



EUROPEAN COMMISSION  
DIRECTORATE-GENERAL  
CLIMATE ACTION

Directorate C - Mainstreaming Adaptation and Low Carbon Technology

## **REDUCING FLUORINATED GREENHOUSE GAS EMISSIONS – FURTHER ACTION AT EU LEVEL**

### **RESULTS OF THE PUBLIC CONSULTATION**

**SEPTEMBER 2011 – DECEMBER 2011**

*In line with the Commission's commitment to transparent and interactive policymaking this document aims at providing an overview and general impression of the feedback provided to the Commission in the context of a public consultation. The statements and opinions expressed in the document do therefore in no way necessarily reflect those of the Commission or the Commission services.*

*This page is intentionally left blank.*

## TABLE OF CONTENTS

0. Executive Summary .....	1
1. Introduction.....	4
2. Quantitative description .....	5
2.1. Respondents.....	5
2.2. Categories of organisations .....	6
2.3. The country or the represented geographical area.....	8
2.4. Use categories for respondents.....	10
2.5. Publication of the questionnaire .....	13
2.6 Remark on the methodology of the evaluation.....	14
3. Evaluation of the questions on choice of policy action .....	15
3.1. Evaluation of Question B 1 .....	15
3.2. Evaluation of Question B 2 .....	17
3.3. Evaluation of Question B 3 .....	20
3.4. Evaluation of Question B 4 .....	20
3.5. Evaluation of Question B 5 .....	23
3.6. Evaluation of Question B 6 .....	25
3.7. Evaluation of Question B 7 .....	27
3.8. Evaluation of Question B 8 .....	29
3.9. Evaluation of Question B 9 .....	31
4. Evaluation of impacts .....	33
4.1. Evaluation of Question C 1 .....	33
4.2. Evaluation of Question C 2 .....	35
4.3. Evaluation of Question C 3 .....	36
4.4. Evaluation of Question C 4 .....	38
4.5. Evaluation of Question C 5 .....	39
4.6. Evaluation of Question C 6 .....	41
4.7. Evaluation of Question C 7 .....	43
4.8. Evaluation of Question C 8 .....	45
4.9. Evaluation of Question C 9 .....	47
4.10. Evaluation of Question C 10 .....	49

This report was finalised by DG CLIMA, based on an analysis of the consultation data carried out by Öko-Recherche (Barbara Gschrey, Winfried Schwarz, Thomas Kimmel)

March 2012

## **0. Executive Summary**

### **Participation**

259 stakeholders participated in the online consultation, 95 identified themselves as individuals (37%) and 164 as organised stakeholders (63%). 77% of the organised stakeholders represented companies, professional associations or trade unions; the remaining organised stakeholders included non-governmental organisations (NGOs) or associations of NGOs (7%), relatively few public authorities (3%) and some other organisations.

62 stakeholders were active at EU or the international level, e.g. including umbrella groups, NGOs, and international companies. All major application sectors were covered. The stationary refrigeration sector accounted for 24% of stakeholders, stationary air conditioning (AC) sectors for 21% and the heat pump sector for 24%.

### **Methodology**

As regards the evaluation of the results a quantitative focus based only on the number of responses given to a particular option in this multiple-choice questionnaire is not appropriate for several reasons.

1. Industrial stakeholders clearly outnumber other organisations such as NGOs and administrations.
2. Certain industries participated very actively whereas other application sectors replied at comparably low numbers; hence the opinion of particular sectors is overrepresented relative to the size of the sector.
3. Submissions by umbrella organisations and associations of NGOs would in a purely quantitative approach be counted only once (just as the position of a single company) although they already represent concerted (and thus very valuable) positions of multiple members or even sectors.
4. Some companies replied more than once since national branches, different departments or daughter companies sent their responses separately, largely using the same text as the mother companies or headquarters.

As a result a more differentiated approach to deriving results was taken by relating answers to the type of respondents giving them. Further, qualitative aspects of the contributions (e.g. textual contributions) were integrated into the analysis and particular weight was placed on concerted positions of umbrella organisations rather than single opinions.

### **Policy action addressing F-gas emissions**

84% of respondents found that the current status quo of implementing the existing regulation was not sufficient. While some stakeholders believed that better implementation would suffice, others wanted to see further legal action. Different opinions as regards the latter were linked to stakeholder types as well as sector particularities.

As for obstacles preventing the switch to alternative technologies, the results indicated that the barriers differ between sectors. This reflects that safe and cost-effective alternatives are not yet available to the same degree in all application sectors. Overall, higher initial investments were the main barrier identified.

In the absence of a global HFC phase-down, the preferred policy actions for organised stakeholders were strengthening containment and recovery, voluntary agreements for specific sectors, and limits to the placing of HFCs on the EU market, in this order. The options preferred by individuals were additional prohibitions, strengthening containment and recovery, and voluntary agreements.

Stakeholders provided numerous suggestions to improve containment and recovery pointing out the importance of control and enforcement of the existing legislation and harmonisation of the situation within the EU as well as the need to broaden the scope of the existing legislation. Further propositions included measures improving awareness and information exchange, the introduction of financial incentives and taxes as well as some technical measures.

### **Impacts of policy options**

When asked who would be most negatively affected, organised stakeholders and individuals selected most often the commercial or industrial end-users of relevant products/ equipment as well as producers of products/ equipment normally relying on F-gases. Individuals also assumed that F-gas producers would experience negative impacts, a concern not shared by the producers themselves.

A majority of industry stated concerns on a strengthened approach with regard to the competitiveness of European businesses in general. However, impacts were likely to differ between product groups. Also, industry associations expressed concerns that non-EU competitors and companies not covered by a strengthened approach might benefit. It was suggested that respecting industrial planning timescales would help minimize negative impacts. Also, it was important to avoid equipment redundancy before their end of life.

Benefits of a strengthened approach would occur for manufacturers of products and equipment relying on alternatives as well as for servicing companies and users of relevant products and equipment. Improved containment and higher energy efficiency due to regular maintenance would result in advantages for end users. NGOs and public authorities highlighted competitive advantages in the alternative refrigeration and AC market.

In additional comments, environmental NGOs underlined the economic and environmental benefits for Member States and consumers that could be achieved through an HFC phase out. Measures affecting the industry, considered to be responsible for HFC use in the first place, were fairer than measures impacting users and service companies. Public authorities highlighted “marketing opportunities for fast movers”.

Stakeholders saw no large differences for the different options in relation to the administrative burden. In sectors where certain reporting requirements already exist, it was suggested that the additional administrative burden could be rather small. Established monitoring, consistent enforcement, control and sanctioning were considered crucial for the implementation of further measures. Environmental NGOs pointed out that sectoral bans on use and marketing would bring about the smallest administrative burden.

## General Conclusions

- Only a tiny minority of all respondents (2%) thought that no further action would be an appropriate response for the EU in the absence of progress at the global level. Similarly, only 10% of respondents thought the current status quo (i.e. existing legal rules and level of implementation) is sufficient.
- A great number of suggestions for improvement on implementation and containment of leakages were made. In addition, over 40% of respondents including some industrial players clearly indicated a need for further legal action.
- Stakeholders were divided on the most appropriate policy options. This was linked to stakeholder type (e.g. industry, NGO, national administration,..) but also to sectoral differences between industrial players. The preferred type of action largely depends on the application sectors and whether requirements already exist or not. This seems to indicate that there is no simple solution in the form of a single policy option that can address the complexities of the different sectors and applications. Over 500 suggested measures collected as part of the consultation indicate that an appropriate mix of policies may be the best way forward.
- The expected impacts similarly varied according to interest groups and application sectors. Many, but not all, industrial players expressed some concerns on the grounds of competitiveness. Other stakeholders including administrations, companies in the field of alternatives, NGOs and many individuals saw concrete opportunities and benefits in a shift away from F-Gases, especially for "fast movers" and "green technologies".
- Such benefits are expected in particular if a global agreement to phase down/out F-Gases can be achieved.

## 1. Introduction

The EU is committed to cutting greenhouse gas emissions by 80%-95% (of 1990 levels) by 2050. To achieve this reduction at the lowest cost, the Commission's Roadmap for moving to a competitive low carbon economy in 2050<sup>1</sup> shows that a contribution of so-called "non-CO<sub>2</sub> emissions" in the order of 70-78% by 2050 is needed.

Fluorinated greenhouse gases (F-gases) have a high global warming potential, up to thousands of times higher than CO<sub>2</sub>. They are used as refrigerants in refrigeration, air AC and heat pumps, as blowing agents for foams, extinguishing agents in fire protection systems, propellants in aerosols, insulation gases in electrical equipment etc, from which they leak into the atmosphere.

Directive 2006/EC/40 on emissions from air-AC systems in motor vehicles ('the MAC Directive') introduces a phase out of refrigerants with global warming potential (GWP) >150 in mobile air AC systems of new passenger car models in the period 2011-2017. Regulation (EC) No 842/2006, the so-called 'F-Gas Regulation', aims at reducing F-gas emissions from all other application sectors through measures including containment and recovery, training and certification of personnel as well as a few bans for specific applications and a number of products containing F-gases. On 26 September 2011, the Commission completed a review of the application, effects and adequacy of the F-Gas Regulation and issued a report<sup>2</sup>.

Based on the findings of this report, the European Commission intends to take further steps to reduce emissions of fluorinated gases by presenting a proposal for a review of the F-gas Regulation. In this context, a public consultation on strengthening EU measures to reduce emissions of fluorinated gases took place from 26 September to 19 December 2011. This consultation was accessible on DG CLIMA's website and consisted in an on-line questionnaire of multiple-choice questions, many of which also allowed to input free text to elaborate on the choices made. Responses could also be sent to a mailbox.

The outcomes of this consultation are summarised in the following.

---

<sup>1</sup> European Commission: Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A Roadmap for moving to a competitive low carbon economy in 2050; COM(2011) 112 final.

<sup>2</sup> European Commission: Report from the Commission – On the application, effects and adequacy of the Regulation on certain fluorinated greenhouse gases (Regulation (EC) No 842/2006)); COM(2011) 581 final.



## 2. Quantitative description

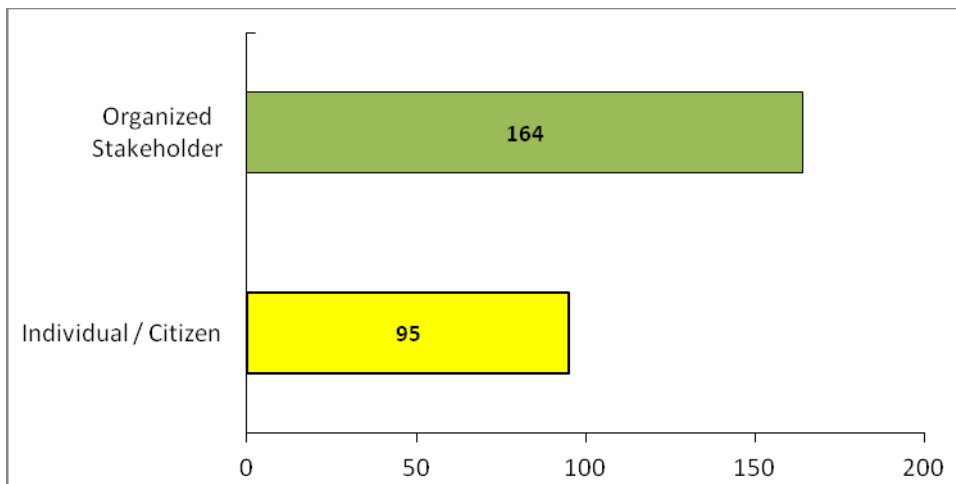
In total 259 submissions in response to the online questionnaire were received. In addition, 2 organisations sent position papers but did not take part in the consultation. The following categories allow an overview of the types and affiliations of respondents and the sectors they represented.

### 2.1. Respondents

*I am replying as / on behalf of:*

- *individual/citizen*
- *organised stakeholder*

Overall, 95 submissions were sent by individuals (37%) and 164 by organised stakeholders (63%) (Figure 1).



**Figure 1: Number of responses received by organised stakeholders and individuals.**

It should be noted that a number of respondents who listed themselves as “*individuals*” could also be regarded as “*organised stakeholders*”. By way of example, some respondents did not have all the information readily available to register as organisation and thus chose to register as individuals, as was communicated separately. As was evident from later questions, many “*individuals*” did indeed have a relation to industry (at least 1/3 of respondents are employed in the field; many also assign themselves to particular sectors), but apparently had preferred to answer in a personal capacity. In spite of such shortcomings, the self-categorisation of the respondents was not changed.

The “*organised stakeholders*” represent a very heterogeneous group and range from industry associations and umbrella organisations at various levels (international, EU and national) to NGOs, national authorities and single companies (see also following question).

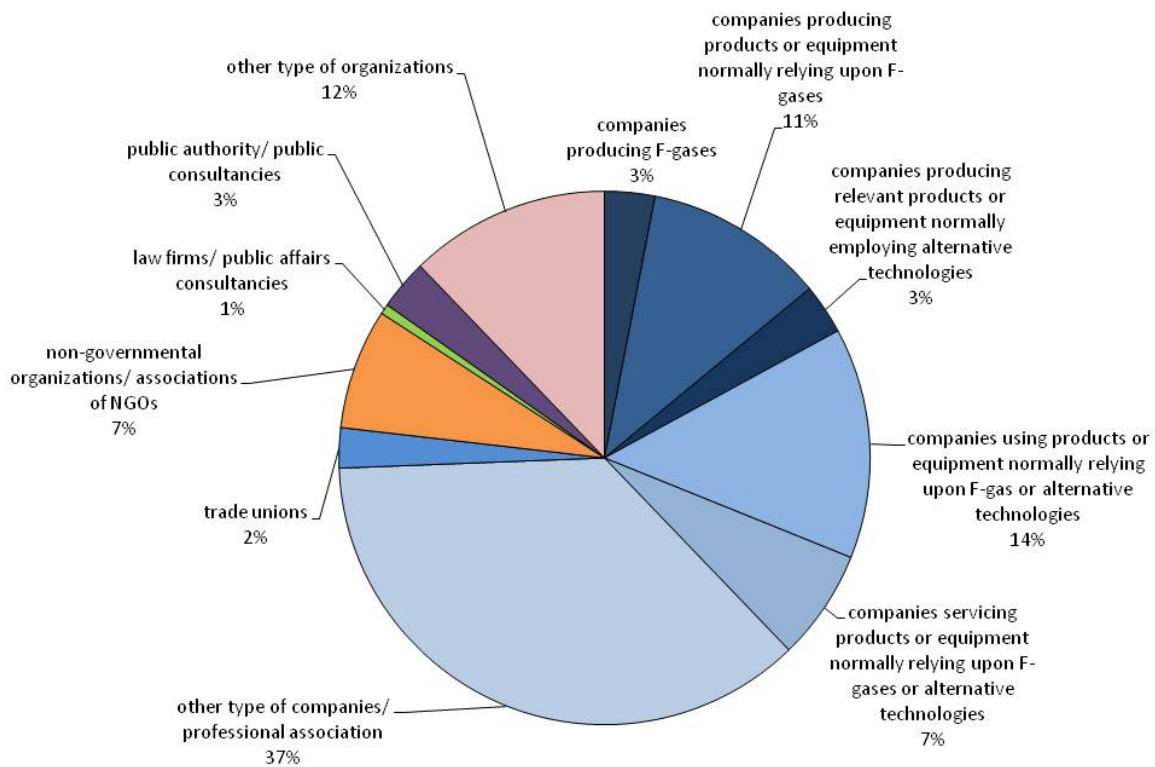
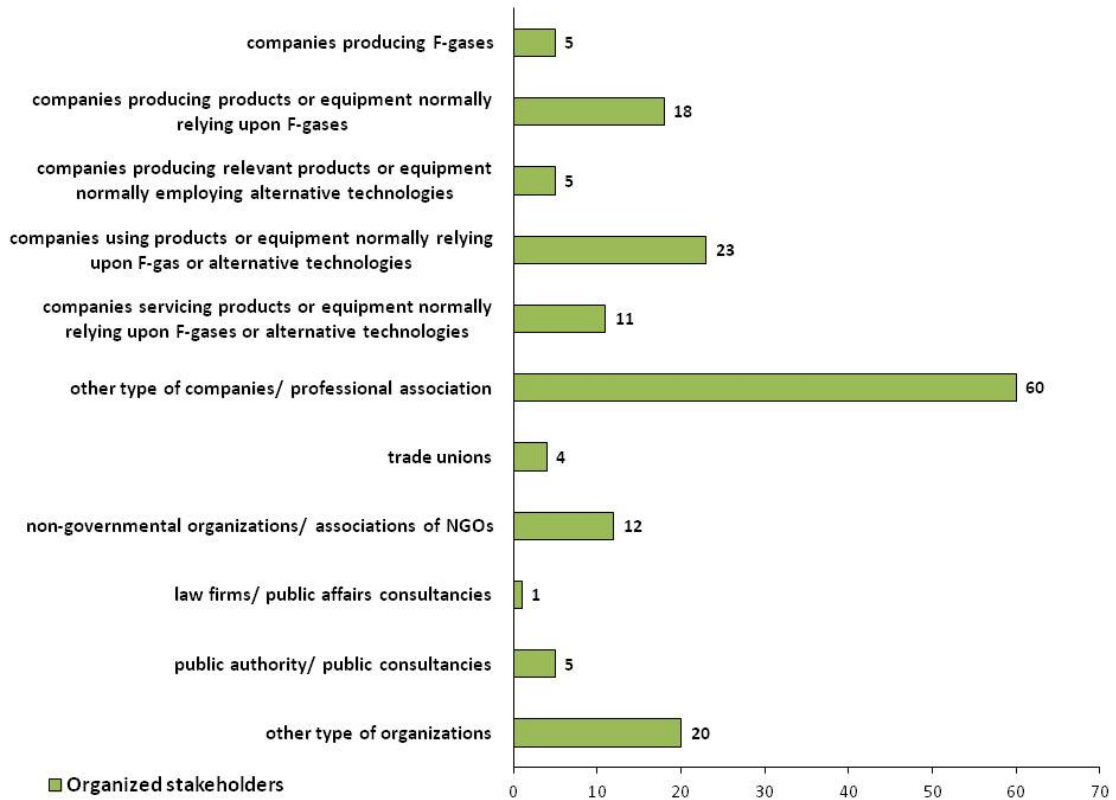
## **2.2. Categories of organisations**

