



EUROPEAN COMMISSION
DIRECTORATE-GENERAL
ENVIRONMENT

Reducing the Climate Change Impact of Aviation

Report on the Public Consultation March-May 2005

In line with the Commission's commitment to transparent and interactive policy-making, 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.

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1. SUMMARY

1.1. General remarks

A public consultation on Reducing the Climate Change Impact of Aviation was held from 11 March to 6 May 2005 in preparation for a Communication from the Commission to the Council and European Parliament. Two different questionnaires, one for individuals and one for organisations, were available online to elicit views, opinions and ideas on aviation and climate change. The standard Commission internet tool for Interactive Policy Making was used. The questionnaire for individuals was aimed at the general public, and replies were anonymous. The questionnaire for organisations contained more detailed and technical questions, and involved identification of respondents. The objective was rather to allow as many as possible to express their views, but since the consultation was based on self-selection of those who are concerned about this issue, the views expressed by respondents cannot be regarded as representative of the views held by all stakeholders. Both questionnaires were available in English, French and German.

1.2. Consultation of individuals

In all, 5564 responses from individuals were received. Most replies came from the UK, Germany, Belgium and France, perhaps reflecting the languages in which the questionnaire was available. In addition, many individual letters were received from citizens, in particular from Germany, the Netherlands and the United Kingdom.

There was widespread support for the policy objective to include the air transport sector in efforts to mitigate climate change (82% fully agree), to include the cost of the climate change impact in the price of air transport (68% fully agree), and to strengthen economic incentives for air transport operators to reduce their impact on the climate (72% fully agree).

Most respondents fully agreed that “increasing the price of air transport would be acceptable if it is necessary to reduce aviation's impact on the climate”. Most completely disagreed - or tended to disagree - with the statements that “increasing the price of air transport should be avoided as it could have an effect on jobs and growth” and “increasing the price of air transport should be avoided as fewer people could afford to fly” and most fully agreed - or tended to agree - that “increasing the price of air transport would be acceptable since it would affect “frequent flyers” most.

In all, 55% of respondents did not feel well informed about the climate change impacts of air transport. A majority considered that comparisons between emissions of different airlines on a given route would greatly influence how often, where and with what airline people fly.

A total of 2244 respondents made use of a free-text field at the end of the questionnaire. While there were some critical remarks, the vast majority of respondents explicitly supported action to reduce aviation's impact on the climate.

Many respondents considered action to reduce demand for air transport essential to reduce emissions from the aviation sector. There was strong support for promotion of alternative transport modes, especially rail. Many considered that the tax-exemption on

kerosene was unacceptable and should be removed. It was suggested that price signals were more important than relying on individual action, with respondents positing that individuals would not modify their behaviour if others were not doing the same. Raising awareness was considered an important way of influencing demand for both air passenger and freight transport. Other suggestions were to restrict flights (particularly at night), to limit the number of times a person could fly in a given period, and even that frequent flyer bonuses should be abolished or converted into penalties.

There was a strong demand for cleaner and emission-free aircraft. The question was raised as to why there are biofuels for cars, but not for airplanes. Some responses mentioned hydrogen as a possible alternative fuel source.

While some highlighted the benefits of air travel for cultural exchange, many people called for a change to the emerging lifestyle of flying frequently for the purpose of short leisure trips.

Some respondents supported offsetting aircraft emissions with emissions reductions elsewhere or the use of sinks, while others objected that this would allow airlines to buy the right to pollute.

Many respondents stressed the need to incorporate the external costs of flights into the price to avoid market distortion but it was also pointed out that the full cost may be difficult if not impossible to calculate.

Some demanded that non-EU industrialised countries should take action as well. Most respondents mentioning this topic nevertheless advocated action by the EU and some explicitly stated that they considered the EU to be strong enough to take action on its own, giving an example to the rest of the world. A few respondents proposed an international air travel tax that would be payable to the UN.

1.3. Consultation of Organisations

A total of 198 organisations participated in the consultation. NGOs made up the largest single fraction of respondents. However, responses were also received from the governments of France and the United Kingdom, and from the Finnish Civil Aviation Authority and the Austrian Ministry for Environment. The major European airline, airport and manufacturers associations as well as a number of individual companies also submitted responses.

There was general agreement among organisations to include the air transport sector in efforts to mitigate climate change, to internalise the external costs of climate change in the price of air transport, and to strengthen economic incentives for air transport operators to reduce their impact on the climate. Many airlines and manufacturers believed that this should be done under International Civil Aviation Organisation (ICAO) guidance and in accordance with ICAO's existing policies. Some manufacturers did not think that further incentives to reduce emissions would be necessary. Several other organisations highlighted the urgency of taking action.

The two Member States submitting formal government positions (France and the United Kingdom) considered emissions trading to be the most effective instrument. Airlines, manufacturers and airports also preferred emissions trading to any other economic instrument, as long as the system was open to other sectors and limited to CO₂. They considered this to be the instrument that is environmentally most effective and cost-

efficient. Some companies active in the aviation industry argued that it needed to be accepted that the aviation sector would not be able to reduce its emission substantially in the next few years. Although there was cautious acceptance by some environmental NGOs for emissions trading, some doubted that it would be possible to find an agreement that would be effective enough. In case emissions trading was chosen, NGOs demanded ambitious targets for emission reductions, a system that is closed for the sector (though some NGOs would be satisfied if this applied only at the beginning), inclusion of non-CO₂ effects or avoidance of trade-offs with other emissions through strict regulation, and auctioning of allowances. One industry association was opposed to the inclusion of aviation in the EU ETS, because it believed that the aviation industry would easily be able to pay for their CO₂ allowances (considering this to be a small cost compared to the cost of a flight), while any consequent increased cost in allowances would be a bigger problem for their members, especially those competing internationally, as it believed these costs featured more strongly in the final product price.

Fuel taxation was the preferred option of the Austrian Ministry for Environment and most NGOs. Airlines and manufacturers objected explicitly to fuel taxation. Both they and the airports considered emissions charges to be more acceptable and some of these organisations suggested using such charges to address the non-CO₂ effects of aviation on the climate and to support research. Some NGOs implied they would like to see measures like fuel taxation in addition to inclusion of aviation in the EU ETS, because of aviation's relatively high impact on the climate and because air transport is not as vulnerable to international competition as some other industries supplying goods and services. VAT on air transport was not considered by many to be a key instrument, but it was thought that this policy could be easily implemented, would produce some beneficial effects, and the revenue could be used to promote rail infrastructure.

There was strong support by organisations that were not active in the aviation industry to reduce demand for air transport. France argued for a reduction in the growth of air transport in the long term by promoting alternative modes of transport. According to the statements of these organisations, the inclusion of external costs into the price of air transport, whether through fuel taxation or through other means, were needed for aviation in order to create a 'level playing field' and to make other modes of transport more attractive. NGOs considered that much air travel was probably unnecessary. Aviation was considered as a new, comfortable mode of transport, but one which would not be sustainable in its current form even in the short to medium-term future. Changes in lifestyle would therefore be necessary, possibly to be achieved through EU measures in combination with raising awareness.

Among other measures, air traffic management was mentioned as being important, both by aviation industry companies and by NGOs. It could increase efficiency and help reduce contrails and cirrus cloud formation.

In the long-term, respondents emphasised the importance of research into new aircraft concepts, new technologies and practices for reducing emissions, and alternative fuels - in particular, the possible use of biofuels in air transport.

Regarding coverage of a new policy, France wanted to limit EU measures to intra-EU flights only; the United Kingdom did not respond to this question. There was widespread support among organisations to include flights arriving from or departing to non-EU countries in EU measures as well. The main arguments used to support this were to ensure a 'level-playing-field' for intra-EU and long-haul flights (to reduce the risk of

economic distortion through cross-subsidisation by foreign carriers, and to avoid that carriers evade EU measures by registering their operations in a third country), to avoid making long-haul flights more attractive than intra-EU flights, to minimise the environmental impacts of aviation, fairness, and to give a signal to the rest of the world. Arguments against including flights arriving from or departing to non-EU countries were the risk of air traffic detouring and the fact that there was no alternative transport mode for long-haul flights.

2. INTRODUCTION

A public consultation on Reducing the Climate Change Impact of Aviation was held from 11 March to 6 May 2005 so as to provide input to the preparation of a Communication from the Commission to the Council and European Parliament planned to be adopted in July 2005.

Two different questionnaires, one for individuals and one for organisations, were available online to seek views, opinions and ideas on aviation and climate change. The consultation was carried out in line with the Commission's policy of good governance, transparency and stakeholder involvement. The standard Commission internet tool for Interactive Policy Making was used. The questionnaire for individuals was aimed at the general public, and replies were anonymous. The questionnaire for organisations contained more detailed and technical questions, and identification of the respondent was required. To facilitate the analysis, some questions were structured and allowed an answer from a number of presented options. For other questions there was a free-text field to answer. The consultation was aimed at giving a voice to interested stakeholders and members of the public on the subject and not at providing a representative survey or opinion poll. However, it should be borne in mind that self-selection of the potential respondents may have introduced a bias towards certain views and ideas and the results should be interpreted accordingly.

This document does not in any way reflect the position of the European Commission. It merely attempts to summarise the comments received from stakeholders.

3. CONSULTATION OF INDIVIDUALS

3.1. Background information about participants

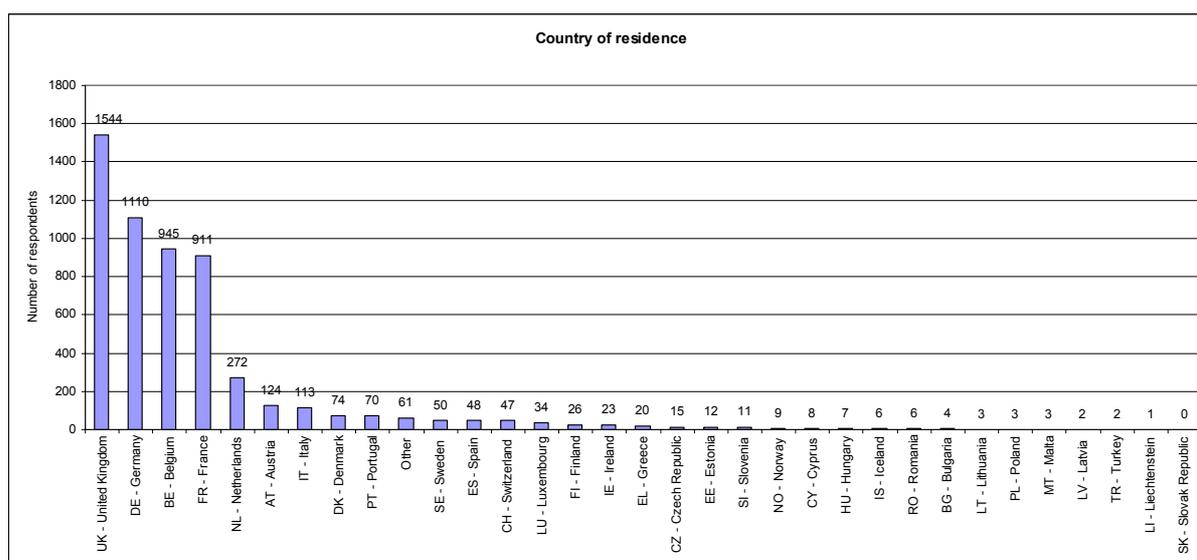


Fig. 1 Number of respondents per country of residence

5564 submissions were received. In addition, the Commission received many letters, in particular from Germany, the Netherlands and the United Kingdom, from individuals concerned about aircraft noise and aviation's environmental impacts.

The largest number of respondents lived in the UK, followed by Germany, Belgium, France and the Netherlands. The languages in which the questionnaire was available (English, French and German), the size of the countries and/or the presence of large hub airports or airports with noise problems may all have been determinants for this distribution.

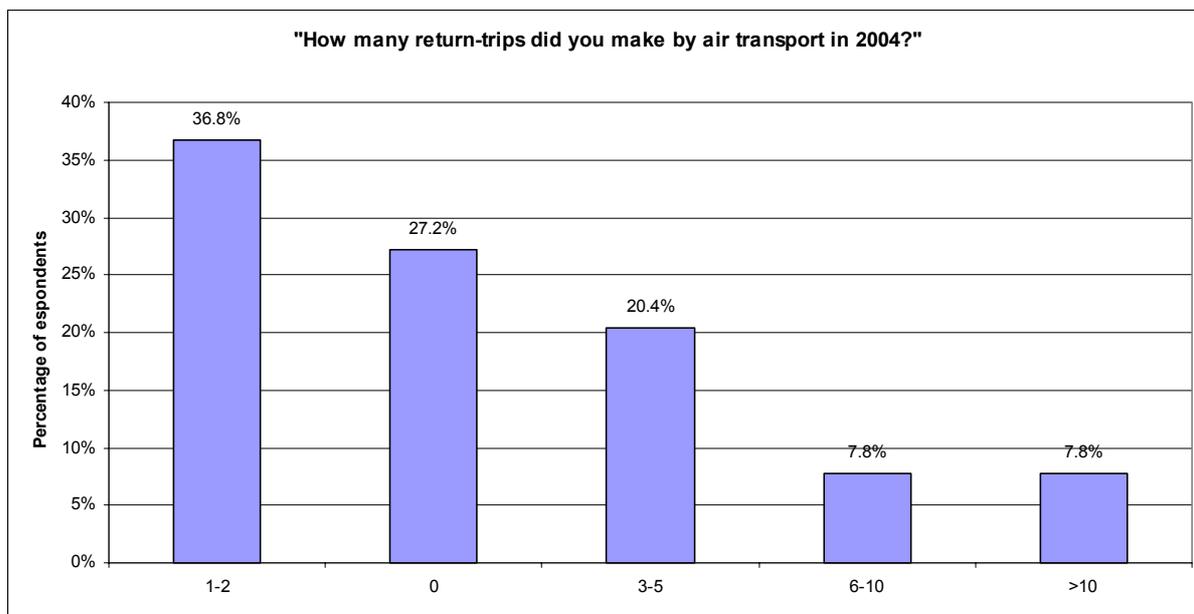


Fig. 2 Number of return-trips by air transport respondents made in 2004

The majority of respondents made return-trips by air transport in 2004: 36.8% made 1 to 2 return trips; 20.4% made 3 to 5 return trips, and 15.6% flew more frequently than 3 to 5 return trips. A little over a quarter of respondents (27.2%) made no return trips by airplanes in 2004.

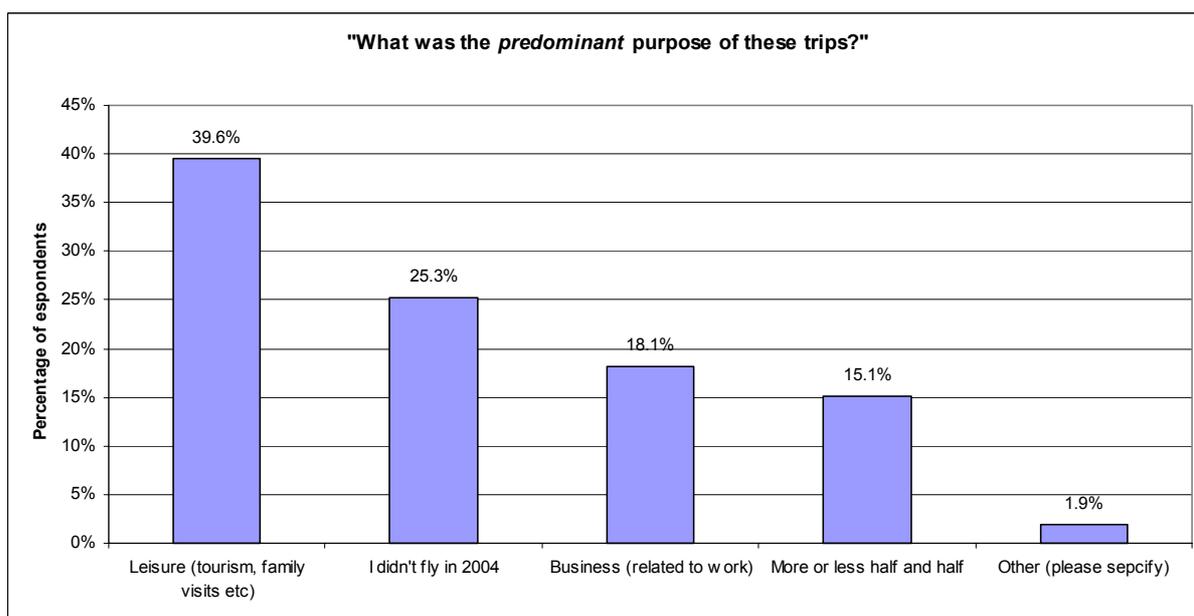


Fig. 3 Purpose of return-trips by air transport respondents made

The predominant purpose of these trips had been leisure (tourism, family visits etc.), while only about half as many respondents stated that that the predominant purpose had been related to work. Though the number of respondents indicating they did not fly in 2004 (25.3%) does not fully coincide with the number of respondents stating in the last question that they did not make any return trips in 2004 (27.2%), most of those who ticked the option “other”, specified that they did not fly or did not make any return trips. The other major “other” reason was that the purpose of their flights had been to study abroad.

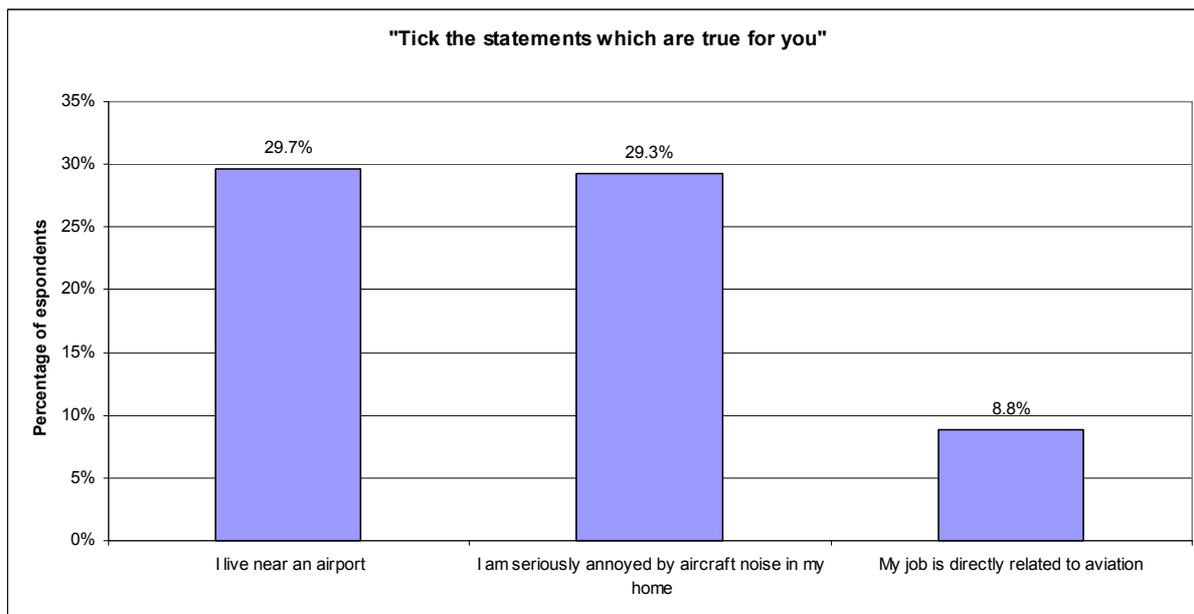


Fig. 4 Share of respondents living near an airport, being seriously annoyed by aircraft noise in their home, or having a job that is directly related to aviation

About 30% of respondents stated that they lived near an airport, and an equal share of respondents affirmed that they are seriously annoyed by aircraft noise in their home. However, there was no strong correlation demonstrated between living close to an airport and annoyance by aircraft noise. Only 35.4% of respondents who stated that they lived near an airport also ticked the statement “I am seriously annoyed by aircraft noise in my home”. Similarly, only 35 % of respondents who were seriously annoyed by aircraft noise in their home stated they live close to an air port.

