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IMPACT ASSESSMENT

Accompanying the document

PROPOSAL FOR A REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

amending Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Community in view of the implementation of a single global market-based measure to international aviation emissions

{COM(2017) 54 final}
{SWD(2017) 30 final}

Table of Contents

List of Acronyms

CAEP	Committee on Aviation Environmental Protection
CDM	Clean Development Mechanism
CNG2020	Carbon Neutral Growth from 2020
CO_2	Carbon Dioxide
CO_2 eq.	Carbon Dioxide equivalent
CORSIA	Carbon Offset and Reduction Scheme for International Aviation
EAG	Environment Advisory Group
EEA	European Economic Area
EU	European Union
ETS	Emission Trading System
EUA	European Allowance
EUAA	European Aviation Allowance
EUC	Emissions Unit Criteria
Extra-EEA	Flights between aerdromes within the European Economic Area and aerodromes in a third countries
GHG	Greenhouse Gas
GMBM	Global Market-Based Measure
GMTF	Global Market Based Measure Technical Task Force
HLG	High Level Group
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
Intra-EEA	Flights between aerodromes within the European Economic Area
LDC	Least Developing Country
LLDC	Land-locked Developing Country
MBM	Market-Based Measure
MRV	Monitoring, Reporting and Verification
MT	Million Tonnes
RTK	Revenue Tonne-Kilometre
SARPs	Standards and Recommended Practices
SIDS	Small Island Developing State
UNFCCC	United Nations Framework Convention on Climate Change

1. WHAT IS THE PROBLEM AND WHY IS IT A PROBLEM?

1.1. CONTEXT

1.1.1. THE NEED FOR MARKET-BASED MEASURES TO ADDRESS GREENHOUSE GAS EMISSIONS IN THE AVIATION SECTOR

Greenhouse gas (GHG) emissions from aviation activities are increasing exponentially. In the absence of further measures, carbon dioxide (CO_2) emissions from international aviation are estimated to almost quadruple by 2050 compared to 2010 (see Annex 5 for more details). The strong growth in GHG emissions from the aviation sector risks undermining the goal under the Paris Agreement of keeping global warming well below 2 degrees Celsius above pre-industrial levels and pursue efforts to limit temperature increase to 1.5 degrees Celsius (see section 3.1 for more details) .

The International Civil Aviation Organisation (ICAO) has set the objective, supported by the aviation industry[1], of maintaining global net CO_2 emissions at 2020 levels through 'carbon neutral growth' (CNG 2020)[2], i.e. compensating emission growth above 2020 levels. However, as noted by Cames et al. (2015)[3], the CNG2020 objective is insufficient to meet the Paris temperature goals. According to them, following an assessment of the remaining carbon budget derived from IPCC's representative carbon pathway (RCP) 2.6, international aviation emissions should start declining not later than 2030. Furthermore, they remind that if aviation's non-CO_2 impacts were taken into account, efforts would need to be higher. It is also important to remind that the aviation industry has set itself the additional, more ambitious, goal to halve aviation emissions by 2050 below 2005 levels, but this has not been adopted by ICAO.

As the potential for emissions reduction from new technologies and operational practices is limited and more costly in the aviation sector (see Annex IV of the 2013 Impact Assessment[4] for more details on technological and operational measures), ICAO States[5] and the aviation industry[6] agree that the use of market-based measures (MBMs) are necessary for air transport to contribute to emission reductions. The use of MBMs allows the sector to offset its strong emission growth from increased activity through acquiring emission units from other sectors at lower abatement costs.

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[1] The International Air Transport Association (IATA) at its 69th Annual General Meeting on 3 June 2013 endorsed a Resolution on the Implementation of the Aviation "CNG2020" Strategy, available at: http://www.iata.org/pressroom/pr/Documents/agm69-resolution-cng2020.pdf

[2] 2010 ICAO Assembly Resolution A37-19, available at: http://www.icao.int/publications/Documents/9958_en.pdf

[3] Cames, Martin; Graichen, Jakob, Siemons, Anne; Cook, Vanessa 2015: Emission Reduction Targets for International Aviation and Shipping. Berlin. http://www.europarl.europa.eu/RegData/etudes/STUD/2015/569964/IPOL_STU(2015)569964_EN.pdf

[4] SWD(2013) 430 final

[5] 2013 ICAO Assembly Resolution A38-18, available at: http://www.icao.int/environmental-protection/Documents/A38-17_A38-18.pdf

[6] IATA's Resolution on the Implementation of the Aviation "CNG2020" Strategy, available at: http://www.iata.org/pressroom/pr/Documents/agm69-resolution-cng2020.pdf

Given the intrinsically transnational nature of aviation activities, effective ways of addressing GHG emissions from international aviation are through multilaterally agreed measures at global and regional level. The International Civil Aviation Organisation (ICAO) is widely considered to be the most appropriate forum for the development of an international market based measure for aviation. The EU has therefore continuously advocated for the promotion of ambitious, global action in ICAO to complement measures taken at national and regional level.

Technical and operational measures in the aviation sector

Technological and/or operational measures (e.g. improved air traffic management and more efficient operation of the aircraft in the air and on the ground) could achieve 10% emissions reduction in the coming years in the aviation sector compare to a business as usual scenario. The use of sustainable biofuels could be a further source for emission reductions; however considerable uncertainty exists over their availability and sustainability and their economic viability has not yet been proven. As a result, and as substantiated by data generated by the EU ETS, their present use by aircraft operators remains extremely small to date. All in all, and compared with the estimated traffic growth, the emission gap remains to be addressed by other means, which is presently being done by the EU ETS.

In 2016, ICAO's Committee on Aviation Environmental Protection (CAEP) agreed on a CO2 standard for aircraft, which should guide their development towards greater fuel and environmental efficiency. For large new aircraft, the standard will apply as of 2020. Existing aircrafts will have to apply the new standard by 2028 the latest.

The reductions achieved through these developments are expected to be outpaced by the larger growth in demand of aviation services. Even under the most optimistic scenario about the effectiveness of non-market-based measures, aviation CO2 emissions in 2050 are still expected to be 3.8 times higher than 2010 emissions due to the forecasted strong increase in aviation activities. Therefore, technological and operational measures, although important, are on their own insufficient to achieve ICAO's self-declared target of CNG from 2020. CAEP therefore concluded that the only way to enable the agreed climate objective was through the Global Market Based Measure.

1.1.2. INTEGRATION OF AVIATION EMISSIONS IN THE EU'S EMISSIONS TRADING SYSTEM

The EU led the way in implementing a MBM for aviation by including flights between aerodromes within the European Economic Area (hereafter "intra-EEA flights"), as well as flights between aerdromes in the European Economic Area (EEA) and aerodromes in third countries (hereafter "extra-EEA flights") in the EU's Emissions Trading System (EU ETS)[7] in 2008 (see Annex 8). As originally designed, the EU ETS covers 35% of global emissions from domestic and international flights and 50% of all international flights.

[7] EU ETS Directive 2003/87/EC

According to Directive 2003/87/EC all aircraft operators carrying out aviation activities covered by the EU ETS have to report annually their emissions corresponding to the previous year. Then, they have an obligation to surrender as many allowances as emissions have been reported. Every year, a number of allowances are issued to aircraft operators. The total amount is defined by the "cap", which is 95% of the average 2004-2006 emissions. Contrary to the cap for stationary installations, the cap for the aviation sector is constant until 2020. 82% of this amount is issued to operators free of charge, 15% is auctioned and 3% is set aside in a "special reserve" to cover the free allocation to new entrants and fast growers. Annex 9 provides more information on the EU ETS for aviation.

When the ICAO Council in 2012 decided that ICAO would begin developing guidance for the implementation of a single, global market based measure (GMBM) covering international aviation emissions, the EU legislators temporarily limited the scope of the EU ETS to give airlines a choice as to the scope applied to their flights (intra-EEA or all flights) in 2012. Following the 2013 ICAO Assembly decision to develop a global market-based measure (GMBM) to address international aviation emissions, the EU limited the scope of the EU ETS to intra-EEA flights during the period 2013-2016 to drive forward the ICAO process in relation to international emissions from aviation.

Annex 8 sets out the chronological development of the EU ETS.

1.1.3. THE ADOPTION OF A GLOBAL MARKET BASED MEASURE FOR INTERNATIONAL AVIATION (GMBM)

ICAO, after several years of intensive negotiations (see Annex 7) at its 39th General Assembly in September/October 2016, reached – for the first time – an agreement on an ICAO Resolution for the implementation of a global market based measure (GMBM) to address the growth in international aviation emissions globally from 2021 through an offsetting system aimed at stabilising them at 2020 levels (see Annex 6)[8].

In its first phase from 2021 to 2026, participation of states in the GMBM will be voluntary, with the possibility to opt-in or out from the system; all countries should then participate in its second phase starting in 2027, except least developed countries, land-locked developing countries, small island developing states and states with a small share of international aviation activity (revenue tonne kilometre (RTK) of below 0.5% individually or below 10% in cumulative terms). As ICAO has no competence for domestic aviation[9], the GMBM is not designed to cover domestic flights. Sixty-six countries, including all member states of the European Civil Aviation Conference[10], Australia, Canada, China, Indonesia, Japan, Mexico, New Zealand, Qatar, Singapore, United Arab Emirates and the United States of America had declared in October 2016 that they will apply the GMBM during its voluntary phase. A complete list of states that have expressed their intention to participate in the voluntary phase is available on the ICAO website[11].

[8] 2016 ICAO Assembly Resolution A39-3, available at: http://www.icao.int/environmental-protection/Documents/Resolution_A39_3.pdf

[9] See statement at http://www.icao.int/environmental-protection/Documents/STATEMENTS/cop4.PDF

[10] ECAC is composed of 44 member states, including all EU member states. A complete list of its members is available on: https://www.ecac-ceac.org/member-states

[11] http://www.icao.int/environmental-protection/Pages/market-based-measures.aspx

By itself, the GMBM does not aim at reducing aviation emissions. The GMBM is an offsetting mechanism, which enables the aviation sector to continue to grow after 2020 in as far as emissions above a certain threshold are compensated for through international offset credits (generated in non-aviation sectors mainly). The baseline for the GMBM is set at the global net CO_2 emissions from international aviation in 2020 so as to achieve the aspirational target of CNG 2020 (although for technical reasons the average 2019-2020 emissions will be used). However, as said before, given the current level of participation in the initial phases and the exemptions for routes to and from certain countries, it is estimated that around 20% of emissions growth above 2020 levels will not be offset, leaving a 20 % gap to achieve the objective of carbon neutrality from 2020.

While this resolution on the development of a GMBM is a breakthrough in ICAO's efforts to address the growth of international aviation emissions, a number of important features of the GMBM still need to be developed and agreed in ICAO before the GMBM can be implemented in 2021. They relate to monitoring, reporting and verification (MRV). i.e the transparency rules, and eligibility of offset units, as well as ways to avoid double counting, registry and governance/compliance set-up. Any delays in agreeing on those elements risk delaying the operationalization of the GMBM. These remaining features are key elements for the effectiveness and environmental integrity of the scheme from a climate standpoint. It should also be reminded that the GMBM is enshrined in a resolution adopted in ICAO and thus not a binding international agreement. However, detailed rules to implement the GMBM are to be adopted in the form of ICAO Standards and Recommended Practices, the former being binding on ICAO member states not filing differences to them. In addition, the actual implementation of the GMBM will depend on domestic legislation to be developed, adopted and implemented by countries and regions participating in the scheme[12].

At its 39th Assembly, ICAO also adopted a resolution on climate action other than through the GMBM[13]. This resolution includes an annex listing the key principles applicable to MBMs addressing international aviation emissions, which may also apply to other market measures different from the GMBM.

Comparing the GMBM and the EU ETS

Both the GMBM and the EU ETS are market-based measures to address GHG emissions. However, there are important differences between them.

The first important difference is the nature of the measure: the EU ETS is a legally-binding cap and trade system setting a limit on the total GHG emissions so as to reduce them, whereas the GMBM is a carbon offsetting scheme, which allows emissions from the aviation sector to continue increasing above the CNG 2020 threshold provided they are compensated for with international emission reduction credits.

Another difference is the level of ambition in terms of emission reductions or limitations to be achieved. In contrast to the CNG2020 target under the GMBM (which will only be met at 80% due the various flexibilities and exemptions), the cap in the EU ETS for aviation activities is set as 95% of the average 2004-2006 emissions from aviation and is expected to decrease annually by 2.2% starting in 2021. This shows that the GMBM is less ambitious

[12] See legal study on "Possible legal arrangements to implement a global market based measure for international aviation emissions": http://ec.europa.eu/clima/policies/transport/aviation/docs/gmbm_legal_study_en.pdf
[13] 2016 ICAO Assembly Resolution A39-2, available at: http://www.icao.int/environmental-protection/Documents/Resolution_A39_2.pdf

than the EU ETS when comparing GHG emission reductions achieved in a given geographical scope.

Thirdly, the GMBM is relying on international offsets. The quality of international offsets is harder to control and raises concerns over additionality and the applicable accounting rules. In addition, it should be recalled that the EU 2030 climate objective under UNFCCC should be met through domestic reduction efforts[14], i.e. without the use of international credits. This was agreed at the European Council conclusions from October 2014[15] and accordingly communicated by the EU under the Paris Agreement.

Under the EU ETS, EU general allowances or EU aviation allowances must be surrendered for each tonne of emitted CO_2 emissions by flights covered by the EU ETS. Up to 2020, certain types of international credits are allowed for surrendering but limited to 1.5% of emissions. In line with the EU contribution to the Paris Agreement, no international credits should be used after 2020 in the EU ETS to ensure that emissions reductions are taking place within the EU.

Finally, the geographic scope is obviously different: the GMBM is applied to international flights globally (although routes to and from a number of countries are exempt), whereas the EU ETS applies to EEA-related flights, including domestic aviation emissions.

More information on the EU ETS features on Annex 9. The main features of the GMBM can be found on the ICAO Resolution 39-3, in Annex 6.

1.2. THE PROBLEMS

Regulation (EU) No 421/2014 introduced Article 28a in the EU ETS Directive 2003/87/EC, which requires the Commission to report back to the Council and the European Parliament on the outcome of the 2016 ICAO Assembly. When doing so, the Commission shall consider and, if appropriate, include proposals in reaction to the ICAO developments on the appropriate scope for coverage of emissions from extra EEA-flights from 2017 onwards. Should the EU decide not to amend the EU ETS in response to the outcome at the 2016 ICAO Assembly, the EU ETS will – by default – apply in its full scope from 2017 onwards. This would mean that aircraft operators will be responsible for GHG emissions from all flights departing from or arriving at aerodromes situated in the EEA.

In its review, the EU should recognise the landmark agreement reached by the 39th ICAO Assembly. With the GMBM, international aviation emissions would be adressed – for the first time – at global level. Although it is unlikely to result in a significant in-sector reduction of GHG emissions in the period up to 2035, which is insufficient under the Paris Agreement, which calls "*to reach global peaking of greenhouse gas emissions as soon as possible […] and to undertake rapid reductions thereafter*"[16] – the GMBM will take the aviation sector one step closer to achieving CNG2020. Based on current levels of participation during the voluntary phase, it is estimated that around 80% of emissions necessary to achieve carbon

[14] http://www4.unfccc.int/submissions/INDC/Published%20Documents/Latvia/1/LV-03-06-EU%20INDC.pdf
[15] EUCO 169/14 http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/ec/145397.pdf
[16] Paris Agreement (2015), article 4(1), available at: http://unfccc.int/files/essential_background/convention/application/pdf/english_paris_agreement.pdf

neutrality from international aviation from 2020 will be offset, leaving a 20% emission gap compared to what would be needed to meet the CNG 2020 goal.

In light of what has been agreed so far in ICAO, a return to the EU ETS full scope, even on a transitional basis until the GMBM is operationalised, may give rise to controversies with third countries and be interpreted as a signal that the EU does not intend to implement the GMBM. It could therefore negatively affect the prospects for finding agreement on the outstanding features of the GMBM (i.e. transparency, accounting and offsetting rules, registry and governance) and the ensuing implementation of the GMBM from 2021 by others.

At the same time, the international climate policy context has also significantly changed after the latest review of the EU ETS for aviation. The Paris agreement goals and the EU commitment to contribute to them with an at least minus 40% domestic target by 2030, compared to 1990 GHG emissions levels, require a fair mitigation effort from all sectors and must be taken into account in the review. Section 3.1 provides further details on the EU's domestic and international climate commitments, while Annex 5, section 3 highlights the need for early and significant action to reduce global GHG emissions to meet the well below 2 degrees Celsius objective under the Paris Agreement.