*Please specify the category that most closely describe your organisation*

- companies producing F-gases*
- companies producing products or equipment normally relying upon F-gases*
- companies producing relevant products or equipment normally employing alternative technologies*
- companies using products or equipment normally relying upon F-gases or alternative technologies*
- companies servicing products or equipment normally relying upon F-gases or alternative technologies*
- other type of companies/ professional association*
- trade unions*
- non-governmental organisations/ associations of NGOs*
- think tanks*
- academic organisations/ association of academic organisations*
- law firms/ public affairs consultancies*
- public authority/ public consultancies*
- representative of religions, churches or faith communities*
- political party*
- other type of organisations*

As shown in Figures 2a and 2b, 77% of organised stakeholders were related to industry and represented companies, professional associations or trade unions (industry-related organisations; these categories are coloured in different shades of blue in Figure 2b).

Only 23% of organised stakeholders were not related to industry: 7% (12) were non-governmental organisations or associations of NGOs and 3% (5) were public authorities. Another 12% (20) selected the category “*other types of organisations*”. In particular the relatively low number of responses from public authorities should be noted.



Figures 2a (top) and 2b (bottom): Selected categories which most adequately describe the type of organisation represented (1 choice per respondent).

### **2.3. The country or the represented geographical area**

*Please indicate your country or, where relevant, the geographical area you represent*

<i>Austria</i>	<i>Greece</i>	<i>Portugal</i>
<i>Belgium</i>	<i>Hungary</i>	<i>Romania</i>
<i>Bulgaria</i>	<i>Ireland</i>	<i>Slovakia</i>
<i>Cyprus</i>	<i>Italy</i>	<i>Slovenia</i>
<i>Czech Republic</i>	<i>Latvia</i>	<i>Spain</i>
<i>Denmark</i>	<i>Lithuania</i>	<i>Sweden</i>
<i>Estonia</i>	<i>Luxembourg</i>	<i>United Kingdom</i>
<i>Finland</i>	<i>Malta</i>	<i>EU wide</i>
<i>France</i>	<i>Netherlands</i>	<i>World wide</i>
<i>Germany</i>	<i>Poland</i>	<i>Others</i>

As shown in Figure 3, out of the 259 submissions received in total, the country represented most often was France (61 total responses), followed by Germany (32), UK (26), Belgium (16) and Italy (12). There was a large number of respondents active at EU (38+5: organisations plus "individuals") and international (18+1) level. Organised stakeholders acting at EU-level include companies, trade and industry-related umbrella associations and non-governmental organisations.

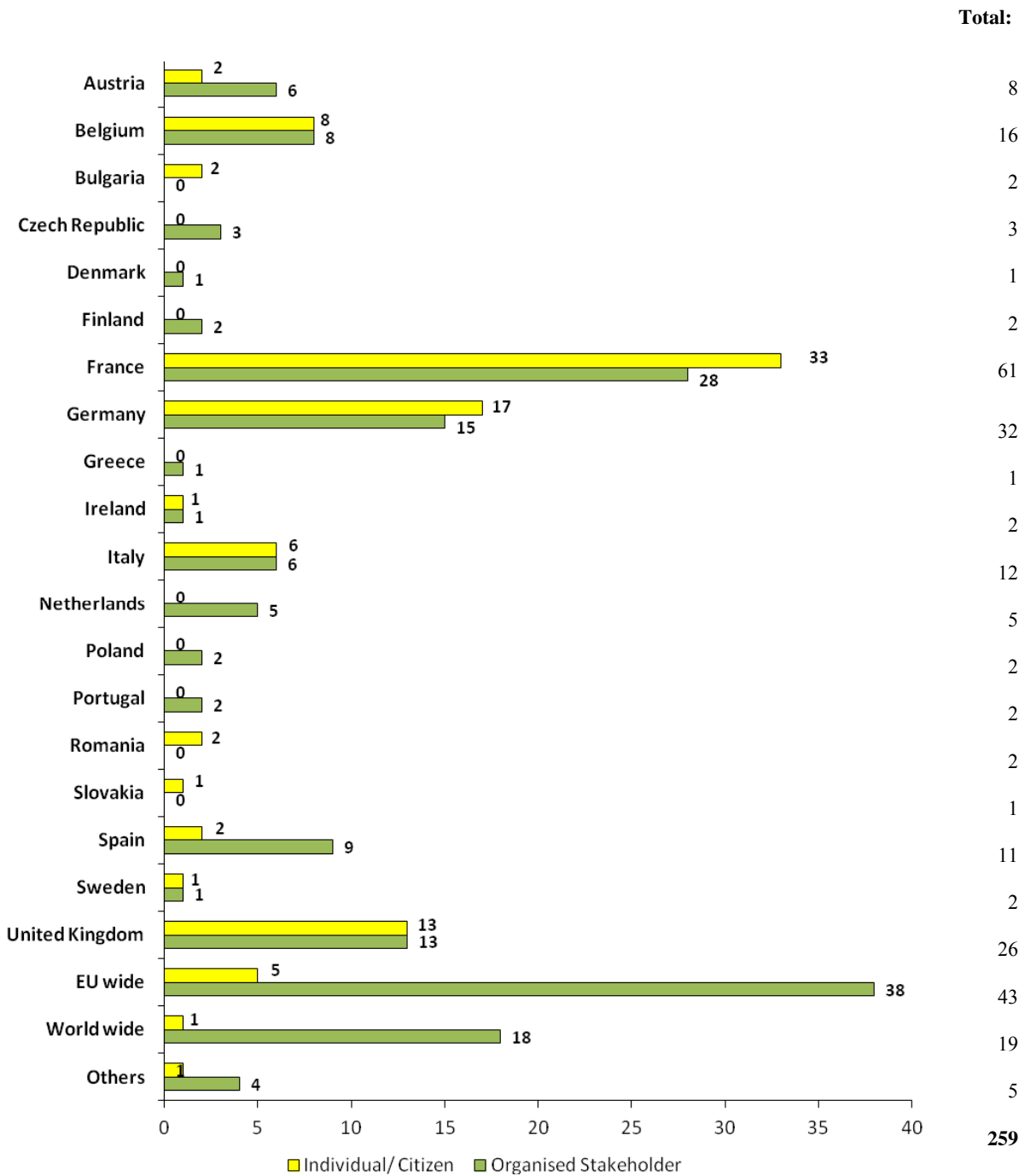


Figure 3: The country or the geographical area represented by the respondents.

## **2.4. Use categories for respondents**

*Please select the option best describing the use category relevant for you, if any (max 3 choices)*

- domestic refrigeration and freezers*
- commercial refrigeration and freezing equipment*
- industrial refrigeration and freezing equipment*
- transport refrigeration*
- room air-AC (factory-sealed movable and single-split systems)*
- air-AC in motor vehicles*
- air-AC in other modes of transport*
- air-AC excluding room a/c, and a/c in modes of transport*
- heat pumps*
- medical aerosols*
- aerosols (other than medical)*
- fire protection*
- foams*
- high-voltage switchgear*
- solvents*
- semiconductors*
- magnesium casting*
- others or no specific use category*

In total, 516 responses were received (197 by individuals/ 319 by organised stakeholders) (Figures 4a,b). Overall, the category “*heat pumps*” was the most represented sector (81; 24%), followed by “*industrial refrigeration*” (72; 14%).

The stationary AC and heat pump sector, including the categories “*room air-AC (factory-sealed movable and single-split systems)*”, “*air-AC excluding room a/c and a/c in modes of transport*” (together 21%) and “*heat pumps*” (24%), accounted for 45% of responses.

Stationary refrigeration sectors were represented by 23% of the responses of organised stakeholders (including “*domestic refrigeration*” (8; 3%); “*commercial refrigeration*” (27; 9%); “*industrial refrigeration*” (40; 13%)). Organised stakeholders included e.g. professional associations of contractors such as AREA (ID 03396347383-49), industry associations such as Food Drink Europe (ID 75818824519-45), etc.

Representatives of the high-voltage switchgear sector contributed 8% (28) of responses, the mobile air AC sector was represented by 3% of responses (11).

The category “*others or no specific use category*” (40; 12%) was chosen e.g. by producers of F-gases, public authorities and non-governmental organisations.

In Figure 4b, responses from the aerosol sectors, fire protection, foam and solvents sectors are summarised as “*other HFC sectors*” due to the relatively small number of responses selected for these categories (Figure 4a).

All major sectors are covered by respondents. However, the differing level of participation from different stakeholder groups which also leads to some sectors being over- and others underrepresented must be kept in mind for evaluating the responses on preferred policy actions and expected impacts, as sector specificities will be reflected in the responses. In particular, a high number of responses on heatpumps was recorded.

As for individuals, it is interesting to note that they also associated themselves with particular sectors. Most individuals chose “*industrial refrigeration and freezing equipment*” (32), “*commercial refrigeration and freezing equipment*” (29) and “*heat pumps*” (25). As mentioned above, many organised stakeholders who categorized themselves as individuals for practical reasons (e.g. a representative of a national refrigeration and HVAC association). While not representing a company, one third of individuals expressed their affiliation to various companies producing, distributing or servicing equipment which relied on F-gases and/or alternatives. Domestic refrigeration equipment was only represented by 13 individuals.

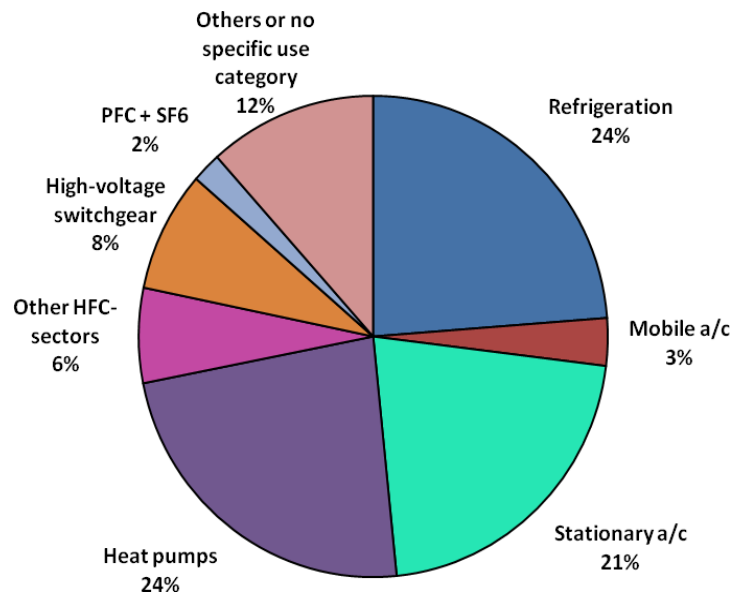
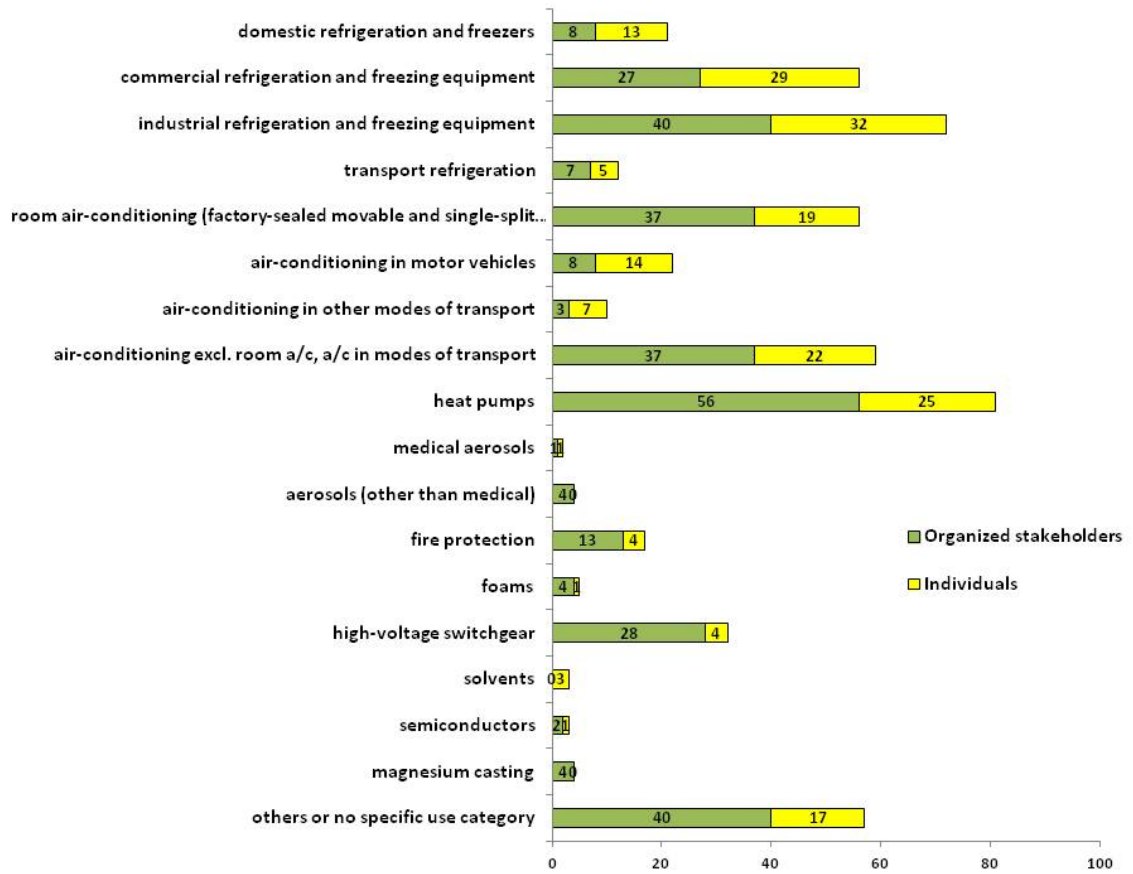


Figure 4a (top) and 4b (bottom): Use categories represented by the respondents (up to 3 choices per respondent). Figure 4b does not distinguish between individuals and organised stakeholders.