3.2. Awareness about climate change impact from airplanes

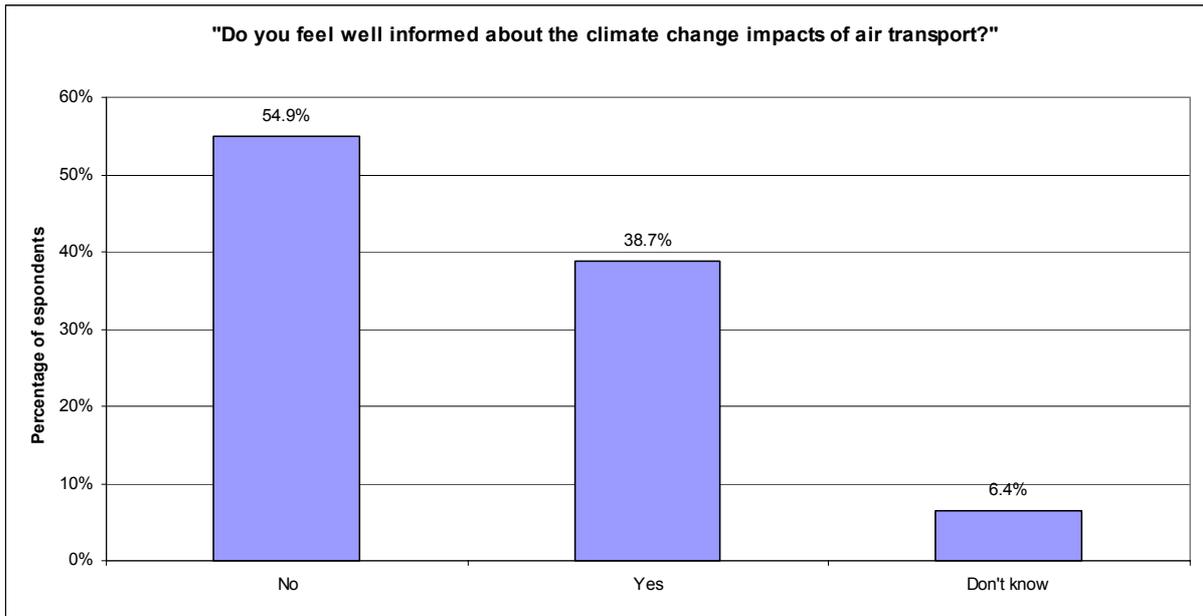


Fig. 5 Awareness about climate change impacts from air transport

A majority of respondents (54.9%) did not feel well informed about the climate change impacts of air transport.

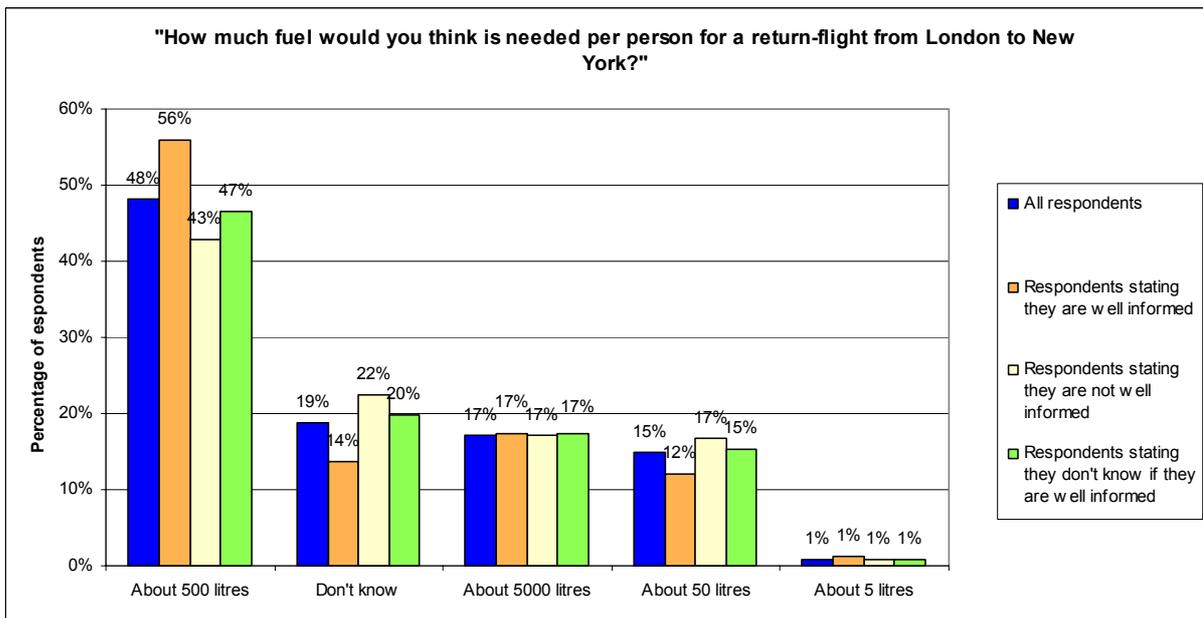


Fig. 6 Estimates of how much fuel is needed for a return-flight from London to New York

Respondents indicating that they were well informed (56%) were largely better able to correctly estimate the amount of fuel needed for a return-flight from London to New York (about 500 litres) than respondents who did not know if they were well informed or respondents who stated they were not well informed. However, even among the respondents feeling well informed, fewer than 60% were able to indicate the right order of magnitude.

3.3. Information

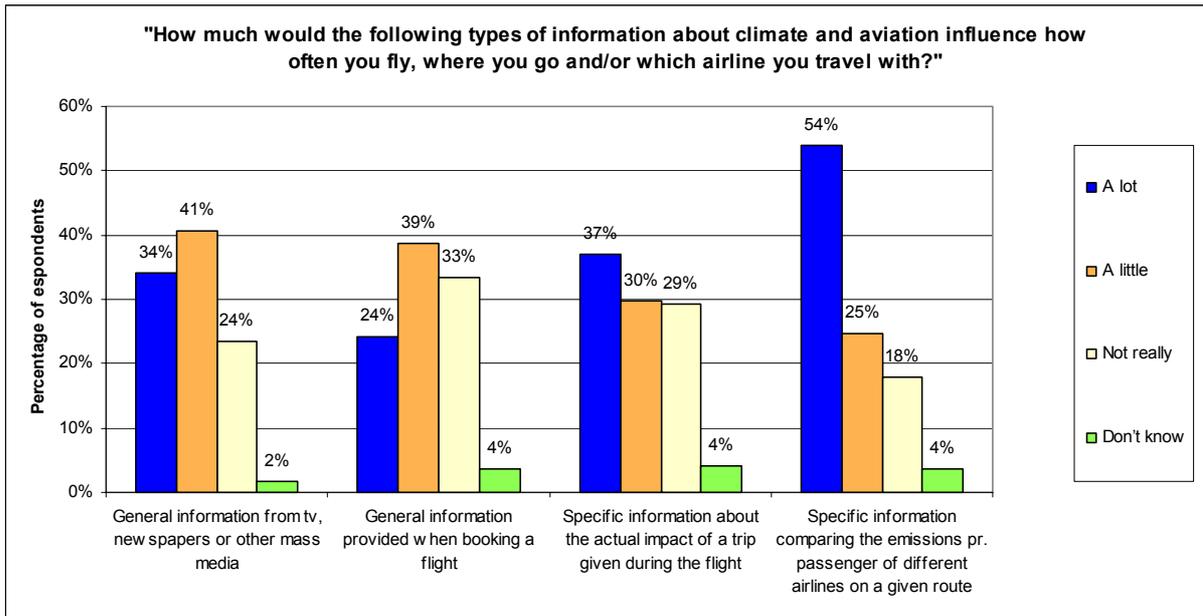


Fig. 7 Degree of influence of different types of information on frequency of flight and choice of airline and destination

A majority of respondents (53.9%) considered that specific information comparing the emissions per passenger of different airlines on a given route is a type of information that would greatly influence how often they fly, where they go and/or which airline they travel with. Specific information about the actual impact of a trip given during the flight was ranked as the second most important type of information influencing these decisions. General information via television, newspapers or other forms of mass media was considered by fewer respondents to be significantly influential, but by many (41%) to be reasonably influential. General information provided when booking a flight was also considered by many (39%) to be reasonably influential.

3.4. Policy objectives

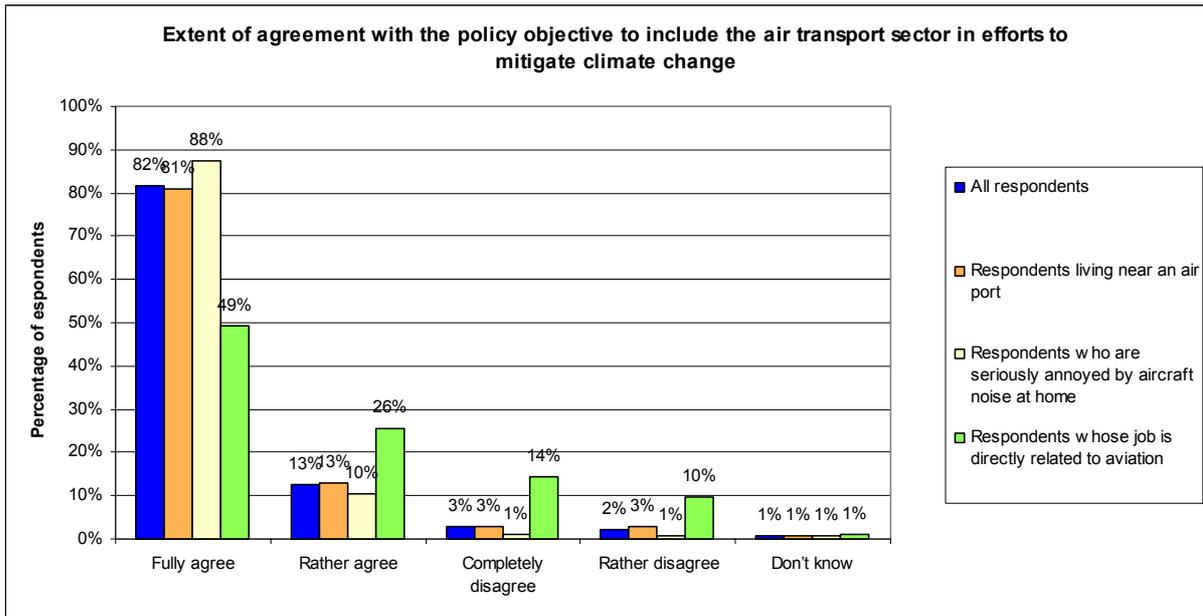


Fig. 8 Extent of agreement with the inclusion of aviation in efforts to mitigate climate change

A large majority of respondents (82%) fully agreed with the policy objective to include the air transport sector in efforts to mitigate climate change. Also a majority of respondents whose job was directly related to aviation fully agreed (49%) or rather agreed (26%) with this objective. Support for the policy objective was not related to the proximity of respondents' homes to airports, but slightly increased for respondents who were seriously annoyed by aircraft noise at home (88%).

Similar results were obtained for the policy objectives of including the cost of the climate change impact in the price of air transport and of strengthening the economic incentives for air transport operators to reduce their impact on the climate.

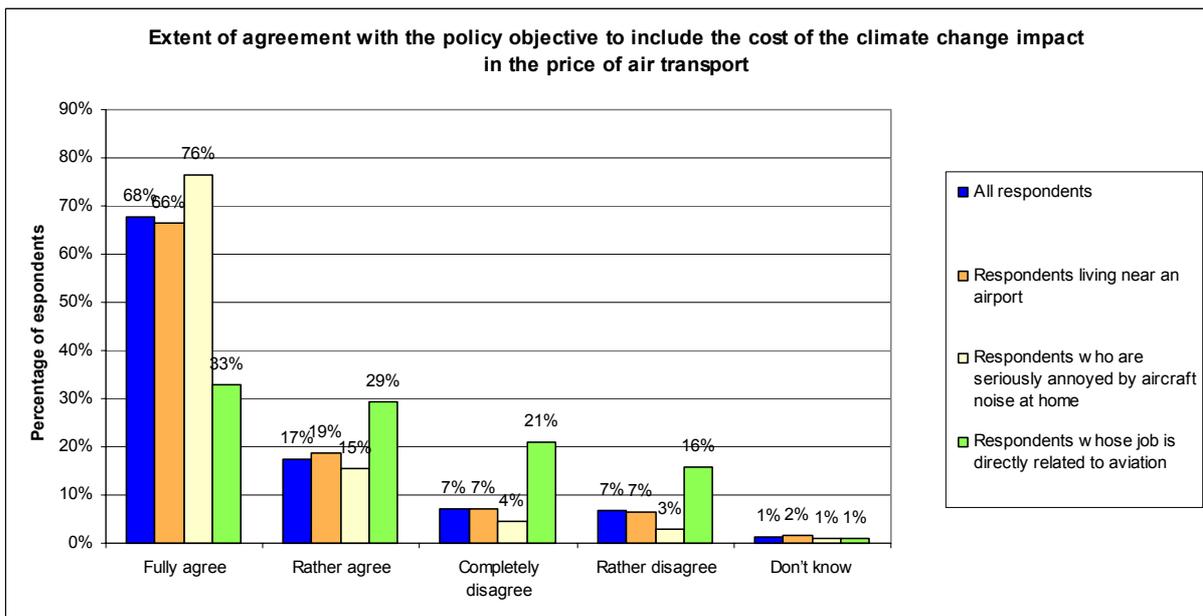


Fig. 9 Extent of agreement with the inclusion of the cost of the climate change impact in the price of air transport

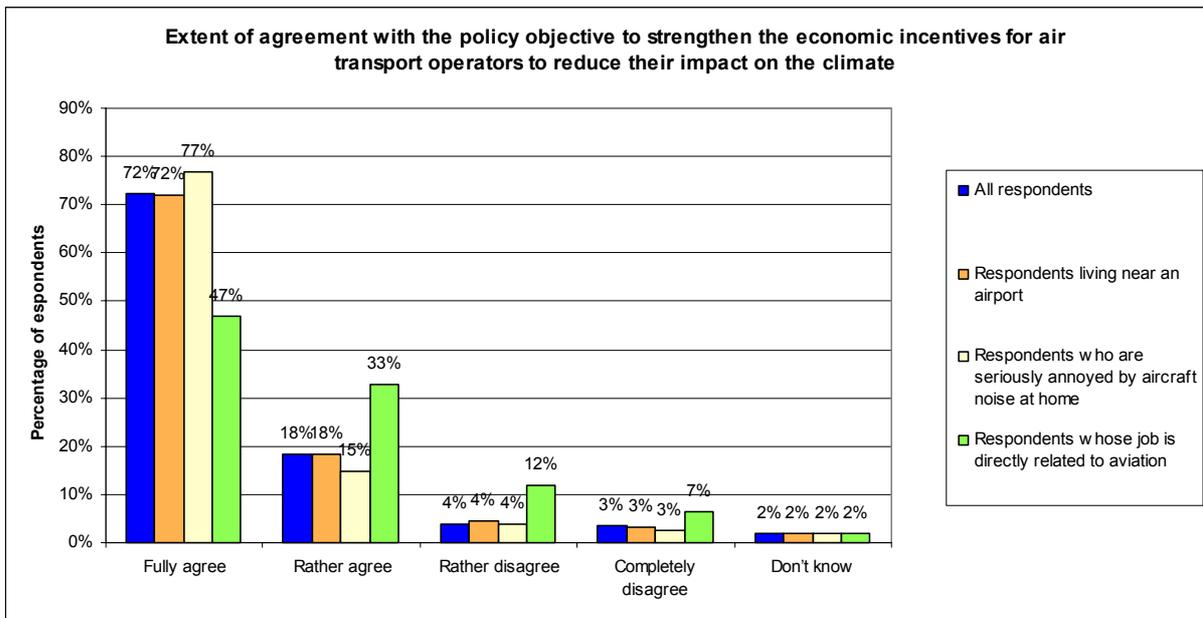


Fig. 10 Extent of agreement with the strengthening of economic incentives for aviation to reduce their impact on the climate

3.5. Opinions about the price of air transport and measures affecting it

A majority of respondents:

- fully agreed with the opinion “Increasing the price of air transport would be acceptable if it is necessary to reduce aviation's impact on the climate”,
- completely or rather disagreed with the opinion “Increasing the price of air transport should be avoided as it could have an effect on jobs and growth”,
- completely or rather disagreed with the opinion “Increasing the price of air transport should be avoided as fewer people could afford to fly”,
- fully or rather agreed with the opinion “Increasing the price of air transport would be acceptable since it would affect ‘frequent flyers’ most”.

