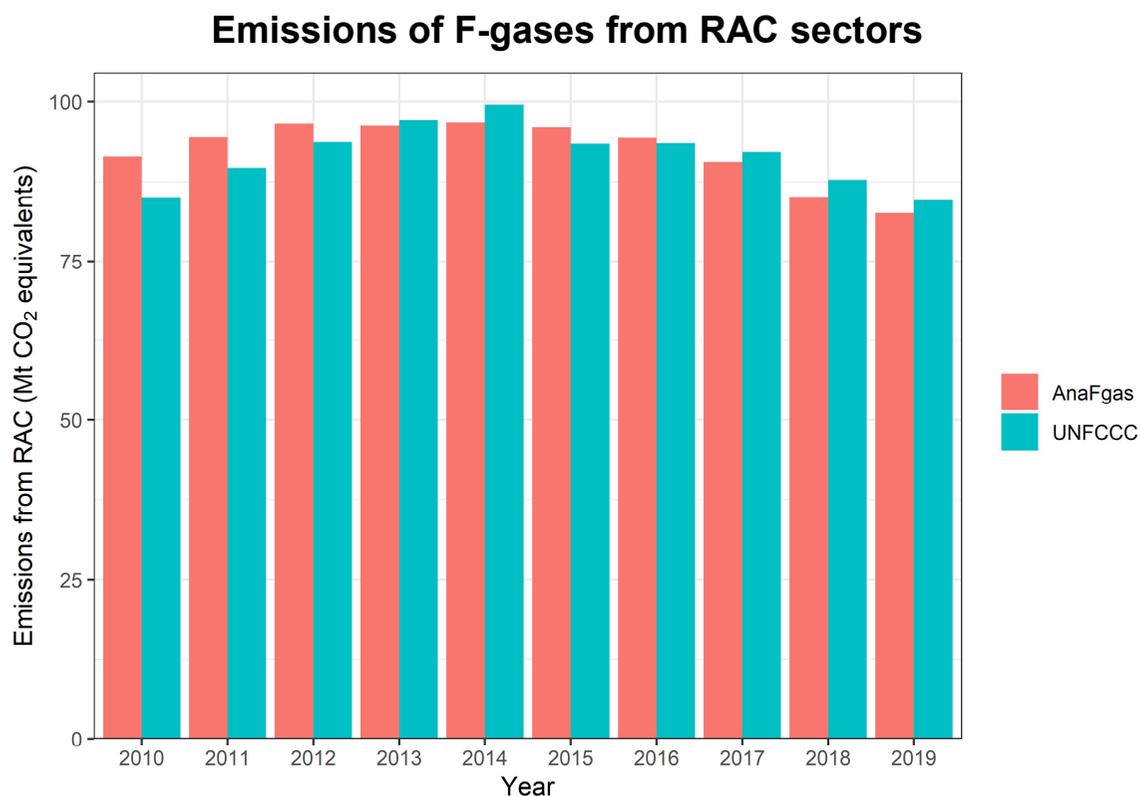
Source: AnaFgas modelling

# Modelling approach and presentation of scenarios

## Validation (II)

Comparison of modelled baseline emissions (AnaFgas) and emissions reported under UNFCCC (EUA submission, 14 Apr 2021)

- Average deviation
  - from 2010 to 2019: -1%
  - from 2014 to 2019: 1%



Source: AnaFgas modelling

# Modelling approach and presentation of scenarios

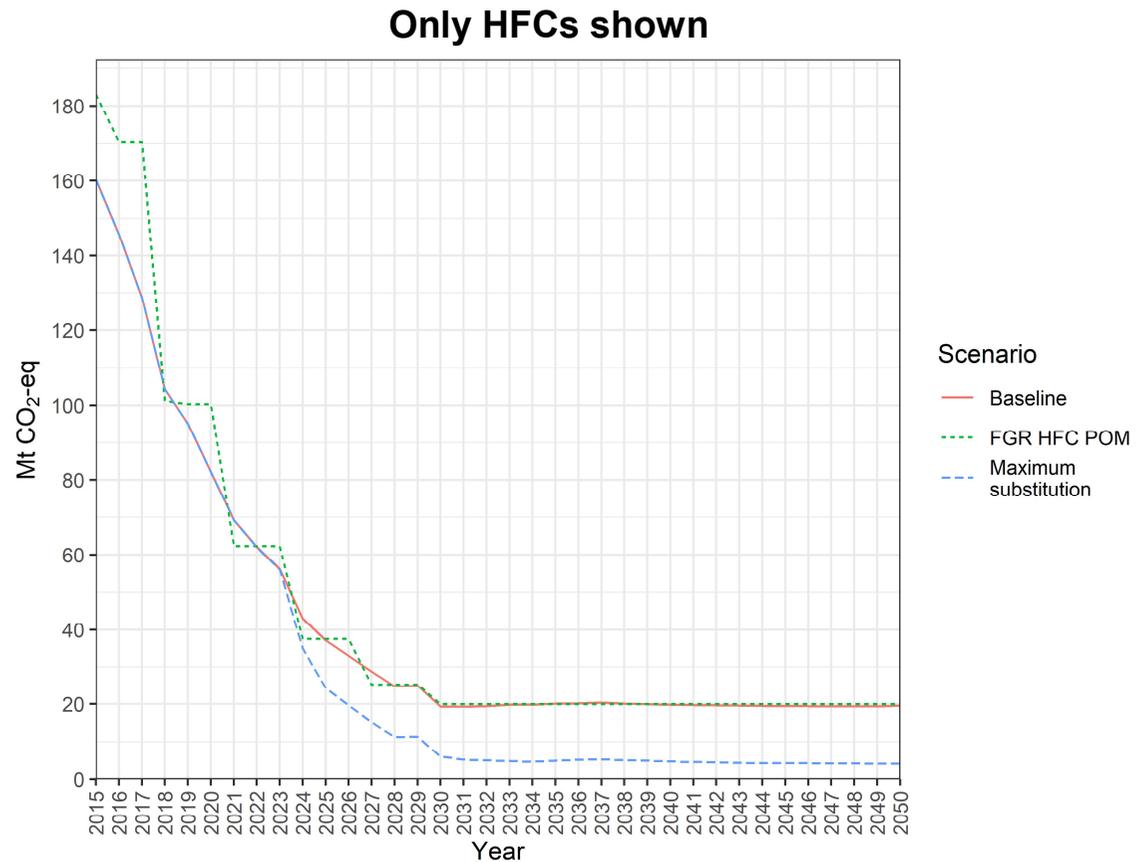
## Validation (III)