**2.5. Publication of the questionnaire**

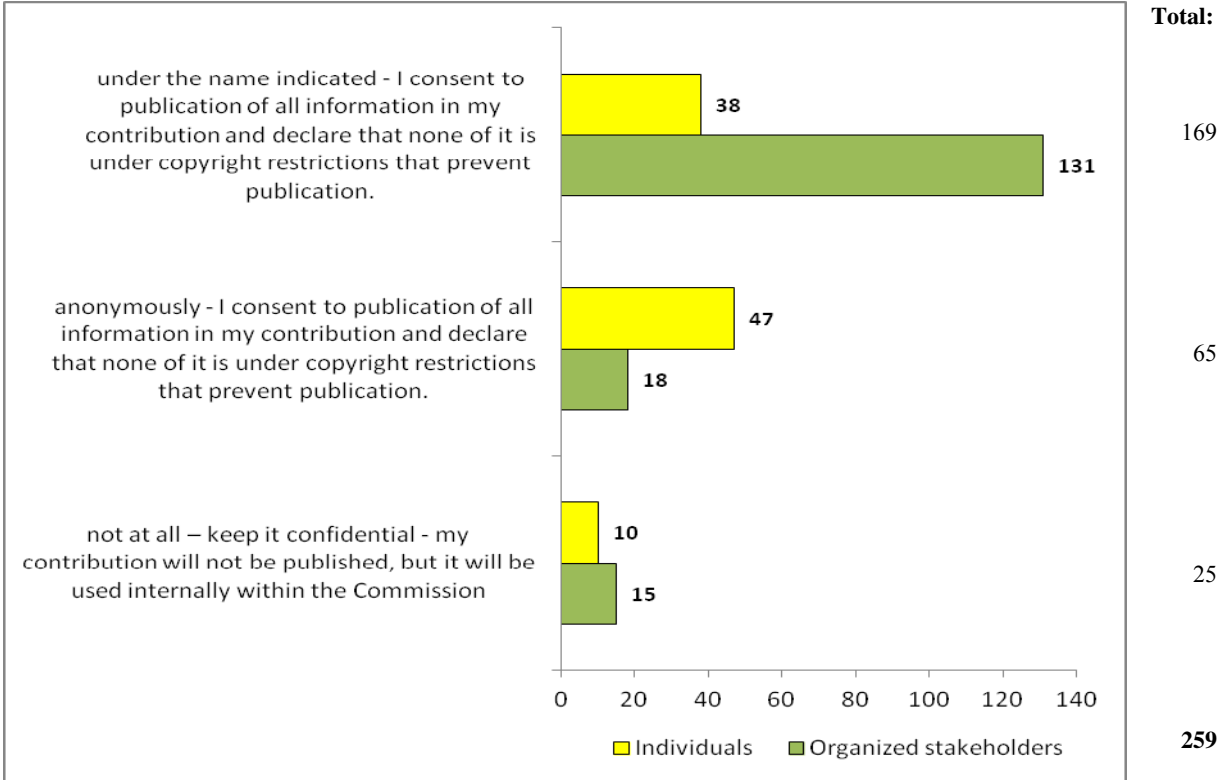
*We may publish your response, together with your identity, on the Commission website, where it will be publicly accessible. Though if you request it, publication will be anonymous. How would you prefer your contribution to be published, if at all?*

- *under the name indicated - I consent to publication of all information in my contribution and declare that none of it is under copyright restrictions that prevent publication*
- *anonymously - I consent to publication of all information in my contribution and declare that none of it is under copyright restrictions that prevent publication*
- *not at all – keep it confidential - my contribution will not be published, but it will be used internally within the Commission*

Out of the total of 259 respondents (95 individuals/ 164 organised stakeholders), 169 agreed to publication under the name indicated (65%), 65 preferred to remain anonymous (25%) and 25 wished that their contribution would be treated confidentially (10%) (Figure 5).

For individuals, 50% wished that their statements would be treated anonymously, 40% agreed to publication under the name indicated and 10% wanted their comments to be kept confidentially.

For organised stakeholders, 80% agreed to publication “*under the name indicated*”, 11% wished their comments to be treated anonymously and 10% preferred their contributions to be treated confidentially.



**Figure 5: The preferred ways of publication chosen by individuals and organised stakeholders (1 choice per respondent).**

## **2.6 Remark on the methodology of the evaluation**

As a result of the findings above it is clear that a purely quantitative analysis of the responses to the online questionnaire would be misleading due to a number of reasons:

- Certain industries participated very actively whereas other application sectors replied at comparably low numbers.
- The number of total responses received varies distinctively for different categories/types of organisations: 77% of organisations represent industry vs. 7% NGOs and 3% for public authorities.
- "One reply" ≠ "one reply": Submissions of umbrella organisations or associations of NGOs would in a purely quantitative approach only be counted once and be equated with submissions from individual companies, although they represent concerted positions of large number of members and/or several branches .
- "Multiple replies": Some member of large umbrella organisations submitted separate responses but used the same choices and comments as larger umbrella organisations. Even certain companies replied more than once since national branches, different departments or daughter companies sent their responses separately, but largely used the same text as the mother companies or headquarters.

**The evaluation needs to take these aspects into account and should not be based on a quantitative analysis only. Instead, qualitative (textual) aspects of the contributions need to be integrated into the analysis and differences between concerted positions of umbrella organisations and single opinions need to be acknowledged.** This has been practised for the following parts on policy actions and impacts (chapters 3 and 4).

### 3. Evaluation of the questions on choice of policy action

#### 3.1. Evaluation of Question B 1

*The European Commission is looking to set out a plan to reduce EU emissions by 80-95% by 2050. In this context, how do you judge current EU policies on greenhouse gas emissions from F-gases (e.g. the F-Gas Regulation on certain F-gases and the Directive on mobile air-AC)?*

- properly implemented and fully sufficient*
- fully sufficient if properly implemented*
- insufficient, even if properly implemented*
- no opinion*

As shown in Figures 6a and 6b, only 8% out of the 254 submissions stated that the current EU policies on greenhouse gas emissions from F-gases were “*properly implemented and fully sufficient*”.

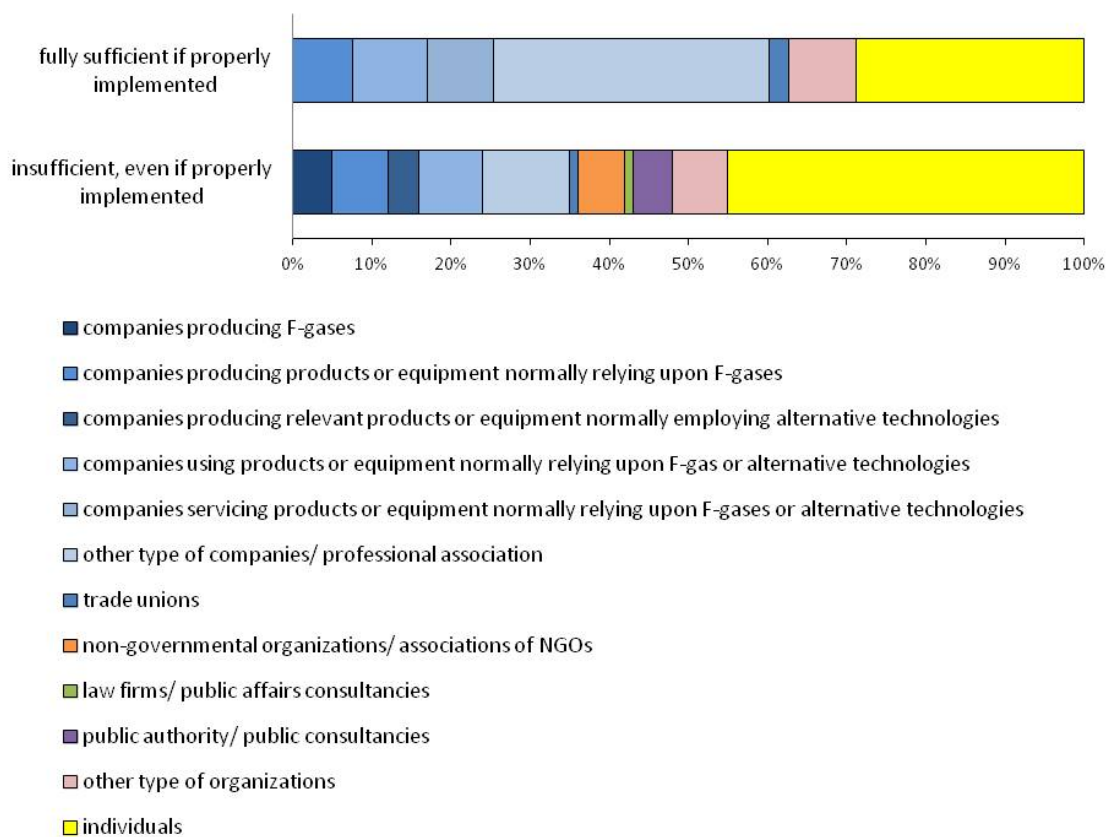
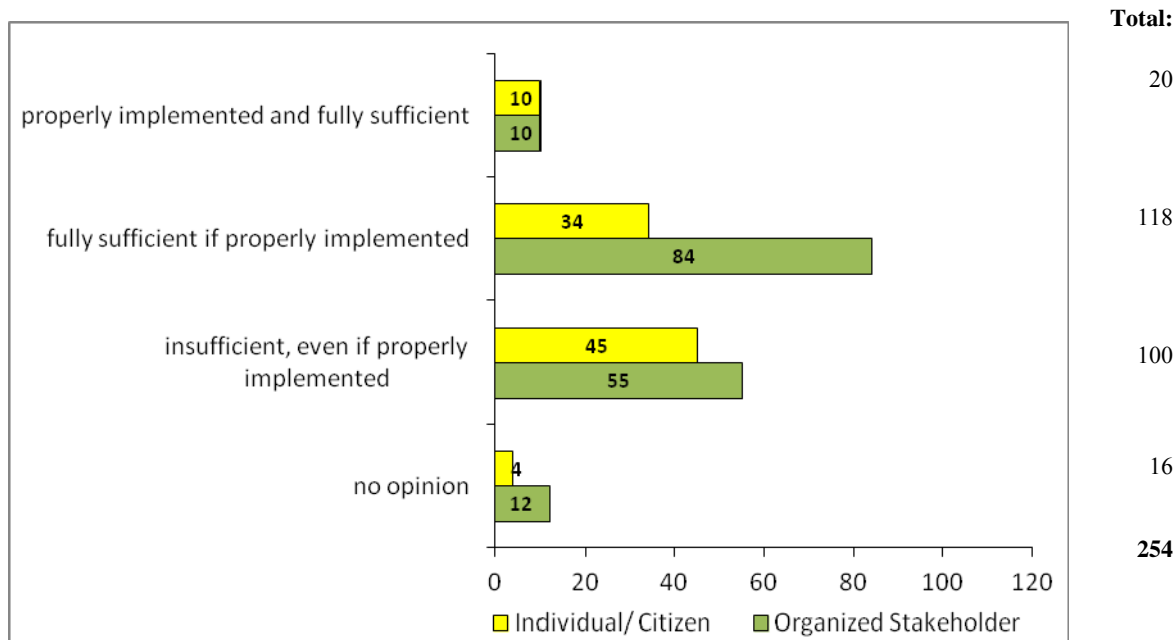
Conversely, a large majority (84%) believed that the status quo is not fully sufficient: 46% overall wanted to see better implementation, a view common among many industrial organisations (>60% of the latter believe so, see Figure 6b). Another 39% overall wanted see further legislative action which included *inter alia* 37 industry related-stakeholders, such as 14 trade and industry associations (e.g. EPEE (ID 08158165539-04), JRAIA (ID 50134607288-38), CECED (ID 04201463642-88)) and 27 companies. Among individuals, the majority chose the latter option.

6% of respondents had no opinion about the current EU policies on F-gas emissions.

All public authorities and NGOs agreed that current EU policies on greenhouse gas emissions from F-gases were “*insufficient, even if properly implemented*”.

Based on application sector, representatives of the refrigeration and air AC sectors, as well as producers of F-gases and alternative equipment wanted to see further legislative action, while representatives of fire protection, aerosols, mobile air AC and transport refrigeration sectors as well as contractor associations mainly considered European F-gas policies to be “*fully sufficient if properly implemented*” or even “*properly implemented and fully sufficient*”.

In summary, 84% (218) of respondents found that the current status quo of implementing the existing regulation was not sufficient (Figure 6b). Of these, some thought better implementation would suffice, others wanted to see further action. Different opinions with regard to further action were linked to stakeholder type and also to sector particularities.



Figures 6a (top) and 6b (bottom; detail): Question B 1 (How do you judge current EU policies on greenhouse gas emissions from F-gases?) (254 responses).

### **3.2. Evaluation of Question B 2**

*What are the main obstacles to switching to alternative technologies with lower impact on the climate (i.e. fluids with low global warming potentials or other non-in-kind technologies) in the applications currently relying upon F-gases? (max 3 choices)*

- there are no real obstacles*
- alternative technologies will not be available in specific applications*
- alternative technologies will require higher initial investments*
- alternative technologies will be more costly to operate*
- alternative technologies will not meet the same performance standards (e.g. reliability, energy efficiency, insulation properties etc.)*
- alternative technologies will require greater effort to meet the same safety standards*
- other*

As shown in Figures 7a and 7b, all choices offered for potential obstacles were selected by respondents (up to 3 choices could be selected). In total, 615 responses were given, 32% by individuals and 68% by organised stakeholders.

Only 5% (30) of the responses (17 individuals / 13 organisations) underlined that there were no real obstacles to the introduction of alternative technologies with lower climate impact. Figure 7b illustrates that this view was frequently chosen by individuals.

Operation costs were similarly considered a lesser obstacle (61 in total; <10%). The exception being SF<sub>6</sub> use in switchgear SF<sub>6</sub>, as well as some claims for XPS foam blowing, aerosols, and fire protection, where F-Gases were considered more economical. Few stakeholders expected higher operation cost for alternatives to HFCs in refrigeration/AC.

On the other hand, many individuals (51; 26% of responses by individuals) and organised stakeholders (107; 19% of responses by organised stakeholders) concurred that higher initial investment costs were the most important obstacle. Most comments by organised stakeholders referred to refrigeration/AC (and a few comments to fire protection). While generally respondents expected that alternative refrigerants would cause higher initial investment costs in the refrigeration/AC sectors, 5 respondents claimed that either the investment costs would decrease over time with growing market penetration or the high initial cost would be compensated by lower operating costs.

Individuals also assumed that the greater efforts required to meet the same safety standards (36; 17%) or performance standards (28; 14%) would be important obstacles.