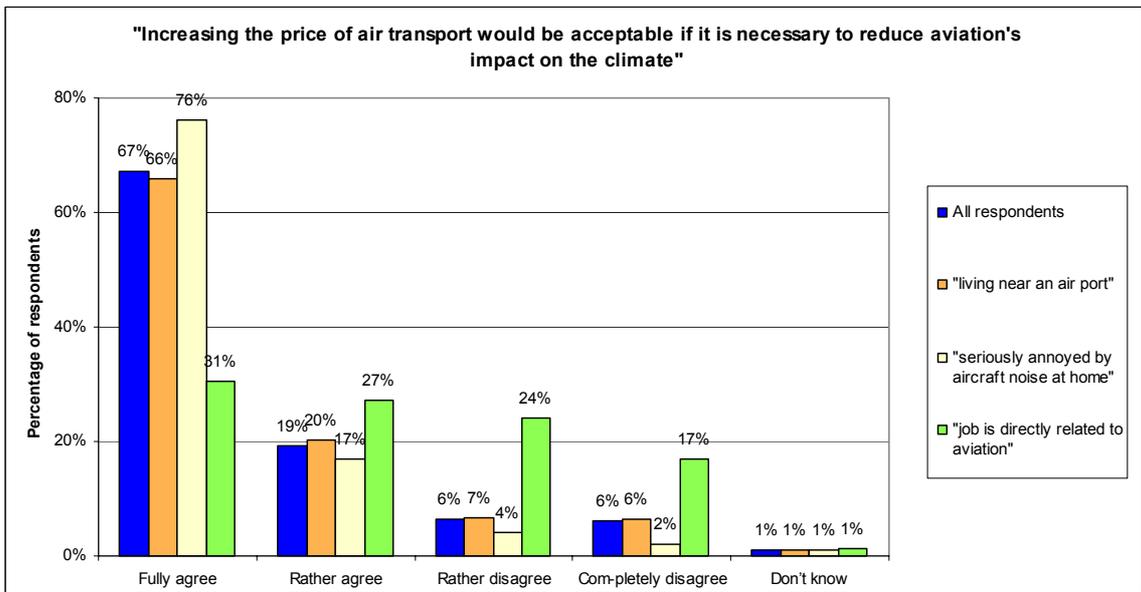


Fig. 11 Extent of agreement with increasing the price of air transport if necessary to reduce aviation's impact on the climate

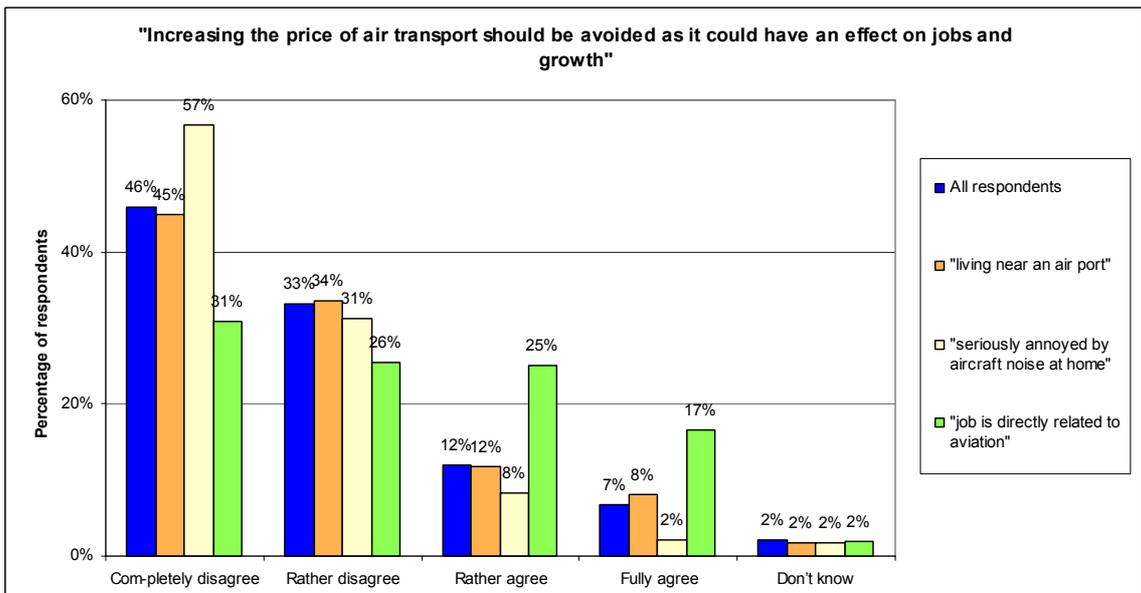


Fig. 12 Extent of agreement with avoiding an increase in the price of air transport as it could have an effect on jobs and growth

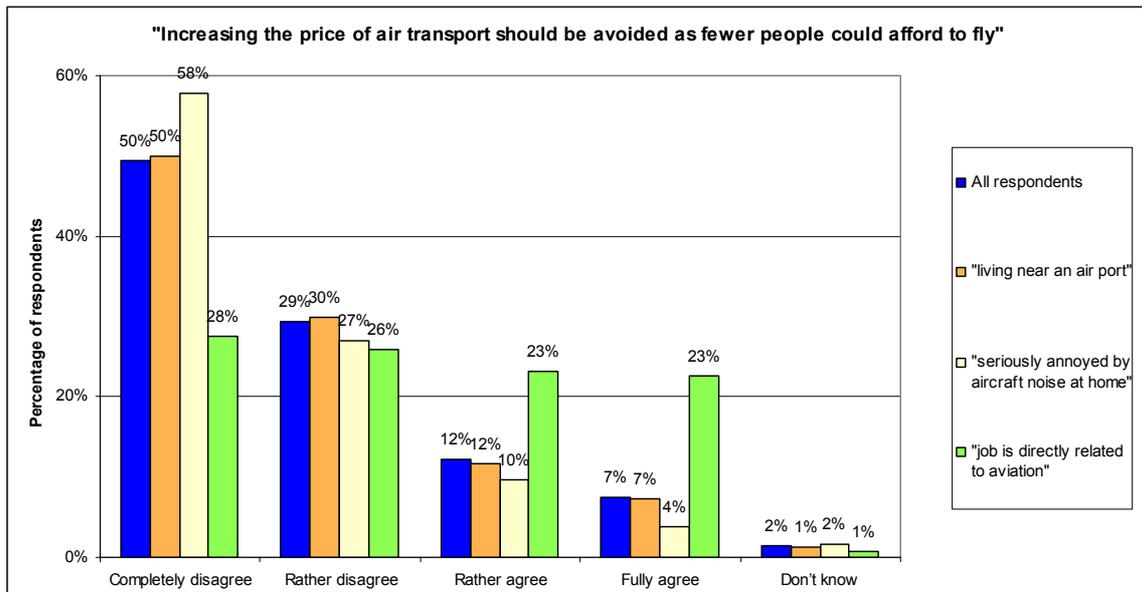


Fig. 13 Extent of agreement to avoid increasing the price of air transport as fewer people could afford to fly

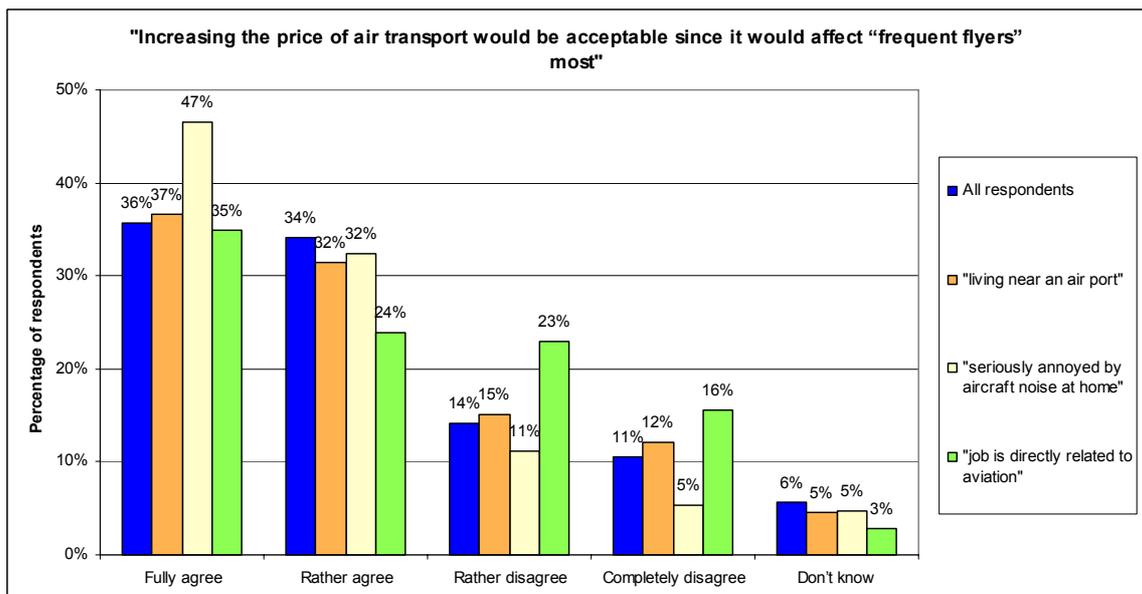


Fig. 14 Extent of agreement to increase the price of air transport since it would affect "frequent flyers" most

According to 86.1% of respondents, should taxes on aircraft fuel, tickets, departures, or similar instruments be implemented and revenues generated, such revenues should be used to reduce the environmental impacts of aviation. Many respondents specified in the free-text field that they would like to see such revenues being used to make railways cheaper than air travel.

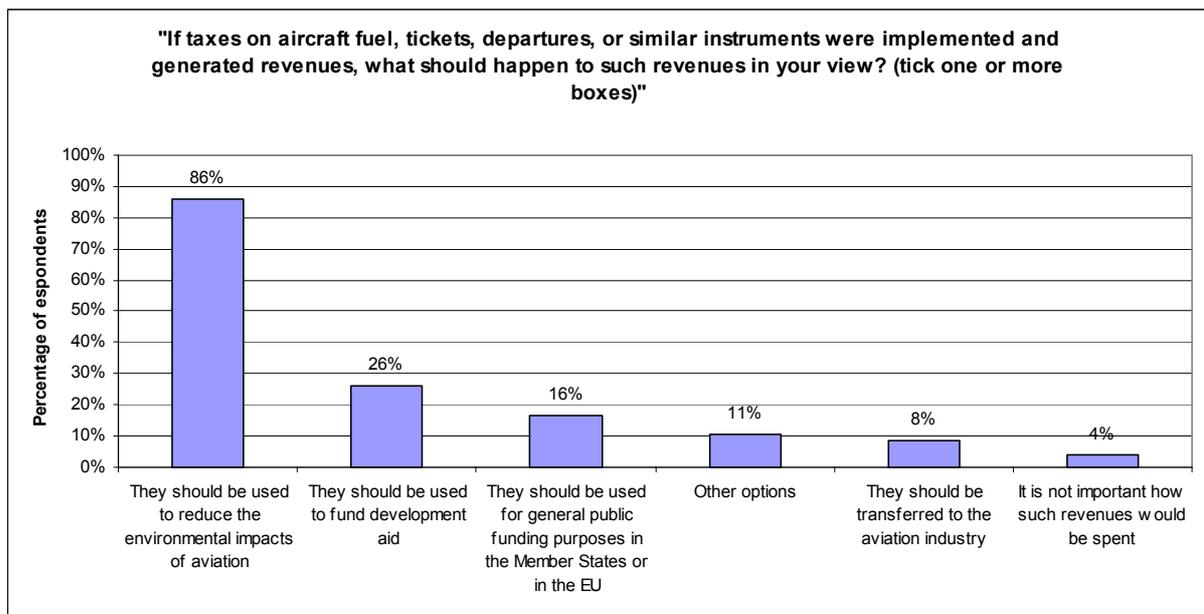


Fig. 15 Use of revenues of taxes on aviation

3.6. Additional comments

2244 individual additional comments were received. While there were some critical remarks, the vast majority of respondents explicitly supported action to reduce aviation’s impact on the climate.

The comment that was most frequently made was that alternative modes of transports, in particular rail, should be promoted and that there needs to be fair competition between transport modes. Respondents indicated that this would not be possible as long as aviation is exempted from taxes. About a third of the respondents who added additional comments made explicit reference to this.

Some respondents wrote they were against any further taxation, frequently indicating suspicion as to the real motives behind such taxes. However, a large majority strongly advocated fuel taxation, although some considered the chances of it being adopted small because of the unanimity requirement in the EU legislative process on this matter.

In general, action on demand was considered by many to be necessary, in order to reduce emissions from the aviation sector. It was felt that price signals would be more important than relying on individual action, as in the latter case people are faced with the question of why they should do something to reduce their impact on the climate if others do not follow suit. Raising consumer awareness was considered as important: proposals were made concerning both advertising and ticketing for passenger transport and concerning a label for goods indicating how far a certain good has travelled by air. Suggestions were also made to restrict flights, or to limit the amount of flights a person could fly in a given period - possibly allowing trades to take place with such individual allowances or “air miles”. Several respondents suggested frequent flyer bonuses should be abolished or even converted into penalties.

There was a strong demand for cleaner and emission-free aircraft. The question was raised as to why biofuels exist for cars but not for airplanes, and some mentioned hydrogen as a possible future source of energy.

While some highlighted the benefits of air travel for cultural exchange, many people criticised the new emerging lifestyle of frequent flying for short leisure purposes. It was widely perceived that this needs to be changed, as a matter of fairness towards future generations and less developed parts of the world, in order to reduce disasters and dangers due to climate change.

Offsetting emissions by making emissions reductions elsewhere or through sinks was supported by some respondents, while others criticised this by describing it as an approach that allows airlines to buy the right to pollute the atmosphere.

Many respondents highlighted the need to take into account the external costs of flights into the price that is paid, because otherwise a fair market could not function. It was also pointed out, however, that the full external costs may be difficult if not impossible to calculate.

Some demanded that industrialised non-EU countries should take also action alongside the EU. Most respondents nevertheless advocated action be taken promptly by the EU and some explicitly mentioned that they considered the EU to be strong enough to take action on its own, setting an example to the rest of the world.

Many also commented on the need to reduce noise impact of aircraft.

A selection of individual comments is available in Annex 1.

4. CONSULTATION OF ORGANISATIONS

4.1. Participants

198 organisations participated in the consultation. Responses were received from the governments of France and the United Kingdom, and from the Finnish Civil Aviation Authority and the Austrian Ministry for Environment. A number of individual companies as well as the major European airline, airport and manufacturers associations submitted responses. 14 participants did not make use of the web-based interface to reply to the questionnaire; therefore, statistical data in chapters 4.2 to 4.5 refer to responses made by the other 184 organisations. All indicated preferences and comments were, however, evaluated and integrated into this report. The largest single fraction of responses was from NGOs, most of them primarily active in the field of environmental protection.

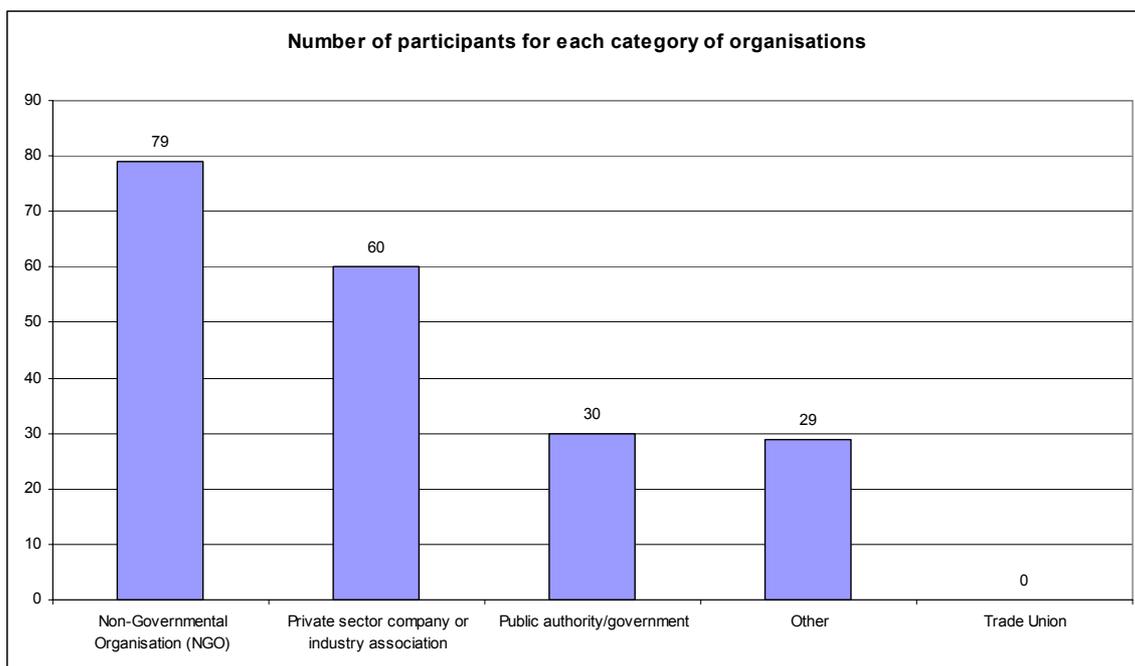


Fig. 16 Number of participants for each type of organisation including organisations that did not make use of the on-line questionnaire

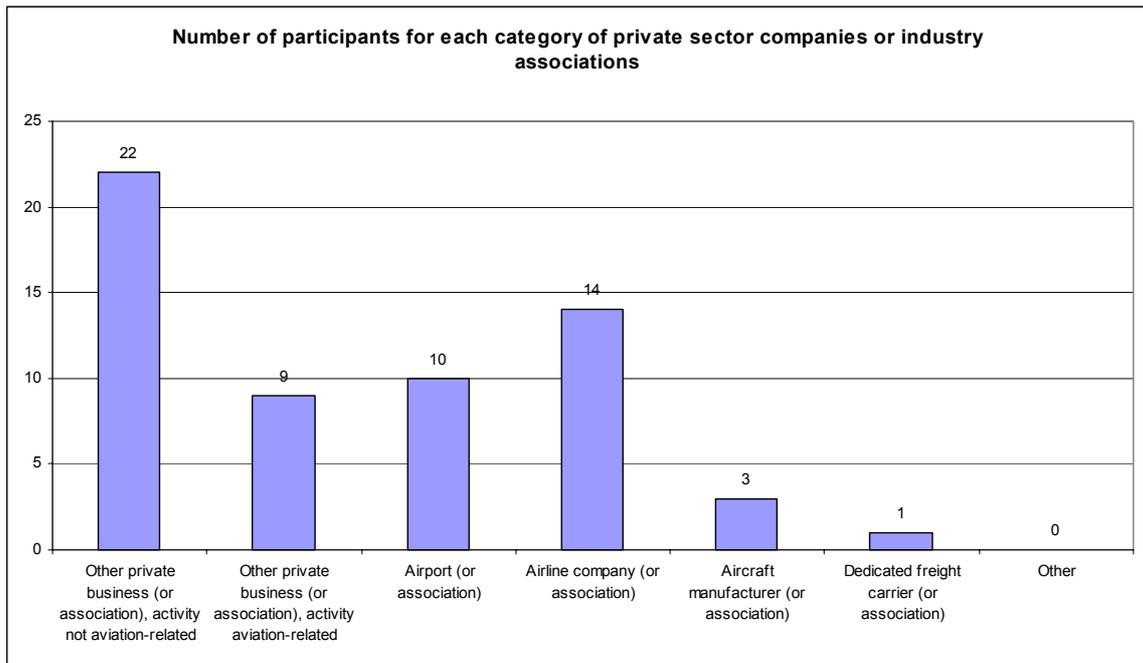


Fig. 17 Type of private sector companies or industry associations that responded including organisations that did not make use of the on-line questionnaire