In this context, the review of the EU ETS for aviation should ensure that the development and implementation of the GMBM are not put at risk whilst aviation fairly contributes to the EU's climate targets in the period 2017-2020, but also after 2020.

While relevant rules for the implementation of the GMBM still have to be developed, the main parameters determining its impacts (environmental ambition / baseline, geographic scope, exemptions, type of units, etc.) are already known. This allows, as requested by the EU ETS Directive, for a first assessment of the outcome of the ICAO Assembly, which needs to look into the post-2020 period, when the GMBM will start to apply. Importantly, this also allows for a longer term vision of impacts of EU policies, including on reaching the 2030 climate targets. It must be noted that this is a first assessment carried out on the basis of the core features of the GMBM agreed in the 39th ICAO Assembly (climate objective/level of ambition, offsetting nature…). The adoption of additional rules applicable to the GMBM through Standards and Recommended Practices and the actual implementation of the GMBM by states in the coming years will provide further details on how this scheme will operate, its actual impacts and the extent to which it will deliver on carbon neutrality from 2020 while avoiding distortions of competition. This may require further analysis in the future.

1.2.1. PROBLEM 1: THE SCOPE OF THE EU ETS IN THE TRANSITIONAL PERIOD (2017-2020) TO EFFECTIVELY ADDRESS AVIATION EMISSIONS

The period between January 2017 and December 2020 must be considered as a transitional period during which efforts will focus on the operationalization of the GMBM, and in particular on finding agreement on the outstanding features of the GMBM (i.e. transparency, accounting and offsetting rules, registry) to ensure that the system will be fit for start from 2021. Therefore, and as required by present legislation, it must be carefully considered whether the scope of the EU ETS for aviation should be amended to take account of the positive outcome of the 2016 ICAO Assembly. Any amendments to the EU ETS for aviation should be fully consistent with EU 2020 climate targets by ensuring that aviation emissions in the EU/EEA are addressed effectively as planned, while further incentivizing the transition to and implementation of the GMBM from 2021 to maximize the global mitigation impact.

1.2.2. PROBLEM 2: POST 2020 IMPLEMENTATION OF THE GMBM AND EU ACTION

With the expectation that the GMBM will start in 2021, the preparations for its implementation through national legislation need to start soon to provide legal certainty to the aviation industry and national authorities. Besides, and considering the EU's commitment under the Paris Agreement and the implementation of the 2030 climate and energy framework, the contribution by the aviation sector to the EU's emission reduction targets needs to be determined. A higher or lower contribution from the aviation sector will have an impact on the efforts by other sectors to ensure that collectively the 2030 target of an at least 40% reduction compared to 2005 will be met. In view of the future implementation of the GMBM, it is essential to assess the environmental, economic (including on competitiveness), and social impacts of the different possible interactions between the GMBM and the EU measure for aviation in the period post-2020. The implications this may have on the relationship with ICAO and international partners must thereby also be taken into consideration, along with EU commitments under the Paris Agreement.

1.3. RETROSPECTIVE EVALUATION/FITNESS CHECK

In the context of the review of the EU ETS for phase 4 (2021-2030) an evaluation of the existing ETS Directive was part of the impact assessment work and has fed into the assessment of the policy options[17]. A specific retrospective evaluation for the EU ETS for aviation is not considered necessary at this juncture, since the EU ETS for aviation has never been applied in its full scope as initially designed: amendments to the scope of the EU ETS for aviation were done on the basis of extensive assessments to address the concerns and opposition raised in relation to the measure as initially designed. The 2013 Impact Assessment[18] accompanying the proposal for Regulation (EU) No 421/2014 most notably assessed the political acceptability, as well as environmental effectiveness of the EU ETS for

[17] SWD(2015) 135 final, Annex 4
[18] SWD(2013) 430 final

aviation under different options for geographical scope, and the impact of introducing minimum thresholds on evironmental effectiveness and administrative burden.

In addition, the European Commission – on an annual basis – conducts indepth analysis of the functioning of the European carbon market and reports its findings to the European Parliament and the Council. Previous Carbon Market Reports[19] have confirmed the effectiveness of, as well as the very high level of compliance with the EU ETS for aviation: airlines responsible for more than 99% of emissions from intra-EEA flights complied with the legislation, including more than 100 commercial aircraft operators based outside the EU but operating flights within the EEA[20].

Moreover, analyses in the EU's ICAO Action Plans have shown that, over 2013-2016, with the inclusion of only intra-European flights in the EU ETS, the EU ETS has contributed to achieve around 16 million tonnes of emission reductions annually, or almost 65 million over 2013-2016, partly within the sector (airlines reduce their emissions to avoid paying for additional units) or in other sectors (airlines purchase units from other sectors, which would have to reduce their emissions consistently). While some reductions are likely to have occurred within the aviation sector, encouraged by the EU ETS's economic incentive for limiting emissions or use of aviation biofuels, the majority of reductions are expected to have taken place in other sectors.

In parallel to providing a carbon price which incentivises emission reductions, the EU ETS also supports the reduction of GHG emissions through €2.1 billion funding for the deployment of innovative renewables and carbon capture and storage. This funding has been raised from the sale of 300 million emission allowances from the New Entrants' Reserve of the third phase of the EU ETS. This includes over €900 million for supporting bioenergy projects, including advanced biofuels, which are relevant for the decarbonisation of the aviation sector. In addition, through Member States' use of EU ETS auction revenue in 2013, over €3 billion has been reported by them as being used to address climate change[21].

The extensive assessments above, as well as this Impact Assessment, which has been called for under Regulation (EU) No 421/2014, are effectively evaluating and assessing the effectiveness and functioning of the EU ETS Directive for aviation, which is considered adequate in terms of retrospective evaluation report and fitness check of the EU ETS Directive for aviation.

[19] Carbon Market Report 2015, available at:
http://ec.europa.eu/clima/policies/strategies/progress/docs/com_2015_576_annex_1_cover_en.pdf
[20] See http://ec.europa.eu/clima/news/articles/news_2016052001_en.htm
[21] See ICAO Action Plans, for example at:
http://www.trafi.fi/filebank/a/1435659226/1f1aad3a6c5babd175c5c5629634ab1a/17994-1_2015__State_Action_Plan_of_Finland.pdf

2. WHY SHOULD THE EU ACT?

As can be seen from Annex 5, aviation CO_2 emissions are growing sharply. Meaningful mitigation measures are required for the sector to contribute to effectively addressing global warming. The EU should continue doing so while facilitating global action, notably through ICAO, as well as through domestic action. Thereby, the EU should not only take into account the recent political agreement on the GMBM it supported in ICAO, but also its climate commitments, both at European and at international level. As recalled in the previous section and set out in detail in section 3.1, the EU has committed to reduce its GHG emissions through domestic efforts by at least 40% compared to 1990 levels by 2030. This is the basis of the EU´s and its Member States' National Determined Contribution in the context of the landmark Paris Agreement, where the EU reiterated its, at least, minus 40% economy-wide target. All sectors, including aviation, must fairly contribute to decarbonise the European economy to meet this target.

The current EU ETS legislation calls upon the Commission to consider the appropriate scope of the EU ETS for aviation emissions from activities to and from aerodromes located in countries outside the EEA following the outcome of the 2016 ICAO Assembly. Through the review of the EU ETS for aviation the EU should ensure that the development and implementation of the GMBM is not put at risk, in order to maximize global climate mitigation efforts, whilst safeguarding that aviation continues to fairly contribute to the EU climate targets.

2.1. SUBSIDIARITY

In line with the 2004 ICAO Assembly's decision not to develop a GMBM but to favour inclusion of aviation into open regional systems, the EU chose to integrate the aviation sector in the EU ETS by amending the EU ETS Directive 2003/87/EC through Directive 2008/101/EC.

Acting at EU level is more efficient than acting at the Member State level, due to the largely transnational nature of aviation, with almost 90% of GHG emissions from aviation in the EU coming from international aviation[22]. Indeed, the single market in aviation is a key goal for the EU. Using emissions information as a proxy, it can be said that in relation to intra-EEA, on average, ~74% of aviation activity corresponds to flights departing from an EEA aerodrome flying to an aerodrome situated in another EEA Member State. Furthermore, acting at the EU level prevents the distortion of competition in the internal market by ensuring that the environmental constraints imposed on intra and extra EEA flights are harmonised at the EU level.

This harmonized approach will also ensure that the regulation is compatible with meeting the EU's 2030 domestic climate targets. Lastly, from an aviation industry perspective, the existence of the EU ETS helps justify argumentation against action at national level by Member States. Without an effective system in place, the likelihood of such action would significantly increase.

[22] SWD(2016) 244 final

2.2. LEGAL BASIS

The legal basis for the EU ETS Directive 2003/87/EC, as well as all subsequent legislation amending it or other legislation regulating GHG emissions, is the environmental legal basis enshrined in Article 192 of the Treaty on the Functioning of the European Union. This should also remain the legal basis for the new Regulation, as the principal objective of the measure is the protection of the environment through the reduction of GHGs.

3. WHAT SHOULD BE ACHIEVED?

Regulation (EU) No 421/2014 introduced Article 28a in the EU ETS Directive 2003/87/EC, which requires the Commission to report back to the Council and the European Parliament on the outcome of the 2016 ICAO Assembly. When doing so, the Commission shall consider and, if appropriate, include proposals in reaction to the ICAO developments on the appropriate scope for coverage of emissions from extra EEA-flights from 2017 onwards. Any amendments to the scope of the EU ETS for aviation should guarantee that the EU achieves its climate targets. In this regard the EU ETS should maintain a high level of environmental ambition within the EU, while further incentivizing the transition to and implementation of the GMBM to maximize the global mitigation impact. Should the EU decide not to amend the EU ETS in response to the outcome at the 2016 ICAO Assembly, the EU ETS will – by default – apply in its full scope from 2017 onwards. This would mean that aircraft operators will be responsible for GHG emissions from all flights departing from or arriving at aerodromes situated in the EEA.

3.1. THE EU'S DOMESTIC AND INTERNATIONAL CLIMATE TARGETS

The EU is bound to achieve its domestic and international climate commitments. It is evident from the different projections outlined in Annex 5 that all sectors of the economy, including aviation, must contribute already prior to 2020, to reduce global GHG emissions to achieve these targets. The need for all sectors of the economy to contribute to emissions reductions has been confirmed by the European Council on a number of occassions[23], as well as being restated in the EU and its Member States' Nationally Determined Contribution under the Union's instrument of ratification for the Paris Agreement[24].

3.1.1. EU CLIMATE TARGETS

Pursuant to the Commission's 2011 low-carbon economy roadmap[25], the EU should by 2050 cut its emissions to 80% below 1990 levels through emission cuts in all sectors. In relation to the this general commitment, the 2011 White Paper on Transport[26] sets a specific target for the transport sector, including aviation, to reduce GHG emissions by 60% by 2050 compared to 1990 and by around 20% by 2030 compared to 2008. Projections of the European Environmental Agency suggest that the transport target will not be met, unless additional measures are put in place[27]. The recently adopted Commission Aviation Strategy also pointed at the relevance and effectiveness of the EU ETS as key tool to reduce the carbon footprint of the aviation sector in the EU[28].

In October 2014, EU leaders agreed on the climate and energy framework for 2030[29], including a binding domestic target to reduce domestic GHG emissions by at least 40%

[23] EUCO 169/14
[24] http://www4.unfccc.int/submissions/INDC/Published%20Documents/Latvia/1/LV-03-06-EU%20INDC.pdf
[25] COM(2011) 112 final
[26] COM(2011) 144 final
[27] European Environmental Agency, "Evaluating 15 Years of Transport and Environmental Policy" (2015), page 10; available at: http://www.eea.europa.eu/publications/term-report-2015
[28] SWD(2015) 261 final, page 72
[29] EUCO 169/14 http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/ec/145397.pdf

below 1990 levels by 2030. The European Council of October 2014 concluded that the target be met in the most cost-effective way possible, by reducing emissions domestically in the non-ETS sectors by 30% compared to 2005 and in the ETS sectors by 43% compared to 2005. To the latter end, the linear reduction factor in the EU ETS sectors would be increased from 1.74% to 2.2% after 2020. For these calculations the aviation sector, including all intra-EU flights, was considered as an EU ETS sector. The 2030 framework will succeed the 2020 climate and energy framework[30] which contains the target of reducing GHG emission by 20% below 1990 levels by 2020. Legally binding legislation establishes the measures to meet the targets under the 2020 package (in force) and 2030 domestic climate framework (currently under discussion by the co-legislators).

3.1.2. INTERNATIONAL COMMITMENT UNDER THE PARIS AGREEMENT

The EU is strongly devoted to achieve the climate objective of limiting global average temperature increase to well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit global temperature increase to 1.5 degrees Celsius, as committed to under Article 2 of the Paris Agreement. Under the Paris Agreement, "*Parties aim to reach global peaking of greenhouse gas emissions as soon as possible […] and to undertake rapid reductions thereafter […], so as to achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century*" (Article 4.1). The Paris Agreement states that "*developed country Parties should continue taking the lead by undertaking economy-wide absolute emission reduction targets*", while "*developing country Parties should continue enhancing their mitigation efforts, and are encouraged to move over time towards economy-wide emission reduction or limitation targets*" (Article 4.4)[31]. The Paris Agreement is a legally binding international treaty. It entered into force on the 4th of November 2016, following its ratification by the EU.

Consistent with the climate and energy framework referred to above, in the EU and its Member States' Nationally Determined Contribution under the Union's instrument of ratification for the Paris Agreement, the EU and its Member States are committed to a binding economy-wide target of an at least 40% reduction in emissions compared to 1990 levels by 2030, with no contribution from international credits[32]. As an economy-wide objective, all sectors of the economy are due to contribute to emissions reductions.

The EU is also commited to meeting at least the global aspirational goal for international aviation that was agreed by the 2010 ICAO Assembly and reaffirmed by the 2013 and 2016 ICAO Assemblies, namely maintaining global net CO_2 emissions from international aviation at 2020 levels through carbon neutral growth[33].

In its recent resolution on the implementation of the Paris Agreement, the European Parliament states that "*any amendment of the existing legislation on including aviation in the*

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[30] EUCO 17215/08

[31] Paris Agreement (2015), available at: http://unfccc.int/files/essential_background/convention/application/pdf/english_paris_agreement.pdf

[32] http://www4.unfccc.int/submissions/INDC/Published%20Documents/Latvia/1/LV-03-06-EU%20INDC.pdf

[33] 2010 ICAO Assembly Resolution A37-19, available at: http://www.icao.int/publications/Documents/9958_en.pdf

EU ETS can only be considered if the GMBM is ambitious, and that, in any case, intra-European flights will continue to be covered by the EU ETS"[34].

3.2. POLICY OBJECTIVES

3.2.1. GENERAL POLICY OBJECTIVE

The general environmental policy objective of the amendments to the EU ETS for aviation following the 2016 ICAO Assembly remain unchanged since the integration of aviation into the EU ETS through Directive 2008/101/EC, namely to ensure the aviation sector's sufficient contribution to reducing the impacts of climate change.

In reviewing the scope for the 2017-2020 period, the EU must ensure that the current level of environmental ambition under the EU ETS for emissions from the aviation sector is at least maintained to meet the EU's domestic 2020 target, while supporting the implementation of the GMBM in relation to international flights.

For the period post-2020, when the GMBM is expected to be operational, the changes to the system must guarantee that the global mitigation impact of aviation emissions is maximised through the implementation of the GMBM, whilst securing the aviation sector's adequate contribution to achieving the EU's domestic 2030 climate target and international commitments under the Paris Agreement.

In addition to the general environmental objective, it must be ensured that both in the period up to 2020 and post-2020, the action has no negative economic impact on the EU, and in paricular its aviation sector, and that it does not harm the relationship with ICAO.

3.2.2. SPECIFIC POLICY OBJECTIVES

The specific objectives for the 2017-2020 period are:

Environmental objective:

- Address emissions from aviation activities, pending the implementation of a GMBM in 2021, to achieve the EU's 2020 climate targets.

Economic objective:

- Maintain the competitiveness level in the aviation sector and the level playing field in the internal market for aviation, including by providing legal certainty to operators and keeping the administrative costs associated with the measure low.