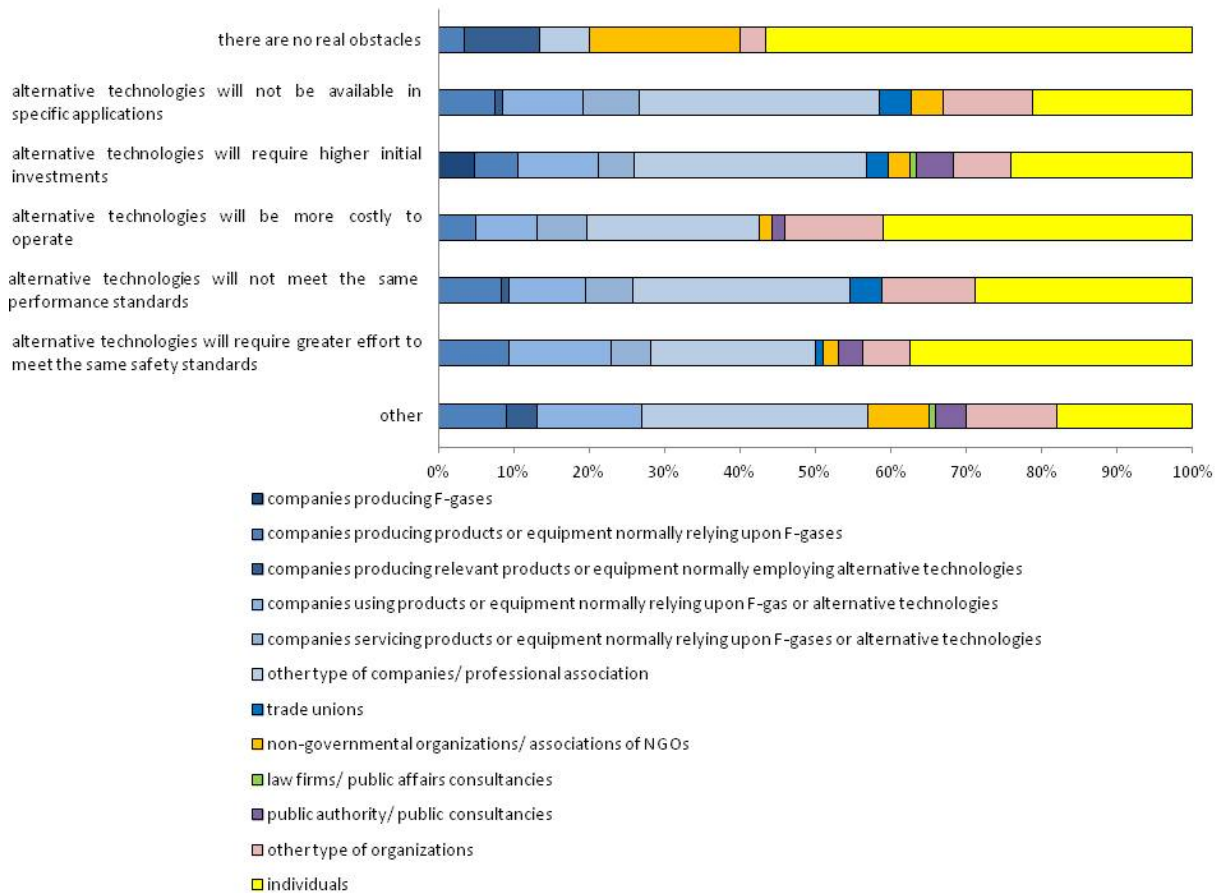
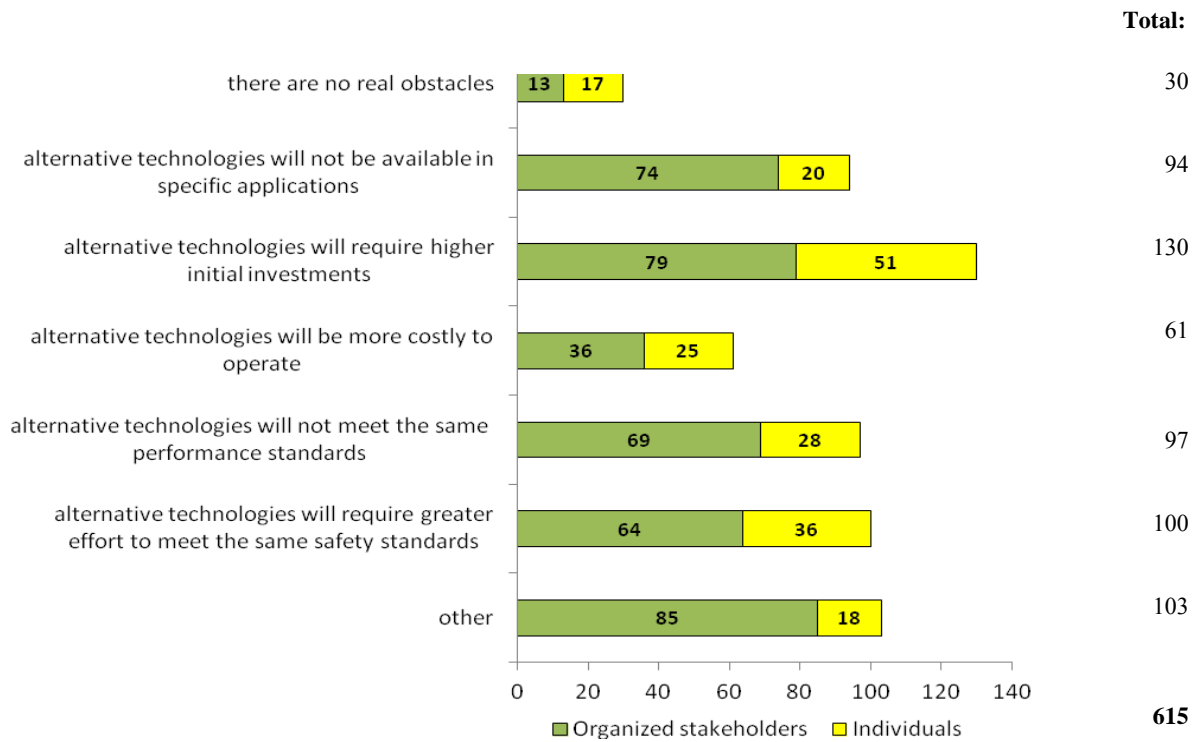
Organised stakeholders, on the other hand, identified a lack of alternative technologies in specific applications as another main barrier (18%; 74), contrary to most individuals. 27 stakeholders gave some more details in their comments. A number of responses related to smaller sectors such as electrical switchgear and the use of SF<sub>6</sub> (9), magnesium sand casting (1), HFCs in foam blowing (1) or HFC propellant gas (1). 14 stakeholders referred to refrigerants, 4 of them stating that alternatives were only available in selected applications, while general concerns against the use of alternatives to HFCs were expressed in 10 comments. As main arguments, lower energy efficiency of alternative technologies was mentioned resulting in higher indirect emissions, as well as less safety or lower

compliance with standards or legislation. It should be noted that many of the general concerns were sent by different branches of the same company using exactly the same wording.

84 organised stakeholders selected “*other*” obstacles (see also 3.3).

As indicated by Figure 7b, different industry players also view the situation on alternatives differently: for producers of F-Gases it is mostly a question of high initial investments, for producers of equipment with alternatives there are few obstacles, users are more than others concerned about safety standards, etc..

Overall, the results indicate that the obstacles identified differ between sectors. This reflects that adequate, safe and cost-effective alternatives are not yet available to the same degree in all applications areas and sectors.



Figures 7a (top) and 7b (bottom): Question B 2 (What are the main obstacles to switching to alternative technologies with lower impact on the climate in the applications currently relying upon F-gases?) (at maximum 3 choices per respondent).

### **3.3. Evaluation of Question B 3**

Further obstacles not yet mentioned in the above section included:

- Insufficient skills, training and education of installation/service personnel (6x).
- Insufficient compliance of alternative technologies with other EU directives such as Ecodesign directive, Energy performance of buildings directive, ATEX directive, Seveso directive, etc (14x responses by branches of one company).
- Space restrictions for non-HFC fire extinguishing agents (1x) and for SF6 free alternatives in electrical switchgear (7x).
- Patents for unsaturated HFCs (1x).
- REACH approval for unsaturated HFCs (1x).
- Too short amortisation periods for investment in refrigeration sectors (1x).

### **3.4. Evaluation of Question B 4**

*In the absence of global action to phase-down HFCs, which options would you consider the most appropriate, at EU level, to contribute to the established targets for reducing greenhouse gas emissions? (max. 3 choices)*

- establishing maximum, gradually declining limits to the quantity of HFCs placed on the EU market (phase down) expressed in terms of CO2 equivalent*
- encouraging voluntary agreements for specific sectors where replacement is technically feasible and cost-effective*
- introducing additional prohibitions on use and marketing for certain equipment and products, where cost-effective alternatives exist (e.g. a ban on application X containing hydrofluorocarbons as of date Y)*
- strengthening, where possible, measures aiming at containment and proper recovery of F-gases (e.g. through stricter and/ or broader application of existing measures in the F-gas Regulation)*
- including emissions related to production and consumption of F-gases under the EU ETS*
- establishing EU harmonized taxes on sales of F-gases*
- setting up deposit and refund schemes for products involving F-gases*
- no further action*
- other policy options at EU level*

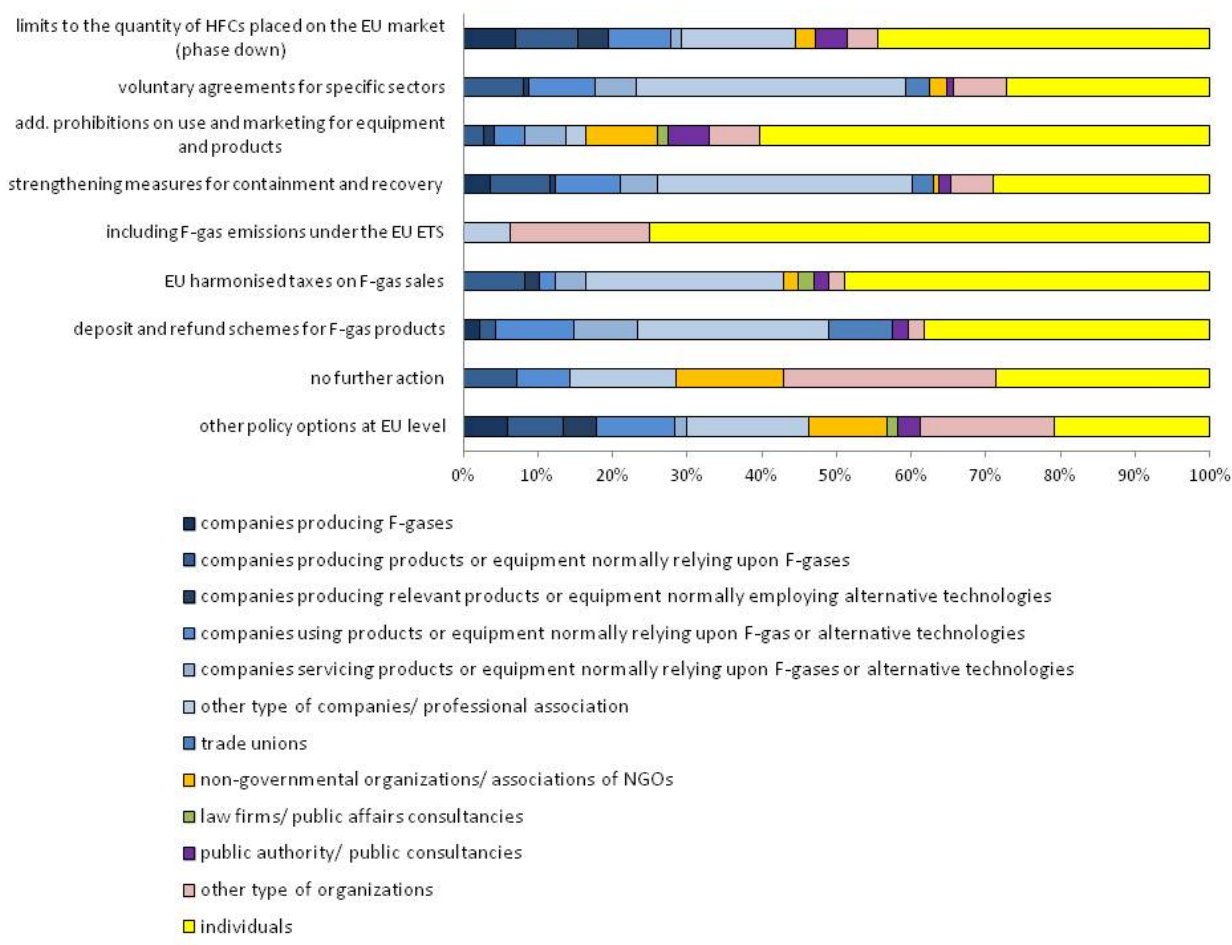
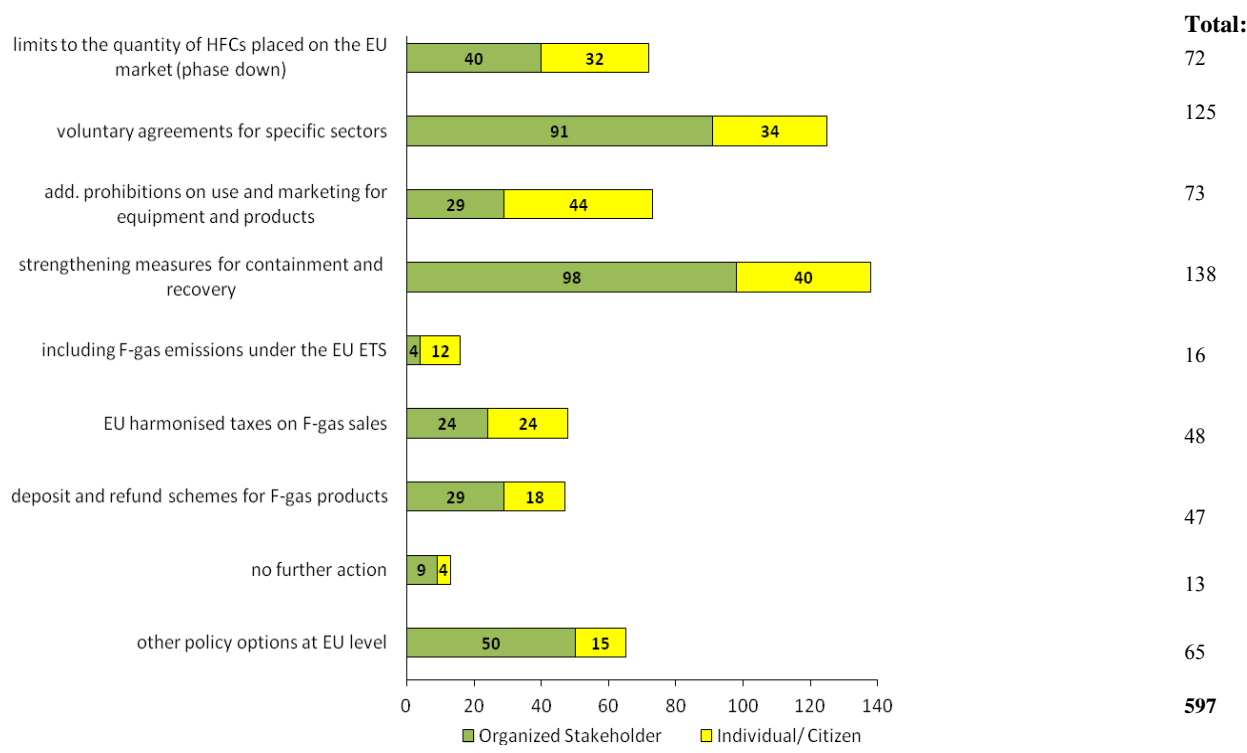
Out of the total of 597 responses, 374 (63%) were given by organised stakeholders and 223 (37%) by individuals.



Organised stakeholders selected containment/recovery as the most appropriate action, followed by voluntary agreements and limits to placing on the market (phase-down) (Figure 8a). On the other hand, bans were more popular with most individuals, public administrations, NGOs and manufacturers of alternative equipment. While taxes & deposit schemes were favored by a few respondents (ca. 8%), **"No further action" was not considered as appropriate action for the EU (only 2% thought so).**

Figure 8b shows that the preference for certain actions is linked not only to organisation type (industrial player, NGO, authority etc.) but also to area of activity: By way of example, a phase-down option was selected by producers of F-Gases and producers of equipment (both alternatives and F-Gases). A phase-down was also supported by public authorities and many individuals.

This heterogeneous picture indicates that according to stakeholders no single policy option is deemed appropriate for all sectors, also since framework conditions for the introduction of alternatives vary.



Figures 8a (top) and 8b (bottom): Question B 4 (In the absence of global action to phase-down HFCs, which options would you consider the most appropriate, at EU level, to contribute to the established targets for reducing greenhouse gas emissions?) (at maximum 3 choices per respondent).