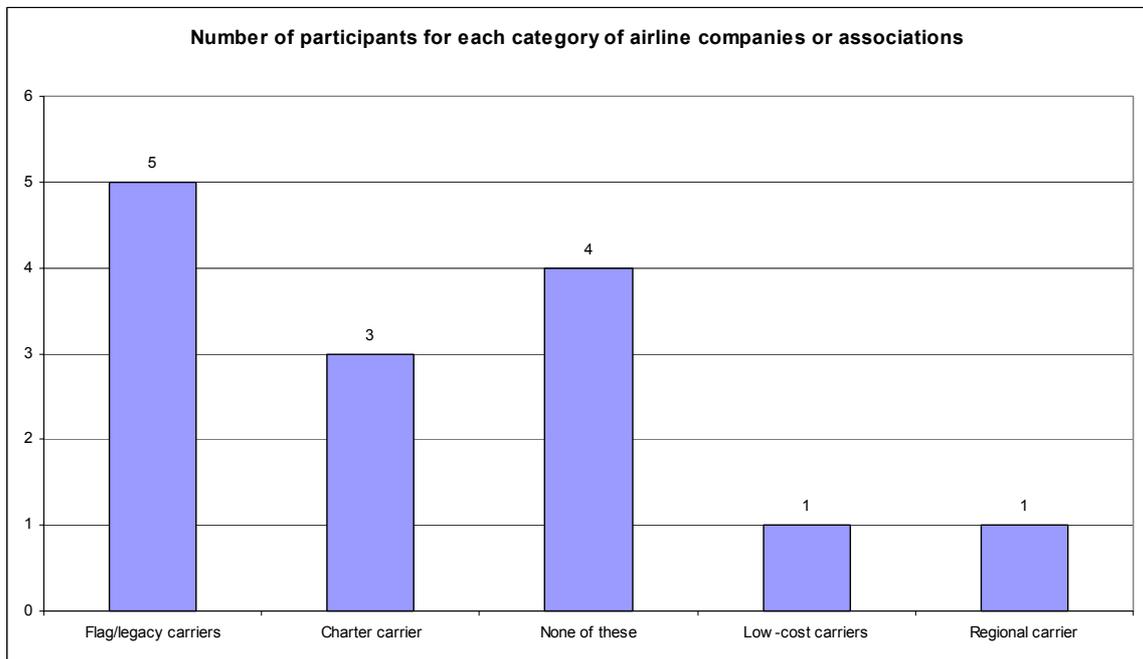


Fig. 18 Type of airline companies or associations that responded including organisations that did not make use of the on-line questionnaire

4.2. Policy objectives

4.2.1. Including the air transport sector in efforts to mitigate climate change

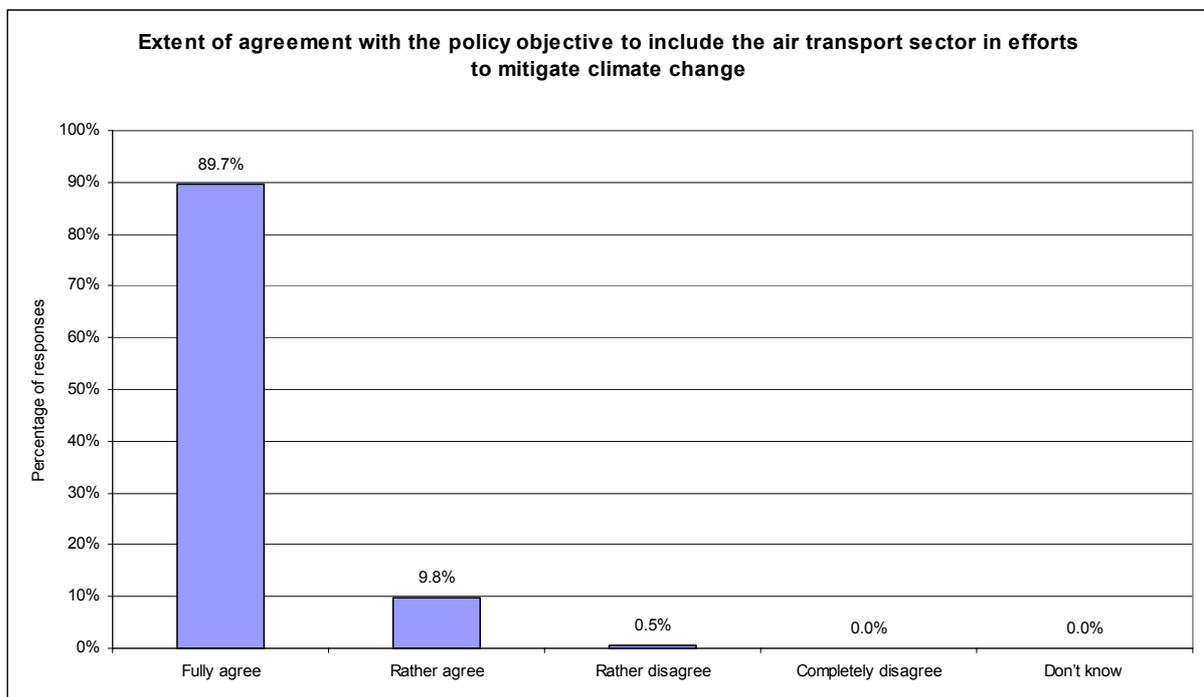


Fig. 19 Extent of agreement with the inclusion of aviation in efforts to mitigate climate change

There was almost unanimous agreement with the policy objective to include the air transport sector in efforts to mitigate climate change. 99.5% of respondents fully agreed or rather agreed with this objective, and most fully agreed (89.7%).

A group of associations representing airlines and manufacturing associations felt “that the air transport sector’s ongoing and self-financing efforts over many years to reduce its impact on climate change should be included in future international environmental protection initiatives.” They stated, however, that “this must be done under ICAO guidance and in compliance with ICAO existing policies related to environment and to the use of economic instruments such as taxes or charges. It must also be consistent with bilateral Air Services Agreements.”

There were a few other concerns expressed regarding action to address aviation’s impact on climate change:

- One aircraft manufacturer issued the following concern: “Additional economic measures applied to civil aviation would have little additional impact on reducing fuel consumption, which is already a central concern for this sector. The injudicious use of economic measures would only serve to restrict growth in this key economic sector, which is recognised as a major facilitator for driving growth through increased mobility and transport of goods. Moreover such additional economic measures could even prevent airlines from replacing their existing aircraft by more fuel-efficient aircraft.” Similarly, a manufacturing organisation stressed that “maintaining a successful and competitive aerospace

industry in the EU is an essential component of delivering the technological innovations necessary to achieve environmental improvements”.

- One airline felt that insufficient recognition was given to their belief that the current contribution of aviation to climate change was relatively small, that the industry was taking the environmental task seriously by already reducing fuel consumption continuously, and that measures other than economic instruments should have higher priority since it was felt that these would have greater potential to reduce aviation's climate impact at lower cost and without market distortion.
- One private sector company stated that they did “not believe that most EU airlines require further incentives to maximise their efficiency”.

One airline association, while supporting the move towards reducing the climate impact of air transport, requested that “any policies in this area must reflect a balanced approach between allowing competition in inter-state mobility for Europe's citizens, thereby ensuring greatest efficiency and choice, and reducing the impact of aviation on the environment. In addition, any measures should include ALL modes of transport and not just aviation.”

The vast majority of respondents welcomed action being taken by the European Commission to include aviation in efforts to combat climate change. Several respondents stressed the urgency of reducing emissions from aircraft. One organisation thought that was already too late to take action to mitigate climate change.

Some points that were made in this context were:

- “uncontrolled growth of aviation could mean that this sector could account for between a half and a three-quarters of the UK’s total emissions by 2050”
- “Urgent action is needed to make sure that emissions reductions by mainstream industry sectors are not overwhelmed by the rapid growth of aviation emissions.”
- “We accept that there is not a "do nothing" option, nor can the Union wait for action to be taken at a global level - though that must be the stated and actual ultimate goal.”
- “Aviation cannot be exported or imported, and is therefore a sheltered sector, just like road transport for example. Aviation can, therefore, just like road transport, bear 'triple digit' Euros per ton CO₂ prices, and this is unlikely to happen by just including aviation in the EU ETS.”
- “Aviation is heavily under-taxed, creating competitive distortions in the transport sector and making it difficult to create support for fair pricing in these sectors, too.”
- “Oil imports pose a heavy burden and a political risk on Europe's economy.”
- “Aviation has a small, but significant and growing impact on climate change, and this must be addressed. [...] in line with the precautionary principle,

aviation must accept its responsibility to address the climate effects of this growth.”

4.2.2. Internalising the external costs of climate change in the price of air transport

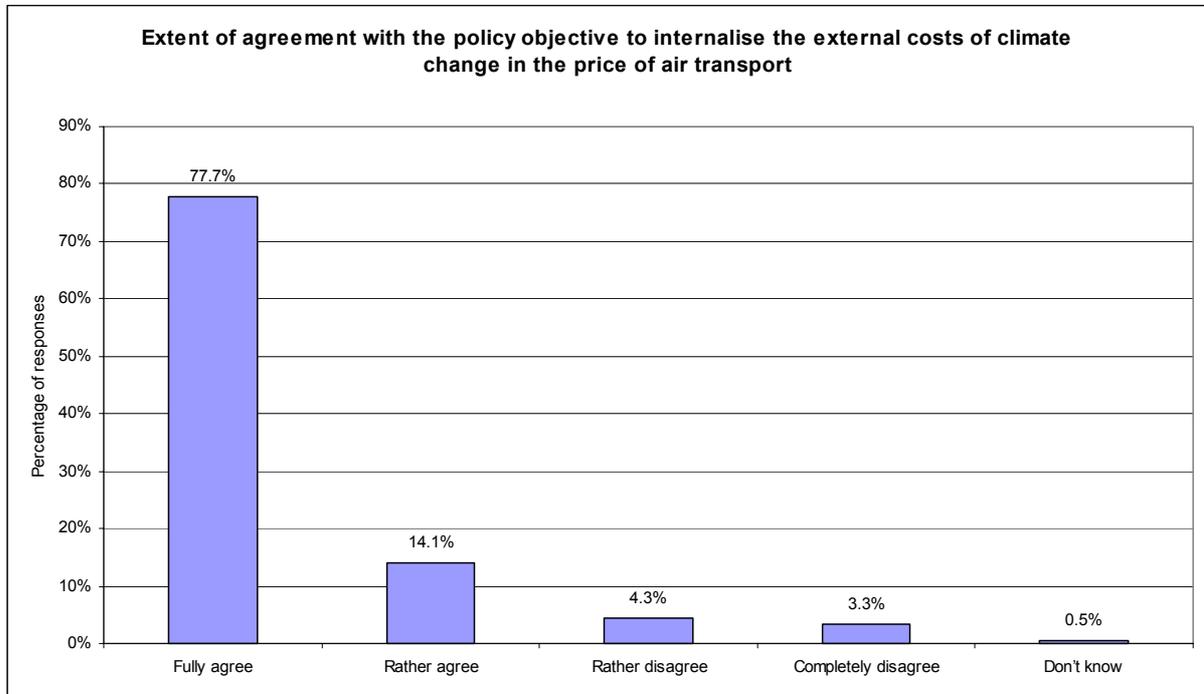


Fig. 20 Extent of agreement with the inclusion of the cost of the climate change impact in the price of air transport

The agreement with the policy objective to internalise the external costs of climate change in the price of air transport was high. 77.7% of respondents fully agreed and 14.1% rather agreed with this objective.

A group of associations representing airlines and manufacturing associations agreed “that the external costs of climate change be internalised in the price of air transport, although such an internalisation assumes many conditions that are currently unclear”. The following conditions were mentioned: non-discrimination between modes of transport; non-distortion of competition between operators within and to/from the EU; and that costs included must be demonstrated to be directly attributable to aviation. Similarly, some respondents stated they agreed in principle on the internalisation of external costs “but it is essential that the same principles are applied to all forms of transport including trains and motor vehicles (e.g. large state train subsidies and support)” and any instrument designed to achieve internalisation of externalities “must be demonstrated as the most cost effective option, which may be economic, regulatory or voluntary in nature”.

4.2.3. Strengthening the economic incentives for air transport operators to reduce their impact on the climate

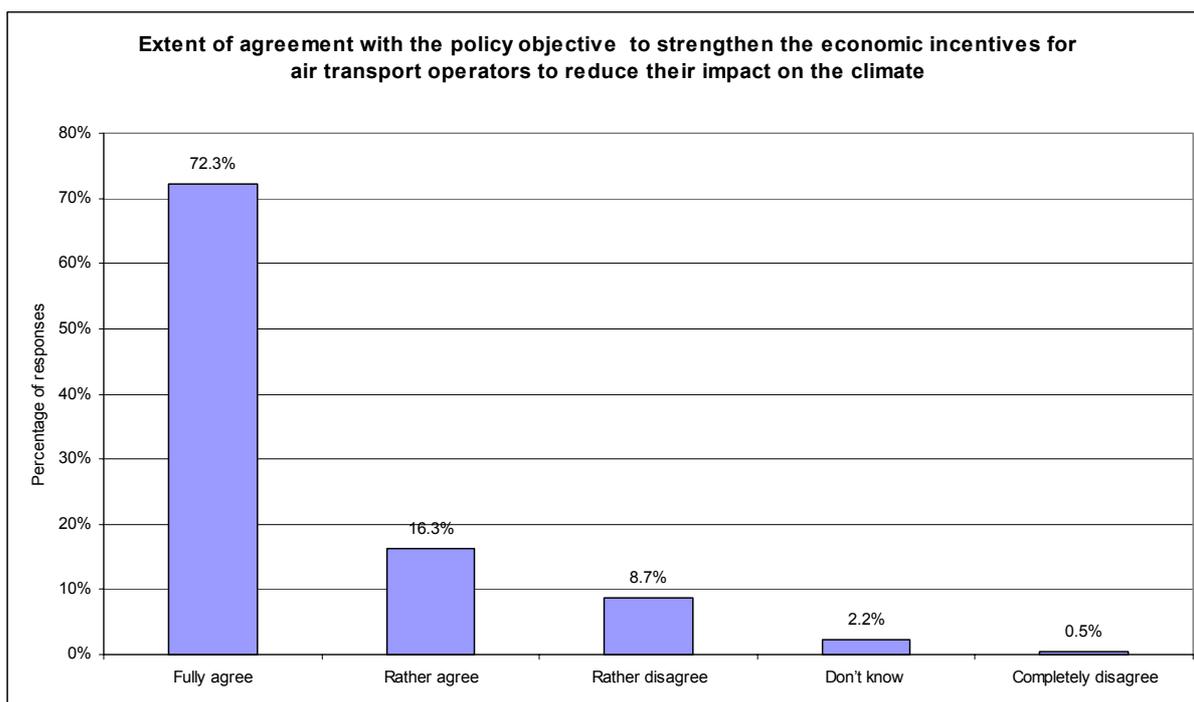


Fig. 21 Extent of agreement with the strengthening of economic incentives for aviation to reduce their impact on the climate

A large majority of respondents supported the objective to strengthen the economic incentives for air transport operators to reduce their impact on the climate: 72.3% fully agreed and 16.3% rather agreed with this objective.

Airlines and manufacturers acknowledged that the use of economic instruments could be a possible policy option, but only in combination with research and technology development and improvements in air traffic management and airport infrastructure. They considered that the use of economic measures “should have a clear environmental rather than fiscal objective, that they should be subject to cost/benefit analysis and that they should take account of the need to preserve the competitiveness of the European Aviation Industry”.

One airline felt that the aviation sector already has a strong incentive to address environmental impacts and that, in terms of CO₂, there are already significant economic incentives for air carriers to focus on minimising fuel consumption. Equally, this respondent felt that there are strong incentives in place through ICAO policies for manufacturers to focus on NO_x emissions improvements.

4.3. Policy options

4.3.1. Economic instruments

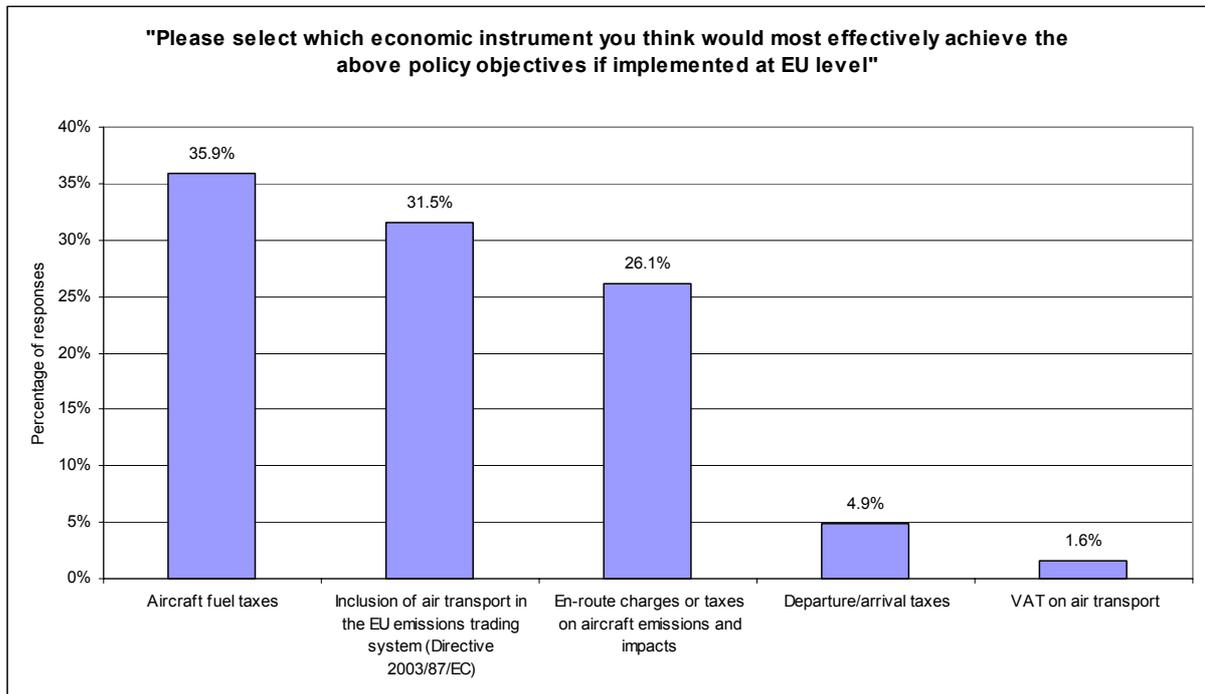


Fig. 22 First choice of economic instrument

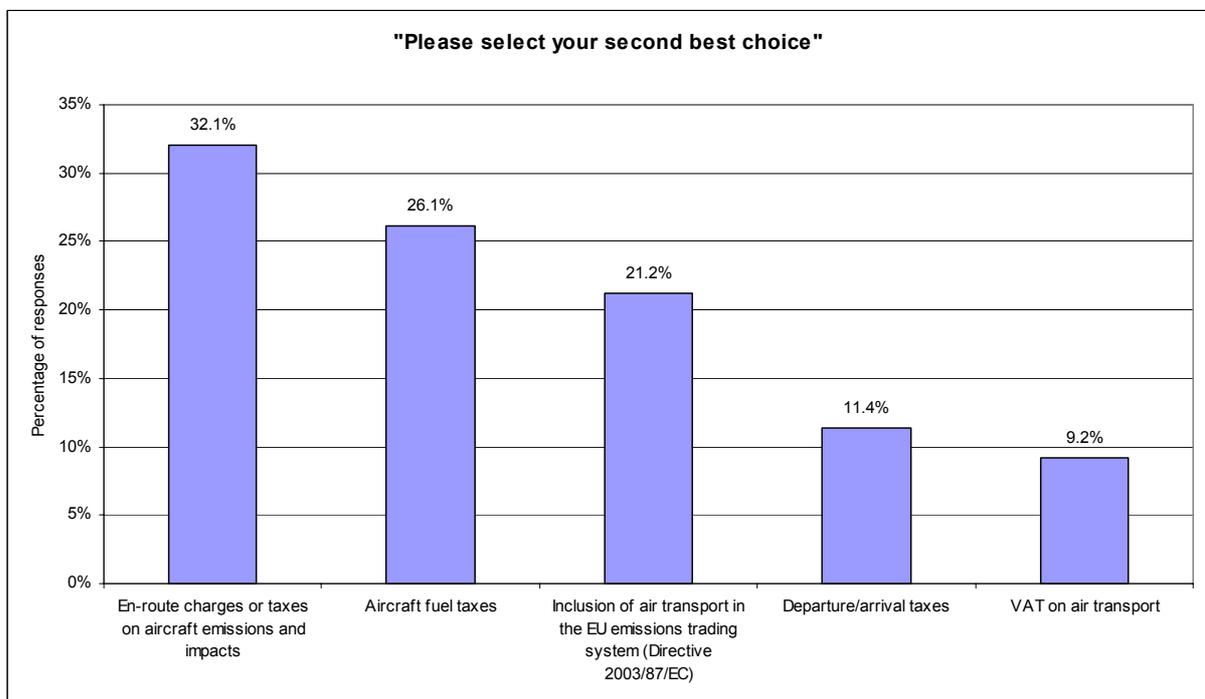


Fig. 23 Second best choice of economic instrument

Aircraft fuel taxes

The largest fraction of respondents (36.9%) considered that, choosing from the list of offered options, aircraft fuel taxation would most effectively achieve the above policy