Relationship to ICAO:

- Enable the development, transition and readiness for the implementation of the GMBM from 2021.
- Political/international acceptability of the EU.

The specific objectives for the period post-2020 are:

[34] European Parliament resolution of 6 October 2016 on the implementation of the Paris Agreement and the 2016 UN Climate Change Conference in Marrakech, Morocco (COP22) (2016/2814(RSP)), paragraph 29

Environmental objective:

- Ensure that aviation emissions from flights to, from or within the EEA continue to be addressed effectively post 2020, so as to at least maintain the EU's current, domestic level of environmental ambition and relevant aviation contribution, in line with the EU's domestic 2030 climate commitment.
- Facilitate the implementation of the GMBM from 2021 to maximize the global mitigation impact to meet the at least 2 degrees Celsius target and to pursue efforts to limit global temperature increase to 1.5 degrees Celsius under the Paris Agreement and ICAO's target of CNG 2020.

Economic objective:

- Maintain the competitiveness level in the aviation sector and the level playing field in the internal market for aviation, including by providing legal certainty to operators and keeping the administrative costs associated with the measures low and avoiding any duplication of regulation.

Relationship with ICAO:

- Implementation of the GMBM by the EU and third countries.
- Political/international acceptability of the EU measure.

4. WHAT ARE THE VARIOUS OPTIONS TO ACHIEVE THE OBJECTIVES?

Pursuant to Regulation 421/2014, the Commission is to report on the outcome of the 2016 ICAO Assembly to the European Parliament and to the Council and consider and, if approprite, include proposals in reaction to the ICAO developments on the appropriate scope for coverage of emissions of extra-EEA flights from 1 January 2017 onwards.

The options described below were developed to take account of the positive outcome of the 2016 ICAO Assembly, namely the adoption of a resolution on the GMBM, including a roadmap for the completion of its key design elements, and to provide continued positive momentum to the ICAO process. They build on the expectation that the GMBM will become operational in 2021. Therefore, the policy options are divided into options available for the 2017-2020 period and options available for the period post 2020 when the GMBM is expected to be operational.The considered policy options up to 2020 and post-2020 are illustrated in **Figure 4-1** below.

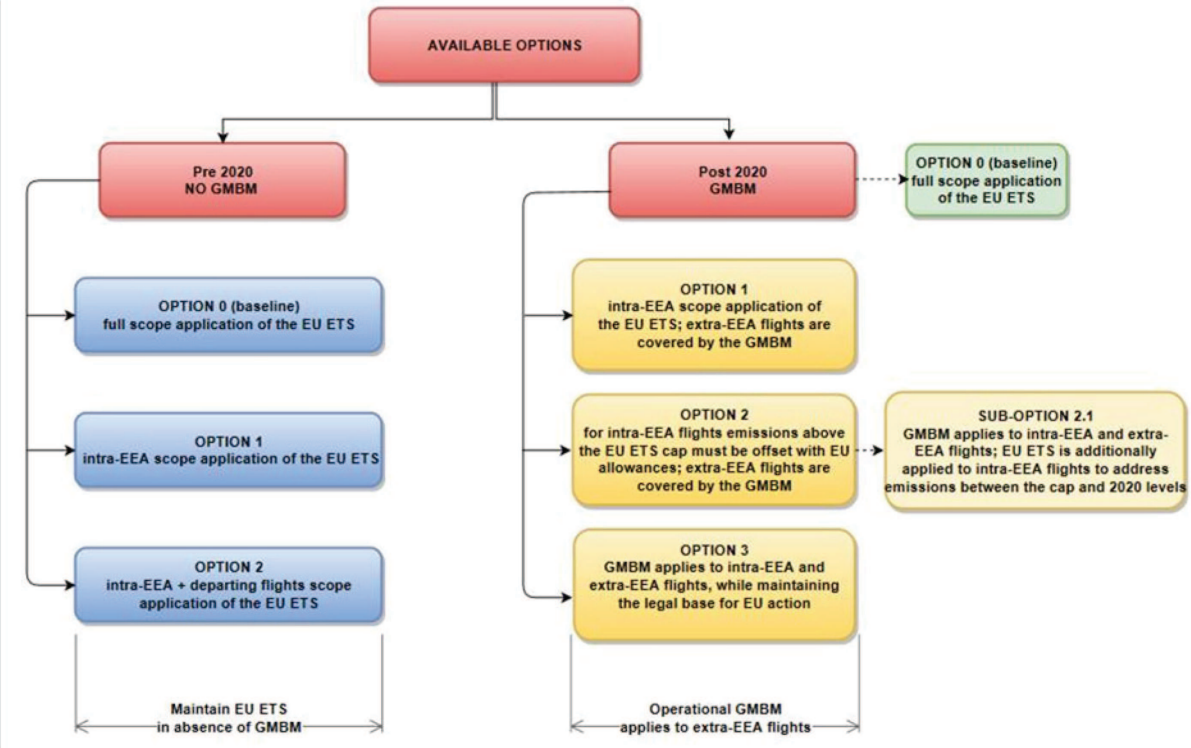


Figure 4-1: Overview of considered policy options

4.1. 2017-2020 OPTIONS

All of the options for the 2017-2020 period maintain the EU ETS to regulate aviation emissions, but with various geographical scopes. They rank from a "do-nothing" scenario (automatic return to full-scope), over a scenario where all flights departing from (but not arriving at) an aerodrome situated in the EEA are covered, keeping the current intra-EEA scope.

4.1.1. OPTION 0: "DO NOTHING" (RETURN TO FULL SCOPE EU ETS)

According to the existing guidelines for impact assessments, the option of "changing nothing" must be considered as the "baseline". The “baseline scenario” should always be developed and used as the benchmark against which the alternative options should be compared.

The EU policy aims at covering emissions from EU-related flights though market-based measures. In the absence of any international developments in this regard the EU ETS would continue covering flights to and from third countries. From a legal perspective, should the EU decide not to amend the EU ETS in response to the outcome at the 2016 ICAO Assembly, the EU ETS will – by default – apply in its full scope from 2017 onwards. This means that if no action is taken aircraft operators will be responsible for GHG emissions from all flights departing from or arriving at aerodromes situated in the EEA unless exemptions take place. This option, despite having been controversial in the past with third countries, has been favoured by some stakeholders due to its high envoronmental impact.

This option is the baseline against which the other policy options will be assessed. The key features of the full scope application, as specified in Directive 2003/87/EC as amended by Directive 2008/101/EC and Regulation (EU) No 421/2014, are summarised in **Annex 9**.

4.1.2. OPTION 1: INTRA-EEA SCOPE

Option 1 would extend the approach taken under Regulation (EU) No 421/2014 beyond 2016. Regulation (EU) No 421/2014 limited the effective coverage of the EU ETS for the 2013-2016 period to intra-EEA flights. The enforcement of compliance obligations up to 2020 would be waived for all flights to and from non-EEA destinations. The amount of allowances to be auctioned and the amount of free allowances to be allocated would have to be adjusted in proportion to the emissions coverage. This option is supported by some stakeholders, notably from the aviation industry and from Member States public authorities.

4.1.3. OPTION 2: DEPARTING FLIGHTS

Under option 2, all emissions from intra-EEA flights and from all departing flights to third countries would be covered, while emissions from incoming flights from third countries would be excluded. The total cap for emissions from aviation activities as well as the quantity of the free allowances and the allowances to be auctioned for aviation activities would have to be adjusted in proportion to the aviation emissions coverage.

4.2. OPTIONS POST 2020

All post-2020 options, except the baseline option, consider that the GMBM will be implemented from 2021 onwards, and it is assumed that it will, at least, cover emissions between airports in EEA and in third countries. Different options, however, are assessed with regards to intra-EEA flights. As referred before, this allows a preliminary analysis of the impacts that different potential scenarios on the basis of the already agreed features of the GMBM.

4.2.1. OPTION 0: BASELINE

As for the period before 2020, the "do nothing" scenario would be, by default, applying the EU ETS to all flights arriving to or departing from the EEA. As also said before, despite this

option being controversial at international level it is supported by some stakeholders, notably individuals and environmental NGOs, due to its high envoronmental impact.

Under this option, the full scope application of the EU ETS for aviation continues post 2020. Contrary to the full scope option under the 2017-2020 scenario, where a limited use of international credits for compliance is provided for, only EU allowances (general and aviation allowances) are eligible for compliance. Moreover, the ETS cap for aviation emissions of 95% of the 2004-2006 average will be reduced in accordance with the annual linear reduction factor that has been proposed to apply to other EU ETS sector of 2.2%. It must be noted that the implementation of the EU ETS for the post 2020 period must start some years before 2020. For example, in the absence of any amendments, allocation procedures, including a complete (full-scope) tonne-kilometre collection exercise, must be undertaken from 2018.

Table 4-1: Key features of option 0 (2021-2030)

Feature	Assumptions
Regional scopes	Intra-EEA and Extra-EEA
Aviation cap	EU ETS aviation cap of 95% of the 2004-2006 average aviation emissions. From 2021 onwards, the annual linear reduction factor of 2.2% that applies to other EU ETS sector will apply to the aviation cap.
Allocation	Free allocation (85%)
Surrendering requirements	All emissions
Eligibility of units	EU allowances (general and aviation allowances)

4.2.2. OPTION 1

The EU ETS would continue to apply to intra-EEA flights. Consistent with the general review of the EU ETS for the period 2020-2030 and the analyses carried out to adopt the 2030 domestic climate target, the annual linear reduction factor of 2.2% that has been proposed to apply to other EU ETS sectors would also apply to aviation cap from 2021 onwards. In addition, only EU allowances (general and aviation allowances) will be eligible for compliance. In a complementary manner, emissions from extra-EEA flights would be subject to the GMBM. To avoid any duplication of regulation, the GMBM would only be applied to emissions from extra-EEA flights but not from intra-EEA flights.

Some stakeholders, notably from the civil society, have stressed that in the light of the expected features of the GMBM the EU should at least keep intra-EEA covered by the EU ETS after 2020.

Table 4-2: Key features of option 1 (2021-2030)

Feature	Assumptions
Regional scopes	Intra-EEA
Aviation cap	EU ETS aviation cap of 95% of the 2004-2006 average aviation emissions. From 2021 onwards, the annual linear reduction factor of 2.2% that applies to other EU ETS sector will apply to the aviation cap.
Allocation	Free allocation (85%)
Surrendering requirements	All emissions
Eligibility of units	EU allowances (general and aviation allowances)
Notes	GMBM would apply to extra-EEA flights, including GMBM CNG2020 target and the eligibility of international credits for offsetting.

4.2.3. OPTION 2

This option should align the EU ETS for intra-EEA flights closer to the GMBM for extra-EEA flights by taking several of its design elements. Different manners of achieving this are conceivable. As under option 1, extra-EEA flights will be covered, in any case, by the GMBM.

The most straightforward option (option 2) would change the design of the EU ETS for intra-EEA flights to operate like the GMBM as an offsetting mechanism, while maintaining a similar ambition level as option 1. Allowances for aviation activities would not anymore be issued. Instead, aircraft operators would have to surrender general ETS allowances for their emissions above certain levels.The design of the EU ETS would continue to maintain a high climate ambition through the following features:

i. The baseline above which offsetting would take place would be the same as the cap for aviation emissions under option 1: 95% of the average 2004-2006 aviation emissions - and application of the EU ETS's linear reduction factor for stationary installations of 2.2% from 2021 onwards to the aviation cap.
ii. Airlines surrender only general EU ETS allowances for emissions above the cap for aviation.

This option also takes into account the opinion by some stakeholders to keep the EU action on intra-EEA flights after 2020.

Table 4-3: Key features of option 2 (2021-2030)

Feature	Assumptions
Regional scopes	Intra-EEA
Baseline	EU ETS aviation cap of 95% of the 2004-2006 average aviation emissions. From 2021 onwards, the annual linear reduction factor of 2.2% that applies to other EU ETS sectors will apply to the aviation cap.
Allocation	No issuance of aviation allowances (i.e no free allocation, no auctioning). Allowances will be purchased from other EU ETS sectors.
Surrendering requirements	Only above aviation cap
Eligibility of units	EU general allowances
Notes	GMBM would apply to extra-EEA flights, including GMBM CNG2020 target and international credits for offsetting.

Another alternative (option 2.1) could consist of combining the implementation of both the EU ETS and the GMBM on intra-EEA flights. The GMBM would be used to offset emissions above 2020 levels, while the EU ETS would address the gap in ambition between the EU ETS cap for aviation and the GMBM CNG2020 baseline.

In this scenario, technical details concerning the interaction between the GMBM and the EU ETS need to be clarified because of a number of differences between the key features of the two systems. Issues that would need to be addressed are outlined in Table 4-4.

Table 4-4: Difference in key features of the GMBM and the EU ETS

Feature	EU ETS	GMBM
Aviation Cap/Baseline	Emissions capped for aviation at 95% of the 2004-2006 average aviation emissions. From 2021 onwards, the annual linear reduction factor of 2.2% that applies to other EU ETS sectors will apply to the aviation cap.	Carbon Neutral Growth from 2020 (baseline calculated as 2019-2020 average emissions)
Allocation	Free allocation (85%)	No free allocation
Surrendering requirements	Yearly. Obligation for operators is based on an individual approach.	Annual calculation of offsetting obligations but three-year compliance cycle. Obligation for operators is based on global sectoral growth rates.
Coverage	Domestic flights and international flights (between EU Member States under the intra EEA scope; to and from third countries under the full-scope).	All international flights between countries participating in the scheme (except on routes to and from exempt countries).
Eligibility of units	EU general allowances and EU aviation allowances.	International credits (eligibility criteria to be determined)

While the differences in key features and the need to clarify the details of the GMBM in the next years make it challenging at this stage to define the precise parameters to model the impacts of option 2.1, notably as regards the administrative effort required, an initial overall assessment of its effects is provided in section 5.

4.2.4. OPTION 3

All intra-EEA and extra-EEA flights would be covered by the GMBM. Intra-EEA domestic flights in respect of which ICAO has no jurisdiction[35] would have to be opted into the GMBM to safeguard a level-playing field within the EEA market. This option would reduce the EU's level of climate ambition. The EU would move from its existing level of ambition to accept that aviation emissions are stabilized at 2020 levels. Furthermore, increases above this

[35] See statement at http://www.icao.int/environmental-protection/Documents/STATEMENTS/cop4.PDF

level would not be compensated with domestic emission reductions, but by using international offsets, representing reductions achieved in third countries and not coming from a cap-and-trade system with possibly less environmental integrity (e.g. emission reductions are not counted compared to a fixed cap but to projected "business-as-usual" emission growth; thus, in case of a too generous "business-as-usual" projection, emissions that would effectively have never occurred may be counted as "reductions"). As explained before, international credits cannot be accounted towards the at least -40% domestic climate target.

This option is supported by some stakeholders, notably from the aviation industry.

Table 4-6: Key features of option 3 (2021-2030)

Feature	Assumptions
Regional scopes	Application of GMBM to international intra-EEA and extra-EEA flights. Domestic flights to be opted-in.
Baseline	CNG 2020
Allocation	No issuance of allowances
Surrendering requirements	Only above target
Eligibility of units	International credits
Notes	GMBM would be applied. The legal base for the EU ETS would be maintained but intra-EEA and extra-EEA flights exempted.

4.3. DISCARDED OPTIONS

The options of covering all intra-EEA flights and 50% of departing and arriving flights for extra-EEA flights (50-50 option), as well as an airspace approach whereby intra-EEA flights would be fully covered but emissions from extra-EEA flights cut back in proportion to the distance travelled within the EEA, were discarded. The 50-50 option has not been further assessed, as it is expected to deliver similar results as the departing flights option[36]. An option based on "airspace" was not considered, as it was proposed by the Commission in 2013 but not adopted by the co-legislators in this form due notably to claims that it would hinder progress in ICAO and concerns linked to complexity[37].

Some options mentioned by certain stakeholders, such taxation-related ones, have been discarded given the difficulties to impose fuel taxes for international flights due to legally binding commitments made in Air Service Agreements with third countries. It should also be noted that one of the advantages of market-based measures is that they allow meting climate targets at the lowest cost, achieving reductions where it is cheaper and improving cost-efficiency. This is also why the majority of stakeholders support the use of MBMs, as opposed to taxes. Furthermore, now that ICAO has adopted a global markets-based measure for international aviation emissions it would not be appropriate for Europe to move away from carbon markets to taxation on CO_2 emissions, all the more since strategic partners such as China and South Korea are also addressing aviation through domestic emission trading schemes.