Comparison of

- modelled POM-adjusted HFC demand under the baseline and the maximum substitution scenario (adjusted for authorisations, reclamation and exports)

and

- POM quantities under the HFC phase-down

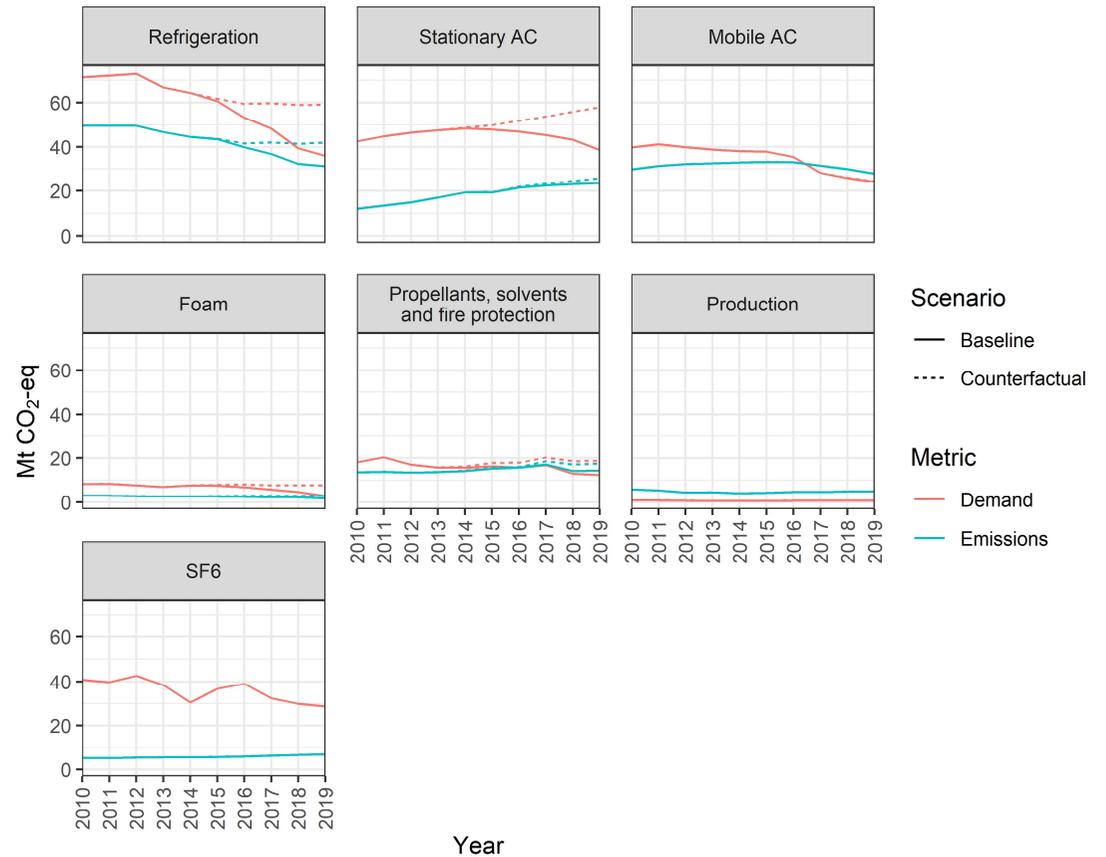


Source: AnaFgas modelling

# Baseline vs counterfactual scenario

Effect of the Regulation on demand and emissions of F-gases in different sectors until 2019

- Strongest effect in refrigeration and air conditioning (including heat pumps)
- Further effects on propellants, solvents and fire protection, and foams

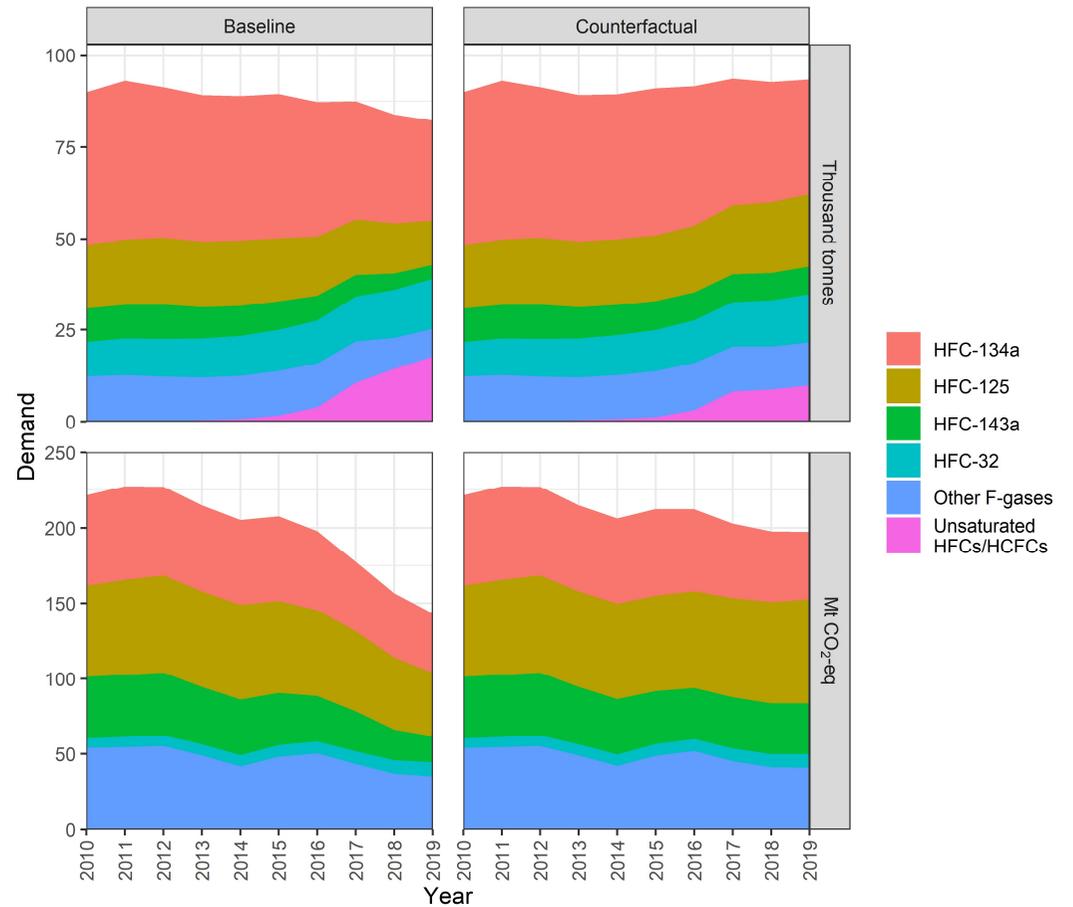


Source: AnaFgas modelling

## Baseline vs counterfactual scenario

Effect of the Regulation on demand of important F-gases until 2019

- Strong decrease of HFC-134a, R404A and R410A (HFC-125 and HFC-143a)
- Increasing demand for unsaturated HFCs/HCFCs (mainly HFC-1234yf and HFC-1234ze)