objectives if implemented at EU level. Fuel taxation was the preferred option of the Austrian Ministry for Environment.

A group of associations representing airlines and manufacturing organisations objected to the application of fuel taxes. Taxes were considered as “blunt instruments that will not deliver the desired affect, as can be seen in the UK with the Air Passenger Duty”.

Other respondents pointed out that all attempts to reduce aviation’s impact on aviation would be in vain if the distortion of competition between aviation and other modes of transport was not addressed at the same time. Apart from external costs to the climate not being incorporated into the costs of air transport, it was felt that tax exemptions granted to aviation (fuel tax, VAT) contributed most of all to this distortion in competition.

Some participants thought that unanimity voting in the Council of the European Union might be an obstacle for the adoption of kerosene taxation at EU-level. They wanted therefore to encourage Member States to “start taxing domestic flights and enter into bilateral agreements in order to tax intra-community flights”.

Several comments were received in response to the question asking on what tax revenues should be spent. Most often it was proposed to support rail infrastructure (see below).

Departure/arrival taxes

Only a few considered that departure/arrival taxes would be the most effective instrument. However, it was felt that “airport charges are simple to apply and collect and allow all impacts, not just climate change, to be managed”. One respondent suggested that “departure/arrival taxes could be modulated according to aircraft emissions - i.e. so freight companies/passengers pay a higher tax to fly on a more polluting aircraft, and a lower tax to fly on a less polluting aircraft”.

En-route charges or taxes on aircraft emissions and impacts

26.1% of respondents considered en-route charges or taxes on aircraft emissions and impacts as the most effective instrument among the offered options. This instrument was also most often considered as the second best choice (32.1%).

En-route charges or other such emissions charges were not the preferred option of a group of associations representing airlines and manufacturers, but “if the revenues resulting from such charges are used to mitigate aviation’s environmental impact or to assist in related research finding, then they could be considered a more acceptable measure than fuel tax”.

Airport operators strongly considered “that NO_x and other non-CO₂ emissions are, at least for the immediate future, most effectively addressed by the employment of modest en-route charges in order to raise revenues which would be wholly used to fund serious scientific research into the effects of these emitters at altitude” and it was stated that “this increased knowledge will then allow the economic measures to be further and better refined in the longer term”.

An airport company specified that they were opposed to revenue-raising charges, because this “would impose excessive costs on EU aviation and would not be as effective as emissions trading in delivering the environmental outcome”. They would also support,

however, “a moderate en-route charge if the revenues are hypothecated specifically to fund research into the non-CO₂ impacts of aviation”.

An airport company proposed combining the policy measures of incorporating aviation into the EU ETS and en-route charges through revenues from an en-route charge being used, for example by Eurocontrol, to buy emission allowances in the EU ETS.

One organisation suggested introducing emissions charging, at least as an interim measure, since “emissions trading will not be achievable until at least 2008 and probably after that”.

One NGO considered an emissions charge as “the optimal solution from an environmental point of view”.

Inclusion of air transport in the EU emissions trading system (Directive 2003/87/EC)

31.5% of respondents chose the inclusion of air transport in the EU emissions trading system as the most effective instrument.

The two Member States submitting formal government positions (France and the United Kingdom) considered emissions trading as the most effective instrument.

Emissions trading was considered as a more promising approach than taxes and charges by airlines and manufacturer associations, because they felt that work within ICAO has shown it to be potentially the most environmentally effective and cost-efficient approach. Another argument put forward in favour of emissions trading was “the absence of short-term technological solutions within the aviation sector, compared to the availability of solutions in other sectors of society”. Similarly, it was considered “important that offsetting should be allowed, as aviation will be constrained through existing operational equipment until 2012 when the next generation of commercial aircraft will be in operation. Until this point it must be accepted that aviation will not be able to substantially reduce its emission production. To create a trading scheme, open trading must apply across all sectors.”

Airlines and manufacturers stated that they should be permitted to trade with other sectors and that the trading system should be limited to CO₂ only. They also felt that the ultimate objective should be to have a global system, as “a regional initiative would be less environmentally effective at global level and could seriously affect the international competitiveness of European airlines and the European industry as a whole in the international context.” Some airlines requested that if “aviation’s CO₂ was included into the EU ETS, Member States and European authorities should agree to remove other instruments such as taxes or charges”.

There was no agreement among airlines about allocation of allowances. One airline felt that “the initial allocation must also be free of charge as experienced by the existing members in the first phase of the ETS”, while low cost airlines thought that any allocation would have to be based on the efficiency of aircraft and an airline's operational practices, not on historical passenger numbers. One NGO felt that ‘grandfathering’ (where allowances are allocated to emitters on the basis of historical emissions) would lead to market entry barriers and a distortion in competition, creating disadvantages for new or expanding enterprises. Another organisation indicated that “if for example market share and routes vary from year to year, it may be difficult to set annual allocations on

multi-annual cycles (as for the National Allocation Plans in EU ETS) - en-route charges based on actual usage may address this issue”.

One organisation representing an industry sector that was not aviation-related was against the inclusion of air transport in the EU emissions trading scheme. They posited that the inclusion of aviation in the EU scheme would undermine the competitiveness of manufacturing industries for which the CO₂ emissions per unit of sales are high in comparison with aviation, while “the aviation sector will have no trouble to pass on the cost to their customers and will be in a position to afford CO₂ prices” that are beyond the reach of some manufacturing industries. They concluded that “in any case, if the Emissions Trading Directive were to be extended to aviation, allowances allocated to aviation should at least not be fungible with those issued to the industries currently covered by the EU ETS.”

One airport company acknowledged that “some perceive the industry’s interest in emissions trading as a ploy for postponing the day when aviation will have to deal with climate change”.

Environmental NGOs agreed with airlines and manufacturers that special rules for aviation were necessary in case aviation was included in the EU scheme (because emissions from international aviation are not yet included under the Kyoto Protocol and of its multiple non-CO₂ climate impacts).

Some NGOs considered emissions trading as a possibility they could agree on provided a number of conditions were fulfilled, which concerned the following areas:

- a cap and trade system with ambitious targets for emission reductions;
- a system that is closed for the sector (some NGOs would be satisfied if this was the case only initially);
- inclusion of non-CO₂ effects/avoidance of trade-offs with other emissions through strict regulation;
- auctioning of allowances.

Several organisations made stated that applying emissions trading to aviation will only be environmentally effective if it is preceded by a clear, credible and quantified target. A university institute commented that “emissions trading is only effective if it reflects large total emission reductions.”

Many environmental NGOs would prefer a system that is not open to the existing EU emissions trading scheme. Other environmental NGOs would see the possibility of having a closed system initially, and allowing a limited exchange in allowances between different sectors at a later stage. One NGO explained its preference for an initially separate trading scheme by stating its opinion that the current system is still in a "learning phase" and pointing out that emissions from international aviation are currently not covered by the Kyoto Protocol, unlike industrial greenhouse gas emissions. Some NGOs expected that there would be “political pressure for aviation to be given either a generous cap, or to have its access to the EU ETS limited” due to the aviation sector being likely to be a net buyer over the short-term, and hence gave preference to a closed system or limited gateway to the EU scheme.

Some NGOs were sceptical that an emissions trading scheme for aviation would be sufficiently effective, not just due to their concern that there might be large pressure for relaxed ceilings but also because they felt it might not include other emissions than CO₂. One NGO stated that “inclusion of aviation into the EU ETS would be a good start but in the short-term at least, it is likely to be insufficient to internalise aviation's external environmental costs”. Most environmental NGOs were of the opinion that any instrument should account for the full climate impacts of aviation. It was often stated that the radiative forcing effect of aircraft emissions was 2-4 times higher than that of CO₂ emissions alone.

Some organisations considered the potential complexity of emissions trading to be a disadvantage, feeling that it rendered it vulnerable to abuse and that it needed high levels of monitoring and verification activity. An aircraft manufacturer organisation had a more positive view and thought emissions trading was the most effective means of delivering an environmental improvement as it provides an incentive for investment in cleaner technology, even if it can be administratively more complex. Another organisation recommended examining carefully the transaction costs and feasibility of including aviation in the EU scheme before its inclusion.

VAT on air transport

Only a few percent of respondents considered VAT on air transport as the most effective policy instrument. However, one organisation felt that VAT on flight tickets, for example, could be applied easily and quickly. It was proposed that the revenues from the application of VAT be used to develop the railway network.

4.3.2. Other types of action

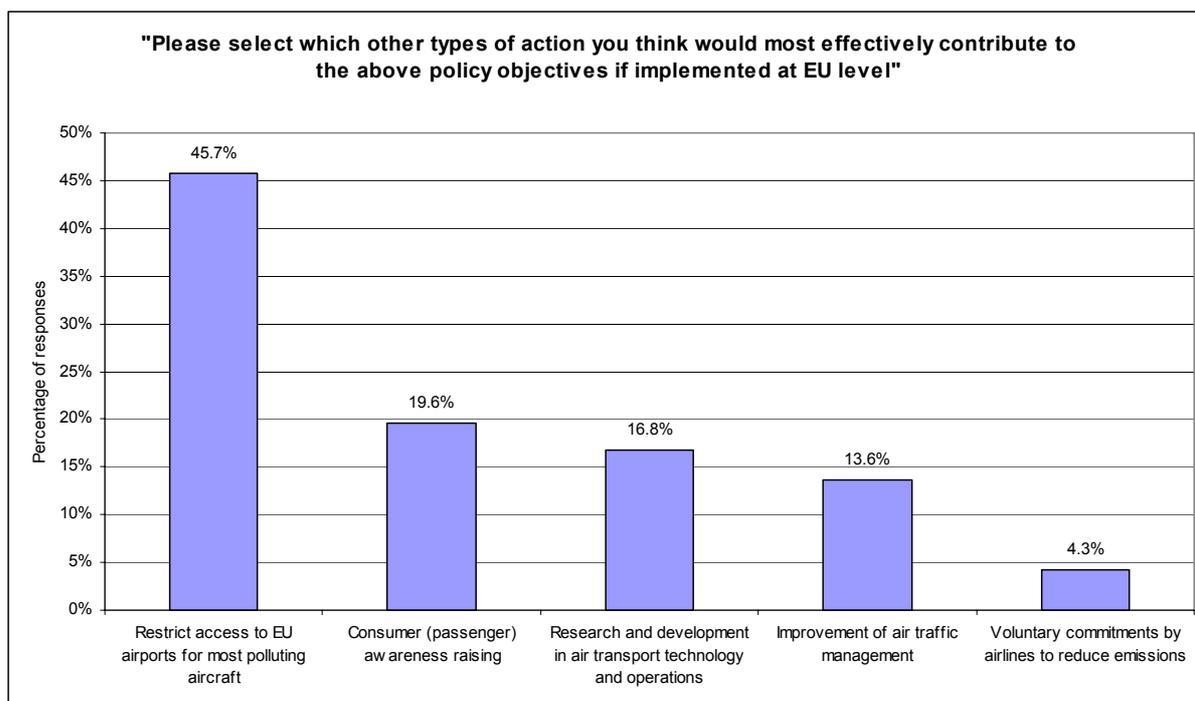


Fig. 24 First choice of action other than economic instruments

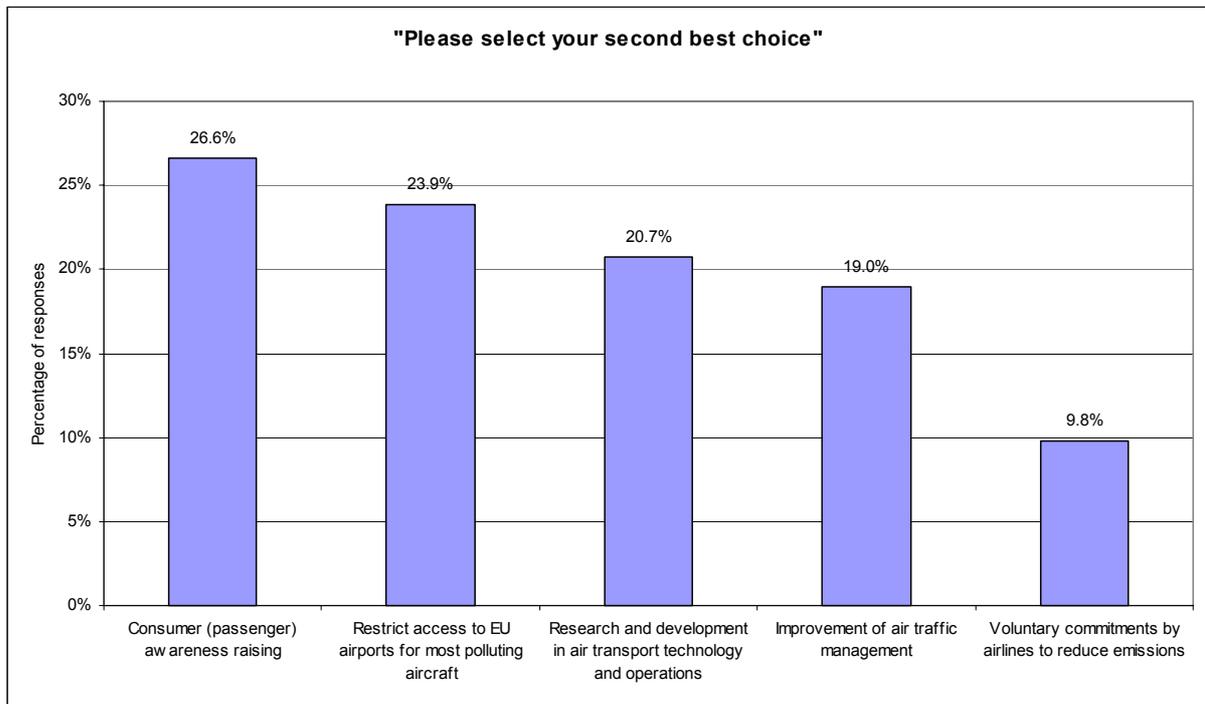


Fig. 25 Second-best choice of action other than economic instruments

Restrict access to EU airports for most polluting aircraft

45.7% of respondents considered that restricting access to EU airports for most polluting aircraft would most effectively contribute to the above policy objectives if implemented at EU level compared to the other possible measures presented in Figure 25.

Consumer (passenger) awareness raising

Consumer (passenger) awareness raising was ticked most often as second best choice.

One airline thought that “awareness should be raised among consumers to explain the increased costs of flying and airlines should be pressured to report on their annual CO₂ emissions”. If an emissions trading system that was open to other sectors was set up, that airline recommended that airlines should also report “on what percentage of their CO₂ emissions have been purchased from the CO₂ market and what percentage has been purchased from Clean Development Mechanism or other offset sources”. Similarly, the airline considered that the aviation industry should be obliged to report on efforts to reduce effects on the environment and to raise awareness among consumers.

Consumer (passenger) awareness raising was considered by several respondents to be a key measure, because they felt that most EU citizens were not currently aware of the link between flying and global warming, which they believed was a major problem from a political perspective.

One suggested measure was to require airlines to disclose on flight tickets the total climate change impact associated with the flight. One NGO suggested printing warnings on the airplane tickets similar to those on packages of cigarettes.

Another possibility would be to require airlines “to give consumers the option of paying a small supplement to make their flight “climate neutral” (i.e. the money would be used to pay for verified emissions reductions)”.

Many respondents felt that awareness raising might be combined with any of the other measures. It was suggested that passengers could be allowed to choose “among a number of CO₂-reducing projects when they pay the ticket, to which their extra-costs will go”. As mentioned by one respondent this might serve two functions: “To reduce the public scepticism and to raise the insights in the climate issue”.

Improvement of air traffic management

A group of associations representing airlines and manufacturers considered that “improvements in ATM and airport infrastructure are vital and actions to reduce congestion and structural inefficiency must be further intensified and developed”.

An NGO thought that “regulations should be enacted to adjust aircraft altitudes to minimise the enhanced radiative forcing caused by 'contrails', i.e., reducing the global warming impact through altering flight altitudes”.