[36] SWD(2013) 430 final
[37] COM(2013) 722 final

4.4. CROSS-CUTTING SIMPLIFICATIONS

The EU ETS Directive foresees in Article 30 (4) that the Commission shall review the functioning of the Directive and give consideration to on-going improvements and refinements.

In view of the 300 largest aircraft operators being responsible for 99% of annual emissions, important simplifications have been made in the past in relation to small emitters. Small emitters are defined as aircraft operators operating fewer than 243 flights per period for three consecutive four-month periods and aircraft operators operating flights with total annual emissions lower than 25000 tonnes CO_2 per year. While commercial aircraft operators (i.e. airlines offering scheduled flights) benefit from an exemption from the EU ETS in case that they emit less than 10000 tonnes CO_2 per year, small, non-commercial aircraft operators were initially covered by the EU ETS.

The Commission launched in early 2013 a study by PWC et al. to investigate the costs and benefits of the inclusion of small emitters in the EU ETS. It revealed amongst others that the obligations with regard to MRV generate relatively higher administrative costs for small than large operators. Compared to the level of EU ETS revenues raised from a small emitter, the administrative cost can be up to 4 times higher[38].

Consequently, Regulation (EU) No 421/2014 introduced a number of simplifications for small emitters. The emissions of aircraft operators with total annual emissions lower than 25 000 tonnes CO_2 are consided as verified emissions if they were determined by using the small emitters tool approved under Regulation (EU) No 606/2010 and populated by Eurocontrol with data from its ETS support facility[39]. Moreover, Member States may implement simplified procedures for non-commercial aircraft operators as long as such procedures provide no less accuracy than the small emiters tool provides[40].

In addition, Regulation (EU) No 421/2014 introduced in Annex I (k) of the EU ETS Directive a de-minimis threshold until 31 December 2020 to remove any obligations for small, non-commercial aircraft operator operating flights with total annual emissions lower than 1000 tonnes per year.

While the MRV simplications for small emitters are permanent, the exemption of small, non-commerical aircraft operators ends at the end of 2020. The extension of the de-minimis threshold post-2020 should therefore be considered.

[38]SWD(2013) 430 final, section 2.6, PWC et al. on ETS Aviation small emitters, available at: http://ec.europa.eu/clima/policies/transport/aviation/docs/report_ets_avaiation_small_en.pdf
[39] EU ETS Directive 2003/87/EC, article 28a (6)
[40] EU ETS Directive 2003/87/EC, article 28a (6)

5. WHAT ARE THE IMPACTS OF THE DIFFERENT POLICY OPTIONS AND WHO WILL BE AFFECTED?

This section will assess the environmental, economic and social impacts of the different policy options. The impacts will be assessed separately for the 2017-2020 options and the post-2020 options.

The quantitative assessment of the impacts of the different policy options is based on the AERO Modelling System (AERO-MS)[41], a modelling tool which is specialised in the aviation sector. It evaluates the environmental and economic consequences for all relevant actors (airlines, consumers, governments and manufactures) of responses to emission-related measures in the aviation sector.

The AERO-MS model was selected as providing a mechanism for modelling the economic and environmental impacts of policies without the need for assumptions (for example, regarding the impact of changes in airline costs on demand or technology development). AERO-MS was also used for the analyses of policies at ICAO and has been performed as part of the previous study in 2013[42]. Since that time, the tool has been updated and now uses a base year of 2010 and it includes forecast years of 2020, 2030 and 2040. A key aspect of the AERO-MS method is that it models the effects of policies on supply-side costs and, as they are passed through, on demand for air travel, in a feedback approach. As a result, it generates the effects of polices on the economics and the environmental impact on aviation. The methodology is explained in more detail in Annex 4.

An important element is that AERO-MS applies growth rates as derived from ICAO's Committee on Aviation Environmental Protection forecasts. While this data is commonly used for studies in the aviation sector, it expects a continued strong growth in aviation emissions, also related to EU emissions. For instance growth in emissions related to departing flights (both intra and extra EU) in the period 2010-2020 is estimated at 36%, with growth even increasing after 2020 to reach an 86% increase in 2030 compared to 2010, overall resulting in average emissions in the period 2021-2030 being 63% above 2010.

In contrast, the increase in aviation emissions experienced in the last few years is markedly lower (e.g., the UNFCCC inventory for the EU report for aviation fuel – domestic and international bunkers fuels, based on fuel sold - show almost no increase in the period 2010-2014). Therefore also a sensitivity scenario is applied using aviation emission projections from the PRIMES models. PRIMES sees significantly less growth, with emissions of aviation fuels sold in the EU increasing in the latest reference projections by only 18% on average over the period 2021-2030 compared to 2010 in the EU. This is referred to as the low aviation emission growth sensitivity.

PRIMES energy model is not aviation specific. It derives its growth rates on the basis of aviation fuels sold in the EU and simulates the European energy system and markets on a country-by-country basis and across Europe for the entire energy system. The model provides amongst others projections of CO_2 emission over the 2015-2050 period in 5-years intervals. The data is based on Eurostat statistics for the years 2000-2010. PRIMES has been used as a model for the revision of the EU ETS and for establishing binding reduction targets for EU

[41] EASA (2010) Research Project EASA.2009/OP15 Study on Aviation and Economic modelling (SAVE)
[42] Technical assessment of possible amendments of the EU ETS Directive for aviation – Final Report (Ricardo-AEA/R/ED58833, 2013) and SWD(2013) 430 final

Member States for non-ETS sectors under the Effort Sharing Regulation for the 2021-2030 period.

The main differences between PRIMES and AERO-MS are due to different growth rates (and different rates of energy efficiency improvement). While a continued strong growth in global aviation activities is likely, in particular due to significant growth of aviation activities related to developing countries, it was deemed appropriate to develop a more conservative sensitivity scenario using PRIMES growth projections, in particular for aviation activities related to the EU. In the PRIMES Reference scenario increase by ~80% between 2005-2030 (63% intra-EU and 89% international extra-EU), but the resulting energy demand increases far less. (15% total, 6% intra-EU and 20% international extra-EU), showing the impact of energy efficiency. These are due to stock replacement of older aircraft, better logistics including more passengers per flight, as well as policy measures such as the Single European Sky.

5.1. ENVIRONMENTAL IMPACTS

In terms of environmental impacts, not only the direct impacts of the policy options on the overall (EEA-related/global) aviation emissions must be considered. The indirect impacts of the policy options through the purchase and surrendering of EU allowances from other EU ETS sectors and offsets through international credits are at least equally important. With the aviation sector contributing to the EU's 2020 and 2030 climate targets, its inability to achieve absolute emission reductions implies that it will be required to purchase allowances from other EU ETS sectors. These purchases of EU allowances from other sectors and the use of international credits up to 1.5% of emissions represent additional emission savings which would occur in other sectors.

5.1.1. IMPACTS ON AVIATION EMISSIONS

Compared to a 'business-as-usual' scenario with no MBM in place to address aviation emissions, all policy options are expected to reduce overall aviation emissions, both in the 2017-2020 and the post-2020 period. However, neither the 2017-2020 options, nor the post-2020 options can prevent an increase in aviation emissions in absolute terms from 2010 to 2020 and from 2020 to 2030 respectively.

5.1.1.1. 2017-2020 OPTIONS

With regards to the 2017-2020 policy options, the results in terms of annual CO_2 emissions of intra-EEA and extra-EEA aviation activities depend on the geographical scope of the option. Variation between options in terms of total EEA-related (flights to or from EEA airports) emissions is small, lower than 1%. None of the options is foreseen to have an impact on the aviation emissions that are unrelated to EEA flights.

Option 0 covers 35% of global aviation emissions and is projected to result in 306.72 Mt CO_2 emissions from EEA-related aviation activities per year. 8% of global aviation emissions fall within the scope of option 1. This option is expected to lead to 308.98 Mt CO_2 emissions from intra-EEA and extra-EEA aviation activities per year. Option 2 covers 22% of global aviation emissions and its annual EEA-related aviation emissions are estimated to amount to 307.84 Mt CO_2 emissions.

Table 5-1. Annual emissions 2017-2020 options

Geographic scope	CO_2 emissions (Mt per annum)			% change from Option 0	
	Option 0	Option 1	Option 2	Option 1	Option 2
Total EEA - related	306.72	308.98	307.84	0.74%	0.37%
Total world	945.38	947.65	946.53	0.24%	0.12%
Covered	327.84	80.08	199.36	-75.57%	-39.19%

5.1.1.2. POST-2020 OPTIONS

In relation to the post-2020 policy options, the overall emissions relate to the degree of interrelationship of the EU measure with the GMBM. The forecasted emissions under option 0 are based on the assumption that the GMBM is not operational in the post-2020 period. Variations between options are not significant (between 393.26 Mt and 403.86 Mt per year).

Option 0 is projected to result in 393.26 Mt CO_2 annual EEA-related emissions in 2030. Over the period 2021-2030 this option is projected to result in 11,573.57 Mt CO_2 emissions from global aviation activities.

Option 1 will result in 1,333.24 Mt CO_2 annual emissions from global aviation activities in 2030 out of which 400.45 Mt CO_2 come from EEA-related flights. This corresponds to 11,617.58 Mt CO_2 emissions over the period 2021-2030.

Option 2 results in 1,333.62 Mt CO_2 annual emissions (400.82 Mt CO_2 from EEA-related flights) in 2030, which correspond to 11,620.58 Mt CO_2 emissions from global aviation activities over the period.

Under option 3, annual emissions amount to 1,336.66 MT CO_2 annual emissions in 2030 (403.86 Mt CO_2 from EEA-related flights), corresponding to 11,640.46 Mt CO_2 emissions over the period.

Although emissions for sub-option 2.1 were not modelled in detail, they are estimated to be in between those for options 2 and 3, closer to the latter when looking at 2030 figures, as the growth above 2020 levels becomes more significant.

These results would be significantly lower in case of the sensitivity scenario with low growth of emissions in aviation, which leads to only 289 Mt CO_2 EU-related emissions on average in the period 2021-2030

5.1.2. IMPACTS ON EMISSIONS FROM OTHER SECTORS

This sub-section analyses how under the different options aviation contributes to achieve emission reductions in other sectors by acquiring and surrendering emission units, either EU allowances under the EU ETS or international credits. Divergences between different options are more significant in this case compared to subsection 5.1.1.

Before 2020, the aviation sector contributes to the EU's 2020 climate target of reducing emissions by 20% compared to 1990 levels. Sectors under the EU ETS are expected to reduce emissions by 21% compared to 2005 levels. For the 2017-2020 options, an EU ETS emissions cap for aviation emissions has been calculated based on the historical aviation

emissions for each of the policy options. EU aviation allowances are surrendered for CO_2 emissions up to the aviation cap[43]. Above the aviation cap, emissions must be offset through the purchase and surrender EU allowances from other ETS sectors (or, in a limited manner, international credits issued under the Kyoto Protocol mechanisms[44].

Also post-2020 the aviation sector will continue to contribute to the EU's climate target of reducing emissions by 2030 by at least 40% below 1990 levels. Sectors under EU ETS are to reduce emissions by 43% below 2005 levels, whereas emissions falling under the proposed Effort Sharing Regulation are to decrease by 30%. As the 2030 target is domestic, international credits cannot be used to achieve it. Similarly to the 2017-2020 options, thresholds have been set for the post-2020 options above which emissions must be offset. For option 3, this would be ICAO's target of CNG2020, whereas for the other options it would be established in accordance with the EU ETS aviation cap: 95% of the average 2004-2006 historical aviation emissions, and application of the EU ETS's linear reduction factor for other EU ETS sectors of 2.2% from 2021 onwards to the aviation cap.

5.1.2.1. 2017-2020 OPTIONS

Under none of the policy options will the aviation sector achieve absolute emission reductions in the pre-2020 period. Since none of the policy options prevent an increase in aviation emissions between 2010 and 2020, there will be a demand from the aviation sector for emission allowances from other ETS sectors and for international credits, thus favouring reductions in them. The larger is the scope, the more significant is that demand.

It is expected that under option 0, 117.37 Mt of CO2 emissions (112.45 through EU allowances) will have to be offset annually (in 2020) through EU allowances and international credits. Under option 1, this amounts to 25.10 Mt of CO2 emissions (23.90 through EU allowances). Under option 2, the figure is 71.67Mt of CO2 emissions (71.67 through EU allowances).

5.1.2.2. POST-2020 OPTIONS

Under all post-2020 policy options, it is assumed that aviation emissions will increase further between 2020 and 2030. Aviation emissions covered by the EU ETS or GMBM are expected to increase by at least 81% under option 0 and up to 91% under option 3 by 2030 compared to 2010. Therefore, under all options demand will be generated for emission units and reductions would be fostered in other sectors. Apart from option 0, main divergences between options are related to the environmental ambition of the measure: the EU ETS cap or the GMBM baseline (CNG 2020). Depending on whether emissions are covered by one or the other emissions reductions will be favoured within EU ETS sectors or in other sectors in third countries.

Under option 0 it is expected that 2,062.35 Mt of CO_2 emissions reductions will fostered in other sectors covered by the EU ETS over the period 2021-2030 (206.2 annually on average). This would be markedly lower in the sensitivity with low aviation emission growth, with only 832.35 Mt of CO_2 emissions to be offset over the period 2021-2030 at the EU level, 83.2 Mt per year.

[43] 85% of these allowances are allocated to operators for free; another 15% of allowances are available via auction

[44] International credits can be used for up to 1.5% of total aviation emissions

Options 1 and 2 show very similar results. Under option 1, 1,703.65 Mt of CO_2 emissions would be offset over the period, including through the EU ETS and the GMBM. From this, 493 Mt CO_2 would correspond to intra-EEA activity covered by the EU ETS, thus fostering reductions in other ETS sectors. Under option 2, the global impact is of around 1,705.7 Mt CO_2 over the period, from which 495Mt corresponds to intra-EEA activity – resulting in reductions in EU ETS sectors. For both options 1 and 2 this would be markedly lower in the sensitivity with low aviation emission growth, with a demand of only 23 Mt of CO_2 per annum at the EU level for other ETS sectors.

Similar figures can be estimated for sub-option 2.1. However, as only around 26 Mt per year would be covered with allowances under the high growth scenario (whilst for the rest of the obligation international credits would be used) the contribution to domestic reductions in the EU would be smaller and proportionally decreasing over time.

Under option 3, 1,354.99 Mt of CO_2 emissions would be offset under the GMBM over the 2021-2030 period, from which 144.42 would correspond to intra-EEA flights. These emissions would be entirely offset with international credits. This means that there will be no contribution from aviation to domestic reductions in the EU, while all other sectors would be required to step up their efforts after 2020 to compensate for that. This shortfall in ambition by intra-EEA aviation could put at risk the economy-wide -40% reduction to which the EU committed in the Paris Agreement.

5.1.2.3. IMPACTS ON THE EU ETS

The potential impacts of the various options on other ETS sectors will be proportional to the scale of the net demand for allowances from the aviation sector. Table 5-3 shows the volume of additional annual demand between 2021 and 2030, for a range of modelling outcomes. As can be seen from the table, the scale of this impact depends primarily on the scope of the coverage of emissions based on the option chosen and the expected growth in aviation emissions. To reflect the uncertainty concerning the growth in aviation emissions, numbers are shown for both an estimate based on detailed AERO-MS emission projections as well as for emissions projections from the PRIMES model. The subsequent impact of additional net demand on the carbon price is the result of the interplay between the supply and demand for allowances.

Table 5-3: Estimated average annual demand for general EU allowances from the aviation sector in 2021-2030, in absolute terms (Mt CO2)

	Average annual demand for general EU allowances (= emissions aviation over cap for aviation) in the period 2021-2030	
	High estimate (based on AERO-MS emission projections), EEA scope	Low estimate (based on PRIMES emission projections, EUCO30 projection), EU scope
Option 0	206	83
Departing flights scenario (for comparison purposes)	135	49*
Options 1 and 2	49.5	23
Option 3	0	0
* The impact assessment supporting the 2030 Climate Change and Energy Framework (SWD(2014) 15final), which included all outgoing aviation in its projections, as covered by the PRIMES model, estimated for the scenario GHG40 an average annual demand for general EU allowances from the aviation of 49 million.		