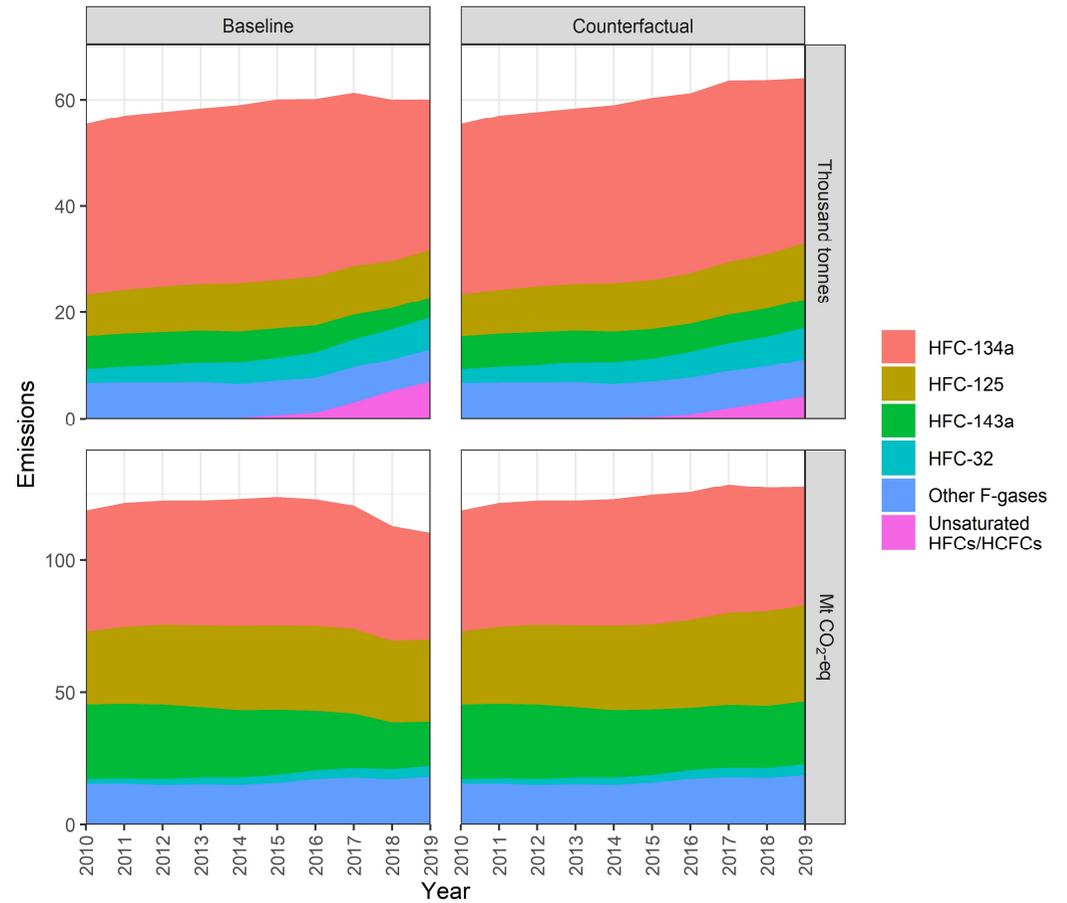


Source: AnaFgas modelling

# Baseline vs counterfactual scenario

Effect of the Regulation on emissions of important F-gases until 2019

- First reduction effects for HFC-134a and R404A (HFC-143a)



Source: AnaFgas modelling

## Baseline vs counterfactual scenario

### Sum of demand and emissions reduction from 2014 to 2019

- Strongest reduction in refrigeration for demand, followed by stationary AC
- Strongest reduction in emissions in refrigeration, followed by propellants, solvents and fire protection

Sector	Sum of demand reduction		Sum of emissions reduction	
	Mt CO <sub>2</sub> eq	Share of total	Mt CO <sub>2</sub> eq	Share of total
Refrigeration	62	44 %	27	62 %
Stationary air conditioning (including heat pumps)	48	34 %	5	12 %
Mobile air conditioning	0.4	<1 %	0.6	<1 %
Foam	12	8 %	3	7 %
Propellants, solvents and fire protection	20	14 %	8	19 %
Production	0	-	0	-
SF6	0	-	0	-
<b>Total reduction (2014 to 2019)</b>	<b>141</b>		<b>44</b>	

Source: AnaFgas modelling

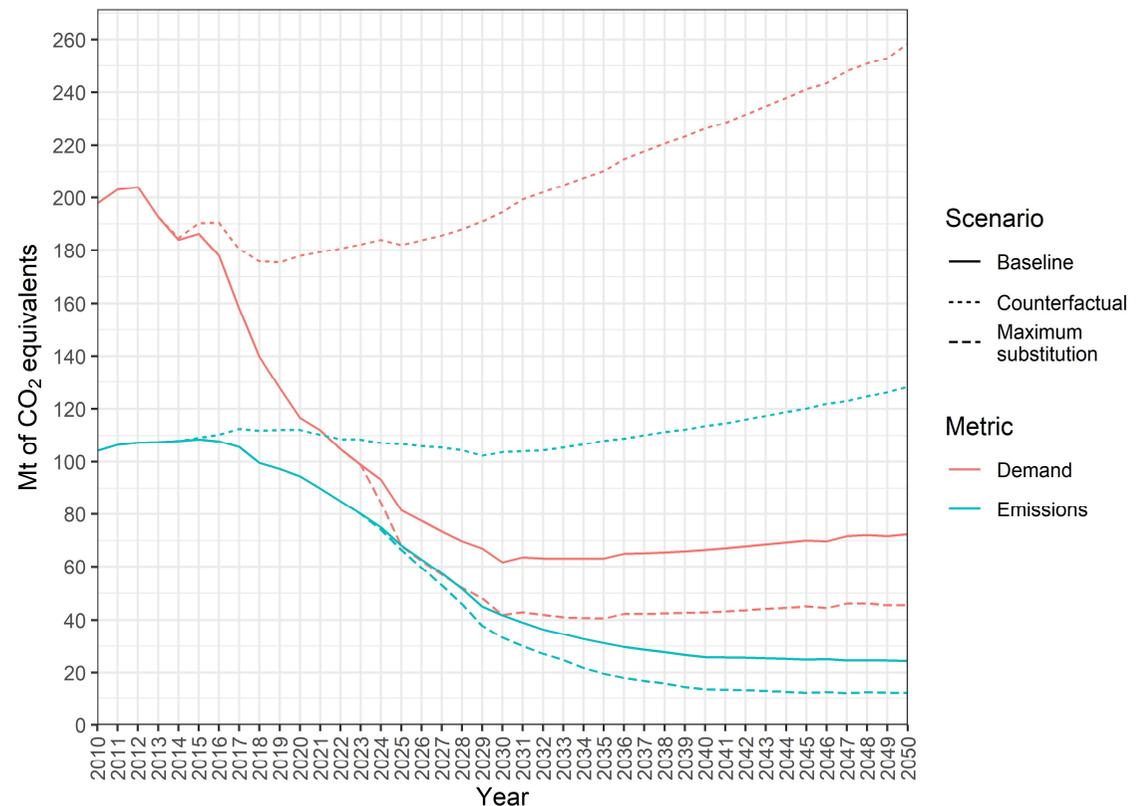
## Forward looking projections (I)

- Strong reduction in demand until 2030 under baseline scenario in comparison to counterfactual
- Further reduction under maximum substitution scenario starting in 2024
- Emissions show reduction but not enough to reach original 2030 target (based on 2011 Roadmap which is less ambitious than today's climate goals!)