### **3.5. Evaluation of Question B 5**

30 specific comments were submitted regarding the option “*strengthening of containment and recovery measures*”. Most aspects referred to enforcement of the existing Regulation, either in general or through more specific measures such as

- Higher efficiency of recovery, recycling, reclamation and destruction of F-gases (11x)
- Systematic controls of operators by authorities (7x)
- Information campaigns for operators (6x)
- Promotion of EU standards e. g. EN 378, EN 16084, EN 13313 (3x)
- Centralised electronic register of certified companies and personnel (3x)

Other stakeholders commented that the scope of the Regulation should be extended:

- Reduction of 3 kg threshold to 1 kg (1x) or 0.5 kg (2x)
- Inclusion of transport refrigeration and bus and truck air AC (1x)
- Certification of personnel at refilling and recycling stations (fire protection) (2x)
- Certification for installation of all non-hermetic systems regardless the charge (1x)
- Sale of pre-charged equipment to certified personnel only (1x)
- Control of F-gas imports from non-EU countries (1x).

Among the 121 responses for voluntary agreements, 25 were specified in additional comments. 5 stakeholders referred to existing voluntary agreements on SF<sub>6</sub> in the switchgear sector, which are considered proven and successful emission reduction instruments. In addition, a representative from the magnesium industry proposed voluntary action to further substitution of SF<sub>6</sub> in magnesium casting. Most organisations represented the stationary refrigeration/ air AC sectors. None gave positive or negative statements about voluntary agreements but supported other emission reduction measures listed under question B4. Additional prohibitions were explicitly rejected (2x). Certain stakeholders disagreed with unilateral EU action in the absence of global agreements.

With regard to the 70 responses supporting a phase down, 14 were accompanied by additional comments: EFCTC (ID 47017277378-73) and EPEE (ID 08158165539-04) highlighted that any choice should not disadvantage EU companies. EFCTC (ID 47017277378-73) specified that it “*supports a global consumption phase-down, taking into account availability of alternative technologies that are safe, energy-efficient & affordable, in preference to a stand-alone EU phase-down, but believes that a stand-alone consumption cap and phase-down of HFCs is preferable to other approaches.*” Another 3 organisations of the refrigeration/ air AC sector would support a global phase-down under the condition that alternatives were available at appropriate cost, but would reject European unilateral action. One of these organisations, JRAIA (ID 50134607288-38), expressed the position that refrigerants with GWP <1000 should be maintained. Two stakeholders of the fire protection sector likewise supported global action. One of them rejected EU unilateral action, the other indicated 2012 as the first year of transition to alternatives.

Among the responses in favour of additional prohibitions, 13 were specified in the comments (further 4 comments do not refer to the option chosen). Among these, 11 were submitted by NGOs, 1 by a manufacturer of alternative equipment and 1 by an individual. The individual stakeholder proposed a ban on import and export of F-gases in pre-charged equipment. All 11 NGO stakeholders supported a full HFC-phase-out by 2020, which was assumed to result in a strong framework for green jobs, investors and EU competitiveness. A phase-out should take place even in the absence of a global HFC

agreement, and could be combined with sales taxes (8x). In addition, prohibition of SF6 use in electrical switchgear was proposed.

No specified comments related to the option “*setting up deposit and refund schemes for products involving F-gases*”. However, under the option “*strengthening containment and recovery*”, some stakeholders also supported including deposit and refund schemes in the revised F-gas Regulation.

62 of the 65 responses for “*other policy options at EU level*” were specified in additional comments. However, only very few of them suggested further measures not included in the answers above.

With regard to the option “*including emissions related to production and consumption of F-gases under the EU ETS*”, 3 written comments were given; however only one related to the subject under question. The stakeholder disapproved to include emissions from production and consumption of F-gases in the EU ETS and taxes because of high uncertainties in measuring leakage and emission factors for refrigerants, as well as the significant differences of costs depending on the country and sector considered, which could not be fairly taken into account by the EU registry for the ETS.

Three measures not yet mentioned elsewhere include:

- Tax benefits to foster non f-gas installation technologies (1x).
- The Commission should engage in an agreement with producers and users of HV Switchgear to jointly fund a R&D programme for the implementation of SF6-free alternatives with the goal to come to a ban of use in new applications as of 2018 (1x).
- Inclusion of toxicity of decomposition products of unsaturated HFC 1234yf into the total assessment of the climate impact of this substance (2x).

### **3.6. Evaluation of Question B 6**

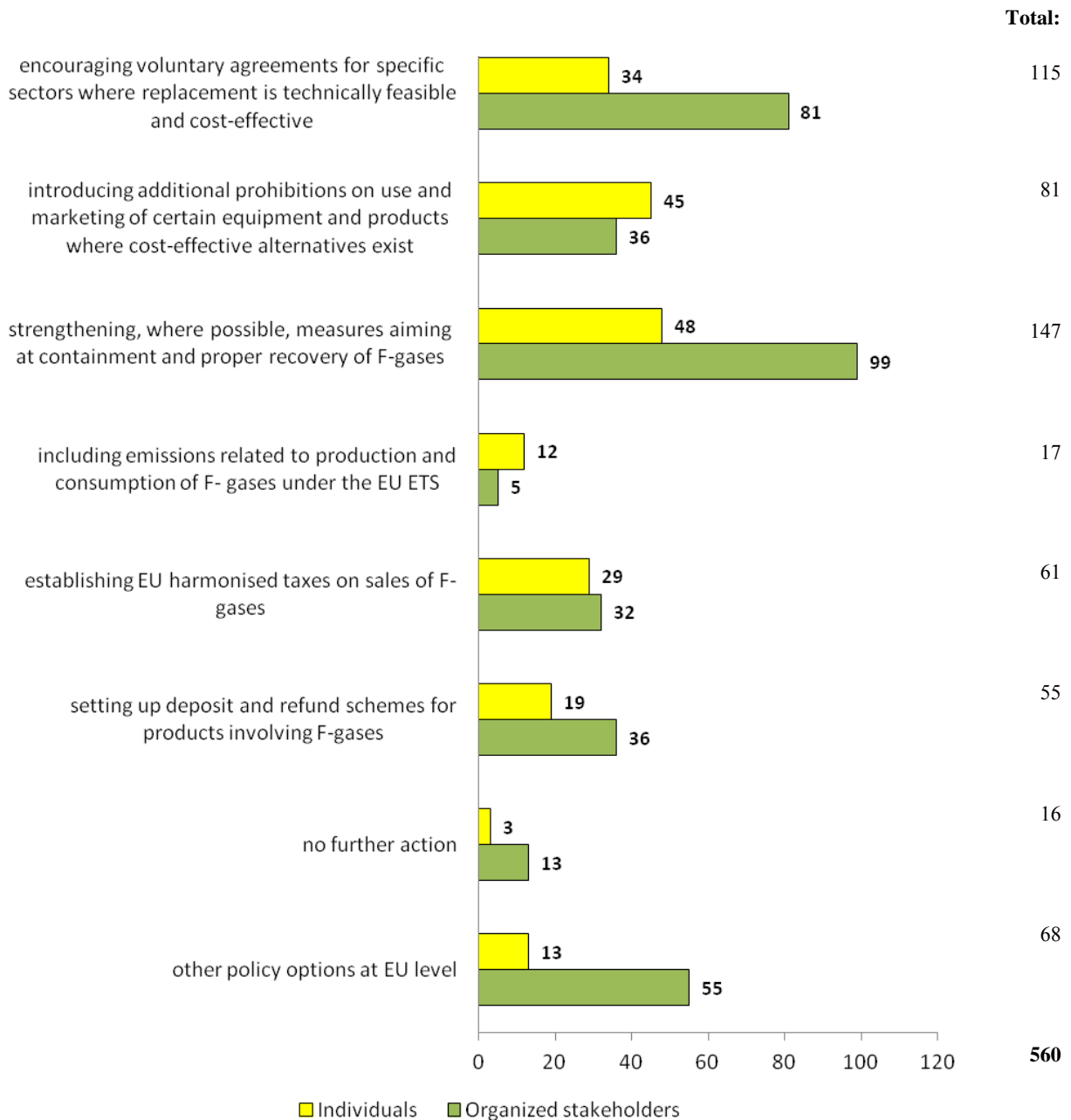
*If a global agreement to phase-down HFCs is eventually concluded, which policy options (if any) would be the most appropriate to complement, at EU level, the establishment of maximum, gradually declining, limits for the quantity of HFCs placed on the EU market expressed in terms of CO2 equivalent. (max 3 choices)*

- encouraging voluntary agreements for specific sectors where replacement is technically feasible and cost-effective*
- introducing additional prohibitions on use and marketing of certain equipment and products where cost-effective alternatives exist (e.g. a ban on application X containing hydrofluorocarbons as of date Y)*
- strengthening, where possible, measures aiming at containment and proper recovery of F-gases (e.g. through stricter and/ or broader application of existing rules in the F-gas Regulation)*
- including emissions related to production and consumption of F-gases under the EU ETS*
- establishing EU harmonized taxes on sales of F-gases*
- setting up deposit and refund schemes for products involving F-gases*
- no further action*
- other policy options at EU level*

A total of 560 responses to this question were received (203 individuals/ 357 organised stakeholders) (Figure 9).

Most responses of both organised stakeholders (28%) and individuals (24%) supported the argument that “*strengthening measures to aim containment and proper recovery of F-gases*” were the most appropriate measure to complement the establishment of an HFC phase down at EU level. 23% of organised stakeholders and 17% of individuals selected “*encouraging voluntary agreements for specific sectors where replacement is technically feasible and cost-effective*” as complementary policy action. “*Introducing additional prohibitions on use and marketing of certain equipment and products where cost-effective alternatives exist*” was chosen by 22% of individuals but only 10% of organised stakeholders. The other choices were named less frequently.

Similarly to question B4, responses to question B6 indicate that no single policy option is considered appropriate for all sectors to complement global action to phase-down HFCs. Preferences vary between respondent type and area of activity.



**Figure 9: Question B 6 (If a global agreement to phase-down HFCs is eventually concluded, which policy options (if any) would be the most appropriate to complement, at EU level, the establishment of maximum, gradually declining, limits for the quantity of HFCs placed on the EU market expressed in terms of CO2 equivalent?) (at maximum 3 choices per respondent).**

### **3.7. Evaluation of Question B 7**

Additional aspects on both enforcement and extension of the F-gas Regulation were submitted addressing the option “*strengthening of containment and recovery measures*”. Comments with regard to enforcement were:

- Improved recovery, recycling, reclamation and destruction of F-gases (4x);
- Reduction of hurdles for cross-border shipment of waste F-gases for destruction (2x);
- Introduction of deposit and refund schemes, but no application of deposit and refund scheme to HFCs for export in bulk or in pre-charged products (3x);
- Promotion of EU standards like EN 378, EN 16084 for long-time leak-tightness (3x);
- Centralized electronic database of certified companies and personnel, available to operators of fire suppression systems (1x), of refrigerant containing systems (2 x);
- Appropriate training for personal certification, no crash courses (1x);
- Enforced certification of companies and technicians in every MS (1x).

Several stakeholders supported to widen the scope of the F-gas Regulation:

- Lowering the 3 kg threshold to 2 kg (1x), 1 kg (1x), 0.5 kg (2 x), inter alia to include domestic heat pumps in periodical leak checking;
- F-gas reporting should include actual use and applications (3x);
- Financial incentives for recovery and reclamation (3x);
- Sales of F-gas and pre charged equipment to certified companies only (2x);
- Certification for installation of all non-hermetic systems regardless the charge (2x);
- Control of HFC sales from distributors to operators (1x);
- Improved labeling provisions (1x);
- Inclusion of ship air AC in Regulation (1x).

Among the 115 responses for “*encouraging voluntary agreements for specific sectors where replacement is technically feasible and cost-effective*” (81 org /34 ind), some additional comments were submitted but, similarly to question B5, hardly any comment explicitly referred to the chosen option.

A representative of a public authority explained that voluntary agreements were only effective in sectors with relatively few stakeholders, and that for the success of voluntary agreements strict regulation should be maintained as “fall back” option.

It should be noted that comments of stakeholders from the electrical switchgear sector on voluntary action about SF6 containment (question B5) are not treated here because this question referred to HFCs only.

Certain comments referred to “*additional prohibitions*” (34 org/ 45 ind). Among these, 8 were submitted by NGOs who supported full HFC-phase-out by 2020. A quote from these comments: “*In the event of a global agreement on an HFC phase down, the European Union must still move to phase out HFCs internally to maintain its first mover advantage in alternative refrigerants as well as achieve rapid emission reductions*” (EIA; ID 92596007443-31). Sectoral bans on HFC use and marketing were considered as the tool “*simplest to implement and verify*”. Another 3 organised

stakeholders favoured sectoral bans for equipment/ products where cost effective alternatives existed. Bans had already proven effective for certain SF6 applications (1x). Another two stakeholders proposed selected bans for international refrigerated transport by sea and road (1x) and for import and export of HFCs in pre-charged equipment (1x).

The option “*including emissions related to production and consumption of F-gases under the EU ETS*” (5 org /12 ind) was only chosen a few times, no written comment was given.

61 responses (32 org/ 29 ind) related to the option “*establishing harmonized taxes on sales of F-gases*”. Organisations included mainly large manufacturers of air AC equipment and NGOs. 8 comments specified the option: 6 stakeholders from NGOs favoured a combination of sectoral bans and a tax on the sale of F-gases which would simultaneously help to spur alternative refrigerant technologies. Shecco (ID 5570907162-93) pointed out that such tax on F-gas sales could “*internalise their external cost*”.

Only 2 written comments by organisations explicitly specified the option “*setting up deposit and refund schemes for products involving F-gases*” (36 org /19 ind). However, under the option “*strengthening containment and recovery*”, 3 organised stakeholders (two European F-gas producers and their association) supported (in same wording) “*introduction of deposit and refund schemes which should not be applied to HFCs for export in bulk or in pre-charged products to maintain competitiveness*”.

With regard to the option “*no further action*” (13 org/ 3 ind), no written comment was given. 4 of the stakeholders who voted for this option were representatives of carmakers. Apparently, they considered the 134a-phaseout of passenger car MACs as sufficient measure for their sector. The situation seemed to be similar for stakeholders of the domestic refrigeration sector, where HFC phase-down is already established.

For 61 of the 68 responses (55 org /13 ind) for “*other policy options at EU level*” additional comments were given. However, only few of them indicated additional measures which were not yet included in the answers provided within the questionnaire.

The following measures were not yet mentioned elsewhere:

- Any EU measures related to F-gases should be in line with a global approach. As a supporting measure, the EU should consider to what extent globally harmonised standards are acceptable and feasible (4x);
- Attention should be paid to the quality of pre-charged equipment manufactured outside of the EU. Imports needed to comply with European standards to guarantee the integrity of the equipment and containment of F-gases (1x);
- Inclusion of further SF6 and PFC applications in the F-gas Regulation (1x);
- Encourage producer responsibility schemes following the example of the WEEE Directive to improve recovery (1x);
- Subsidies for the production of HCFC-22 via HFC-23 carbon credits to stop (1x).



### **3.8. Evaluation of Question B 8**

*If you have a specific suggestion on how to reduce leaks and improve recovery of F-gases from products through stricter and/ or broader application of the type of measures already present in the F-gas Regulation, please briefly specify below:*

Comments to this question were submitted by 145 stakeholders including 117 organised stakeholders and 36 individuals. Many of the suggestions were also mentioned under other questions, but are summarised again here.

#### **Control and enforcement of the existing legislation and harmonisation of the situation within the EU**

- Public reporting of HFC use/leakage rates by major users of F-gases. More regular reporting of F-gas use. Include data on destruction in reporting obligations.
- Regular control of logbooks,
- Control of recovery practices and reclamation/destruction facilities.
- Restricting sales of refrigerants and pre-charged split systems only to registered professionals.
- Systematic controls by assigned market surveillance authorities in EU27.
- Extend liability to installers, service companies, distributors or wholesalers of refrigerants: Any company/person who assigning work to a 3rd party on a refrigerant circuit should make sure that the 3rd party is properly certified.
- Reduce administrative burden for cross border transport of recovered refrigerants (without prior consent).
- Limit of the validity of certificates to a maximum of 5 years.
- Specific provisions on F-gas within the waste legislation in order to improve consistency.
- The European Commission should continue with its infringement procedures for Member States which are not yet compliant with the F-gas rules.
- Extend labelling provisions to other products.
- Extend recovery requirements to all types of products and equipment.
- Specify requirements on leak tightness in the Ecodesign Directive.
- Require destruction of HFC-23.
- Introduce sector-specific maximum leakage rates

#### **Broadening of the scope of the existing legislation:**

- Include mobile refrigeration (maritime, road, rail) in the Regulation's scope.
- Include air-AC in buses, trains, planes, marine containers, refrigerated freight trains.
- Include all fluorinated gases, including HFOs and HFO blends in Annex I.
- Ban the use of F-gases in equipment with small charges.