Another NGO felt that “as the warming effects of contrails and cirrus clouds are higher than the one of the CO₂-emissions from aircraft it is worth to intensely study steps in air traffic management so that these regional emissions do not occur at all by not allowing planes to fly through the zones where contrails can be formed because of the atmospheric conditions”.

Improving load factors (through e.g. changes in route network and timetables), operational optimisation of individual flights and advanced air traffic management were other possible improvements that were mentioned.

A specific measure that was recommended by two organisations was the mandatory adoption of the "Continuous Descent Approach".

Research and development in air transport technology and operations

A group of associations representing airlines and manufacturers urged “the EU to strengthen its financial and political support to ambitious Research & Technology Development programmes, so as to accelerate and promote technological progress on emissions and noise that ensure long-term sustainability”.

It was pointed out that research and development in air transport technology and operations would be particularly important as regards a long term view: Aircraft flying today were designed 40 years ago, and unless a large research programme is launched immediately, it was felt that the industry will still be operating solely with kerosene in 30 years time.

Voluntary commitments by airlines to reduce emissions

A group of associations representing airlines and manufacturer associations felt that many measures had already been “systematically and continuously used over recent decades to minimize and reduce aircraft emissions”. It was stated that “The environmental achievements delivered through technological developments over the last 30 years have led to reductions of 35% in engine fuel burn and 75% in noise generated. A 30% reduction in aircraft weight has contributed to these improvements. In addition to this, research and development in the sector contributes to the development of environmental benefits in other sectors, one such example is the development of wind-turbines.”

One association of manufacturers specified that a Civil Aviation Sustainability Strategy (CASS) was being developed by the aerospace industry which would set out very specific environmental targets. “Companies will be encouraged to sign up to and implement the aims of the strategy. Progress towards delivering the goals in the report will be monitored through a process external to the companies taking part on the annual basis.”

The UK also supported “voluntary action by airlines, airports and aerospace companies to control greenhouse gas emissions and develop sustainability strategies”, including emissions reporting and targets at a company level.

However, some respondents clearly expressed their doubt that voluntary measures alone would realise the desired emission reduction.

Demand-side management

Several organisations suggested that demand-side management would be the only effective way of dealing with a problem which is quickly growing in magnitude and that other attempts would likely be at best palliatives (see chapter 4.4.1). It was observed that “the current explosive growth, particularly in intra-Europe air travel, is dominated by leisure-based flights”. Reducing the perceived need to travel was considered to be the priority. France also recommended reducing the growth of air transport in the long term by promoting alternative modes of transport.

Demand management by means of taxes/charges was advocated and it was stressed that it would be important to level the playing field between various modes of transport. Apart from economic instruments, additional measures were advocated to reduce demand for air transport.

Substitution of air travel by train was the most often cited option to reduce demand. This was widely supported both by organisations and individuals (see chapter 3.6). It was argued that for this purpose it would be necessary to ensure that travelling by train was made less expensive than travelling by airplane.

However, a group of associations representing airlines and manufacturers stated that “apart from the enormous and consistent subsidies given to EU rail systems for operations and infrastructure (more than €39bn per annum in the last data reported by the EC), railways also benefit from the €6.2bn subsidy from the EU to Europe’s coal industry, which provides the fuel for more than a quarter of EU electricity generation on which the railways depend.”

Some organisations acknowledged that for some European regions and routes there were few alternatives to air travel. One airline stated that “it is also unfair to limit air travel to the more affluent by imposing high taxes or charges”. One organisation contradicted this argument by making reference to a study that found that “the wealthy fly much more than the poor and low-cost flights have not changed that”.

Most organisations demanding that flights be substituted by rail referred to the development of alternatives for shorter flights. Distances below which flights should be replaced by train in particular according to these statements varied between 800 km and 1500 km. Some also mentioned other modes of public transport such as buses as an alternative.

While it was mentioned in some replies that rail transport in Europe was not pollution-free, as electricity for railways was in part produced with fossil fuels, railways were considered as a much cleaner mode of transport than air transport, and a transport mode that could potentially be pollution-free, if all electricity was produced from renewable energy sources.

The development of more high-speed rail links between European cities, and of an actual Trans-European network of high-speed trains was considered to be a priority. It was proposed to eliminate air transport connections between cities for which there were high-speed train connections. However, it was mentioned that regional railways would also be important and that public transport in general needed to be promoted. In particular, it would also be important to improve timetables across Europe, and to develop an integrated timetable of connections aimed at reducing travel times also by shortening waiting time in train stations in order to increase the attraction of public transport. It was considered that high-speed rail should become much less expensive and that booking (international) train tickets should not be more complicated than for a flight ticket. A Europe-wide integrated fare system and incentives for travellers were mentioned in this context. One respondent observed: “National Rail Administrations are still behaving as if Europe consisted of 25 separate non integrated networks; most appear reluctant to offer [a] routine trans-European [network] through passenger services, that can offset the airlines’ growing adverse global impact. Trans-European rail links are hindered by interchange difficulties, unhelpful timetabling, ticketing and un-commercial carrier revenue conditions.” Reference was made to the Interreg IIc study "Multimodality along the Atlantic Facade".

Modal shift from air to less polluting options like rail was considered particularly important for freight, because air-freight may be many times more polluting than transport by rail, according to one source.

It was also considered that more investment and EU-funding in low cost rail transport would in turn make it politically more acceptable to introduce taxes and VAT on air transport.

Another possible measure suggested as a way of reducing demand was to require airlines and travel agents to always quote the full return cost of travel including all taxes, charges and the cost of transport from airport to destination, because “too many show the one-way, before-tax price which encourages demand”. Deregulation with a lack of impact assessments was considered by one respondent to be among the causes for the increase in air traffic.

Other measures

Other proposed measures were:

- CO₂ tax.
- A bio-fuel objective for aviation fuel.
- Particularly high taxation for short-haul flights.
- Restriction on short hop connections to longer distance departures: the former was thought to cause both increased airport congestion and pollution. It was

recommended that short "hops" be replaced by rail connections wherever possible.

- Minimise domestic flights in particular.
- Elimination of subsidies to airports and carriers.
- Establish standards for airports concerning their interconnectivity with public transport and rail transport for freights.
- Constraining capacity at airports/ restrict construction and extension of airports.
- Gradual tightening of the efficiency and emissions standards for airplanes. Enforcing tougher engine emission standards through a directive. One airline mentioned explicitly that they supported further increases in NO_x stringency as developed by ICAO. A university institute called for stringent emissions reductions, of the order of a 50-80% decrease in emissions per passenger km.
- Prohibition of night flights in Europe.
- A policy on the volume of air traffic in Europe.
- Specific measures for light aviation.
- Include military aircraft in efforts to reduce emissions.
- “A new EU wide balanced assessment of the challenge aviation poses to EU climate change objectives, looking ahead to 2020 and 2050”, carried out by the European Environment Agency.
- “Aggressive policy against USA non-participation: preferential terms for particular states in the US, if they have started carbon trading and if they want them.”
- Speed limits for aircraft.

4.4. Impacts

4.4.1. Short to medium term

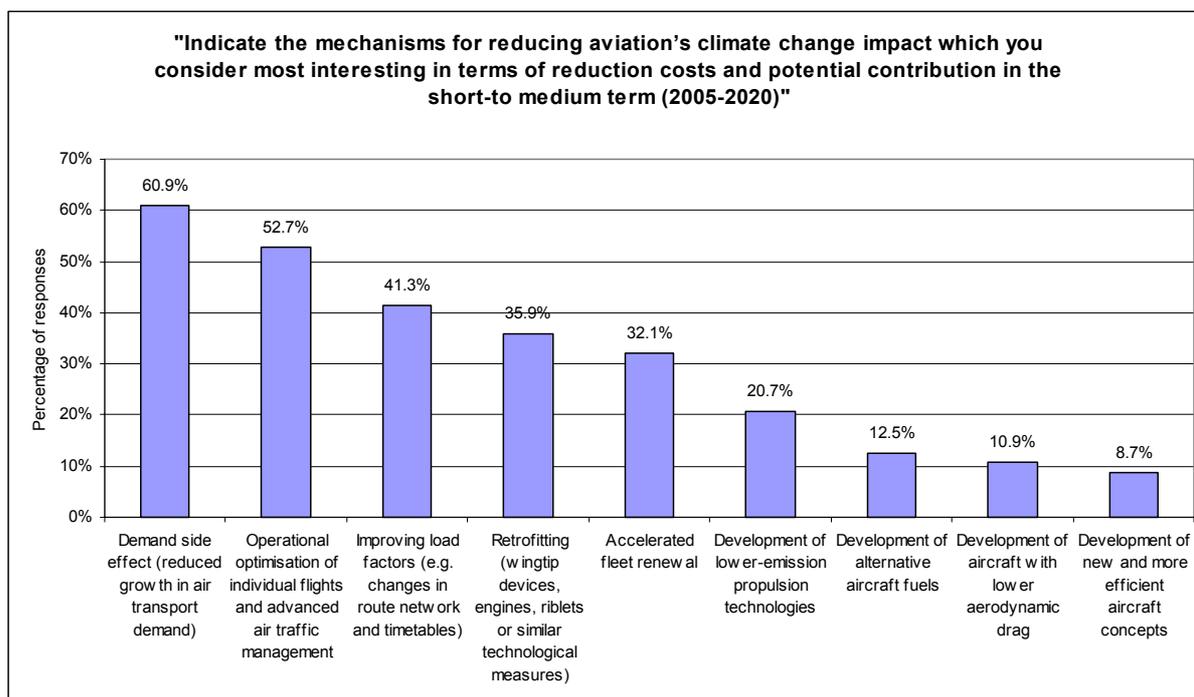


Fig. 26 Mechanisms for reducing aviation's climate change impact ranked according to how interesting they are in terms of reduction costs and potential contribution in the short- to medium-term (2005-2020)

In the short to medium term (2005-2020), demand side effect (reduced growth in air transport demand) was considered as the most interesting mechanism among several options in terms of reduction costs and potential contribution in the short-to medium term. 60.9% of respondents chose this option. Operational optimisation of individual flights and advanced air traffic management (52.7%), and improving load factors (e.g. changes in route network and timetables) (41.3%) came next.

The preference for a mechanism aiming at reducing demand for air traffic and the numerous calls for measures to substitute train for air transport or calls for other demand-side measures reflected a general perception of many respondents that increases in efficiency of aircraft technology were not sufficient to limit or reduce emissions from this sector and that offsetting emissions did not change the growth itself of emissions from this sector.

According to a respondent from the fossil fuel industry, improving energy efficiency of aircraft should be the primary focus. Aviation companies stated, however, that possibilities for efficiency improvements are limited, which was one of the reasons for their preference for the emissions trading system (see chapter 4.3.1). One airline organisation took a position against demand-side measures: "Air Transport is such an integral part of the successful European and global economy that policies regarding environmental impact must not be used to limit demand or increase costs further in this area".

Many respondents wanted to see reductions in the growth of air transport in order to achieve emission reductions in this sector. One organisation stated for example that they “would prefer the use of measures to control or reduce demand for air travel to reduce its impact on climate change, rather than purely efforts to improve the energy efficiency of aircraft.” A research centre commented: “We need to remember that the concern is about absolute emissions not about improving efficiency in a growing market.” Similar comments from NGOs were: “policies put in place now must lead to the necessary restructuring of the entire transport sector. Unlimited growth of air transport will not be part of a sustainable transport solution for Europe.”; “history has shown how the increase of traffic has nullified reduced emissions by technical improvements. That is why we must combat the increase of traffic.”

A private sector company explained its support for demand-side measures as follows: “There are no current or prospective technologies that can make mass airline flying sustainable. Yet some flying is essential to our societies. Keep it to the absolute essentials. Only demand minimisation has any prospect of keeping climate change emissions to survivable levels. High speed railways can be run from sustainable energy sources (although they are not at present), so encourage rail infrastructure.”

A government institution made a link between their preference for taxation as an economic instrument (see chapter 4.3.1) and their preference for demand-side effects, as they considered a tax on aircraft fuel, if it was sufficiently high, as the best instrument to induce a change (“Lenkungseffekt”). An NGO shared this view: “There would be little value in any of the policy options unless the taxes/charges were so high as to bring about a significant reduction in demand. We favour en-route charges or taxes on aircraft emissions and impacts because these will bear most heavily on those most responsible for pollution.” Similarly, another organisation suggested “demand-side action through an environmental levy on aviation fuel, plus the imposition of VAT on air fares, is straightforward and would have an immediate effect”.

A research institute pointed out the importance of equity, in case demand was constrained, to make sure that it is not just wealth that determines “access to the limited CO₂ sink (a common good held equally by all not just the wealthy)”.

4.4.2. Long term

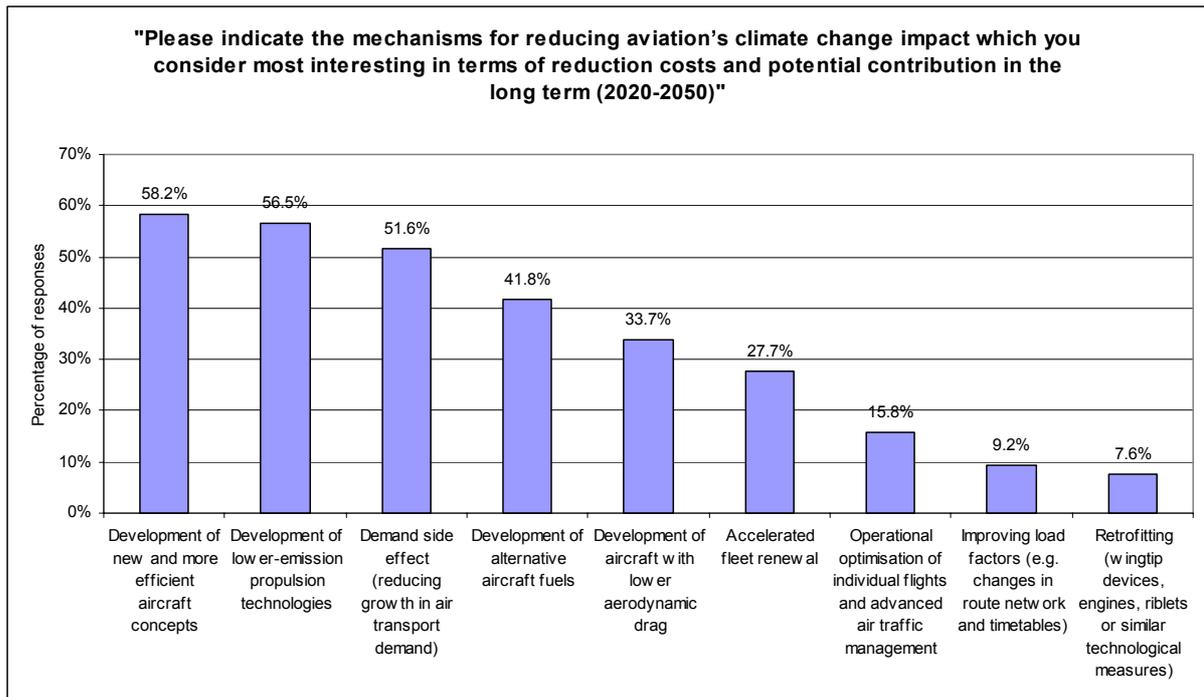


Fig. 27 Mechanisms for reducing aviation's climate change impact ranked according to how interesting they are in terms of reduction costs and potential contribution in the long-term (2020-2050)

Development of new and more efficient aircraft concepts (58.2%), of lower-emission propulsion technologies (56.5%) and of alternative aircraft fuels (41.8%) were considered as the most interesting in a list of options in terms of reduction costs and potential contribution in the long term (2020-2050). Demand side effect (51.6%) was considered as important, but to a lesser extent than for the short to medium term.

It was observed by a university institute that “current aviation technology will not deliver the necessary reduction in emissions” and that “there are no current or prospective technologies that can make mass airline flying sustainable”.

Many respondents wished new technologies to be investigated and developed. One university commented that it was necessary “to move to low emission aviation concepts that will probably be very different to current generation jet aircraft”.

4.4.3. Scope of action

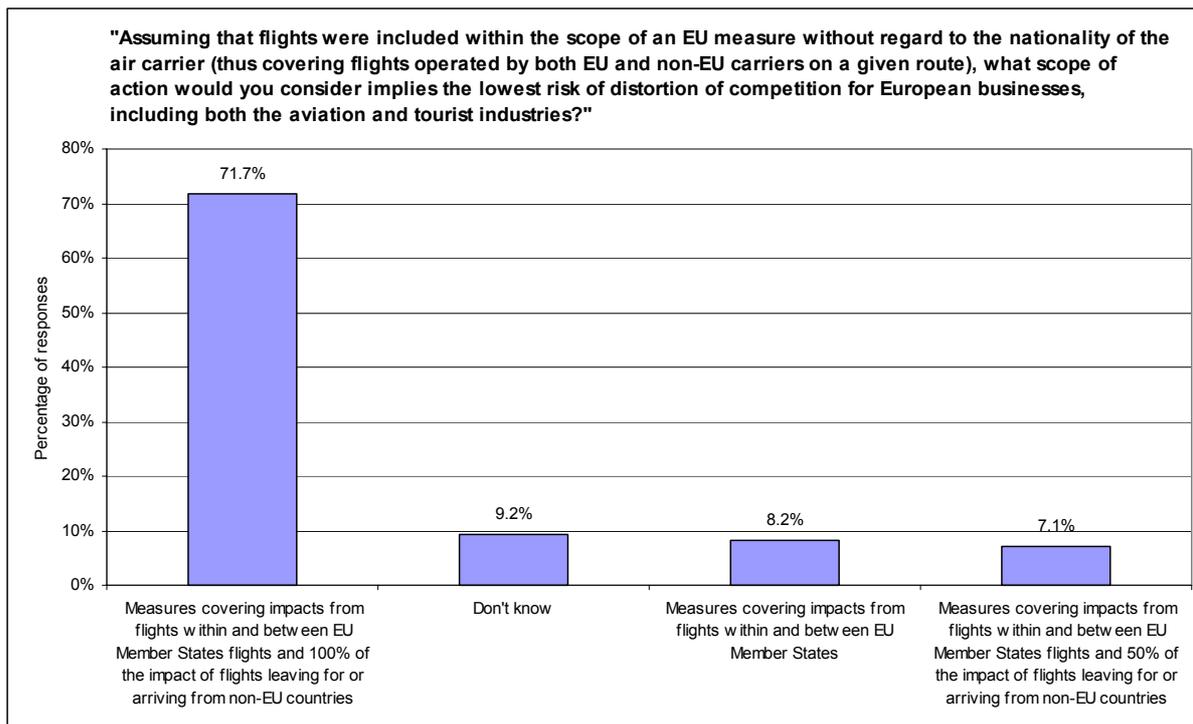


Fig. 28 Geographical scope of action

A large majority of respondents thought that measures covering impacts from flights within and between EU Member States flights and 100% of the impact of flights leaving for or arriving from non-EU countries, covering flights operated by both EU and non-EU carriers, implied the lowest risk of distortion of competition for European businesses, including both the aviation and tourist industries.