Target: 38 Mt CO<sub>2</sub> eq for EU-27+UK  
vs.

Current projection: 47 Mt CO<sub>2</sub> eq

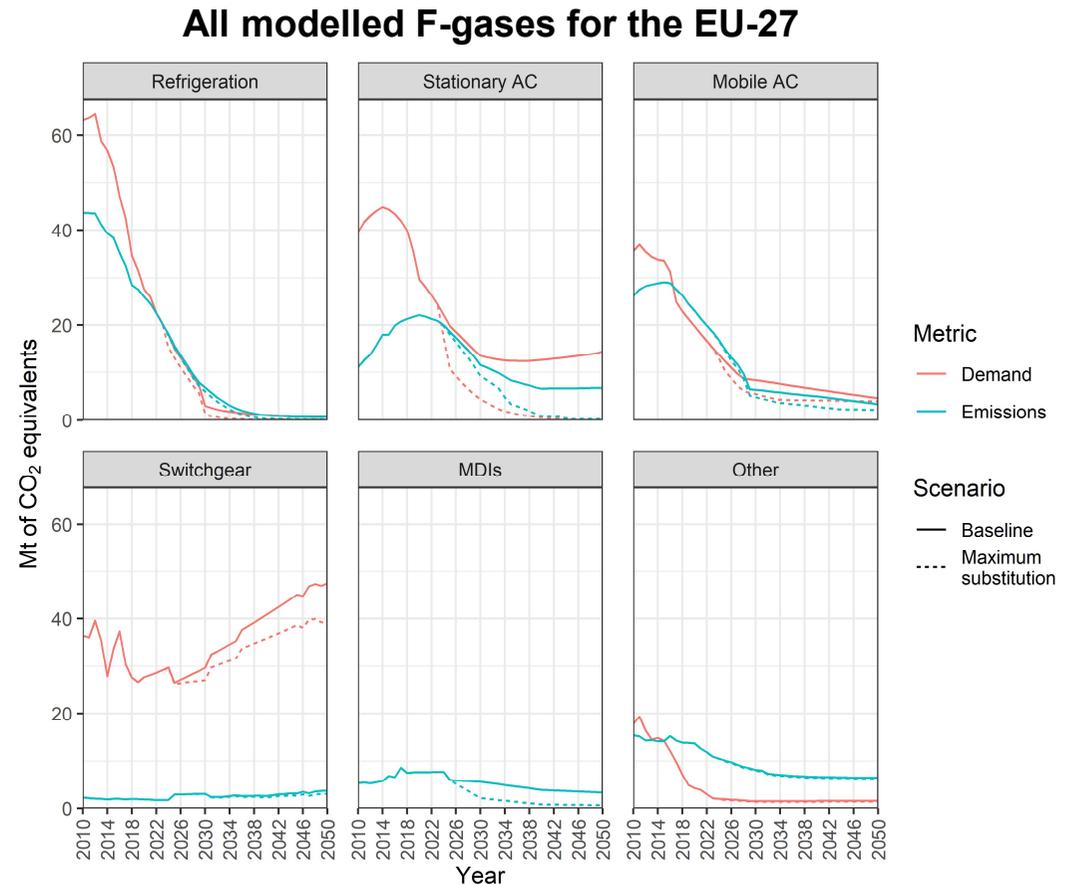
### All modelled F-gases for the EU-27



Source: AnaFgas modelling

## Forward looking projections (II)

- Strongest reduction achieved in refrigeration but still potential left
- Most potential for further reduction in stationary air conditioning (incl. heat pumps) applications
- Also potential in mobile air conditioning, electrical switchgear and metered dose inhalers (MDIs)



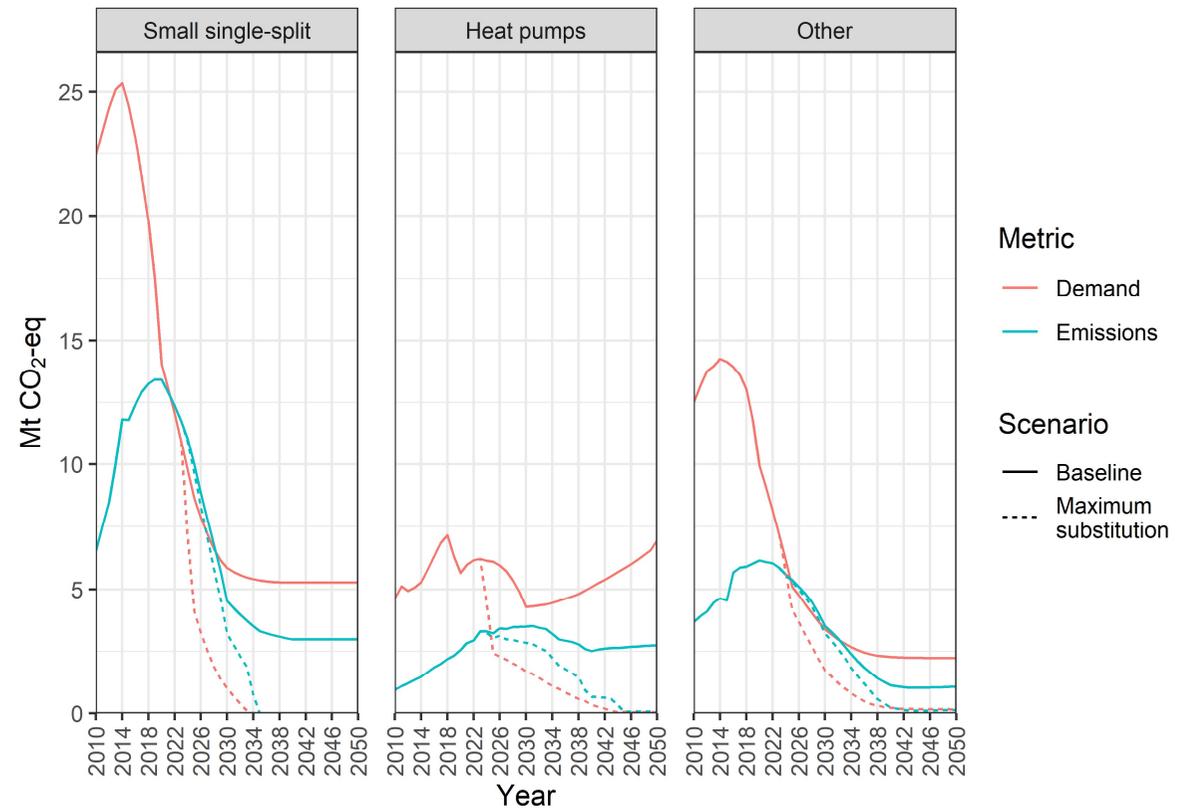
## Forward looking projections (III)