**Improve awareness and information exchange:**

- Promotion and publication of best practice examples, leak containment trainings and European standards, support of information exchange.
- Eco efficiency assessments for evaluation of environmental impact.
- Continuous efforts to raise awareness and inform operators.

**Technical measures:**

- Introduce CO<sub>2</sub> technology in mobile air AC.
- Improve equipment design, in particular through the removal of flare and flange joints wherever possible.
- Promote the use of low or zero GWP technologies.
- Reduce F-gas charges.

## Sector specific comments:

For the rail sector, it was suggested to improve existing maintenance programmes which then could serve as a basis for a voluntary commitment on F-gas emission reduction targets.

For the switchgear sector, further measures should take into account international standards in this sector. Existing voluntary agreements should be extended. Reporting of SF<sub>6</sub> emissions e.g. by separating emissions during service life and emissions at end of life should be improved.

For the fire protection sector, it was suggested that refilling and recycling stations should be subject to certification (1x).

### **3.9. Evaluation of Question B 9**

*If you have any specific suggestions of technical adjustments to the current F-gas Regulation, e.g. to clarify its provisions, please briefly specify below:*

Certain technical adjustments to the current regulation were mentioned under question B8, but are also included here. It should be noted that suggestions for new measures proposed under question B9 and related wording are not included.

Technical adjustments in the F-gas Regulation:

- Definition of “container”: Improve and harmonise with ADR Regulations and restrictions of supply of containers.
- Define “technically feasible” and “disproportionate cost” in Articles 3 and 4 of the F-gas Regulation.
- Definition of “non-refillable container”.
- Definition of “novelty aerosol and gas horn”.
- Include a definition of “application”, e.g. “the charge considered in an application is that contained in an individual refrigeration circuit”. An application could consist of several refrigeration circuits and the leak of one circuit would not contaminate the other circuits. The maximum quantity that could be emitted referred to the total charge of the individual circuit.
- Include a definition of “aerosol dispensers” to differentiate these products from non-refillable containers, e.g. as already defined in the Aerosol Dispensers Directive 75/324/EEC.
- Article 3.1c should be rewritten to state: “applications containing 300 kg or more of fluorinated greenhouse gases shall install leakage detection systems AND be checked for leakage at least once every six months”
- Article 3.4 should be rewritten to state: “Where a properly functioning appropriate leakage detection system is in place, the frequency of the checks required under paragraph 2(b) shall be halved”.
- With regard to electrical switchgear, new international standards have been adopted. In particular, within the framework of the International Electrotechnical Commission (IEC) the scope of Medium Voltage (1kV – 52kV) and High Voltage (above 52kV) has been clarified. These internationally agreed definitions should be used to be reflected in the revision of the F-gas Regulation.
- An inconsistency in the application of the GWP 150 limit was highlighted. All measures apply to the substances listed in Annex 1 including those with a GWP <150. For preparations with a GWP <150, only the destruction measures apply. The GWP 150 limit should also apply to substances as well as preparations. Retaining and adjusting this measure will further encourage the use of low GWP fluids.

Technical adjustments in Council Regulation 304/2008: Needs for clarifications of practical skills were highlighted.

Clearer definition of the indirect leak detection method was proposed as the current definition could be interpreted in a way that a very basic observation of the system and performance by any technician can be considered indirect leak detection.

Furthermore, the use of the 4AR GWP values was suggested.

## 4. Evaluation of impacts

### 4.1. Evaluation of Question C 1

*Who do you think will be most exposed to any negative impacts of a strengthened approach to F-gas emissions? (max 2 choices)*

- Producers of F-gases*
- Producers of products or equipment normally relying upon F-gases*
- Commercial or industrial users of relevant products or equipment*
- Individuals using relevant products or equipment*
- Companies servicing relevant products or equipment*
- Others*

In total, 426 responses to question C1 were received, 265 from organised stakeholders (62%) and 161 from individuals (38%).

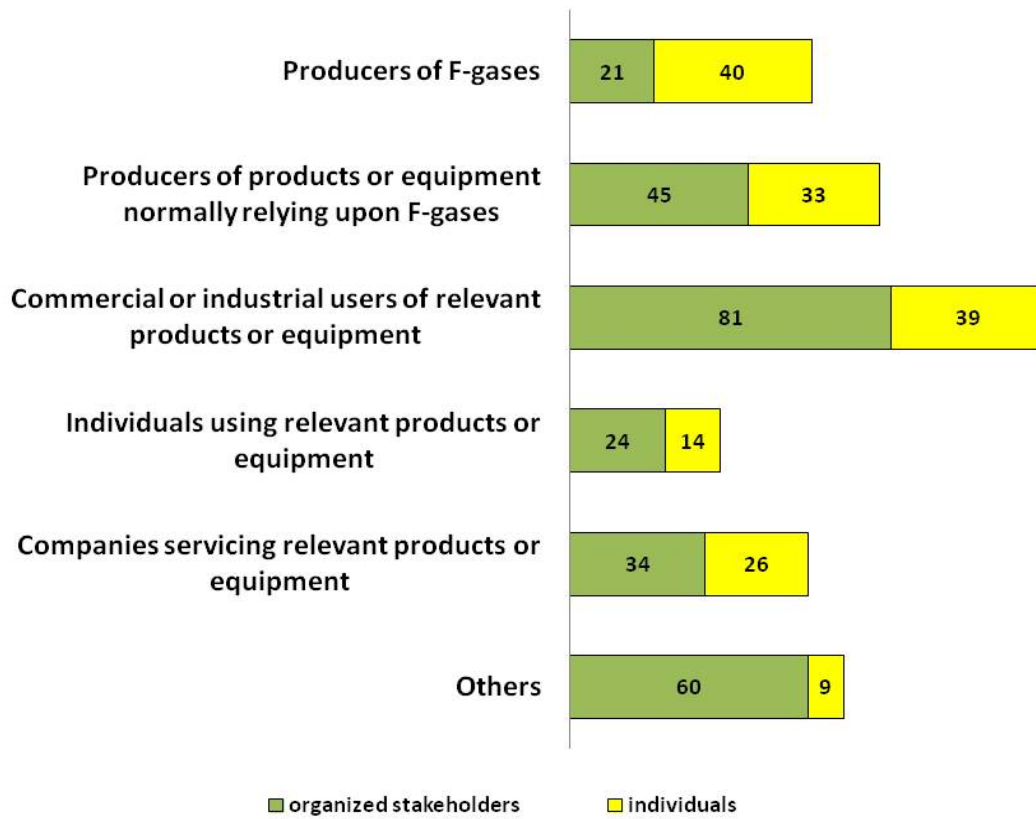
As shown in Figure 10, the option selected by most stakeholders (28%) was that “*commercial or industrial users of relevant products or equipment*” would be most exposed to any negative impacts (81 organised stakeholders/ 39 individuals). Among the organised stakeholders, about 43 companies (incl. 16 branches and daughter companies), 29 umbrella organisations/ trade and industry associations (e.g. from mobile AC sector, foam sector, fire protection sector, transport refrigeration sector) and 4 types of other organisations expressed this opinion.

18% of all responses (76; 45 org/ 33 ind) indicated that “*producers of products or equipment normally relying upon F-gases*” would be most affected by negative impacts. Organised stakeholders who expressed this opinion included about 18 companies, and 20 umbrella organisations/ trade and industry associations (in particular domestic applications’ sector, foam sector, fire protection sector, high-voltage switchgear sector).

The option that “*others*” would be most exposed to any negative impacts was chosen 69 times (60 org/ 9 ind). Organised stakeholders who selected this choice included about 16 companies, 32 umbrella organisations/ trade and industry associations (e.g. domestic applications’ sector, contractor associations, refrigeration and AC sector, high-voltage switchgear sector etc.) and 9 other organisations (e.g. non-governmental organisations). Comments relating to the category “*others*” are discussed below (question C2).

Out of 60 responses, 20 organised stakeholders assumed that “*producers of F-gases*” would be most negatively affected by a strengthened approach to F-gas emissions. However, no producer of F-gases expressed this opinion.

To conclude, organised stakeholders and individuals widely shared the opinion that commercial or industrial end-users of relevant products/ equipment would be most exposed to negative impacts, followed by producers of products/ equipment normally relying on F-gases. Individuals also considered F-gas producers to be exposed to negative impacts.



*Figure 10: Question C 1 (Who do you think will be most exposed to any negative impacts of a strengthened approach to F-gas emissions?) (at maximum 2 choices per respondent).*

*Total responses: 426 (265 organisations/ 161 individuals)*

## **4.2. Evaluation of Question C 2**

The following comments of the respondents relate to the category “*others affected by negative impacts of a strengthened approach to F-gas emissions*” in question C1.

Many organised stakeholders pointed out that the question was unclear or too unspecific, as it did not contain definitions of a “strengthened approach” and what is meant by “negative impacts”.

Other comments about negative impacts of a strengthened F-gas policy approach were:

- Negative effects on contractors or in particular contractors who did not achieve proper certification or qualification (ca. 11x; including contractor associations e.g. AREA (ID 03396347383-49));
- Negative impacts on owners and operators of equipment (ca. 8x).
- Negative effects for importers and exporters of refrigerants (1x).
- No negative impact would occur if “strengthened approach” referred to a greater focus on implementation of existing regulations (2x).
- All environmental NGOs explained that a measure affecting the industry responsible was fairer and more desirable than impacting users and servicing companies. An HFC phase out would result in economic and environmental benefits for Member States and consumers (5x).
- Several stakeholders expressed their general concern about the competitiveness of European businesses and competitive distortions of the market (e.g. AISBL (ID 04077716126-17), T&D Europe (ID 90453504235-64). Some expected a “*knock-on effect throughout the supply chain with consequent negative impact on suppliers, contractors and operators*”. F-gas producers (e.g. EFCTC (ID 47017277378-73)) underlined the universal impacts of a strengthened approach, which would affect everyone but would depend on the approach chosen. They pointed out that a consumption cap and phase-down would enable markets to adapt as new information, options would become available over time. Respecting industrial planning timescales would help minimize negative impacts.

Some comments related to particular sectors:

- In the mobile AC sector, additional high investments for vehicle design and risks of “regulation dependency” from too few suppliers of refrigerant gases were stated (1x);
- In the refrigeration and air-AC sector, the transition to substances other than HFCs would lead to increased product safety considerations and costs (1x);
- With regard to the fire protection sector, ASSURE (ID 81529956853-55) pointed out that the technical complexity of the problems encountered in this sector required that all possible technical solutions would remain available to fire engineers. In case of a ban of HFC solutions, consumers and the wider public could be adversely affected (1x);
- As for high voltage switchgear, respondents stated that the Regulation should not restrict the use of SF6 in switchgear >52 kV as no alternative to SF6 was available or as the use of other insulation media would drastically increase the space needed for such equipment and hence costs, which were subsequently passed onto customers. Any further measures in this sector could negatively affect the reliability of electricity supply (8x). However, the availability of SF6 free alternatives in the medium-voltage switchgear sector was emphasized (2x).

### **4.3. Evaluation of Question C 3**

*Who do you think will benefit most from a strengthened approach to F-gas emissions? (max. 2 choices).*

- *Producers of F-gases*
- *Producers of products or equipment normally relying upon F- gases*
- *Producers of products or equipment employing alternative technologies*
- *Commercial or industrial users of relevant products or equipment*
- *Individuals using relevant products or equipment normally*
- *Companies servicing relevant products or equipment*
- *Others*

As shown in Figure 11, out of the total of 342 choices, 213 responses were given by organised stakeholders (62%) and 129 by individuals (38%).

106 respondents (60 organised stakeholders/ 46 individuals) argued that “*producers of products or equipment employing alternative technologies*” would benefit most from a strengthened approach to F-gas emissions. Among the organised stakeholders, about 27 companies, 22 industry organisations (e.g. ISOPA (ID 00770563312-18), PU Europe (ID 27993486325-38), CECED (ID 04201463642-88)), 7 non-governmental organisations and 4 public authorities held this opinion.

“*Companies servicing relevant products or equipment*” were also identified as beneficiaries of a strengthened approach by 40 stakeholders (17 organisations/ 23 individuals). Organised stakeholders who selected this option included in particular associations and companies from the mobile AC sector (e.g. ACEA (ID 0649790813-47)) and the transport refrigeration sector (e.g. ECLSA (ID 12075096931-04), Transfrigoroute (ID 49864752280-23)).

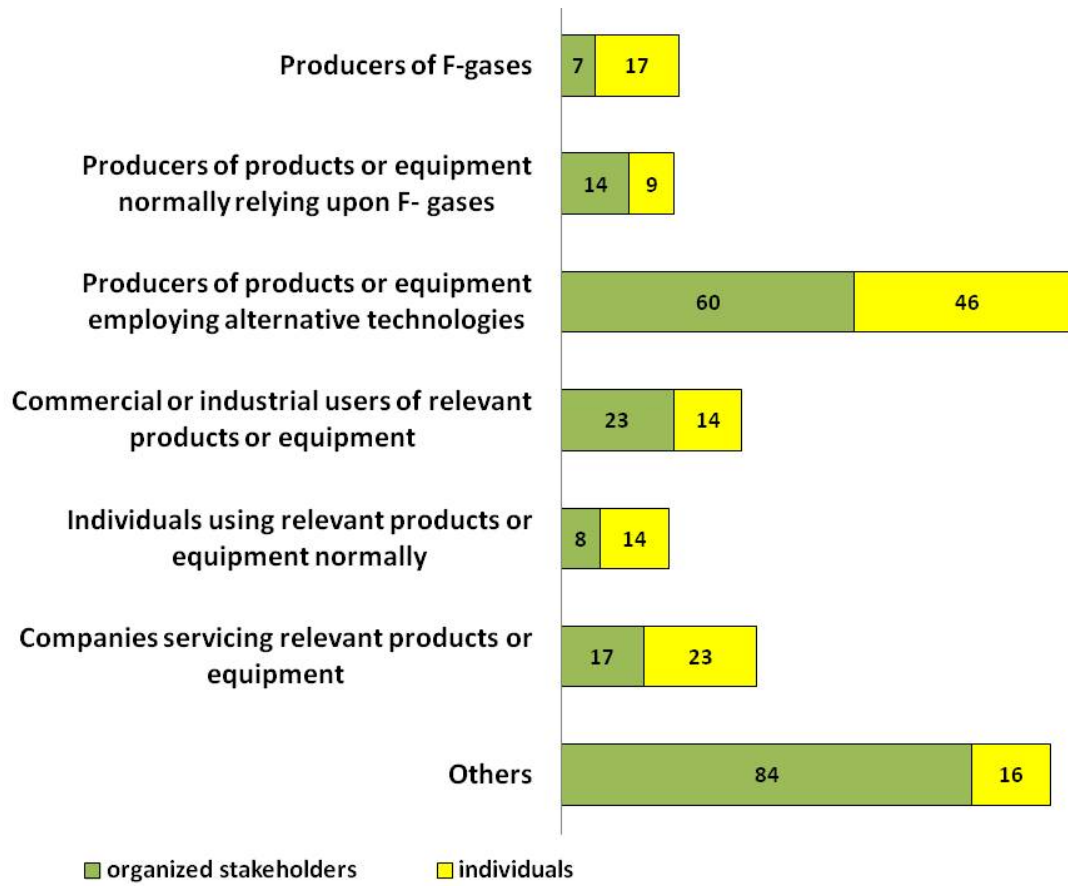
While in the previous question C1, a large share of respondents argued that “*commercial and industrial users of relevant products or equipment*” would be mostly exposed to negative impacts of a strengthened approach to F-gas emissions, 37 respondents (23 organisations/ 14 individuals) to question C3 selected that “*commercial and industrial users of relevant products or equipment*” would benefit most from a strengthened F-gas policy approach. The organised stakeholders who selected this option were several companies, 10 industry associations (in particular organisations of contractors) and other organisations (e.g. non-governmental organisations).