As the EU ETS cap sets a binding limit for emissions from stationary installations, additional demand for allowances from aviation would not lead to additional emissions but would have to be matched by additional reductions in other ETS sectors. Therefore, a net increase in demand could be reflected through a limited impact on the carbon price signal for other ETS sectors as well as through increased revenues from the auctioning of allowances by Member States, leading to higher revenues from auctioning being available for climate and energy measures.

Increased demand for allowances will have a different impact on the power sector and on energy intensive industry which both fall under the ETS. Installations in the power sector have to buy all allowances needed for compliance on the carbon market, and an increase in demand would impact the carbon price for these installations. Any such impact will depend on the volume of allowances and the interaction with the Market Stability Reserve. By contrast, a smaller impact on industry is expected, since the proposal for revision of the EU ETS foresees the continuation of free allocation to industry. Any potential price impact would therefore affect mainly those allowances which are purchased on the market while at the same time being offset by a higher value of free allocation.

The impact due to changes in the carbon price is expected to be proportional to the overall increase in the demand for allowances. The overall cap or limit on the number of allowances for stationary installations in the ETS is some 15.5 billion allowances in 2021-2030. The different options are expected to have a limited economic impact on other sectors covered by the EU ETS, due to the small size of the net demand from the aviation sector when compared to overall emissions figures. Aviation demand is relatively modest compared to the total GHG emissions covered by the EU ETS. Overall emissions covered by the system in the

period 2021-2030 is forecasted to be between 1887 Mt of CO2 eq in 2020 and 1558.8 Mt of CO2 eq in 2030[45]. When these figures are compared with the expected demand from the aviation sector it can be noted that, with the exception of the baseline option, the proportion remains between 1% and 3%. For the baseline option due to the larger scope the proportion ranges from 5-12%, depending on the assumed growth in emissions. This means that while the net demand for allowances from aviation would result in an increase in the demand for ETS allowances this is limited in scale when compared to the overall number of allowances on the market.

Furthermore, from 2019 on the Market Stability Reserve[46] will lead to adjustment of the number of allowances to be auctioned depending on the number of allowances in circulation. In general, scenarios with a higher net demand from aviation could lead to a swifter reduction in the surplus. However, because the number of allowances to be placed in the reserve reflects the number of allowances in circulation, at the same time a faster increase in the net demand for ETS allowances will be partially offset by a lower amount of allowances being placed in the reserve. The MSR will therefore mitigate the impacts of an increase in demand on the overall balance between supply and demand for allowances in the EU ETS, and thus the impact on the carbon price.

Under option 0, 206.2 Mt of CO2 emissions must be covered through ETS allowances annually (over the period 2021 - 2030), or translating to in total a demand of over 2 billion allowances in the ETS over 10 years. This number would be reduced to as much as 83 Mt of CO2 emissions that need to be covered by ETS allowances annually over the 10 year period in case of the sensitivity with low aviation emission growth.

It is clear that options 1 and 2 would have an impact on the ETS in terms of the net demand for ETS allowances from the aviation sector, although the extent of this impact depends strongly on the growth of emissions in aviation in intra-European flights, as flights to and from third countries would be covered by the GMBM. Under options 1 and 2, the need to cover emissions through ETS allowances would be reduced to around 49.5 Mt of CO2 emissions per annum, or around half a billion over the 10 year period. This number would be reduced further to as little as 23 Mt of CO2 emissions per year (230 Mt over 2021-2030) in case of the sensitivity with low aviation emission growth.

Under options 1 and 2, impacts on the ETS are thus probably more limited. It should be noted that for instance the Impact Assessment accompanying the proposal for a 2030 Climate and Energy Framework[47] simulated a net demand from aviation towards the other ETS sectors, based on all outgoing flights equal to around 488 Mt of CO2 emissions over the period 2020-2030, or the need to cover emissions through allowances from the ETS at around 49 Mt of CO2 emissions per year.

Under option 3, there would be no need at all to cover emissions via allowances from the ETS, as also intra-European emissions would be addressed through the GMBM, where international credits are allowed. Under this scenario, fewer emissions reductions would need

[45] EU Reference Scenario 2016. Energy, transport and GHG emissions. Trends to 2050. https://ec.europa.eu/energy/sites/ener/files/documents/ref2016_report_final-web.pdf

[46] Under the MSR, each year 12% of the surplus of allowances is transferred in the MSR provided the surplus is higher than 833 million allowances. If the surplus in the ETS would drop below 400 million allowances, then the MSR would start releasing allowances to the ETS market. (See: Decision EU) 2015/1814 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading scheme and amending Directive 2003/87/EC)

[47] SWD(2014) 15 Final

to take place in other ETS sectors to meet the binding cap on emissions from stationary installations compared to a situation in which aviation would still remain part of the ETS.

5.2. COMPETITIVENESS AND ECONOMIC IMPACTS

With regards to the economic impacts, it is important to assess the policy options' implications on operating costs, prices and demand, as well as auction revenues. It will also be necessary to contemplate whether there is a potential of the policy options to distort competition, in particular in relation to direct-city pair routes, one-stop services and tourist destinations. The administrative effort resulting from the different options is also be evaluated.

Competitiveness relates directly to improvements in productivity. Assessing impacts of policies on productivity is difficult, not least because there are multiple ways in which to measure productivity. In the widest sense, an increase in productivity refers to an improvement in the ratio of inputs to outputs. An increase in fuel prices should lead to the reduction of fuel as an input per unit of output (RTK), for example by incentivising high occupancy rates of aircraft, as well as investment into more efficient aircraft. At the same time, it may lead to a decrease in the average productivity of capital, as existing aircraft are used less intensively (e.g. only when high occupancy rates can be guaranteed). A conclusive assessment of overall productivity impacts in this wider sense is therefore not easily modelled. The present assessment, instead, looks at what is defined as cost/price competitiveness: the estimated impact of the policy options on costs and prices in the sector. In addition, we look at how the changes in price affect demand and the impact this has on the level playing field. Since the administrative costs associated with the measure can also have an impact on the level playing field, they must also be considered

5.2.1. IMPACTS ON OPERATING COSTS, PRICES AND DEMAND

All policy scenarios up to 2020 and post-2020 imply minimal additional operating costs compared to a business-as-usual scenario without any market-based-measures in place to regulate aviation emissions. The differences in operating costs have a minimal impact on the average price per RTK and thus on demand.

Indeed, empirical evidence on ticket prices for consumers confirms the minor economic impact the EU ETS for aviation has had up to date: based on a sample of EU and US airlines, the EU ETS seems to lead to price increases between 0.43 % and 0.94 % for passenger tickets (excluding taxes and charges). Ryanair has been one of the most transparent airlines by publishing figures of the cost to passengers of climate change measures. These have been cited as being €0.25 for passengers flying from continental Europe, and £0.25 for passengers buying tickets in the UK. Concerning transatlantic flights, US airlines have included fees around $3 to cover for EU ETS costs in their ticket prices. This price top-up due to the EU ETS is much lower than most airport taxes and charges (e.g. US charges of $16 for passengers to arrive and to depart)[48].

[48] SWD(2013)430

5.2.1.1. 2017-2020 OPTIONS

For the 2017-2020 policy options, the expected additional operating costs rise with an increase of the geographical scope of the option. Total operating costs are summarized in the table below, showing very little variation compared to the baseline option.

Table 5-4: Summary of total operating costs and change over baseline on flights with origin or/and destination within the EEA in 2020

	Total operating costs (in € million)	Change over baseline	Change in operating costs per RTK over baseline
Intra-EEA/EEA domestic			
Option 0	93,699	-	-
Option 1	93,711	0.01%	-0.26%
Option 2	93,720	0.02%	-0.11%
Extra – EEA			
Option 0	281,816	-	-
Option 1	281,406	-0.15%	-0.71%
Option 2	281,631	-0.07%	-0.34%

The slight differences in operating costs result in an almost identical average price per RTK for the three options. The results are presented in the table below. The price reductions achieved under options 1 and 2 compared to option 0 are for all options around 0.7% for flights to and from third countries, and 1.11% under the three options, for intra-EEA flights. Differences are thus negligible.

Table 5-5. Summary of price per revenue tonne kilometre (RTK) and overall RTK on flights with origin or/and destination within the EEA in 2020

	Calculated price (€) per RTK	Total RTK (millions)
Intra-EEA/EEA domestic		
Option 0	1.11	89,765
Option 1	1.11	90,008
Option 2	1.11	89,886
Extra-EEA		
Option 0	0.71	411,554
Option 1	0.70	413,888
Option 2	0.70	412,700

The slight difference in price is also reflected in a very limited variation in demand expressed as overall RTK of intra-EEA and extra-EEA flights. Option 0 results in an overall RTK of 501,319 million, option 1 in an overall RTK of 503,896 million and option 2 in an overall RTK of 502,586 million.

5.2.1.2. POST-2020 OPTIONS

In relation to the post-2020 options, the projected operating costs depend on the degree to which international credits are used for compliance within an option. This is due to the fact that the average price of an international credit is estimated to be lower than the average price of an EU allowance in the 2020-2030 period.[49] Operating costs in 2030 are summarised in the table below. This shows how the variations linked to the different options are very limited compared to those related to other operating costs (i.e., variations in fuel cost). Differences between the options are also very small, not reaching 0.5%.

Table 5-6 Summary of total operating costs and change over baseline on flights with origin or/and destination within the EEA in 2030

	Total operating costs (in € million)	Change over baseline	Change in operating costs per RTK over baseline
Intra-EEA/EEA domestic			
Option 0	134,230	-	-
Option 1	134,304	0.06%	-0.33%
Option 2	134,329	0.07%	-0.59%
Option 3	134,541	0.23%	-2.61%
Extra-EEA			
Option 0	429,921	-	-
Option 1	427,955	-0.46%	-2.08%
Option 2	427,979	-0.45%	-2.13%
Option 3	428,182	-0.40%	-2.53%

For the same reason the operating costs slightly vary, the average price per RTK does not differ much between the options. As shown in the table below variations on prices per RTK only amount few € cents.

Table 5-7 Summary of price per revenue tonne kilometre (RTK) and overall RTK on flights with origin or/and destination within the EEA in 2030

	Calculated price (€) per RTK	Total RTK (millions)
Intra-EEA/EEA domestic		
Option 0	1.13	127,276
Option 1	1.13	127,773
Option 2	1.13	128,130
Option 3	1.10	130,997
Extra-EEA		
Option 0	0.70	631,988
Option 1	0.69	642,439
Option 2	0.69	642,810

[49] International credits which meet the standards of the EU ETS for use up to 2020 are currently priced at around €0.40, less than one-tenth of the value of EU ETS allowances.

	Calculated price (€) per RTK	Total RTK (millions)
Option 3	0.68	645,796

As regards sub-option 2.1, impacts were not modelled, but are estimated to be between those for options 2 and 3, as part of the obligations are met with allowances and part with international offsets.

In line with the difference in price per RTK, total demand in RTK of intra-EEA and extra-EEA flights also varies moderately between the options. Option 0 results in an overall RTK of 759,264 million, option 1 in an overall RTK of 772,791 million, option 2 in an overall RTK of 770,928 million and option 3 in an overall RTK of 776,793 million.

All these impacts would be even lower with the sensitivity that foresees moderate aviation emissions growth, where the amount of emissions to be offset on flights within the EEA is expected to be lower.

5.2.2. Impacts on Level Playing Field

Under all policy options, the EU ETS, and the GMBM when applicable from 2021, are applied uniformly to all operators irrespective of their nationality or any other characteristics. Thus, they do not present a direct distortion of competition. However, under certain circumstances a potential risk of indirect distortion of competition could arise due a preference for alternative flights, which would not be covered by any of the policy options.

It should be noted that distortions have not been identified during the 5 years where the EU ETS has been applied to aviation, and it is expected that this should be even less the case where other routes will be covered, after 2020, by a new market instrument such as the GMBM.

It must be stressed that the possibility of distortions could increase with higher operational costs associated to the different measures. Nevertheless, as section 5.2.1 demonstrates, this will not be the case in the period up to 2030, where impacts on costs or prices per RTK remain very limited.

Finally, it is important to highlight that under Option 3 the GMBM would apply to all intra-EEA flights, including those operated by carriers based in third countries. Therefore, if the GMBM was not adequately implemented by some third countries a risk of competitive distortions arises even within the EEA. It must be recalled that the GMBM obligations are enshrined in an Assembly Resolution, which is not, in itself, legally binding. States can reserve to it and not apply the GMBM to their operators flying on European routes. Even if technical rules are developed and adopted as standards, it remains to be decided what level of detail those standards will have, and what is left to "recommended practices" or guidance documents, increasing the risk of a heterogeneous implementation that could hinder a level playing-field. There is also a risk that countries with lower capacities are not ready to implement it by 2021, and that could equally affect flights within the internal market. For those reasons, it must be pointed out that under Option 3, risks of competitive distortions could even affect direct competition on routes within the EEA, as the decision to apply the GMBM obligation on intra-EEA routes, for some operators, would be in the hands of third countries' administrations.

5.2.2.1. COMPETITION BETWEEN DIRECT CITY-PAIR ROUTES

Under all *2017-2020 options*, intra-EEA flights are covered by the EU ETS, whereas flights outside the EEA are exempt. Consequently, distortions in border regions are theoretically conceivable, as traffic might shift from within the EEA towards nearby airports outside the EEA in response to an increase in relative prices for intra-EEA traffic.

Under the *post-2020* options, the potential for competitive distortions on city-pair routes near EEA region borders would no longer exist under the full convergence Option 3, where GMBM applies to all flights, both within and outside the EEA (with the exception of the foreseen exemptions from GMBM for small states and domestic flights). As said above, Option 3 encompasses a more relevant risk of distortion if it is not properly implemented and enforced by third countries responsible for the administration of their airlines, as highlighted above. In theory, the potential of distortions remain under the other options, although given the limited economic impact (price per RTK, as explained in section 5.2.1) it is considered to be highly unlikely that companies modify their established routes due to this.

5.2.2.2. COMPETITION BETWEEN ONE STOP SERVICES

The 2006 Impact assessment[50] already explored the risk of route change to use extra-EU hubs under the full-scope EU ETS, but found that the likelihood of such a distortion would only become positive at a carbon price of €75 per tonne CO_2. It is not expected that allowances prices will reach those levels in the period up to 2030.

Under a reversion to the full ETS scope (Option 0), the option with the highest costs per RTK, allowance costs in 2020 would be a mere 0.3% of total operational costs for flights between the EEA and third countries, thus adding only €1 to the cost of a flight with an operating cost of €300 per passenger. The magnitude of distortions under the other options would be even lower due to their lower operating costs.

As all 2017-2020 policy options fully cover intra-EEA flights, possible competition distortions are avoided for intra-European travel. However, as the policy options - depending on different geographical scopes - may not cover non-stop services in the same way as one-stop services, there could be some hypothetical potential for distortion through the use of hubs outside the EEA in order to limit the quantity of emissions covered by the EU ETS.

Similarly to the pre-2021 options, there is some potential for theoretical competitive distortions in all post-2021 options. In options 1 and 2 this would relate to the implementation of the EU ETS to intra-EEA routes, while the GMBM applies to routes out of the EEA. In any case, in the light of the much reduced cost impacts, this risk can be considered as negligible. Under Option 3 this type of risk disappears, but, as explained above, there is a more relevant risk of competitive distortions (including on intra-EEA flights) if the system is not properly implemented by third countries on their operators.

Again, given the limited economic impact (price per RTK) it is considered to be highly unlikely that companies modify their established routes due to this. In case of flights covered by the GMBM under all options 1, 2, and 3, the risk will depend on which routes are finally covered by the ICAO measure, but this is out of the remit of this assessment.

[50] SEC(2006) 1684

5.2.2.3. COMPETITION BETWEEN TOURIST DESTINATIONS

In theory, distortions between tourist destinations are conceivable as illustrated in table 5-8 for the 2017-2020 period and in table 5-9 for the post-2020 period:

Table 5-8: potential distortion of competition between tourist destinations in the period 2017-2020

	Tourist located within EEA	Tourist located outside of EEA
Option 0	No distortion between tourist destinations within the EEA and outside the EEA, as all flights departing and arriving in the EEA are covered.	Potential preference for not travelling to tourist destinations within the EEA, as flights to and from those destinations are covered.
Option 1	Potential preference for travelling to tourist destinations in outermost regions or outside of the EEA, as all other flights to and from tourist destinations within the EEA are covered.	No distortion for travelling to tourist destinations in the EEA, as flights between the EEA and third countries are not covered.
Option 2	Potential preference for travelling to tourist destinations outside of the EEA as only one way is covered, as opposed to both ways for destinations in the EEA.	Potential preference for not travelling to tourist destinations within the EEA, as the return flight is covered.