### Assumptions for most relevant stationary AC sub-sectors for the EU-27

- Small single-split
  - Increasing sales until 2030: ca. 1 million more units sold in 2030 compared to 2020 (+ 14%)
  - Plateau phase from 2030 to 2050 at around 7.2 million units per year
- Heat pumps
  - Strong increase in sales until 2050
  - + 279 % from 2020 (ca. 700 000 sold) to 2050 for small heat pumps (charge < 3 kg)
  - + 894 % from 2020 (ca. 116 000 sold) to 2050 for large heat pumps (commercial; charge around 15 kg)

**Assumptions to be further substantiated.**

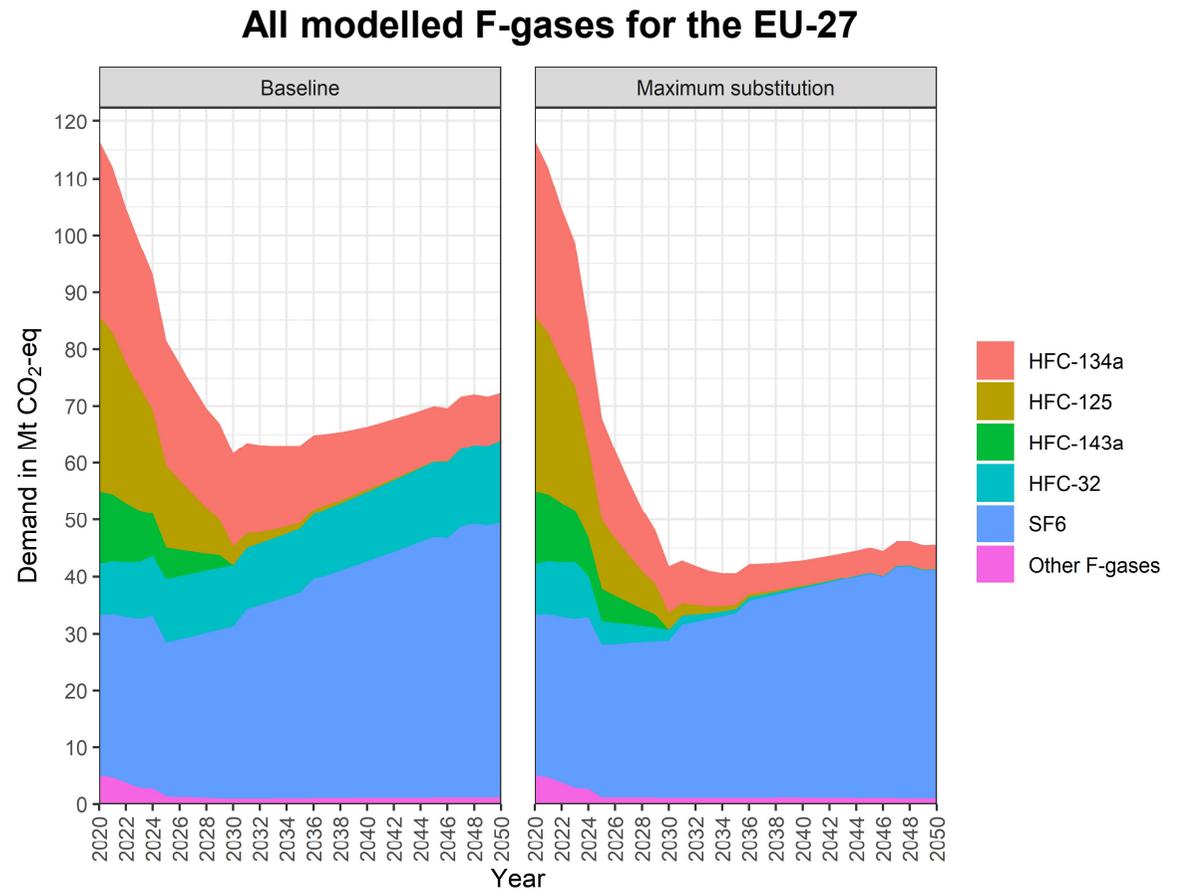
### Modelled F-gases for stationary AC in the EU-27



Source: AnaFgas modelling

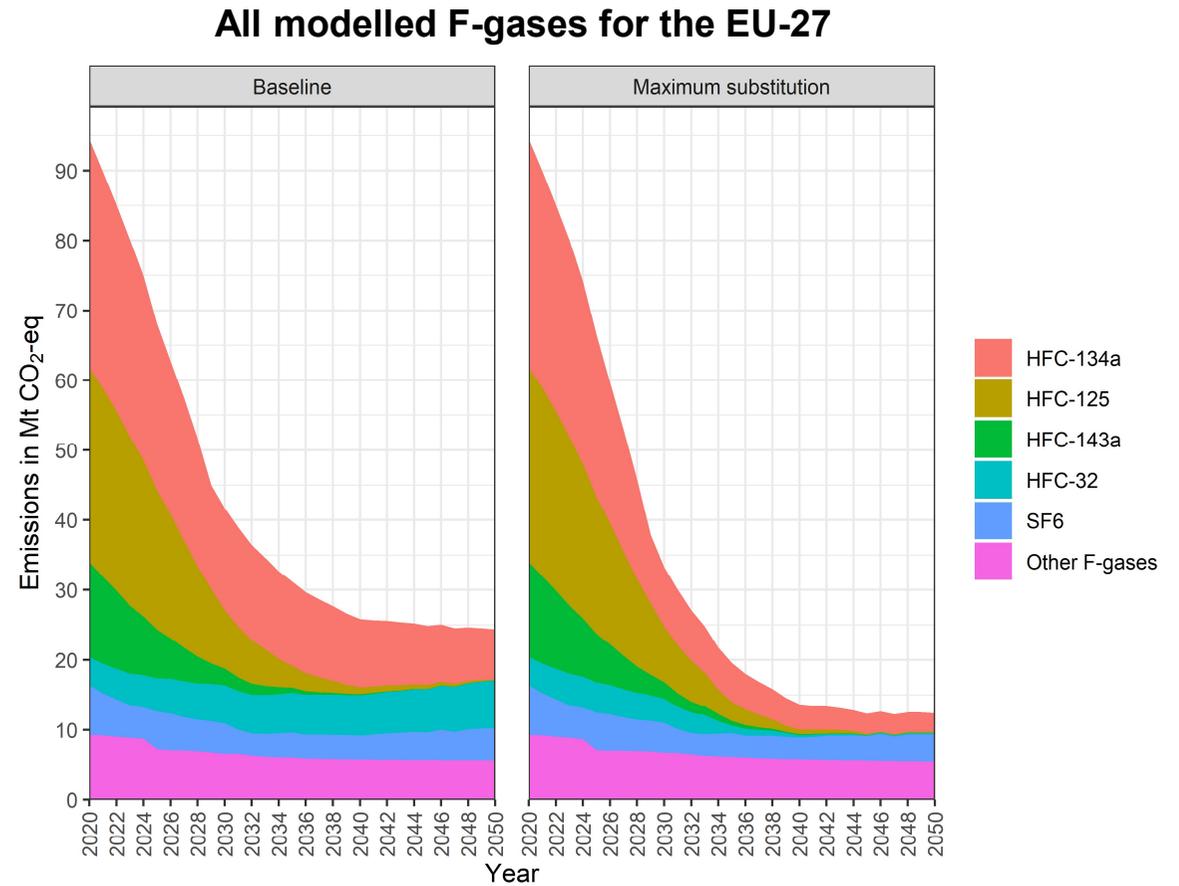
## Forward looking projections (IV)