Some respondents (14 organisations/ 9 individuals) expected that “*producers of products or equipment normally relying upon F-gases*” would benefit most from strengthened F-gas policy approaches arguing with the need for innovation.

100 respondents (84 organisations/ 16 individuals) argued that “*others*” would benefit most from a strengthened approach to F-gas emissions. They specified their responses as summarised below (C4).

In summary, both individuals and organised stakeholders thought that producers of products and equipment relying on alternatives would benefit most from a strengthened approach. Other groups of beneficiaries were also specified.





*Figure 11: Responses to Question C3 (Who do you think will benefit most from a strengthened approach to F-Gas emissions?)*

*Total responses: 342 (213 organisations/ 129 individuals)*

#### **4.4. Evaluation of Question C 4**

The following comments of respondents concerned the category “*others affected by positive impacts of a strengthened approach to F-gas emissions*” in question C3. Many of the organised stakeholders pointed out that the question was unclear or too unspecific, as it did not contain definitions of a “*strengthened approach*” and what legislative rules are meant and what “*negative impacts*” refer to. It was also emphasized that clarity about the revision of the regulation would assist planning (ca 4x) and that owners and operators of equipment would be impacted by any type of review (ca. 6x)

Further comments about positive impacts of a strengthened F-gas policy approach:

- The overall environmental benefits of a strengthened approach were highlighted several times (ca. 15x).
- Companies underlined that non-EU competitors and companies not covered by a strengthened approach would profit most as they would experience competitive advantages in general (5x) or in particular in the switchgear sector (8x). An American company present on the EU market explained that they would need to run separate production lines for EU and non-EU markets, which would lead to additional costs and could result in the decision to withdraw from EU markets (1x).
- Competitive advantages of first and fast movers on the market were stated (6x), especially equipment manufacturers “*unless restrictions result in overly high costs*” (1x).
- End users would profit from decreased life cycle costs due to better containment and higher energy efficiency (6x).
- Producers of substitution fluids would benefit (ca. 4x).
- Companies servicing stationary equipment would benefit as leakage control, audits and retrofit were required (2x).
- Operators of district cooling facilities would benefit (1x).
- Users in third countries could profit from the move to cleaner technology (1x).

#### **4.5. Evaluation of Question C 5**

*What type of application (if any) do you think will be most positively affected by a phase-down of HFCs? (max. 3 choices) domestic refrigeration and freezers*

- commercial refrigeration and freezing equipment*
- industrial refrigeration and freezing equipment*
- transport refrigeration*
- room air AC (factory-sealed movable and single-split systems)*
- air-AC in motor vehicles*
- air-AC in other modes of transport*
- air-AC excluding room a/c, and a/c in modes of transport*
- heat pumps*
- medical aerosols*
- aerosols (other than medical)*
- fire protection*
- foams*
- solvents*
- others or no specific use category*
- no positive impact*

Of the 259 participants in the online consultation, 60 did not answer this question (11 individuals/ 49 organised stakeholders). Organised stakeholders who did not answer at all included especially stakeholders from sectors not using HFCs (e.g. casting, switchgear). Of the 339 responses to this question, 172 were given by organised stakeholders (51%) and 167 by individuals (49%).

Figure 12 shows that the category “*others or no specific use category*” was selected 64 times (19%). 53 responses were given by organised stakeholders, including 42 responses by industry-related organised stakeholders such as companies, large umbrella/ industry associations (e.g. EFCTC (ID 47017277378-73), EPEE (ID 08158165539-04), AREA (ID 03396347383-49), T & D Europe (ID 90453504235-64) etc.) and 11 other organisations, mainly non-governmental organisations. Certain environmental NGOs stressed that they could not indicate an appropriate answer since the question referred to a 'phase-down', rather than a staged phase-out. They pointed out that a phase-out of HFCs would be beneficial for all applications listed.

Benefits were mostly expected for the refrigeration sectors (domestic, commercial, industrial, transport) which were selected in 128 responses (38%), as well as stationary AC sectors (28 responses, 8.5%), and mobile AC sectors (36 responses; 11%). Other sectors were considered to profit less.

43 responses (13%; 27 org/ 16 ind) expressed the opinion that “*no positive impact*” would result from a phase-down of HFCs. Organised industry-related stakeholders who voted for this option included some representatives of the electrical switchgear sector, certain manufacturer associations and one trade association of the refrigeration and air-AC sector.

It can be concluded that most participants assumed that no single type of application would be most positively affected by a phase-down of HFCs but several application sectors. Refrigeration sectors were considered to be somewhat more positively affected than mobile AC and stationary AC and heat pump sectors. A few stakeholders, however, believed that a phase down of HFCs would not have any positive impact.

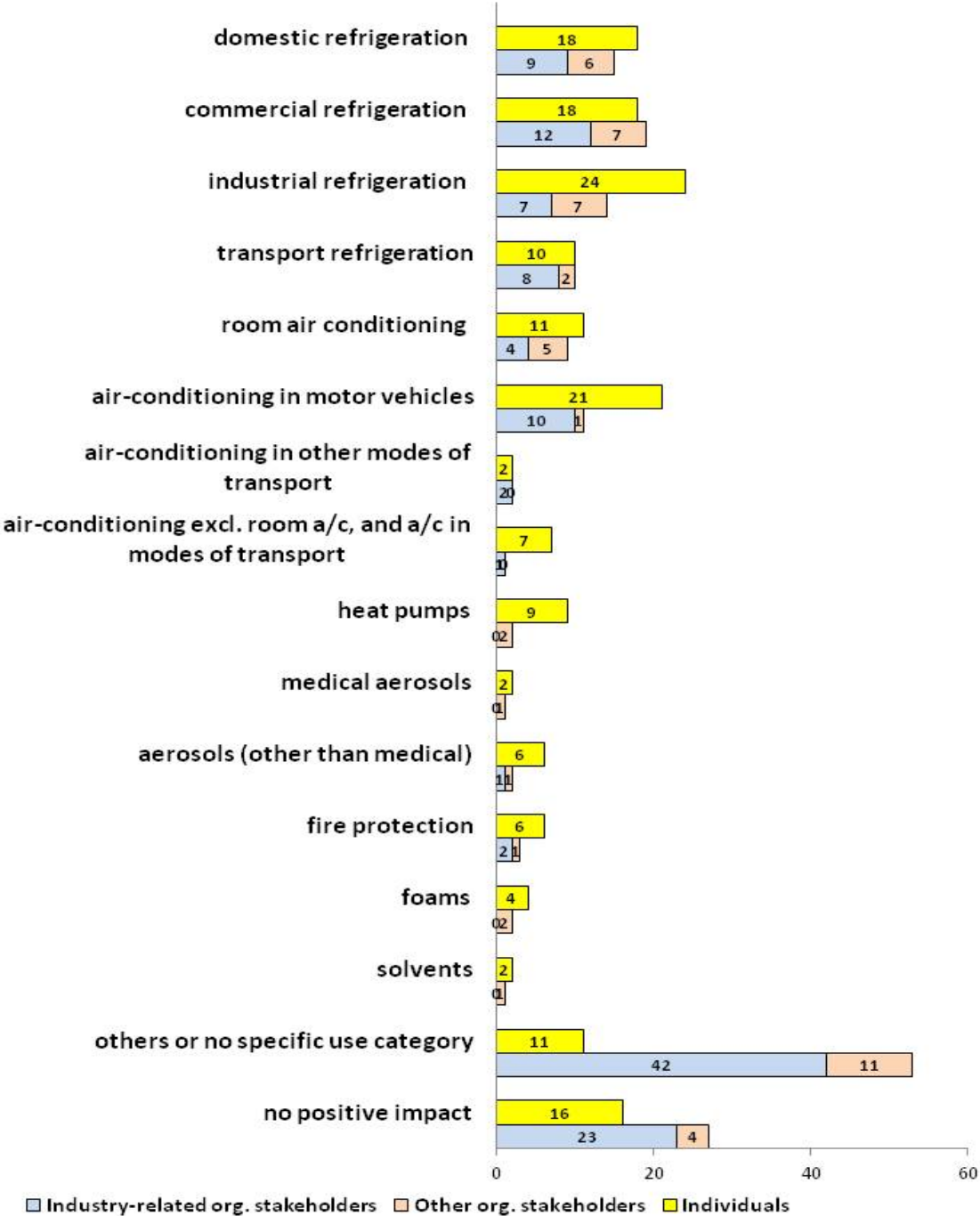


Figure 12: Responses to Question C 5 (What type of application (if any) do you think will be most positively affected by a phase-down of HFCs?) (at max.3 choices). Total: 339 responses (172 org/ 167 ind).

#### **4.6. Evaluation of Question C 6**

*What type of application (if any) do you think will be most negatively affected by a phase-down of HFCs? (max. 3 choices)*

- domestic refrigeration and freezers*
- commercial refrigeration and freezing equipment*
- industrial refrigeration and freezing equipment*
- transport refrigeration*
- room air AC (factory-sealed movable and single-split systems)*
- air-AC in motor vehicles*
- air-AC in other modes of transport*
- air-AC excluding room a/c, and a/c in modes of transport*
- heat pumps*
- medical aerosols*
- aerosols (other than medical)*
- fire protection*
- foams*
- solvents*
- others or no specific use category*
- no negative impact*

Out of the 423 responses received to this question, 254 were selected by organised stakeholders (60%) and 169 by individuals (40%) (Figure 13). 42 participants in the online consultation did not answer this question (10 individuals/ 32 organised stakeholders). Stakeholders who did not answer were 9 companies, 19 industry associations, including those of sectors not using HFCs (i.e. casting, switchgear), and one other organisation.

Despite the comparably small size of the sector, the most-selected category was “*heat pumps*” (53 responses; 13%, 42 org/ 11 ind) which reflects the high number of industry stakeholders affiliating themselves to this sector among the respondents. This again indicates that a purely quantitative evaluation of responses to the online consultation can be rather misleading as discussed under methodology above.

Refrigeration sectors accounted for 30% of total responses (128) and 38% of responses by organised stakeholders (64), mainly industry-related organisations. Individuals also selected these sectors comparably often (48; 28% of responses by individuals).

The category “*others or no specific use category*” was chosen 47 times (11%; 40 org/ 7 ind). Organised stakeholders who selected this option were 18 companies, 15 industry associations

including large umbrella organisations (e.g. EFCTC (ID 47017277378-73), EPEE (ID 08158165539-04), JRAIA (ID 50134607288-38)) and 2 other organisations.

31 responses related to the category “no negative impact” and were given by 18 individuals and 13 organised stakeholders including environmental NGOs and certain public authorities.

As in the previous question C5 on positive impacts in particular applications, many participants to the online questionnaire decided not to answer question C6 on negative impacts in particular applications.

Responses tend more towards stationary air AC and heat pump applications as being negatively affected by a phase-down of HFCs, which reflects the large number of companies active in the field of heat pumps and stationary air AC that participated in the evaluation.

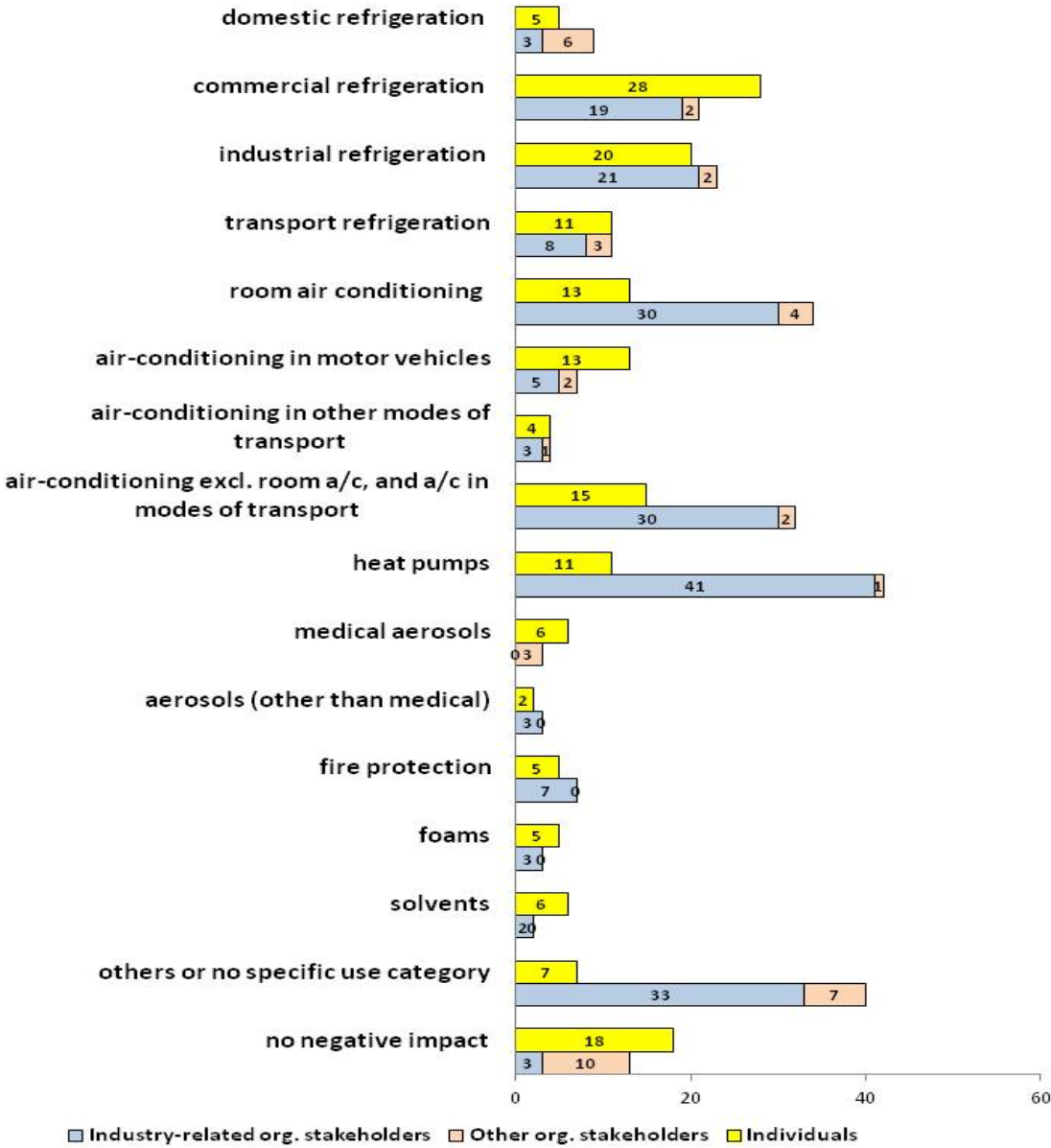


Figure 13: Responses to Question C 6 (What type of application (if any) do you think will be most negatively affected by a phase-down of HFCs?) (at max.3 choices). Total: 423 responses (254 org/ 169 ind).

#### 4.7. Evaluation of Question C 7

Which policy option do you expect to impose the greatest administrative burden?