Table 5-9: potential distortion of competition between tourist destinations in the period 2017-2020

	Tourist located within EEA	Tourist located outside of EEA
Option 0	No distortion between tourist destinations within the EEA and outside the EEA, as all flights departing and arriving in the EEA are covered.	Potential preference for not travelling to tourist destinations within the EEA, as flights to and from those destinations are covered.
Option 1	Potential preference for travelling to tourist destinations outside the EEA, as flights are covered by GMBM (if at all) as opposed to the EU measure.	No distortion for travelling to tourist destinations in the EEA and international destinations in countries not exempted from the GMBM, as GMBM applies to those international flights. Potential preference for domestic destinations or destinations in countries to which the GMBM does not apply.
Option 2	Potential preference for travelling to tourist destinations outside the EEA, as flights are only covered by GMBM (if at all) as opposed to the EU measure.	No distortion for travelling to tourist destinations in the EEA and international destinations in countries not exempted from the GMBM, as GMBM applies to those international flights. Potential preference for domestic destinations or destinations in countries to which the GMBM does not apply.
Option 3	No distortion of competition between international destinations in countries not exempted from the GMBM, if GMBM is applied to those international flights. Potential preference for domestic destinations or destinations in countries to which the GMBM does not apply, as domestic flights are not covered.	No distortion of competition between international destinations in countries not exempted from the GMBM, if GMBM is applied to those international flights. Potential preference for domestic destinations or destinations in countries to which the GMBM does not apply, as domestic flights are not covered.

The impact of different ETS policy options on tourist destinations was analysed in detail within a separate annex in the previous impact assessment in 2013. The overall finding was that wherever impacts could be expected due to competitive distortions between different destinations or the general rise in fuel costs, these would be negligible due to the low allowance costs[51].

A review of the current options confirms that this is still the case. For example, when presuming a 2020 ETS price of €15/tonne CO_2[52], on the popular tourist route London

[51] SWD(2013) 430 final, Annex VII
[52] Presumption is derived from long term price projections

Gatwick to Crete, the allowance costs per RTK are estimated at around 0.6 cents(€). Over the 2,700km flight route, this means a cost of around €17 per revenue tonne, or ~€1.70 per passenger, which is unlikely to distort competition to non-EEA Mediterranean tourist destinations, such as nearby Turkey (e.g. Antalya) under Options 1 or 2, under which no allowance costs, or only allowance costs for the departing flights would respectively arise for flights to Turkey. Equally, the insignificant amounts by which overall flight costs increase are not expected to have an impact on overall tourism receipts, e.g. by reducing the number of tourist flights, or tourists spending less on accommodation and leisure activities at their destination, in order to compensate for higher flight costs.

The forecast allowance prices for the year 2030 result in an increase of around €67 per revenue tonne on the 2,700km flight route from London Gatwick to Crete under the baseline option 0, around €6.70 per passenger. Because the same rules apply for intra-EEA and extra-EEA flights under option 0, no negative impacts would occur (on the contrary, the 2,900km London Gatwick to Antalya flight route would result in slightly higher prices due to the additional 200km).

Option 1 applies more stringent rules to intra-EEA flights (EU ETS), whilst extra-EEA flights only face GMBM international credits prices, which are expected to be lower. Despite this difference, the London Gatwick to Crete route would only create extra costs of around €100 per revenue tonne, or €10 per passenger, whereas the London Gatwick to Antalya flight route would only face GMBM allowance prices of €16 per revenue tonne, or about €1.60 per passenger. Thus, the difference between the most extreme options would be a net decrease in emissions-related charges of just over €8 per passenger compared to Crete. It is unlikely that such a small difference in flight costs would have a tangible distorting impact on tourism in Crete. Under all other options, the gap in allowance costs is even lower.

5.2.3. Impact on Member States' Budgets (Auction Revenues)

Impacts on Member States' budgets are associated to proceeds from the auctions of allowances under the EU ETS. All options that foresee allocation of allowances encompass some sort of revenue generation for Member States.

5.2.3.1. 2017-2020 Options

All 2017-2020 policy options generate auction revenues for public authorities. Since the number of auctioned allowances depends on the geographical scope of the ETS for aviation, the auction revenues in 2020 vary between the policy options as shown below.

Table 5-10: Auctioning amounts and revenues for EU Member States in 2020

	Option 0	Option 1	Option 2
Auctioned allowances (Mio. EUAAs)	31.6	8.2	19.8
EUAA price (EUR/EUAA)	15	15	15
Auctioning revenues (Mio. EUR)	474	124	298

5.2.3.2. Post-2020 Options

As opposed to the pre-2021 policy options, not all of the post-2020 options will generate auction revenues for public authorities. Under option 0, the auction revenue in 2030 would amount to €1,034.2 million and under option 1 to €302.3 million.

Options 2 and 3 would not generate any auctioning revenues, as option 2 does not foresee allocation through auctions and the GMBM does not have any revenue generation mechanism.

Table 5-11: Auctioning amounts and revenues for EU Member States in 2030

	Option 0	Option 1	Option 2	Option 3
Auctioned allowances (Mio. EUAAs)	**24.6**	**7.2**	**0.0**	**0.0**
EUAA price (EUR/EUAA)	42	42	-	-
Auctioning revenues (Mio. EUR)	1,034	302	-	-

5.2.4. ADMINISTRATIVE EFFORT

The administrative effort to implement the various policy options under consideration takes into account the key administrative tasks under the EU ETS and the GMBM that must be performed by the aircraft operators and the competent Member States authorities. These are mostly related to MRV obligations by aircraft operators and compliance activities by competent authorities.

The key administrative tasks associated with the 2017-2020 options are outlined in **Table 5-12** below.

Table 5-12: Key administrative tasks under the EU ETS

Entity	Tasks
Operators	• submission of monitoring plan • notifying changes to monitoring plan • setting up monitoring and report systems • collect, and archive data • prepare annual emission report • ensure that annual emission reports are verified by accredited independent verifiers • submit annual emissions report to competent authority • purchase and surrender allowances
Competent Member States authority	• approval of monitoring plan for each aircraft operator and subsequent updates to the monitoring plan • approval of annual emissions reports as verified by accredited verifiers; • administer registry • calculate the allocation of free allowances • guidance, training, helpdesk for airline operators • accrediting verifiers • monitoring compliance and enforcing in case of non-compliance
European Commission	• prepare legislation and guidance documents • administer the EUTL registry • approves allocations of free allowances • updates aviation operator list

The tasks will generate costs, which can be distinguished between one-off costs or on-going costs. **Table 5-13** illustrates the type of cost created by the individual tasks.

Table 5-13: Type of costs incurred under the key administrative tasks

	One-off Costs	On-going Costs
Aircraft operators	• initial preparation (i.e; interpreting legislation, training employees) • setting up of a system to comply with legislation • elaborate monitoring plan • provision of data for free allocation	• monitoring and reporting of emissions • verification (fees for third party verifiers) • effort of purchasing allowances
Government administrators	• initial preparation (i.e. legislation, guidance documents) • setting up of a system to comply with legislation • approval of monitoring plans • allocation of allowances/defining individual share	• help desk • checking emission report and verification statement • updating EU ETL for aviation sector • compliance

As assessed under the impact assessment[53] accompanying Commission Regulation 600/2012 (on verification and accreditation under the EU ETS) and 601/2012 (on the monitoring and reporting of GHG under the EU ETS) the aim of minimising costs for Competent Authorities and operators has always been one of the main elements of the EU ETS MRV.

Several measures have been taken to reduce costs associated to monitoring, reporting and verifying emissions, both by aircraft operators and by the Commission and national competent authorities. These include the development of IT systems supporting data delivery (e.g. reporting in web-based application), review of data (e.g. through automated checks) and data management (easier updating of documents, storage and tracking of data). Large aircraft operators have well-developed data management systems. This is not always the case for smaller ones. However, operators emitting less than 25.000 CO2 tonnes per year can benefit, since 2014, from using Eurocontrol's "Small Emitters Tool" that facilitates reporting obligations, not requiring additional verification of data (see Section 4.4). In 2015, 268 aircraft operators used this tool to report their emissions, avoiding incurring in additional monitoring and verification costs.

Larger companies must verify emission reports. Generally, under the EU ETS, verification costs are estimated to be on average in the order of € 800 and € 1000. Around 200 Verification Bodies are estimated to be active in the EU ETS system with a total number of verifiers estimated in the order of 1200 individuals.

[53] SWD (2012) 177. http://ec.europa.eu/clima/policies/ets/monitoring/docs/swd_impact_assesment_en.pdf

On the side of competent authorities, access to Eurocontrol's "ETS Support Facility" reduces the cost of checking emission reports and track compliance. Furthermore, coordination amongst competent authorities helps to share best practices and reduce costs. The Compliance Forum, established in 2008, meets every year to carry out these coordination activities. It is composed of all the major national and local ETS Competent Authorities, including aviation ones, and the Commission.

5.2.4.1. 2017-2020 OPTIONS

Due to the similarity with the system up to 2016, option 0 and option 1 are not expected to generate significant additional one-off costs. As the departing flight scope under Option 2 is new, it is likely to result in higher one-off costs, especially as regards the initial preparation and the help desk.

When considering the on-going costs, the administrative effort will become more important with an increase in geographical scope because of the higher volume of flights covered, which significantly raises the efforts related to MRV. Thus, lowest costs correspond to option 1, followed by option 2 and option 0.

5.2.4.2. POST-2020 OPTIONS

In terms of administration, the GMBM will not be significantly different from the EU ETS. The same key administrative tasks will have to be carried out. Even though ICAO has still to develop the implementation guidance and standards, the GMBM will also be based on route-based monitoring, reporting, and verification (MRV) of emissions. Also with regard to transaction costs of buying allowances or international credits, no differences are to be expected compared to the current EU ETS. The administrative costs for operators and national authorities are therefore not expected to be significantly different under the two systems.

However, the implementation of the GMBM will require an additional effort and result in one-off costs. These costs should be minimal for operators and national administrators in the EU ETS as it can be expected that the existing MRV infrastructure and processes can equally be used for the GMBM. No major changes are to be expected in this respect. As the surrendering obligations will be calculated differently under the GMBM than the EU ETS, there will be one-off costs to establish the implementing regulation and develop guidance for the implementation.

In this light, option 0 would result in insignificant one-off costs for intra-EEA and extra-EEA flights. With regard to extra-EEA flights, all other options entail the same one-off costs for the introduction of the GMBM. In relation to intra-EEA flights, option 1, similarly to option 0, only implies insignificant one off costs, whereas options 2 and sub-option 2.1 – that take over more elements from the GMBM – and 3 would entail more changes and thus result in higher one-off costs.

With regard to on-going administrative costs, the MRV costs should not differ significantly because all options require that emission data is reported, monitored, and verified at the level of routes. It is expected that the current MRV requirements under the EU ETS will be to a large extent used for the implementation of the GMBM in the EU. Alternatively, it could also be considered that the MRV rules for the EU ETS are adjusted to be in line with ICAO's MRV rules. In either case, as the same or very similar MRV rules will apply under GMBM

and the EU ETS, the on-going MRV costs should therefore be essentially equal across options.

With regard to other administrative tasks and their costs for operators and national administrators, options 0 and 3 will have lower costs because intra- and extra-EEA flights will be treated equally. With options 1 and 2, the GMBM rules will apply to extra-EEA flights and the EU ETS rules will apply to intra-EEA flights. While there are differences between GMBM and EU ETS rules (e.g. related to the type of allowances or credits to be surrendered, the calculation of the surrender obligation), these differences should not generate significant additional administrative costs for operators and national administrators once IT and administrative processes are established. It is important to note that an operator will only deal with one national administrator ("one-stop shop") even if rules differ for extra- and intra-EEA flights.

Sub-option 2.1. leads to the highest administrative complexity because EU ETS and GMBM rules are applied simultaneously applied to intra-EEA flights. This will complicate also the calculation of the surrender obligation. This is particularly due to the fact that under the GMBM operators' obligations are calculated on the basis of the global growth of the sector compared to 2020 levels while under the EU ETS aircrafts operators' obligations are based on their overall individual emissions compared to a base year.

In the implementation of options 1 and 2, special attention needs to be given to operators from non-EEA countries that operate intra-EEA flights and do not benefit from the small-emitter exemption. These non-EEA operators should in principle be administered by their home country for all international flights (including intra-EEA flights) under the GMBM. To avoid double regulation, adjustments might be needed in the implementation of the EU ETS and the GMBM to avoid that emissions are reported and offset twice. The development of outstanding MRV rules in ICAO, notably on transparency, will be relevant in this regard; equally, the eventual adaptation of the EU ETS MRV in the coming years can play an important role. Avoidance of duplication would require specific administrative checks to ensure that carriers are complying with their obligations under the systems. This would help to ensure a level-playing field between all operators – irrespective of their nationality – on intra-EEA routes.

The administrative burden is expected to be, in principle, greater for small airline operators, since large airline operators are likely to be able to build upon their existing IT systems and even incorporate national variations if necessary. However the review of the EU ETS in 2014 already introduced simplified MRV requirements for small emitters that extremely reduce this burden under the EU ETS.

In any case, the costs of implementing the GMBM would be higher in case this is not done in a harmonised manner within the EU. Using common rules for the implementation of the GMBM – based on the provisions of the current EU ETS Directive – will contain the administrative costs for operators and national administrators.

5.3. SOCIAL IMPACTS

The social impacts of a policy are the impacts on people, their employment prospects, and rights, access to services, quality of life, income, health and safety. Social impacts also focus on distributional impacts of a policy option i.e. across and within different social and economic groups, identifying ‘winners’ and ‘losers’ and assessing whether the policy is likely to improve or aggravate existing inequalities. For this assessment, the main areas of interest are the potential impacts of the policy options on lower income social groups by potentially

reducing access to air travel, and on employment if jobs are lost or created as a result of the policy options.

5.3.1. IMPACT ON LOWER INCOME GROUPS

The minor impact on prices and overall passenger demand both under the 2017-2020 and the post-2020 policy options has already been alluded to above. As the ticket prices will remain stable for intra-EEA flights and even decrease for extra-EEA flights with reduced ETS coverage, low income groups will not be negatively impacted and there will not be a risk to increase inequalities in Europe.

5.3.2. IMPACT ON EMPLOYMENT

Employment impacts may occur from a rise or fall in airlines' activity as a result of the policy options for the period up to 2020 and post-2020. Employment impacts are roughly proportional to overall activity.

In the timeframe between 2017 and 2020, option 1 is expected to generate a 0.4% and option 2 a 0.2% higher EU aviation sector employment in 2020 than the baseline option (option 0).

For the post-2020 options, EU aviation sector employment in 2030 is expected to be 1.5% higher under option 1, 1.39% under option 2 and 2.74% under option 3 in comparison to the baseline option 0.

However, in comparison to the baseline option 0, the policy options up to 2020 and post 2020 reduce government revenues from the emissions trading, thus reducing public sector budgets and employment, or requiring tax increases in other sectors to compensate for the shortfall in revenue - consequently reducing employment in the affected sectors. The impact on total net employment (across the whole economy) is not clear, although it is expected to be even smaller than in the aviation sector.

5.4. IMPACT ON OUTERMOST REGIONS

Under all pre and post-2020 options economic impacts for outermost regions are almost insignificant.

5.4.1. 2017-2020 OPTIONS

Under the 2017-2020 options, option 0 covers flights between EEA mainland and the outermost regions. Such flights are exempted under option 1. However, domestic flights within a given outermost region are covered under the ETS[54]. Under Option 2, outermost regions are treated as 'third countries', except that domestic flights within them are subject to the requirements of the EU ETS. This means that flights from mainland EEA countries to outmost regions and flights within outermost regions are covered. All other flights are not. Thus, option 0 followed by option 2 cover the largest share of flights related to the outermost regions and option 1 the lowest.

The difference in coverage has an impact on aviation *emissions* from EEA related flights within, to and from outermost regions. Option 0 results in 10.21 Mt CO_2 emissions per

[54] Except for flights performed in the framework of public service obligations, which have been exempted under the aviation ETS Directive

annum in 2020, option 1 in 10.37 Mt CO_2 emissions per annum in 2020 and option 2 in 10.28 Mt CO_2 emissions per annum in 2020.