- Further reduction in demand of HFC-134a, HFC-125, HFC-143a, HFC-32 and SF<sub>6</sub> possible
- Mainly in refrigeration and air conditioning sectors, for MDIs and electrical switchgear



## Forward looking projections (V)

- Further reduction in emissions of HFC-134a, HFC-125, HFC-143a and HFC-32 possible
- Effects of early replacement of SF<sub>6</sub> in electrical switchgear will show significant effects even after 2050, due to the long lifetime of equipment



## Reduction in demand and emissions from 2024 until 2030/2050

Sector	Subsector	Reduction in <u>demand</u> in Mt CO <sub>2</sub> eq (Baseline vs. maximum substitution)		Reduction in <u>emissions</u> in Mt CO <sub>2</sub> eq (Baseline vs. maximum substitution)	
		Until 2030	Until 2050	Until 2030	Until 2050
Refrigeration		<b>14</b>	<b>36</b>	<b>5</b>	<b>19</b>
	Central systems	4	14	1	7
	Condensing units	5	12	1	5
	Trucks and trailers	2	6	1	5
	Other	2	5	1	3
Stationary AC (including heat pumps)		<b>61</b>	<b>302</b>	<b>9</b>	<b>117</b>
	Small single splits and heat pumps	37	167	6	73
	Large splits and heat pumps	21	119	3	41
	Other	3	16	0	4
Mobile AC		<b>16</b>	<b>59</b>	<b>6</b>	<b>45</b>
	Trucks	11	42	4	35
	Other	4	17	2	10
MDIs		<b>10</b>	<b>73</b>	<b>10</b>	<b>73</b>
Switchgear		<b>9</b>	<b>113</b>	<b>0</b>	<b>7</b>
Other		<b>1</b>	<b>4</b>	<b>1</b>	<b>4</b>
<b>Total</b>		<b>111</b>	<b>596</b>	<b>31</b>	<b>264</b>

Source: AnaFgas modelling

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## Role of scenarios in the quantification of impacts

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- Guide further quantification of level of ambition needed for
  - Objective A: Raising ambition in line with the European Green Deal
  - Objective B: Seeking full alignment with the Montreal Protocol
- Which reduction in emissions and consumption can possibly be achieved?
  - By when?
  - At what cost?
- Generation of price tags at technology level and at scenario level (“abatement costs”)

## Objective B: Seeking alignment with the Montreal Protocol

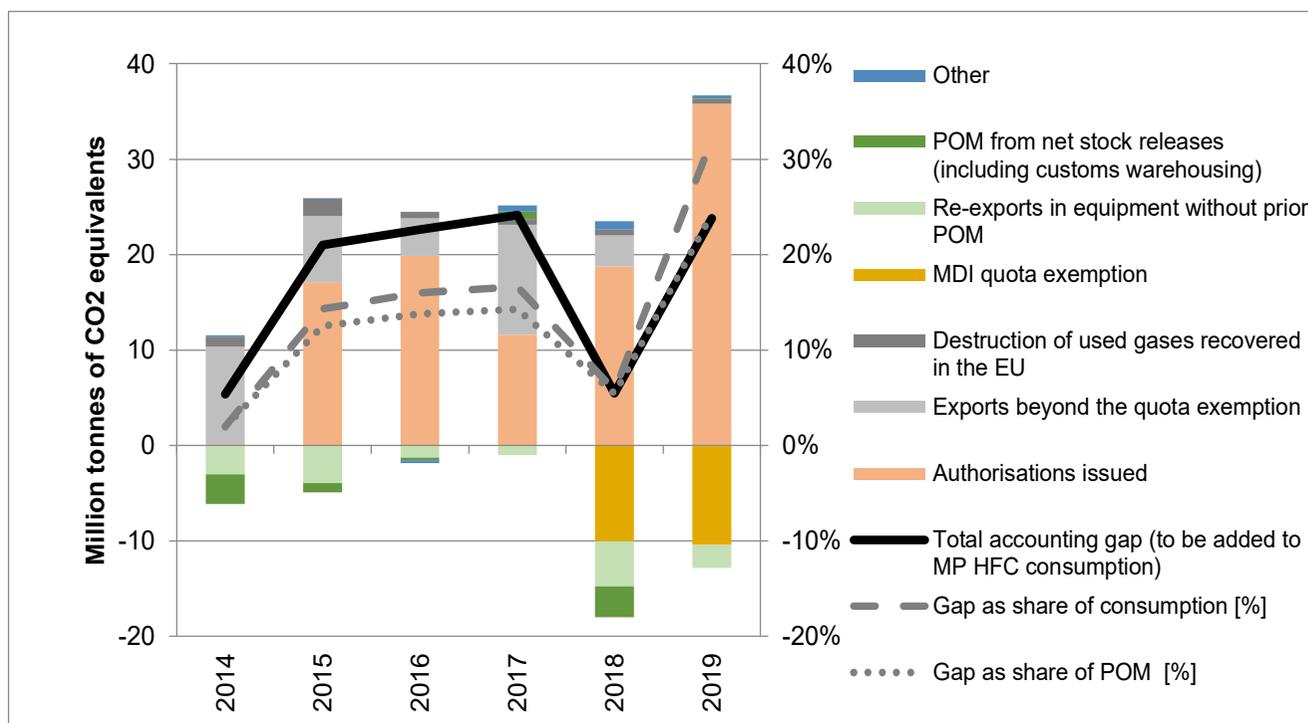
### Objective B:

Seeking alignment with the Montreal Protocol

Note the significant difference between metrics:

- HFC POM (Placing on the market) limited under the FGR
- HFC consumption limited under the Montreal Protocol (MP) / Kigali Amendment

### Accounting differences – non-exempted POM vs. MP HFC consumption (EU-28)



Source: [EEA 2020 confidential dataset], own calculations

Details on metrics: Annex 4 of 2020 EEA report <https://www.eea.europa.eu/publications/fluorinated-greenhouse-gases-2020>

## Which consumption level will the POM phase-down lead to?

### **Objective B:**

Seeking alignment  
with the Montreal  
Protocol

Expected limits for EU-27 in the 2030s...