- *Establishing maximum, gradually declining limits to the quantity of HFCs placed on the EU market (phase-down) expressed in terms of CO2 equivalent*
- *Introducing additional prohibitions on use and marketing of certain equipment and products where cost-effective alternatives exist (e.g. a ban on application X containing hydrofluorocarbons as of date Y)*
- *Strengthening, where possible, measures aiming at containment and proper recovery of F-gases (e.g. through stricter and/or broader application of existing rules in the F-gas Regulation)*
- *Other*

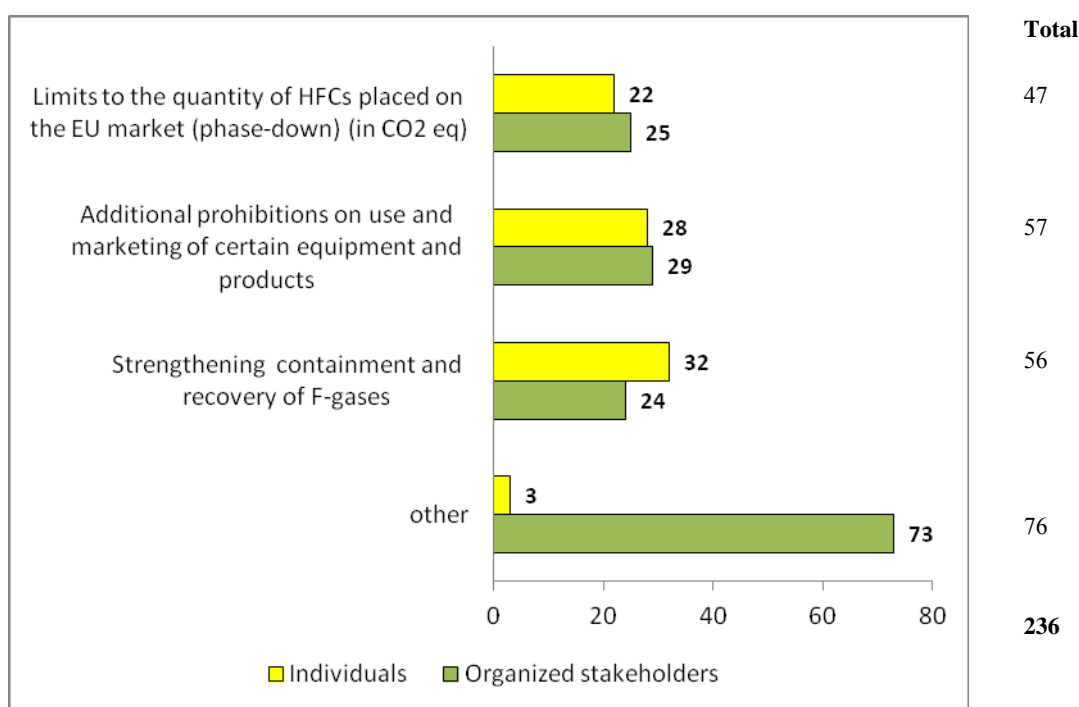


Figure 14: Responses to Question C 7 (Which policy option do you expect to impose the greatest administrative burden?) (228 responses in total).

Out of the 236 responses received to this question, 151 were selected by organised stakeholders (64%) and 85 by individuals (36%) (Figure 14).

19% of organised stakeholders (29) and 33% of individuals (29) held the opinion that additional prohibitions would result in the greatest administrative burden. Organised stakeholders included 11 companies, 12 industry associations related to various sectors and 4 other organisations.

“Strengthening containment and recovery of F-gases” was selected by 25% of stakeholders (24 org/32 ind). Organised stakeholders included about 10 companies, 10 industry associations, mainly of sectors currently not subject to containment measures such as the transport refrigeration and foam sectors and 3 public authorities.

26% of individuals (22) and 17% of organised stakeholders (25) chose the policy option “*Limits to the quantity of HFCs placed on the EU market (phase down) (in CO2 eq)*”. Organised stakeholders who selected this option included in particular representatives of the mobile AC sector, the domestic appliance sector and contractor associations.

32% of total responses (76) expressed the opinion that “*other*” policy options would result in the greatest administrative burden. Specific comments are evaluated below (question C8).

In general, it seems that few differences are expected in the administrative burden for the options provided.



#### **4.8. Evaluation of Question C 8**

Many organised stakeholders pointed out that question C7 was too unspecific to be answered easily as it remained unclear who would be affected by an administrative burden (e.g. Member States authorities, industry, end users etc.) (ca.12x). Since “*strengthened approach*” could mean different policy options, the impact on different applications could be different as well. Certain stakeholders explained that reporting requirements and related administrative burden already existed for some industry groups, e.g. producers of F-gases, therefore possibly leading to a rather small additional burden.

It was highlighted that certain measures resulting in high administrative effort and poor environmental benefit should be avoided, but overall benefits should drive political decisions (e.g. associations such as EPEE (ID 08158165539-04), etc.; companies such as Johnson Controls (ID 01407542946-11), DuPont (ID 3181166932-58), etc.).

Other comments are summarised in the following:

##### - Control and enforcement of the existing legislation

- For the implementation of further measures, established monitoring, as well as uniform enforcement, control and sanctioning was considered crucial (ca. 5x).
- It was suggested that any monitoring of placing on the market could be a simple annual audit similar (but much simpler) to the EU ETS audits, and that participants to a cap & phase-down approach should pay for their own audits (3x).
- Any monitoring system should cover all application sectors (1x), as well as mandatory registration and a full inventory of the installed base in order to ensure proper risk management (1x), and improved incentives for recovery and recycling of F-gases (1x).
- With regard to pre-charged equipment, it was proposed that policies on supply reductions should include such equipment and HFC compounds (1x).

##### - Aspects related to the options presented

- Environmental NGOs explained that sectoral bans on use and marketing would be the simplest method of reducing F-gas emissions while bringing about little administrative burden. In the absence of such bans, a GWP-weighted phase out was considered a rather complex means of controlling emissions likely to suffer from problems related to implementation, compliance and enforcement.
- Concerns referred to economic disadvantages for EU businesses due to an increased administrative burden (2x).
- Comments by individuals referred to disproportionate administrative burden caused by developing, implementing and policing a phase-down (1x).
- The application of eco efficiency concepts (1x) and life cycle cost analyses (1x) were recommended.

##### - Sector-specific comments

As for the fire protection sector, it was stated that bans on specific products could prevent operators from refilling of existing systems (2x). A phase down as well as the broadening of existing measures within the sector would have a relatively small administrative burden (1x). Policies reducing the supply of F-gases in the EU such as import restrictions should also include pre-charged equipment and F-gas compounds (1x).

As for the high voltage switchgear sector, it was pointed out that stricter policy measures would require administrative resources to the detriment of more modern technical solutions. The policy measure proposed was the promotion of a frame of EU wide voluntary commitments for this sector (7x). A producer of SF6-free switchgear supported regulatory restrictions due to their effectiveness and the clarity they would provide to industry and users.

#### **4.9. Evaluation of Question C 9**

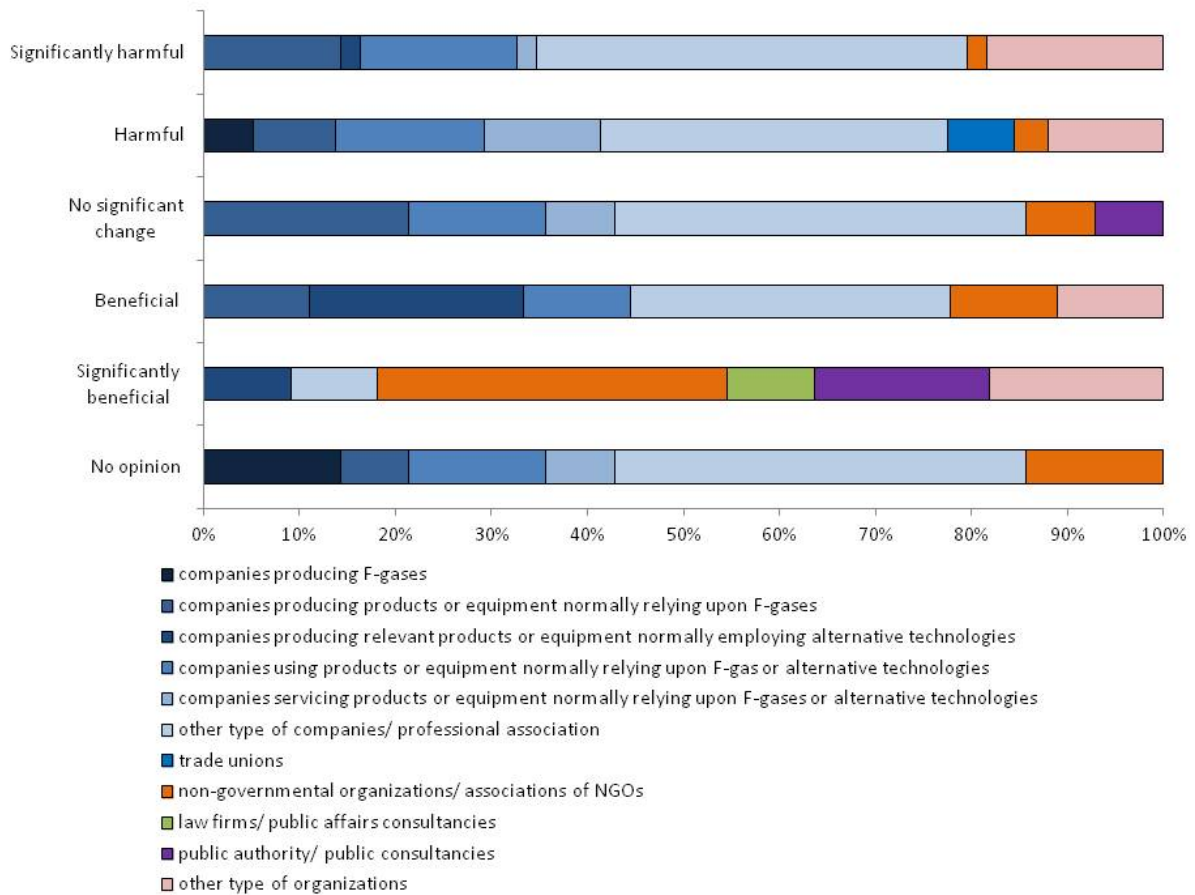
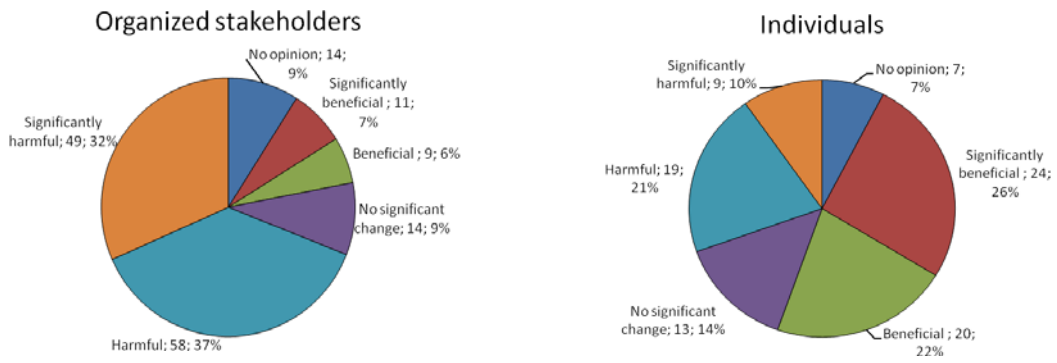
*How do you think a shift towards alternatives having a lower or no global warming potential will affect the competitiveness and market shares of European businesses (or the business you represent)?*

- No opinion*
- Significantly beneficial for competitiveness*
- Beneficial for competitiveness*
- No significant change*
- Harmful for competitiveness (specify below)*
- Significantly harmful for competitiveness (specify below)*

Of the 247 responses to this question, 155 were given by organised stakeholders (63%) and 92 by individuals (37%). 12 stakeholders did not answer this question.

As shown in Figures 15 a/b, there was considerable disagreement between organised and individual stakeholders. While a majority of organised stakeholders believes that a shift to alternatives could be “harmful” or “significantly harmful” for the competitiveness and market shares of European businesses, most individuals believe that a shift could be “(significantly) beneficial” or have “no effect” on competitiveness.

Among industrial stakeholders concerns were expressed in particular by the stationary air AC and heat pump sectors (which represent a large number of respondents). Organisations that viewed a shift to low GWP alternatives as “(significantly) beneficial” included manufacturers of alternative technology like Danfoss (ID 22898061944-46) and Eaton (ID 73933867171-56), etc.), as well as NGOs, public authorities and consultancies such as Shecco (ID 65570907162-93).



**Figures 15 a, b (top) and c (bottom): Responses to Question C 9 (How do you think a shift towards alternatives having a lower or no global warming potential will affect the competitiveness and market shares of European businesses (or the business you represent)?).**

#### **4.10. Evaluation of Question C 10**

Only the respondents who indicated that the competitiveness and market shares of European businesses or their own business in particular would be affected negatively by a shift towards lower or zero GWP alternatives (categories “*harmful*” or “*significantly harmful*”) could also submit specific comments and explanations to back up their opinion. 96 specific comments were submitted by organisations, two of which explained that they only chose one of these categories since only these allowed for comments. 20 comments were submitted by individuals.

#### **Negative impacts of global action vs. unilateral EU action**

The majority of organised stakeholders discussed the impacts of a shift towards alternatives with lower or no GWP at global level as opposed to such development at EU level. As a general consideration, it was underlined that impacts would be likely to differ between product groups and markets, thus important factors to take into account in policy decisions were the timing and setting of deadlines, as well as technical constraints and international trade obligations. In addition, some stakeholders advised that initial implementing measures should maintain and support fair competition.

- Most organisations stated that a global agreement could drive innovation and economic development in Europe by providing a level playing field and would result in competitive advantages for European companies at international level. The Air AC and Refrigeration Industry Board (ACRIB) (ID 53802347380-76) mentioned that “*only if a coordinated global policy is implemented that competitiveness could be enhanced through improved innovation and economic development of the European Region as a whole.*”
- Certain organisations supported a global approach because their members were active also outside of the EU or worldwide.
- Some F-gas manufacturers expressed concerns regarding competitiveness (3x): For example, Arkema SA (ID 35321797057-83) lined out that “*even with a global agreement for a consumption cap and phase-down, any associated production cap and phase-down could damage competitiveness, increase costs and displace production for no environmental gain*”.
- Under a unilateral approach, isolated from global developments, strong concerns about competitive disadvantages for EU and non-EU businesses were highlighted by some as industry would need to adjust to market requirements and might possibly have to dislocate production and other economic activities. For example, Daikin Europe (ID 47338336902-73) explained: “*Benefit would be only possible if there is a global approach towards alternatives, due to the economy of scale. Unilateral EU actions would have a negative impact as the industry would need to adjust its activities on the local market only.*”
- It was pointed out by one stakeholder that proper treatment of import and export of both F-gases and products containing them was necessary to avoid negative impacts.

#### **Negative impacts of a shift towards alternatives**

- Individuals were particularly concerned about increased costs for end users (9x), which was supported by some organised stakeholders who lined out that prices for contractors would be higher and would be passed on to the end user or result in loss of competitiveness (training, insurance costs due to safety issues etc.) (5x).

- The low number of suppliers of particular alternatives on the market, resulting in little or no competition (4x). For the fire protection sector, an industry association (ID 81529956853-55) stated: *“ASSURE members have indicated that for companies involved in the design and supply of fire protection equipment containing F Gases an EU move towards lower or no global warming impact alternatives would severely impact on their competitiveness in export markets where no such policy exists.”*
- Safety concerns of alternative technologies in many applications were expressed (3x) or in particular large applications in urban areas, as supported by French national legislation that banned the use of substances of safety classification A3 (3x).
- Alternative technologies at least as energy efficient as HFC solutions were not available in all applications (4x).
- Small and large equipment should be distinguished: As for small equipment, the charge size should be reduced rather than choosing alternative refrigerants. As for large systems, alternative technologies were justified and available on the market (3x).
- Higher investment costs were assumed for alternative technologies if equal energy efficiency was required (3x).
- Prices of alternative substances were higher (2x).
- Costs for development of alternatives would occur (1x).
- Technology would become more complex due to the properties of alternatives (1x).
- Supply of alternative substances was smaller (1x).
- Production capacities could be shifted to non-EU countries resulting in increased emissions from transport of products and equipment to EU markets (1x).

Sector specific comments:

As for transport refrigeration, negative impacts were expected due to increased competition with temperature-controlled transporters from non-EU countries and/ or temperature-controlled transport by rail or ship, which would not face additional investments. Cost increases would be likely to be passed on within the supply chain.

With regard to air AC in the rail sector, alternatives were not readily available on the market at reasonable investment costs but would require substantial investments.

As for the high voltage switchgear sector, it was explained that currently no technologies comparable to SF6 high-voltage switchgear existed with respect to criteria such as compactness, insensitivity to ambient conditions, low maintenance, low cost, safety, security of supply, etc. (15x). EU manufacturers of SF6 high-voltage switchgear expressed concerns about their competitiveness, in particular with regard to their high levels of export activities, their role as world market leaders, and potential dislocation of production capacities.