It was felt that covering 100% of flights leaving for or arriving from non-EU countries would make sure there is a level-playing-field for both intra-EU and long-haul flights, and that it would reduce the risk that airlines evade the EU measure by flying to non-EU territory close to the EU.

It was observed that even with this option some distortion in competition remained, since EU carriers fly much more within the EU than non EU carriers, but to cover 100% of the impact of flights leaving for or arriving from non-EU countries would at least reduce the risk of economic distortion by cross-subsidisation of intra-EU flights by foreign carriers. One airline thought that economic distortions might continue to exist also due to facts that are not related to climate policy such as support to airlines by some non-EU states in the area of airline insurance and security best practice.

It was mentioned that a disadvantage of a measure covering also 100% of impacts leaving for or arriving from non-EU countries could be that cultural exchange would be reduced, as European tourists/businesses would stay more in Europe, and people from other continents would stay more in America. It was considered that there might be a risk of distortion in the “inbound leisure market (eg. by encouraging a North American tourist to consider destinations other than Europe)”, but it was thought that “this impact is likely to be minimal compared with the other costs and factors influencing such a decision”. On the whole, effects on tourism were considered to be small, whether flights leaving for or arriving from non-EU countries were included or not.

Apart from avoiding distortions in competition, other advantages of a measure that covered also 100% of the impact of flights leaving for or arriving from non-EU countries were mentioned:

It was stated that CO₂ emissions would be reduced more substantially. Flights to and from the European Union were large in volume compared to intra-EU flights and particularly polluting given their length. Their emissions were growing more rapidly than the ones of intra-EU flights. Not including the outbound leisure market could even have the effect of encouraging long-distance flights instead of flights within Europe. One NGO stated: “It is important that the EU begins to count total GHG emissions as a result of its economic transactions rather than simply from the EU land mass. This means charging flights carrying goods and passengers to and from the EU, not just within it.”

It was suggested that it could give a good example and a signal to other parts of the world that Europe cares about future generations and that something needs to be done about the impact of aviation on climate change, and it would be “a mechanism for forcing the recalcitrant Annex I countries (US/Australia) to engage, whether they liked it or not” into the concept of polluter pays for climate change.

Many suggested that since all of aviation was responsible for contributing to climate change, many felt it would be only fair if flights leaving for or arriving from non-EU countries were included in an EU measure.

As transport costs would be higher, there would be a market trend “towards the upgrade from heavy primary goods to lighter secondary goods”, which might “help prevent the damaging globalisation of trade in raw materials, which leads to larger CO₂ emissions and monopolisation of the food market” and benefit also third world producers, felt an NGO.

Some NGOs suggested: “A good option seems intra-EU flights plus all departing flights to third countries, as EU air safety & security policies have this scope too.”

Several respondents stated that the emissions from aviation were a global problem and that the ultimate aim should be a global scheme, though a few respondents doubted that the 100% inclusion of extra-EU activity was practically or politically deliverable.

Some participants thought that covering the impact of flights leaving for or arriving from non-EU countries could be reduced to 50% if corresponding non-EU countries would introduce similar measures, in order to avoid double counting.

In case not all aircraft leaving for or arriving from non-EU countries were included, the possibility of a compensatory “climate change tax” or airport charge was mentioned.

The main argument of those who picked the option to cover 50% of the impact of flights leaving for or arriving from non-EU countries was that “to charge 100% might encourage hub airports just outside EU jurisdiction” and worldwide taxation or other measures would be necessary.

The arguments of those who considered that measures covering impacts from flights within and between EU Member States implied the lowest risk of distortion of competition for European businesses can be summarized as follows:

That the EU should gain experience first with economic instruments on internal flights. Any extension would imply “significant political and legal obstacles”; “International flights that have origin or destination outside the EU should be addressed at the global level through ICAO”.

It was also considered that there was “no alternative to air travel for long-haul flights between the EU Member States and other continents.”, “Aircraft operations on intra-EU routes reflect the demand for intra-EU air travel by citizens of the EU. If those citizens are concerned about climate change in the EU, then they ought to be prepared to bear the costs of the choice of travel, since there are alternatives to air travel for such intra-EU travel.”

Another argument was that “Long-haul carriers [...] already have sufficient incentives to reduce fuel burn and thereby emissions, because of the competition from other air carriers”.

4.5. Questions related to the potential inclusion of aviation in the EU Emissions trading Scheme (ETS)

The questions on the potential inclusion of aviation in the EU emissions trading scheme were preceded in the questionnaire by the following note: “The following questions relate to one particular policy option which is currently the subject of a detailed study (complementing previous studies on other policy options), and for which the Commission would be interested in receiving specific input on a number of issues. All of these questions are hypothetical in the sense that they concern issues which would have to be addressed only IF aviation were to be included in the EU emissions trading scheme (cf. Directive 2003/87/EC).”

4.5.1. Agent - who should participate?

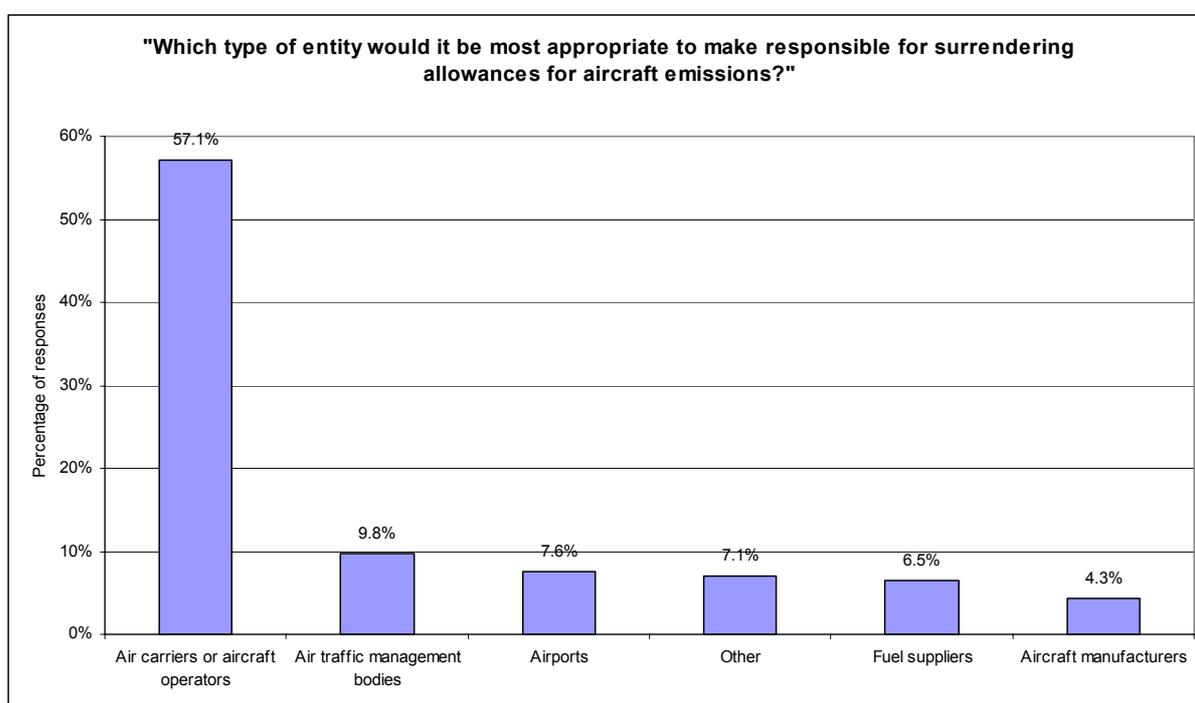


Fig. 29 Type of entity that should surrender allowances for aircraft emissions

The vast majority were of the opinion that air carriers or aircraft operators should be the agent participating in an emissions trading scheme.

However, an “airports approach” was also advocated by some since according to this view it would allow emissions from all flights from EU airports to be targeted, not simply emissions from EU airlines or intra-EU flights. It was argued that the EU has jurisdiction over EU airports, whereas the EU does not have the same jurisdiction for non-EU airlines or non-EU manufacturers.

A general efficiency argument was put forward stating that whoever can sustain the introduction of emissions trading: (i) from an early date, (ii) with least contention, (iii) with minimum ongoing audit/costs etc, and (iv) with nil or minimal potential for market distortion, both within and beyond the EU aviation industry, should be the one who participates in the scheme.

4.5.2. Degree of harmonisation

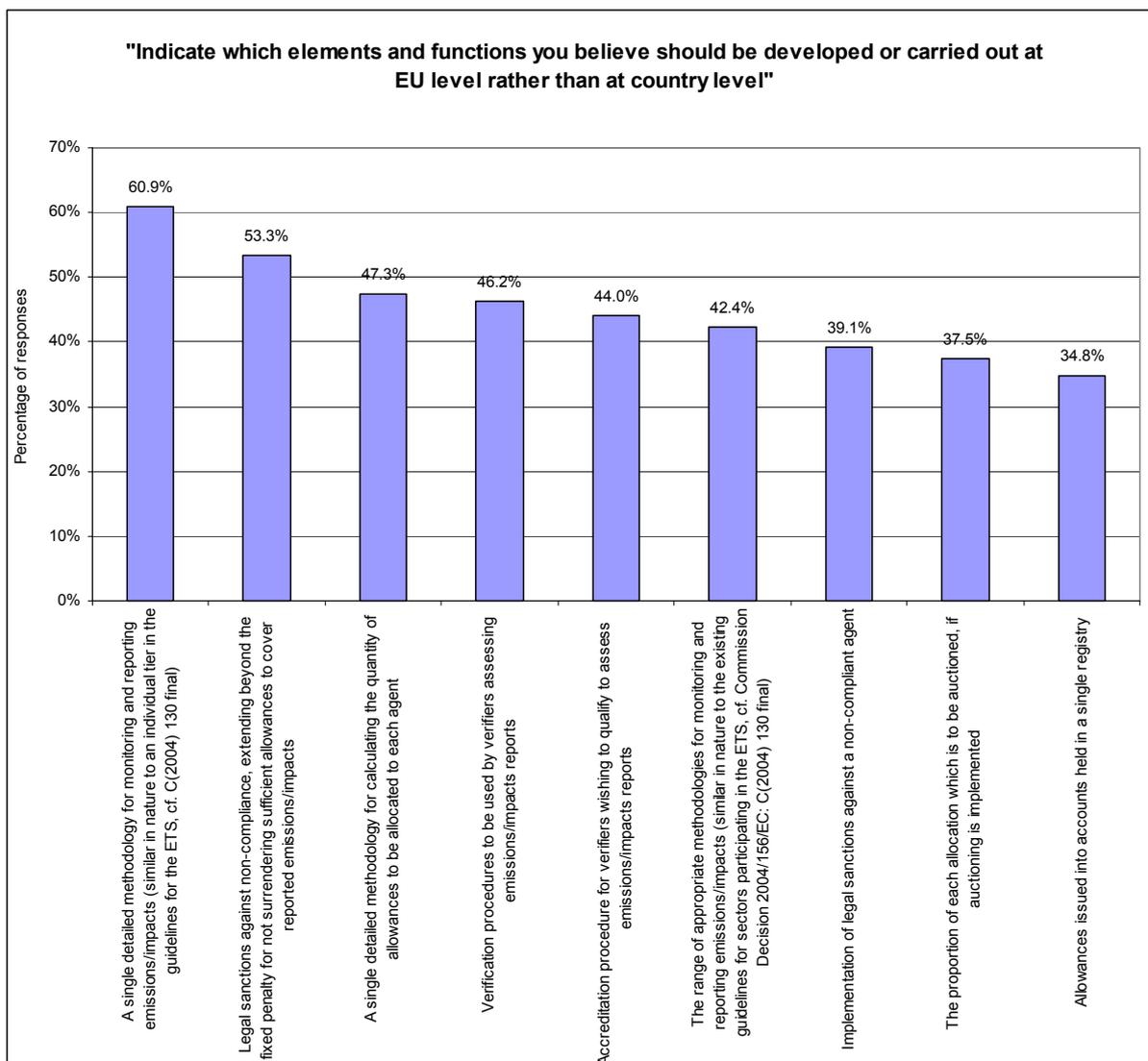


Fig. 30 Choice of specific elements and functions that should be developed or carried out at EU level rather than at country level

Harmonization at EU level was thought to be most appropriate as for a single monitoring and reporting methodology. Legal sanctions extending beyond the fixed penalty for non-surrender of sufficient allowances were also seen as requiring harmonization at EU level. The harmonization of allocation methodology and verification procedures was also broadly supported.

4.5.3. Allocation methodology

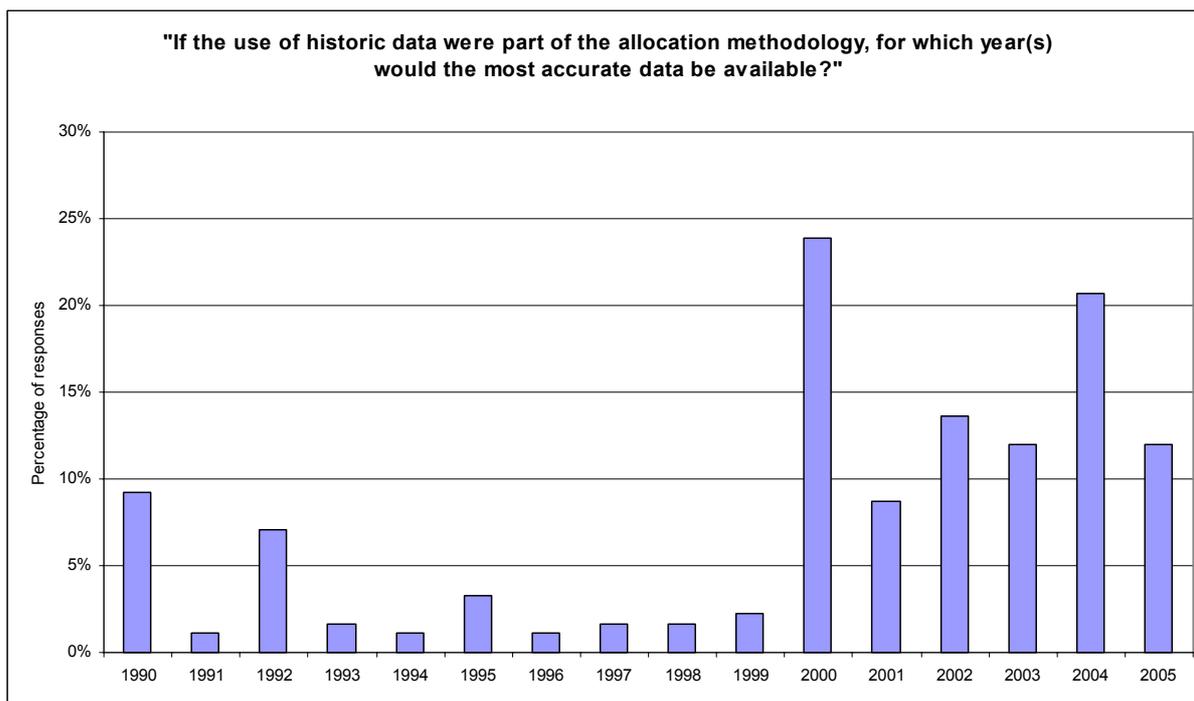


Fig. 31 Year for which the most accurate data would be available, if the use of historic data were part of the allocation methodology

The years 2000 and 2004 were thought of as providing the most accurate data for a base year. Data prior to 2000 were generally not considered to be accurate.

4.5.4. Benchmarking

The following question was asked: “If benchmarking based on performance would be part of the allocation methodology, which performance indicator should be used? (explain briefly your choice)”

Fuel consumption or emissions per actual cargo and passenger traffic was generally the preferred choice (revenue tonne kilometre or RTK). Respondents felt that allocations should initially be distributed via a benchmarking performance criteria based on fleet performance on a per passenger basis. Fuel burn per revenue tonne kilometre would provide a performance indicator that could be applied both for passenger and cargo flights. This was seen as a reasonably accurate measure of activity, and providing for an incentive to operators to achieve high levels of occupancy. Fuel consumption or emissions per available traffic capacity was also to a limited extent advocated.

Correction factors were proposed by some such as mode of operation, length of flight, type of aircraft operated, age of fleet, recent fleet replacement and any voluntary measures that have been put in place at an earlier stage.

France expressed its preference for benchmarking to allocate allowances. France thought that this method would avoid giving an undue advantage to companies that are lagging behind in modernising their fleet; it would also allow an equitable treatment of new entrants and of reduced activities in a given period.

4.5.5. Monitoring, reporting and verification of impacts CO₂-emissions

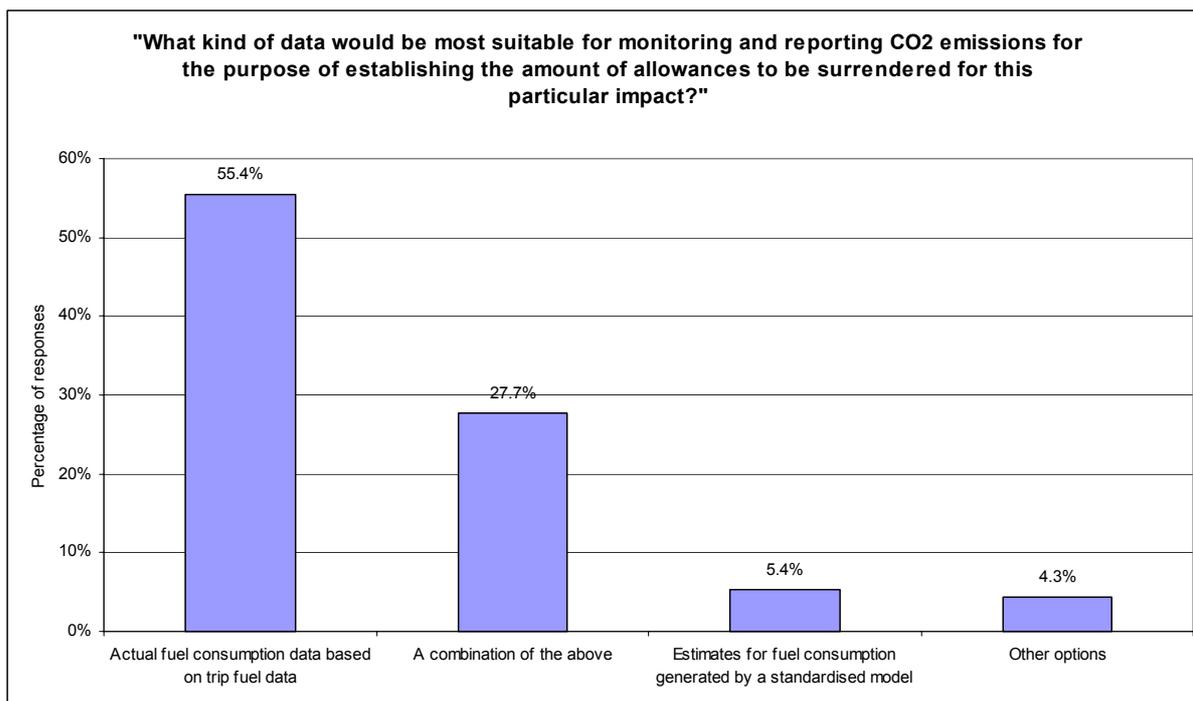


Fig. 32 Data for monitoring and reporting CO₂ emissions

Actual fuel consumption data was perceived as the most suitable for monitoring and reporting. A combination approach was seen as viable but monitoring and reporting based on estimates alone did not get much support.