- 2030 POM (FGR): ~ 20 Mt CO<sub>2</sub> eq
- 2034 MP consumption limit: ~ 33 Mt CO<sub>2</sub> eq
- 2036 MP consumption limit: ~ 25 Mt CO<sub>2</sub> eq

Low-/high-consumption scenarios were developed for all key drivers of 'accounting gap':

- 2030 consumption (FGR):  
Plausible range between 13 – 35 Mt CO<sub>2</sub> eq

- ▶ FGR needs tighter POM schedule and/or removal of exemptions after 2030 for guaranteed compliance with Montreal Protocol

## Objective A: Raising ambition in line with the European Green Deal

### **Objective A:**

**Raising ambition in  
line with the EU  
Green Deal**

#### **Process for quantification of feasible raise of ambition:**

- Derive a price tag for the maximum substitution scenario (MaxSub)
- Build a scenario proportionate to what will be asked from other sectors
  - Compare technology specific abatement cost price tags against threshold of €400/t CO<sub>2</sub> eq
  - For scenario: limit deployment of substitution technologies to those where threshold is not exceeded
  - Derive emission & demand pathway from model
- Recalculate HFC demand pathway
  - Into HFC POM pathway for potential ambition level of revised FGR phase-down schedule (and dates for accompanying prohibitions)
  - Into HFC consumption pathway for comparison with MP/Kigali requirements

## Progress on cost assessment of AnaFgas scenarios

### Objective A:

Raising ambition in line with the EU Green Deal

- Cost assessment of
  - Baseline scenario vs counterfactual
  - Maximum substitution vs counterfactual & vs baseline
  - First screening for around 400 €/t CO<sub>2</sub> eq abatement scenario
- Preliminary results available for 2024-2030 time horizon
- For few sectors & emerging technologies, more data needed to fill gaps on:
  - Investment cost
  - Operating cost
  - Gas prices

# Preliminary results on economic impacts: Cost of technological change

## Objective A:

Raising ambition in line with the EU Green Deal

Sector	Cost of technological change increase in total expenditure (Capex + Opex) compared to counterfactual scenario, related to technological change, i.e. not considering increased HFC prices			Emission reduction cost: annualised cost of technological change vs lifetime-averaged emission reductions of new installations	
	EU 28 average 2015-2019, baseline scenario vs counterfactual	EU 27 average 2024-2030, baseline scenario vs counterfactual	EU 27 average 2024-2030, maximum substitution scenario vs counterfactual	EU 27 average 2024-2030, baseline scenario vs counterfactual	EU 27 average 2024-2030, maximum substitution scenario vs counterfactual
	Million €/ year	Million €/ year	Million €/ year	€ / t CO2e	€ / t CO2e
Refrigeration	80	220	183	-54	-58
Stationary A/C	94	469	1 227	-32	-58
Mobile A/C	16	201	549	125	93
Foam	25	52	52	10	10
Propellants, solvents & fire protection	22	18	19	6	4
Other HFCs & PFCs	-	-	-	NA	NA
SF6	-	-	32	NA	122
<b>Total</b>	<b>237</b>	<b>960</b>	<b>2 062</b>	<b>-37</b>	<b>-45</b>

MaxSub additional expenditures for technology cost 2024-2030 about twice as high as in baseline  
BUT

New equipment installed in 2024-2030 would save more emissions integrated over its lifespan:  
Technology set deployed in MaxSub would be more cost-efficient

**Note the difference in averaging & annualising between absolute cost and specific reduction cost!**

Preliminary results on economic impacts:  
**Cost of technological change, deriving the ~ 400 €/t CO<sub>2</sub>e eq abatement scenario**

**Objective A:**

**Raising ambition in line with the EU Green Deal**

**Technology-specific emission reduction cost in MaxSub scenario have very wide range:**

- Measures << - 100 €/t CO<sub>2</sub> eq,  
e.g. replacement options for R-134a in some refrigeration & stationary AC sectors
- Very few measures > 400 €/t CO<sub>2</sub> eq,  
e.g. R-744 or R-729 replacing R-134a or R-513A in some mobile AC sectors: bus AC, tram AC, train AC;  
HFC-1234ze replacing R-32 / R-454C / R-455A in large displacement chillers

Next steps: fill data gaps and derive ~ 400 €/t CO<sub>2</sub> eq abatement scenario

Based on current assumptions, a ~ 400 €/t CO<sub>2</sub> eq abatement scenario is expected to be very close to the maximum substitution scenario

## Preliminary results on economic impacts: **End-users' cost for HFC price increase**

### **Objective A:**

**Raising ambition in  
line with the EU  
Green Deal**

- In 2015-2019 evaluation period, cost for technological change made up only ~13% of total end-users' compliance cost.
  - On top: ~1.6 billion €/year for increased HFC prices for end-users that did not (yet) switch to low-GWP alternatives
  - Average price increase 8 €/t CO<sub>2</sub> eq at bulk level (OEM purchase)
  - Distributional effect: balanced by profits in the HFC supply chain
- Modelling of future HFC prices subject to very high uncertainties
- Future HFC demand, subject to cost of price increase, will strongly decline:
  - 2024-2030 average: ~ - 60% in baseline, ~ - 70% in MaxSub (vs 2015-2019)
  - 2040-2050 average: ~ - 80% in baseline, ~ - 95% in MaxSub (vs 2015-2019)

## Preliminary results on economic impacts: **Macro-economic effects**

### **Objective A:**

**Raising ambition in  
line with the EU  
Green Deal**

#### Macro-economic effects on EU-27 level

- To be assessed using GEM-E3 model operated by the Commissions' Joint Research Centre (JRC)
- For baseline & ~400 €/t CO<sub>2</sub> eq abatement scenario
- Based on
  - End-user cost data provided from AnaFgas model, affecting:  
manufacture of hardware, service needs, gas and energy demand
  - International trade patterns for equipment and gases

## Preliminary results on environmental impacts: **emissions**

### **Objective A:**

Raising ambition in line with the EU Green Deal

~400 €/t CO<sub>2</sub> eq abatement scenario as intermediate to baseline and maximum substitution scenario, expected to be very close to MaxSub

Sector	Emission savings compared to counterfactual scenario				
	EU 28 average 2015-2019, baseline scenario vs counterfactual	EU 27 average 2024-2030, baseline scenario vs counterfactual	EU 27 average 2024-2030, maximum substitution scenario vs counterfactual	EU 27 average 2040-2050, baseline scenario vs counterfactual	EU 27 average 2040-2050, maximum substitution scenario vs counterfactual
	Mt CO <sub>2</sub> e/a	Mt CO <sub>2</sub> e/a	Mt CO <sub>2</sub> e/a	Mt CO <sub>2</sub> e/a	Mt CO <sub>2</sub> e/a
Refrigeration	5	25	26	36	37
Stationary A/C	1	16	17	45	51
Mobile A/C	0	1	1	3	5
Foam	1	2	2	3	3
Propellants, solvents & fire protection	2	4	6	8	11
Other HFCs & PFCs	-	-	-	-	-
SF <sub>6</sub>	-	-	0	-	1
<b>Total</b>	<b>9</b>	<b>48</b>	<b>52</b>	<b>95</b>	<b>108</b>