Due to the difference in coverage, *ETS allowance costs* of flights to/from the outermost regions for 2020 will also vary between the three options. However, the impacts are expected to be very limited in all cases, always below €0.1 per RTK and in most cases even below €0.02

Table 5-14: RTK of flights within EU ETS/GMBM scope to/from the outermost regions in 2020

	RTK (millions)			Allowance cost per RTK (€)		
	Op. 0	Op. 1	Op. 2	Op. 0	Op. 1	Op. 2
Canary islands	9,668.7	95.3	4,619.2	0.01	0.02	0.01
Azores	408.0	9.8	126.7	0.01	0.02	0.01
Madeira	605.5	0.0	282.9	0.01	0.04	0.01
Saint Martin	6.7	-	3.4	0.02	-	0.02
Guadeloupe	797.8	1.2	381.2	0.01	0.07	0.01
Martinique	811.1	-	394.5	0.01	-	0.01
Mayotte	49.0	-	21.8	0.01	-	0.00
Réunion	1,445.1	-	621.8	0.01	-	0.01
French Guiana	346.5	-	191.7	0.01	-	0.00

5.4.2. POST-2020 OPTIONS

Under all 2030 options, flights between EEA mainland and outermost regions, as well as within outermost regions are treated as intra-EEA flights.

Nevertheless, CO_2 *emissions* from EEA-outermost regions aviation activities vary between the options. Under options 0 and 1, they would result in 13.16 Mt CO_2 emissions in the year 2030; 13.8 Mt CO_2 emissions in 2030 would be the consequence of option 3 and 13.23 of option 2.

The tables below summarise the impacts modelled or the different options for the year 2030. *Allowance costs per RTK* generally range from €0.02 and €0.03 for options 0 to 2; option 3 has with even lower costs.

These values suggest that overall impacts on flight cost and therefore structure, frequency or accessibility in the regions, as well as impact on the price of goods to be imported/exported are so low that they can be considered as negligible.

Table 5-15: RTK of flights within EU ETS/GMBM scope to/from the outermost regions in 2030

	RTK (Millions)			
	Op. 0	**Op. 1**	**Op. 2**	**Op. 3**
Canary islands	13,612.20	13,638.71	13,315.33	14,185.79
Azores	575.02	582.19	479.90	588.01
Madeira	854.95	856.87	830.17	883.75
Saint Martin	11.14	11.15	11.15	11.40
Guadeloupe	1,189.61	1,192.25	1,163.37	1,231.30
Martinique	1,218.45	1,220.11	1,195.85	1,261.82
Mayotte	79.65	79.87	75.62	80.59
Réunion	2,197.13	2,202.92	1,948.24	2,248.59
French Guiana	554.39	555.55	548.40	565.62

Table 5-16: Allowance costs per RTK of flights within EU ETS/GMBM scope to/from the outermost regions in 2030

	Allowance cost per RTK (€)			
	Op. 0	**Op. 1**	**Op. 2**	**Op. 3**
Canary islands	0.02	0.02	0.02	0.00
Azores	0.02	0.02	0.02	0.00
Madeira	0.02	0.02	0.02	0.00
Saint Martin	0.06	0.06	0.06	0.01
Guadeloupe	0.02	0.02	0.02	0.00
Martinique	0.02	0.02	0.02	0.00
Mayotte	0.03	0.03	0.03	0.01
Réunion	0.02	0.02	0.02	0.00
French Guiana	0.02	0.02	0.02	0.00

5.5. Cross-cutting Issues

5.5.1. Small Emitters

In relation to the aviation sector, practically all small and medium sized enterprises (SMEs) covered by the system are small emitters. Therefore this assessment will focus on small emitters as regards the impact on SMEs.

As explained in previous sections, Regulation 421/2014 amending the EU ETS Directive introduced permanent simplifications for small emitters in relation to MRV as a result of a study by PWC et al at the request of the Commission.

The study by PWC et al. revealed that the EU ETS covers about 300 "large" aircraft operators – with annual emissions higher than 25,000 tons CO2 – who are responsible for about 99 %

of emissions and around 2600 non-commercial small emitters (e.g. business jets) who are responsible for only 1 % of emissions. The study also showed that the MRV obligations generate relatively higher administrative costs for small than large operators. Compared to the level of EU ETS revenues raised from a small emitter, the administrative cost can be up to 4 times higher.

The simplifications for operators with emissions below 25 000 tons introduced by the Regulation are estimated to drastically reduce costs for operators emitting less than 25 000 tonnes CO_2. In particular, these operators can report emissions to competent authorities using Eurocontrol's "Small Emitters Tool".

On the other hand, Regulation 421/2014 also introduced an exemption for small (below 1 000 tons CO_2 emissions per year) non-commercial operators. Whereas commercial aircraft operators (i.e. airlines offering scheduled flights) benefit from a permanent exemption from the EU ETS in case that they emit less than 10 000 tonnes CO_2 per year, small, non-commercial aircraft operators emitting less than 1 000 tonnes CO_2 per year are only exempted until 2020.

Please see the 2013 Impact Assessment, section 2.6 and the 2013 PWC et al. study on ETS aviation small emitters for further details.[55]

5.5.2. LEGAL CONSIDERATIONS AND RELATIONSHIP WITH ICAO

By contrast with the EU ETS for intra-EEA flights which is functioning well and is being fully complied with – by EU and non-EU operators alike -the implementation of the EU ETS on flights to and from third countries (extra-EEA flights) has been subject to controversy in the past. Legal and political issues related to the different options should thus be considered. It is also important to look into the GMBM legal form and the consequences it may have in relation with the different options.

Legal and political aspects in the light of the experience with the implementation of the EU ETS

The EU´s competence to address both domestic and international aviation emissions, including from flights to and from third countries, was recognized by the European Court of Justice on its Judgment of 21 December 2011[56], also considered to be consistent with the Chicago Convention. Therefore, there are no legal competence issues that prevent the development and implementation of any of the options that have been assessed both for the period 2017-2020 and post-2020.

Risks can be identified where the EU regulates flights to or from third countries (option 0 and 2 for the period 2017-2020, option 0 for the post-2020 period). A number of countries opposed the full-scope EU ETS alleging that the EU would have no competence to oblige their operators to participate in the EU ETS. This demonstrates that any of those options could be opposed by third countries and by airlines, using the additional argument that now ICAO has adopted a resolution on a GMBM for international aviation emissions, which is expected to be the global measure to be applied to international flights, as defined by the Chicago Convention, between third countries and the EU. Political opposition may generate retaliation measures from third countries or create compliance problems.

[55] SWD(2013) 430 final, section 2.6, PWC et al. on ETS Aviation small emitters, available at: http://ec.europa.eu/clima/policies/transport/aviation/docs/report_ets_avaiation_small_en.pdf
[56] Case C-366/10

Under those options there is a risk that third country aircraft operators[57] seek not to comply with the EU ETS obligations. In fact, in the past, the United States adopted the 'EU ETS Prohibition Act' which would have allowed its authorities to seek to forbid airlines based in the United States to comply with the EU ETS. While this risk cannot be avoided, non-compliance cases can always be enforced by member states' competent authorities, and fines can be imposed according to the EU ETS Directive. In the past, two airlines have paid fines of more than €1 million each for non-compliance with the EU ETS for intra-EEA flights, and those airlines have now come into compliance under the current intra-EEA scope.

Risks associated with third countries opposition and non-compliance are less significant under options limiting the scope of the EU action to intra-EEA flights (option 1 pre 2020 and options 1 and 2 post-2020). The experience in the period 2013-2016 shows that the intra-EEA scope has not raised political opposition, and aircraft operators, including from third countries, have largely complied with the EU ETS obligations. Compliance rates are above 99% of emissions covered, including more than 100 commercial operators that are based in third countries.

The outcome of the 39th ICAO Assembly and its consequences

While not an ICAO member (the EU is only an observer in ICAO), the EU, through its Member States, made its opposition clear during the negotiations over the GMBM being qualified as the "exclusive" market-based measure. The language in the Resolution would permit co-existence between the GMBM and other regional or domestic market measures - which is relevant for the EU, but also for other States implementing similar measures, such as South Korea or China from next year. Of course, this must be read in conjunction with the preambular language pointing at the need to make sure that the same international emissions should not be accounted and paid twice and that any overlap and duplication should be avoided, thereby also suggesting the possible co-existence between the GMBM and other national or regional measures. This is further reinforced by the Annex on general principles for MBMs added during the Assembly to the second climate-related resolution[58]. The Assembly also adopted another resolution acknowledging the growing existence of regional cooperation and recognised the establishment of regional aviation systems, such as exist in the EU. It supported the need to better integrate them in an ICAO context, which should provide good basis for the removal of current obstacles posed by ICAO's State-based approach, not well enough adapted to how the EU and its Member States operate. Finally, ICAO practice, when adopting standards for instance, also allows States to develop or maintain more ambitious levels domestically, should they so wish. The EU has notably done so in the field of safety for instance.

In any case, it must be noted that rules on MRV and eligibility of emission units are still pending adoption by ICAO. Depending on the content of these rules and how the EU later adapts its MRV rules duplication between the GMBM and the EU ETS could be minimised or even avoided, and consistency ensured, thereby allowing for an harmonious relationship between the GMBM and the EU ETS.

The GMBM legal form and its risks

[57] For information on the commercial airlines based outside the EEA with the highest numbers of flights within the EEA, see the Commission's additional analysis of the 2013 Impact Assessment at http://data.consilium.europa.eu/doc/document/ST-16247-2013-INIT/en/pdf, Annex III

[58] ICAO Resolution A 39-2

A risk that has to be taken into account under post-2020 options (1, 2 and 3) is related to the weakness of the legal form under which the GMBM has been adopted. The GMBM's main features are enshrined in an ICAO Assembly Resolution, which, despite its political importance, is not legally binding. The study on "Possible legal arrangements to implement a global market based measure for international aviation emissions" (by Pablo Mendes de Leon, Vincent Correia, Uwe Erling and Thomas Leclerc for the Directorate General Climate Action[59]) shows that from a legal perspective the best solutions to guarantee that the GMBM is implemented as a binding measure would be an amendment of the Chicago Convention, supplemented with the establishment of Standards (yet to be developed and agreed), or a new treaty to which technical annexes would be attached. However, such processes would take many years to complete as they involve ratification by the States party to the treaty, with the risk of non-achievement in the end. The combination of a resolution with ICAO Standards (yet to be developed and agreed), which is how the GMBM is expected to be regulated, is considered a more pragmatic approach, but it is recognized that its potential to effectively deliver an effective regulatory framework depends significantly on the political support of countries to adopt national legislation and implement the system. Once national rules to implement ICAO Standards are adopted, these become binding, not needing any ratification.

Therefore, a risk exists under options 1, 2 and 3 that the GMBM is not duly implemented by certain countries, or that the adoption of the corresponding domestic legislation is delayed. Airlines from third countries could not fulfil their obligations under the GMBM in the absence of domestic legislation and enforcement measures. Such situation could undermine a homogeneous implementation of the GMBM, leading to competitive distortions. Furthermore, there is a certain risk that the implementation of the GMBM will be delayed or not materialise because a number of important features of the GMBM – notably relating to the transparency, accounting and offsetting rules, registry, compliance and governance – still need to be developed and agreed in ICAO before the GMBM can be effectively implemented.

These legal risks could affect flights to and from third countries under post-2020 options 1, 2 and 3, but also *intra-European flights* under option 3 and sub-option 2.1. To minimize these risks, the EU legislation has and could further elaborate rules applicable by default, including under post-2020 options 1 and 2. In all circumstances the Commission maintains the right of initiative at any stage, should these risks materialise.

Conclusions: the GMBM and its compatibility with the different EU ETS options

- Before 2020 the GMBM will not be operational. No consideration needs to be given to the interaction of the possible options with the GMBM.

- So far, the implementation of the EU ETS on intra-EEA flights has not faced legal nor political challenges. Compliance rates are very high. This confirms that past controversies on the EU ETS were limited to extra-European international flights

- The Assembly Resolution on the GMBM is politically relevant and may have legal consequences in States, but is not an international treaty. In addition, it does not exclude the possible co-existence between the GMBM and other schemes.

[59] http://ec.europa.eu/clima/policies/transport/aviation/docs/gmbm_legal_study_en.pdf

- The legal weakness of the GMBM could pose risks in terms of implementation of the measure by third countries, which could entail competitive distortions and affect its climate objective

- The GMBM Resolution is expected to be completed with standards and recommended practices (SARPs) whose content still needs to be developed. Standards have legal effects, requiring domestic legislation to be implemented. Some rules could also be contained in recommended practices or guidance documents. It must be noted that states can file differences to SARPs and it is usual practice for states to impose stricter requirements than those contained in ICAO rules. The development and implementation of SARPs are relevant steps through which legal and political aspects related to the different post-2020 EU ETS options could be addressed.

6. HOW DO THE OPTIONS COMPARE?

6.1. ENVIRONMENTAL IMPACTS

In general, the most relevant environmental impacts are the consequence of the reductions achieved in other sectors through the purchase and cancellation of units. In the 2017-2020, these impacts vary with the scope; after 2020 the divergences are linked to the different climate ambition between the EU ETS and the GMBM. Importantly, the use of international credits under the GMBM means that it does not contribute to reduce emissions in the EU, but in third countries, affecting the ability to reach the domestic 2030 climate target. The direct impacts in terms of total emissions under each option show lower variations.

6.1.1. 2017-2020 Options

The wider the geographical scope of the policy option, the lower the global annual CO_2 emissions from aviation activities. Consequently, the option with the narrowest geographical scope (option 1) would result in an additional 0.24% of emissions compared to the option with the widest geographical scope (option 0). Option 2, would result in 0.12% more emissions than option 0. However, due to the short period of time during which the policy options will be applicable, the difference in effects on CO_2 emissions from the aviation sector between the options is relatively small (2.26 million CO_2 emissions per year).

Similarly, the additional emission reductions that can be achieved by other ETS sectors through the demand for EU allowances from the aviation sector depend on the geographical scope of the policy option. In this case, variations are significant: under option 0, demand is 5 times higher and under option 2, demand is three times higher than under option 1.

6.1.2. Post-2020 Options

The emission savings will become lower the more the EU ETS for intra-EEA flights is converged to the GMBM. Thus option 3 will result in the least emission savings with 0.73% higher global aviation emissions and 2.81% higher emissions in the EEA per year than option 0. The difference in emission savings between options 1 and 2 compared to option 0 is almost identical with an increase of 0.47% and 0.5% respectively at global level (2.07 and 2.17% at EEA level).

The additional emission savings that can be achieved in other sectors through the demand for EU allowances and international credits from the aviation sector show higher variation. These are the lowest under option 3 with 135.4 Mt annually on average in the 2021-2030 period. This is due to the fact that the required reduction in emissions for intra-EEA flights is less ambitious under the GMBM option compared to the other options with additional EU action.

Option 1 and option 2 show better results: they are likely to result in similar emission reductions by other sectors with 170.3 MT CO_2 and 170.4 MT CO_2 additional emission reductions per year (2021-2030) respectively. Moreover, it has to be recalled that intra-EEA flights under options 1 and 2 would contribute to domestic emissions reductions by other EU ETS sectors by requiring the purchase of around 49.5 million allowances annually (around 26 million under sub-option 2.1).

Since the price of international credits is expected to be lower than the price of EU allowances during the 2021-2030 period and not being any limits on the use of international credits for offsetting under option 3, this is the only option where intra-EEA aviation will not trigger any demand for EU allowances from other sectors. The whole amount of emissions to be offset, including the part corresponding to intra-EEA activity would be covered with international credits. This means that there will be no contribution from intra-EEA aviation to domestic reductions in the EU under option 3, while all other sectors would be required to step up their efforts after 2020. This shortfall in ambition by intra-EEA aviation under option 3 could put at risk the economy-wide -40% reduction to which the EU committed in the Paris Agreement.

6.1.3. Impact on the EU's 2030 targets and commitments under the Paris Agreement

The EU and its Member States are committed to a binding target consisting in an economy-wide objective of an at least 40% reduction in GHG emissions by 2030 compared to 1990. The European Council of October 2014 concluded that the target be met in the most cost-effective way possible, by reducing emissions in the non-ETS sectors by 30% compared to 2005 and in the ETS sectors by 43% compared to 2005. To achieve the latter, it has been proposed to increase the linear reduction factor applicable to the EU ETS sectors from 1.74% to 2.2% after 2020. For these calculations the aviation sector, including all intra-EU flights, was considered as an EU ETS sector. This was reflected in the Nationally Determined Contribution submitted by the EU and its Member States under the Paris Agreement.