Actual fuel consumption data based on trip fuel data:

Since the link between the amount of fuel burned and pollution caused is clearly established, taking actual fuel use was thought to be the most appropriate methodology. Some respondents pointed out that it is also easily verifiable by independent assessors, since there are well established figures for the amount of CO₂ generated per unit of all commonly used fuels. It was also argued that only monitoring based on actual data gives an incentive to reduce emissions beyond the parameters that can be reflected in estimation models.

It was argued by some that there is a need to introduce a correction factor (inter alia flight altitude) which takes into account the climate impact of emissions.

Estimates for fuel consumption generated by a standardised model

Some respondents pointed out that actual fuel consumption will change per flight and therefore an average would be more reasonable based on model, type and age of aircraft together with average payload per sector. It was also felt that a standardised model would also keep the system simple and were not necessarily more prone to abuse than taking actual consumption data, if an impartial body constructed the model.

A combination of the above

It was felt that actual fuel consumption data should be used where it is available but that there should be a standardised model if the factual data is not available. Under this

system, it was also suggested that there should be an incentive for carriers to provide the factual data rather than using the standardised model.

If actual fuel consumption was used as a methodology, it was felt that this could be hard to monitor and verify for aircraft on flights starting or finishing outside the EU. On the other hand, it was accepted that it is not easy to develop a standardised model that includes all variables.

It was also pointed out that reduced fuel consumption can have adverse effects or trade offs, such as an increase in noise levels.

Other options

If fuel suppliers were to be the ones participating in the emissions trading scheme, it was felt that the quantity of sales or delivery of kerosene would be the proper data to be used.

NO_x emissions and other non-CO₂ impacts

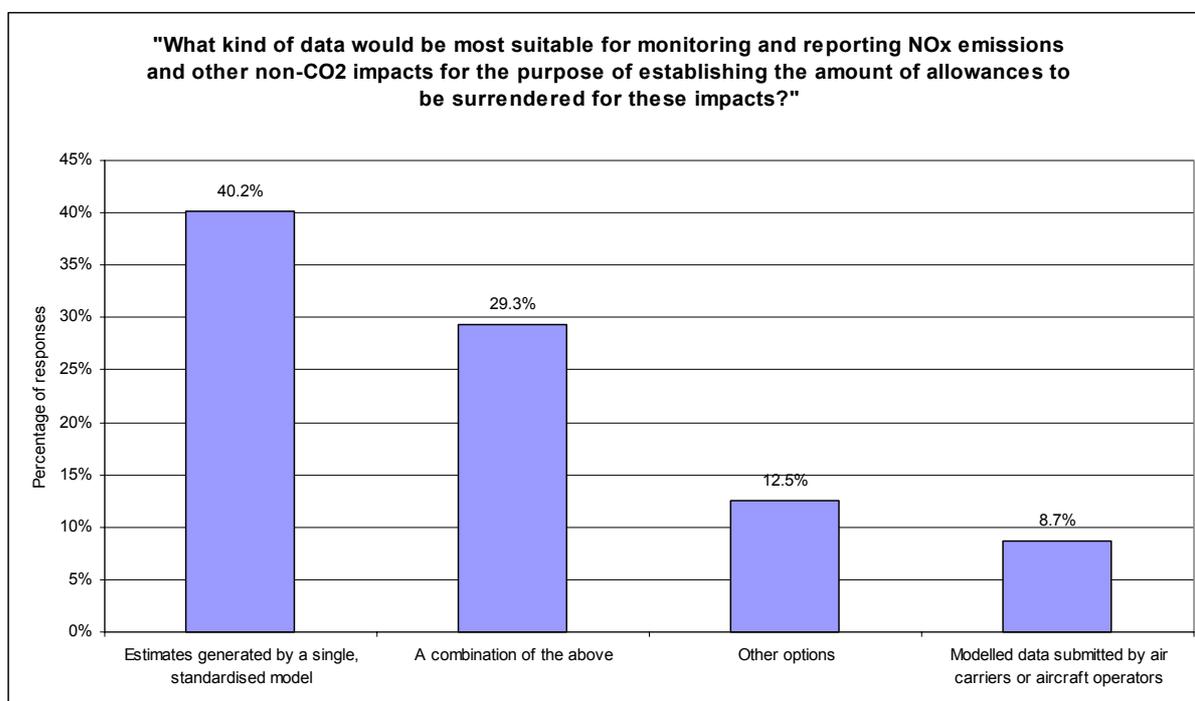


Fig. 33 Data for monitoring and reporting NO_x emissions and other non-CO₂ impacts

A harmonized standardised model was deemed to be superior. A combination approach was also supported.

Estimates generated by a single, standardised model

The general argument was that a single, standardised model is required since different calculation methodologies could lead to distortions. It was also pointed out that because it is not possible to measure NO_x emissions in the same way that it is possible to determine carbon usage, a standardised model would be preferable for NO_x emissions.

Other options

It was thought that monitoring of non-CO₂ emissions should be based on verifiable data, not modelling. The argument that verifiable data do not exist was not addressed.

Some respondents also felt that it would be unnecessarily complex to monitor non-CO₂ emissions. Therefore, they recommended that a simple multiplier on CO₂ emissions should be employed, for the purposes of determining the amount of allowances to be surrendered to take account of non-CO₂ emissions.

For the most part this section was used to advocate for the exclusion of non-CO₂ emissions from any requirements.

Modelled data submitted by air carriers or aircraft operators

It was suggested that airlines should first collect the required data in order to ensure that there is a consistent approach to monitoring and verification ahead of implementing any emissions reductions policies based on the data provided.

A combination of the above

A combination approach was advocated since it could take into account differences in flights, engines and aircrafts. A mixture of approaches was deemed to be necessary and recommendable to ensure checks and balances and to allow commentary on the validity of models.

Trade-offs

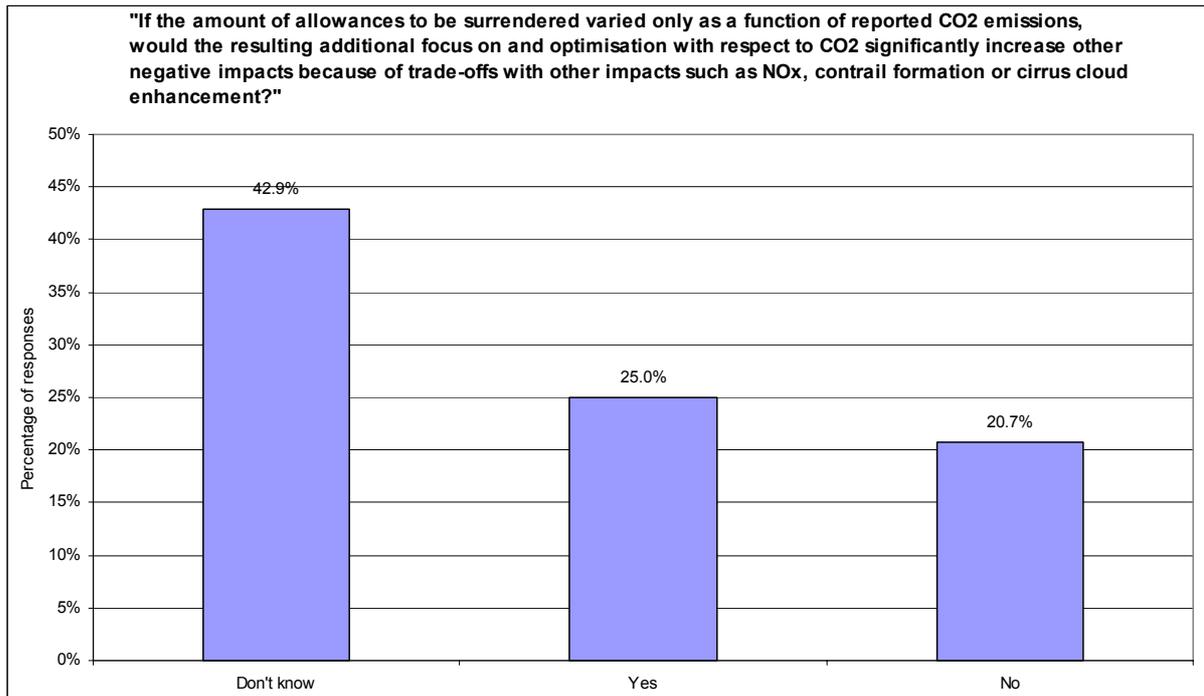


Fig. 34 Existence of trade-offs between CO₂ emissions reductions and increased impacts due to NO_x emissions, contrail formation or cirrus cloud enhancement

There seemed to be little consensus on this point. The largest group of respondents (42.9%) did not know if there would be trade-offs with other impacts if the amount of allowances to be surrendered varied only as a function of reported CO₂ emissions. 25% of respondents thought that there would be trade-offs, while slightly fewer participants (20.7%) said the opposite.

The arguments of those who answered in the affirmative can be summarised as follows:

- “It is well established that focussing engine technology design purely onto the goal of reduced CO₂ emissions will almost inevitably result in increased emissions of NO_x and/or water vapour etc.”, “Reference to all jet engine manufacturers (Rolls Royce and GE etc) confirms this.”, “Well known technological tradeoffs exist between NO_x and CO₂ burn in an engine.”, “Over the last decade, aircraft NO_x emissions have been growing at a faster rate than CO₂ emissions due to the technology focus on fuel efficiency leading to higher combustion temperatures.”
- “There is a trade-off between reducing CO₂ and reducing NO_x. However, it is a trade-off when engines are at the design stage, so a scheme that varied allowances surrendered only as a function of reported CO₂ would not immediately mean significant amounts of additional NO_x being produced. But, over time, varying allowances solely as a function of CO₂, using a crude ‘multiplier’ (e.g. multiplying CO₂ by 2.7) could incentivise the design of engines that produce less CO₂ but more NO_x.”
- There might be trade-offs between CO₂ and contrails, ozone and cirrus, depending on where and when emissions from aviation are released: “One

answer to increasing fuel efficiency is planes that cruise at higher altitudes, but where the combined GWP of the various emissions would probably be greater, even though they might consume less fuel and emit less CO₂”.

Most respondents did not rule out the possibility, however, that these trade-offs could be circumvented by appropriate measures, in particular as far as NO_x is concerned (see below).

Similarly, many of the respondents that picked the answer “no” did not believe that there were no possible trade-offs, but, as expressed by some airlines, agreed that “current technology is able to reduce CO₂ without increasing NO_x” or that “Technology improvements to reduce CO₂ emissions can be achieved in parallel with improvements in NO_x emissions”.

Other arguments of those who stated that there are no trade-offs are:

- If the impact of the economic measure were to reduce flight use, all emissions would be reduced.
- “This is an area of scientific uncertainty, but based on initial discussions with a number of stakeholders, and taking into account the existing regulatory framework for NO_x, we do not think there would be a significant increase in other negative impacts as a result of introducing a CO₂ only scheme.”
- “Available evidence from earlier studies suggests that this trade-off is very limited or even non-existent, as least as far as NO_x is concerned. The main reasons for this is that the ONLY of nine reduction mechanisms listed in the previous question that has a trade-off issue is the development of more fuel efficient engines. All other reduction mechanisms have no trade-off or even a positive trade-off (in particular retrofitting of winglets and individual flight optimisation, that lead to lower engine loadings, and hence lower pressure ratios and lower NO_x emission indices. So initially using a 'multiplier' (e.g. 2.7) for CO₂ instead of a more refined policy is not a big problem. Of course, specifically targeted policies are even better but this should not postpone introduction of an incentive on CO₂. As far as cirrus clouds and contrails are concerned, science is yet too uncertain to make strong statements about trade-offs.”

Those who indicated they did not know if there were trade-offs mostly referred to scientific uncertainties or did not consider a trade-off to be significant. Some of the arguments mentioned are indicated here:

- “the impact on other emissions [than NO_x] is less clear as the scientific evidence is less developed here. Thus we do not think the impact can be said to be 'significant'.”
- “The answer to this question would probably depend significantly on the degree to which European air traffic management intends to implement flight altitude reduction strategies for the (already-stated) purpose of mitigating upper-altitude NO_x, contrail and cirrus cloud enhancement impacts, i.e. cruise altitude reduction.”

The question about whether there are trade-offs, if allowances would be allocated based on CO₂ only, is closely linked to the question if and how other impacts of aviation on the climate than CO₂ should be addressed.

One airport company summarised findings on other impacts of aviation on the climate than CO₂ as follows: “The IPCC’s assessment is that aviation’s total climate impact is some 2.7 times that due to CO₂ alone, due mainly to the climate-warming effects of NO_x and water vapour emissions (contrails) in the atmosphere and to cirrus cloud enhancement effects. IPCC’s estimate of 2.7 is a central estimate although the report highlights the range of uncertainty around it, pointing out that: “the total radiative forcing may be about two times larger or five times smaller than the best estimate”. The latest research has revised the estimate of radiative forcing to 1.9 times the impact of CO₂ emissions, plus the impact on cirrus clouds, which continues to be very uncertain.”

Most organisations agreed and/or insisted that impacts other than CO₂ are dealt with, although there was disagreement about how this should be done. One NGO specified: “A prerequisite for successfully reducing the climate change impact is that the full impact of this sector is covered by policies. It will therefore be necessary to develop and implement a package of policies which do not only cover the CO₂ impact, but also the other climate impacts such as contrails, cirrus clouds etc.” Airports agree “that aviation should address its verified, total climate change impacts on a global level”, they emphasised, however, “that if the radiative effects of NO_x and other emissions are addressed by aviation, then they should also be addressed by other industrial and transport sectors”.

Measures proposed included:

- Include current best guesses of total effects of all emissions into emissions trading, based on results of IPCC.
- Use of a CO₂ multiplier, for example 2.7, as a good second best alternative
- Further increases in NO_x stringency, as it was advocated by several organisations and two airlines. The airlines recommended such policies to be developed by ICAO and reminded that “the EU through its Advisory Council for Aeronautics Research in Europe (ACARE) has set a target of 80% reduction in NO_x emissions from new aircraft in 2020 relative to equivalent size new aircraft in 2000”.
- Other measures than traditional command and control regulation, “since this (e.g. of NO_x emissions through ICAO) is extremely weak, ineffective and slow to develop”.
- An emissions charge for NO_x. This was also mentioned as a possibility by airport operators (see chapter 4.3.1.).
- A separate trading scheme for NO_x.
- Local charges and landing and takeoff (LTO) NO_x standards.
- Reducing contrail formation by changing operating altitude (at increased fuel costs at lower altitudes).

Airlines and manufacturers stressed that emissions trading should focus on CO₂ (see chapter 4.3.1): “The temptation to expand the scope of emissions trading should be avoided as it will confuse the focus of achievements.”, “We fully support aviation's inclusion in the EU Emissions Trading Scheme from 2008, but on a CO₂ only basis, for two reasons. First, were "radiative forcing" impacts to be included, we are concerned that this would give airlines an incentive to actually burn more fuel, increasing CO₂ impacts. Second, effects such as contrail formation are determined by where aircraft fly (not aircraft emissions), and hence other measures are likely to be more appropriate.”

A few organisations argued that emissions trading could be introduced first on a CO₂ basis only, and developments leading to trade-offs could be dealt with at a later stage when it would be clear what these trade-offs are. One organisation stated that “a focus on CO₂, which is comparably easy to measure and monitor, is definitely better than waiting until the last doubts about impacts of other GHG emissions of aircraft are scientifically proven”. Similarly, an airports organisation commented: “Other (i.e. non-CO₂) emitters might also be effectively addressed in the longer term via emissions trading in their own right when their full effect and inter-relationship is properly understood - but in the shorter term will need to be addressed via alternative mechanisms in order to avoid the perverse impacts that would necessarily arise were they to be traded as a simple multiplier of CO₂.”

Some organisations pointed that an integrated approach needed to be chosen to address both emissions and noise, especially because some feared that there would be more noise if policy focused on emissions only. One organisation said that “as both noise and local air quality are already tackled through EU legislation, limiting production of greenhouse gases from aviation must now be prioritised.”

4.6. Other comments related to the subject of this consultation

Many comments that were received in the free text field at the end of the consultation referred to specific parts of the questionnaire. These were integrated in the appropriate chapters of this report. The other comments are summarised here.

One political organisation regretted that the issue of setting a target was not addressed in the consultation. Some organisations already made comments on the target of emissions reductions they would like to see:

- “The environmental objective for the sector must at least be in line with mid- and long-term climate targets for 2020 and 2050, such as those agreed by EU leaders in March. Although a 450ppm 2050 carbon concentration target is safer and would require even larger cuts in emissions, in the order of 80% (on 1990 levels) by 2050.”
- “The EU must agree to a target to reduce or offset aviation's CO₂ equivalent emissions (both CO₂ and non-CO₂ climate impacts) to 8% below 1990 levels by 2008-2012 in respect of all flights from EU airports.”

Some respondents suggested establishing a long-term action plan for reducing aviation's emissions and an independent assessment of the challenge aviation poses to EU climate change policy objectives, looking ahead to 2020 and 2050.

Several stakeholders made the case for taking into account the different levels of importance of air traffic to Member States:

- “Countries like Ireland, Greece and especially Finland are located on the outskirts of the EU or behind a sea depending on air travel in international passenger traffic and in export of valuable goods. Measures shall be more strict in Central European Member States where intermodality is a real alternative. Any measures shall impact short flights over land (like Paris - Amsterdam) more compared to (long) flights over sea (like Helsinki-Stockholm).”
- “Given the disproportional reliance of the island of Ireland on air transportation, it is imperative that the policy solution does not negatively impact on regional growth objectives nor disproportionately impact on one member state over others.”

Some respondents also used the free text field to highlight their criticisms of the questionnaire. There was some suggestion that the questions on policy options were not detailed enough, making it difficult to judge if a given policy option would be acceptable or not and some protested that they had been obliged to pick as a “second best choice” economic instruments they might basically reject. Some participants also felt that measures aiming at reducing demand could have been covered in greater depth.