- Emission effects of replacement of SF<sub>6</sub> in switchgear, modelled in MaxSub scenario, will show mainly after 2050, as avoided emissions during disposal

## Preliminary results on environmental impacts: **demand/consumption**

### Objective A:

Raising ambition in line with the EU Green Deal

### Objective B:

Seeking alignment with the Montreal Protocol

**~400 €/t CO<sub>2</sub> eq abatement scenario as intermediate to baseline and maximum substitution scenario, expected to be very close to MaxSub**

Sector	Demand savings compared to counterfactual scenario				
	EU 28 average 2015-2019, baseline scenario vs counterfactual	EU 27 average 2024-2030, baseline scenario vs counterfactual	EU 27 average 2024-2030, maximum substitution scenario vs counterfactual	EU 27 average 2040-2050, baseline scenario vs counterfactual	EU 27 average 2040-2050, maximum substitution scenario vs counterfactual
	Mt CO <sub>2</sub> e/a	Mt CO <sub>2</sub> e/a	Mt CO <sub>2</sub> e/a	Mt CO <sub>2</sub> e/a	Mt CO <sub>2</sub> e/a
Refrigeration	12	41	43	51	52
Stationary A/C	9	56	65	99	112
Mobile A/C	0	1	3	5	6
Foam	2	7	7	7	7
Propellants, solvents & fire protection	4	7	8	9	13
Other HFCs & PFCs	-	-	-	-	-
SF <sub>6</sub>	-	-	2	-	7
<b>Total</b>	<b>28</b>	<b>112</b>	<b>128</b>	<b>172</b>	<b>197</b>

- ▶ HFC demand to be recalculated into HFC POM for FGR policy option & likely HFC consumption for conclusion on compatibility with MP/Kigali



# Preliminary results on economic impacts: **administrative burden**

- Estimation of administrative burdens is **work in progress**:
  - To date, insights provided by stakeholders (OPC, interviews) – to be complemented by further analysis
  - Feedback to date has been limited to qualitative sentiments; does not consider size of change; does not cover all measures on the short-list
- ▶ *Please provide data on administrative and compliance costs for prospective measures, see Annex 4 to the Briefing Paper*

**OBJECTIVE A:**  
Raising ambition in line with the EU Green Deal

**OBJECTIVE B:**  
Seeking alignment with the Montreal Protocol

Measure	Costs to MS CAs (interviews)	Costs to businesses (business association/organisation response to OPC)
Placing on the market of new prohibitions		
Increase HFC phase-down ambition		
Removing exemptions from the HFC phase-down and de-minimis thresholds for reporting		
Add new HFC Phase-down steps	Not asked	
Make separate HFC production phase-down	Not asked	
Add flexibility to align with future Montreal Protocol decisions	Not asked	

Key	Majority suggest no cost change / mixed response	Slight agreement / majority believe that costs will increase	Broad agreement / majority believe that costs will increase	No comments provided
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## Preliminary results on economic impacts: **administrative burden**

### OBJECTIVE C:

Improving implementation and enforcement

Key
Majority suggest no cost change / mixed response
Slight agreement / majority believe that costs will increase
Broad agreement / majority believe that costs will increase
No comments provided

Measure	Costs to MS CAs (interviews)	Costs to businesses (business association / organisation response to OPC)
Extending certification and training programmes to lower GWP alternatives		
Detailed rules for customs authorities (border checks, etc).		
Requirements for customs for the treatment of illegally traded containers and products and equipment illegally placed on the market		
Enforcement of minimum penalties for non-compliance related to quota, authorisations, reporting, verification and illegal trade activities		
Prohibit transport, storage and use of all non-refillable F-gas containers		
Prohibit online / offline sales of illegally traded containers / products / equipment		
Limit transit (T1) procedures or introduce licensing requirements.		
Mandatory certification for natural persons and undertakings selling bulk F-gases online and for importers of bulk HFCs		
Mandatory documentation by companies for downstream sales for bulk HFCs		
Labelling requirements for additional substances		
Strengthen obligations of economic operators to prevent illegal trade	Not asked	
Limit the market players to legitimate participants	Not asked	
More comprehensive monitoring	Not asked	

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- 10.00** Welcome and keynote speech by Deputy General Director Clara de la Torre: The F-gas review in the context of the European Green Deal *(DG CLIMA)*
- 10.10** Introduction to the objectives of the workshop and housekeeping rules *(DG CLIMA)*
- 10.15** Findings of the study supporting the evaluation of the F-gas Regulation *(Project team)*  
– Effectiveness, efficiency, relevance, coherence, EU added value
- 11.00** Overview of policy options analysed in the study supporting the impact assessment *(Project team)*
- 11.30** Q&As *(All)*
- 12.30** Lunch break
- 13.30** Modelling approach and presentation of scenarios *(Project team)*
- 14.00** Preliminary findings regarding the assessment of impacts *(Project team)*
- 14.30** Overview of specific further data needs *(Project team)*
- Q&As** *(All)*
- Switchgear sector
  - Cooling sector
  - Other sectors
- 14.40**
- 16.45** Closing remarks and explanation of next steps *(DG CLIMA)*
- 17.00** Close of the workshop

## Overview of specific further data needs (I)

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To further substantiate the preliminary findings, we are looking for **quantitative data and concrete examples** related to the following matters:

### **For the evaluation:**

- Concrete examples of national/regional/local rules or codes or fire regulations or safety rules which hamper the use of alternatives to conventional F-gases
- Data on administrative costs for current measures (Annex 4 to the Briefing Paper)
- Modelling aspects: Market development data for split AC, multi split & VRF (historic and future)

### **For the impact assessment:**

- Prices for HFCs (pre-phase-down levels) and alternatives in certain sectors
  - Foam blowing: HFC-152a, HFC-1234ze, HCFC-1233zd
  - Fire protection: HFCs except HFC-134a
  - Technical aerosols: HFC-152a
  - MDIs: HFC-227ea

## Overview of specific further data needs (II)

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### For the impact assessment (continued)

- **Cost data and energy data for F-gas alternatives** in the following sectors/applications:
  - Centralized refrigeration systems
  - Refrigerated trucks and trailers
  - Stationary AC: Single-split units; VRF/ multi-split systems; heat pumps
  - Switchgear MV and HV
- ▶ Companies and experts that can provide **specific quantitative data** are kindly requested to get in contact for the format and detail of data
- **Administrative cost data for envisaged policy options** (Annex 4 to the Briefing Paper) – will be provided as Word document.

For all submissions of feedback and data after this workshop, please use the following email address: [webinar@oekorecherche.de](mailto:webinar@oekorecherche.de).

Deadline for submission is **Monday 24 May 2021**.

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>>> Q&As <<<

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**Thank you very much for your participation  
in today's workshop!**