Assuming regulation of intra-EEA aviation under the EU ETS (post-2020 options 1 and 2), demand for allowances would be around 23 million annually between 2021 and 2030 (230 million over the period) as implied by the low emissions growth scenario in PRIMES, and around 49.5 million annually (495 over the period) in AERO. This would be the sector contribution to reaching the EU's 2030 climate goals, along with other sectors.

If the aviation sector was not regulated under the EU ETS but exclusively by the GMBM the demand for allowances from aviation would no longer occur. The regulation under the GMBM (as under post-2020 option 3) would not foster any domestic emissions reductions in the EU, as the GMBM is operating on the basis of international offsets. Aviation would thus not contribute to the EU's climate goals. Therefore, in order to attain the agreed domestic reduction in the EU, other sectors would need to increase their contributions.

6.2. Competitiveness and Economic Impacts

Divergence in impacts on operating costs, price and demand between options are very limited. Impacts can be considered negligible compared to those associated with other types of costs, such as fuel costs. This also leads to absence of risk of competitive distortions. The highest risk, in this regard, can be associated to a possible non-implementation of the GMBM by certain countries, which could result in competitive distortions. This could affect intra-EEA flights under option 3 in case a state does not properly implement the GMBM on its operators flying between EU member states. Finally, with regards to impacts on national budgets, the larger is the scope of emissions covered by the EU ETS, the higher are the revenues generated by auctions of allowances.

6.2.1. Impacts on Operating Costs, Prices and Demand

6.2.1.1. 2017-2020 OPTIONS

In general, the differences in impacts on operating costs, price and demand are minimal. The narrower the geographical scope of the 2017-2020 option, the less significant the additional operating costs resulting from it. Thus the operating costs are the highest under option 0 and the lowest under option 1. Compared to option 0, the operating costs are -0.1% lower under option 1 and -0.04% lower under option 2. The three options result in an almost identical average price per RTK (difference of less than 1% per RTK) with option 0 having the highest price per RTK and options 1 and 2 having the same price. The reduction in price per RTK is reflected in an overall, albeit small, raise in demand for intra-EEA and extra-EEA flights, which increases with the narrowing of the scope of the option. Compared to the baseline, the overall RTK increases by 0.5% under option 1 and by 0.25% under option 2.

6.2.1.2. POST-2020 OPTIONS

Divergence in impacts on operating costs, price and demand are also very limited in the post-2020 scenarios, especially on flights to and from third countries. The operating costs and the average price per RTK are the lowest under option 3 and the highest under the baseline full scope option (option 0).

All options show a reduction of costs compared to the baseline. Compared to the baseline, the operating costs in 2030 under option 3 are -2.61% lower for intra-EEA and -2.53% lower for extra-EEA flights. For intra-EEA flights, the operating costs in 2030 would also be lower under option 1 (-0.43%) and option 2 (-0.59%) albeit less significant than under option 3. For extra-EEA flights, the reduction of operating costs under option 1 (-2.56%) would be almost identical as under option 3 and slightly lower under option 2 (-2.13%).

Similarly, the average price per RTK is highest under the full scope (baseline) option 0 for intra-EEA and extra-EEA flights. In contrast, it is the lowest under option 3 for intra-EEA flights with a change in price per RTK of -2.75% for intra-EEA and -2.65% for extra-EEA flights compared to option 0. For intra-EEA flights, the calculated price is almost identical for options 1 and 2 and slightly less compared to option 0 (-0.5% and -0.65% respectively). The calculated price for extra-EEA flights under options 1 and 2 is identical to the price under option 3, which results in a change in price per RTK of approximately -2.65% for options 1 and 3 and of -2.22% for option 2.

The change in price per RTK compared to the baseline is reflected in an overall raise in demand for intra-EEA and extra-EEA flights in comparison to option 0. Consequently, the overall RTK for intra-EEA (+2.92%) and extra-EEA (2.18%) flights would increase the most significantly under option 3. The raise in demand would be less significant under option 1 (+0.5% for intra-EEA and +2.04 for extra-EEA flights) and option 2 (+0.67% for intra-EEA and +1.71% for extra-EEA flights).

6.2.2. IMPACTS ON LEVEL PLAYING FIELD

Although none of the policy options directly distort competition, there is a theoretical risk of indirect distortion of competition in favour of city-pair routes outside the EEA in border regions, the use of hubs outside of the EEA in one-stop services and tourist destinations outside the EEA. However, it must be noted that distortions have not been identified during the 5 years where the EU ETS has been applied to aviation, and this should be even less the case where other routes will be covered, after 2020, by a new market instrument such as the GMBM.

As anticipated, the implementation of the GMBM may represent a risk of competitive distortions if a state, for political or capacity reasons, does not apply it to its operators. This would affect extra-EEA flights under options 1 and 2, but also intra-EEA flights under option 3, as there would be airlines flying within Europe being administered by third countries.

6.2.2.1. 2017-2020 OPTIONS

In relation to the 2017-2020 options, the risk of distortion of competition is highest under option 0 and lowest under option 1 with regards to city-pair routes and one-stop services with option 0 having the most important impact on the total operational costs for flights. Conversely, the risk is inversed in relation to the indirect distortion of competition between tourist destinations, with the risk being highest under option 1, which exempts extra-EEA flights from the scope of the EU ETS and lowest under option 0, treating intra-EEA and extra-EEA flights equally and thus making extra-EEA flights than intra-EEA flights of the same distance.

The risk of indirect distortion of competition is considered to be theoretical under all three policy options, mainly due to the low magnitude of the extra allowance costs.

With regards to the city pair routes and the one stop services, the geographical borders between European and the rest of the world, from which it is mostly separated by sea, as well as the tariffs, visas and other barrier to the free movement of goods and people that generally exist between the EEA and other countries render the potential risk even more hypothetical.

6.2.2.2. POST-2020 OPTIONS

As with the pre-2020 options, significant distortions in relation to city-pairs and one-stop services are unlikely to occur in practice, partly due to the low magnitude of the extra allowance costs relative to total costs, as well as the geographical and political barriers to the free movement of goods and people that generally exist between the EEA and other countries. Under the full ETS scope (Option 0), allowance costs in 2030 would on average account for around 3% of costs for flights between the EEA and third countries, thus adding around €10 to the cost (and price) of a flight with an operating cost of €300 per passenger. Cost increases (and therefore potential distortions) are generally significantly lower for all other options, and variations amongst them not relevant, as the GMBM would in all cases cover flights to and from third countries – and non-EEA related routes with higher traffic. As said above, there are specific risks attached to option 3 in case some states do not properly implement the GMBM on their operators.

For the same reasons mentioned above, also in relation to tourism is the potential risk purely theoretical.

6.2.3. IMPACT ON MEMBER STATES' BUDGETS (AUCTION REVENUES)

All 2017-2020 policy options generate auction revenues for public authorities. The wider the geographical scope of the policy option, the more important the auction revenue. The auction revenues generated under option 1 represent 26% of the auctioning revenues generated under the full scope option; under option 2 these are 63% of full scope ones.

In contrast, only options 0 and 1 under the post-2020 scenario would generate auctioning revenues. Due to the larger scope, the revenue would be more than three times higher under option 0.

6.2.4. ADMINISTRATIVE EFFORT

6.2.4.1. 2017-2020

In terms of one-off administrative costs, option 2 would generate the highest administrative effort, whereas the effort resulting from options 0 and 1 would be almost identical. In relation to the on-going costs, the administrative effort would be the highest under option 0 and lowest under option 1. Option 1 is thus, overall, the one with lower costs.

6.2.4.2. POST-2020

In terms of administration, the GMBM will not be significantly different from the EU ETS. However, technical rules under ICAO, notably on MRV, still need to be developed and adopted. Once this is the case, the assessment of administrative efforts could be refined.

In any case, the same key administrative tasks will have to be carried out. The GMBM will also be based on route-based monitoring, reporting, and verification (MRV) of emissions. The administrative costs for operators and national authorities are therefore not expected to be significantly different under the two systems.

However, the implementation of the GMBM will require an additional effort and result in one-off costs. These costs should be minimal for operators and national administrators in the EU ETS as it can be expected that the existing MRV infrastructure and processes can equally be used for the GMBM.

Option 0 followed by option 1 would result in the lowest one-off costs due to their similarity with the current system. Options 1, 2 and 3 would raise additional one-off costs resulting from the implementation and operation of the new requirements under the GMBM. They would be higher under option 3 because of the GMBM's coverage of both, intra EEA and extra EEA flights and highest under 2.1, as both systems are applied jointly on intra-EEA flights (plus the GMBM on extra-EEA ones).

With regard to on-going administrative costs, the MRV costs should not differ significantly because all options require similar compliance (e.g. MRV of emissions at the level of routes). To keep administrative costs to a minimum and avoid double regulation, the administrative rules under the EU ETS and the GMBM should be consistent and converge as much as possible, taking account of the technical guidance still to be developed by ICAO. Complexities attached to sub-option 2.1 mean that the administrative effort for this alternative is expected to be higher than under the other options.

6.3. SOCIAL IMPACTS

6.3.1. LOWER INCOME GROUPS

Due to the predicted stable ticket prices under all policy options up to 2020 and post-2020, no impact is expected on lower income groups.

6.3.2. EMPLOYMENT

The impact on total net employment (across the whole economy) is considered to be difficult to estimate and thus unclear. With regards to employment in the aviation sector, between the 2017-2020 policy options, is assumed to be highest under option 1 and lowest under option 0. After 2020, employment in the aviation sector is likely to grow under all options compared to the baseline, more under option 3 and almost identically in relation to options 1 and 2. In any case, variations are small (less than 1.3% difference compared to baseline between options 1 and 3).

6.4. OUTERMOST REGIONS

Overall, the allowance costs per RTK remain very low on flight with outermost regions and are therefore is not expected to significantly affect structure, frequency or accessibility of flight services or to have any impacts on the price of imported or exported goods.

Under the 2017-2020 policy options, option 0, followed by option 2 result in the lowest allowance costs per RTK in the outermost regions. Post-2020, option 0 is expected to lead to the highest allowance costs per RTK. Option 3 followed by option 2 result in the lowest allowances costs per RTK, being in all cases very small.

The direct emission reductions resulting from the coverage of EEA flights to, from and within outermost regions in 2020 are the most important under option 0 and the least significant under option 1. After 2020, they are lowest under options 0 and 1, closely followed by option 2.

6.5. SMALL EMITTERS

With regards to all of the post-2020 options, extending the de-minimis threshold for non-commercial aircraft operators beyond 2020 would maintain the environmental effectiveness, due to the small amount of GHG emissions covered by the exceptions, while containing the administrative burden and costs for aircraft operators, as well as for national administrations. Simplified MRV procedures for small emitters are assumed not to change.

6.6. LEGAL AND POLITICAL CONSIDERATIONS

There are no legal obstacles to any of the options. However, there is a risk that a number of third countries and airlines oppose the EU measure alleging that the EU would have no competence to oblige their operators to participate in the EU measure. The risk of such opposition increases where the EU regulates extra-EEA flights (2017-2020: options 0 and 2; post-2020: option 0). Options 1 for the period 2017-2020 and 1 and 2 post-2020 only regulate intra-EEA flights, as in the period 2013-2020, where the EU ETS has been successfully applied and compliance rates have been very close to 100%. For the post-2020 period, option 3 should not raise any negative reactions from stakeholders in the aviation industry.

Opposition/non-acceptance of an option could lead to a higher risk of non-compliance by operators, for which the EU ETS contains legally-binding enforcement measures.

A potential risk for all of the options entailing the GMBM post-2020 (all options except for option 0) is that the GMBM is not duly implemented by certain countries, or that the adoption of the corresponding domestic legislation is delayed. In particular with option 3, this could lead to distortions on the internal EU market for aviation if responsible administrations in

third countries do not properly enforce the compliance of their airlines with the GMBM for flights operated within the EEA.

6.7. CONCLUSIONS

Pre-2020 period

All three options for the period running from 2017 to 2020 show very similar results in terms of intra-EEA emissions, economic and social impacts. Due to the short period of time during which the policy options will be applicable, the difference in effect on CO2 emissions from the aviation sector between the options is relatively small (2.26 million CO2 emissions per year).

To ensure a smooth transition towards the post-2020 period, including by allowing ICAO to finalize the remaining work to allow for the start of the GMBM in due time, option 1 is preferred, i.e. continuation of the EU ETS for intra-EEA flights as in 2013 to 2016. This option allows maintaining the current level of environmental ambition, results in the lowest operating costs and price per RTK, and requires the lowest administrative effort. Its impacts on the level playing field, as well as its social impacts, are, as is also the case for the other two options, negligible. Finally, the EU ETS for intra-EEA flights has a compliance rate of above 99% which shows its acceptance with all airlines (including the major US and China carriers) that operate within the EEA.

Post 2020 period

The assessment shows significant differences between the options with regard to the climate impact from intra-EEA flights:

Option 3 – the application of the GMBM – the analysis and conclusions will need to be complemented in the light of further development on the implementation of the GMBM and the risks identified can be better assessed. While the GMBM is meant to address international emissions on a global scale, it will not by itself contribute to the EU's 2030 objective of reducing emissions by at least 40% through domestic efforts, as set out in the EU's commitment to the Paris Agreement based on its currently agreed basic features and nature..

Options 1 and 2 lead directly to significant emissions savings. The required emission savings from intra-European aviation will be in line with the efforts of other sectors in the EU economy. Furthermore, as airlines will surrender EU ETS allowances, the emissions from intra-EEA flights will be offset by domestic emissions reductions within the EU.

Sub-option 2.1 is a hybrid between options 2 and 3 because airlines would have the same obligation as under option 2 but could offset their emission growth after 2020 with international credits instead of EU ETS allowances. This could lead to lower emission reductions within the EU compared to options 1 and 2, and would mean that the contribution of intra-EEA aviation would decrease at a time where all other sectors of the EU economy would be required to intensify their efforts to meet the EU 2030 climate target.

With regard to the relationship to ICAO, option 0 – a return to the full scope of the EU ETS covering all arriving and departing flights – would revive international tensions and most likely hinder the introduction of the GMBM at the global level. The option 0 should therefore be discarded. All other options resolve the main disagreement with international partners, i.e. the coverage of emissions by the EU ETS outside the European airspace, because extra-EEA flights will only be covered by the GMBM. As regards intra-EEA flights, options 1, 2, and sub-option 2.1 are in line with the ICAO Resolution listing principles for market-based

measures and build on the current EU ETS for intra-EEA flights that has been successfully implemented. Option 3 – the implementation of the GMBM for intra-EEA flights – would avoid any risk of criticism but this would come at a high environmental cost (as discussed above).

The other economic and social impacts do not differ significantly between the post-2020 options.

Finally the analysis provided above will need to be reassessed ahead of the start of the GMBM to take account of new developments as regards its implementation, including the development of rules for eligibility of units and transparency. According to the Resolution adopted at the 39th ICAO Assembly, SARPs on eligibility of units and monitoring, reporting and verification must be adopted by 2018. Following that, states should start taking steps towards the implementation of the GMBM. Other developments are also needed, such as a registries system or setting up the relevant bodies for the governance of the GMBM.

Therefore, it can be concluded that for the post-2020 period no final decisions should be made at this stage. As explained above, in order to facilitate the process towards the operationalization of the GMBM option 0 should be discarded, so the intra-EEA scope could become the default option. Once there is more clarity on the rules and actions taken by ICAO and third countries to implement the GMBM, a report and review under the EU ETS Directive should be undertaken.

Table 6-1. Comparison of the 2017-2020 policy options against effectiveness and efficiency criteria

Objectives / Policy option	EFFECTIVENESS		
	Objective 1 Environment	**Objective 2 Economic**	**Objective 3 ICAO relationship**
Option 0	++	≈	--
Option 1	+	+	≈
Option 2	+	-	-

Magnitude of impact: ++ strongly positive; + positive; – – strongly negative; – negative; ≈ marginal/neutral; ? uncertain; n.a. not applicable. Cost-effectiveness is assessed by comparing costs and emisions reductions achieved.

Table 6-2. Comparison of the post-2020 policy options against effectiveness and efficiency criteria

Objectives / Policy option	EFFECTIVENESS		
	Objective 1 Environment	**Objective 2 Economic**	**Objective 3 ICAO relationship**
Option 0	++	≈	--
Option 1	+	≈	≈
Option 2	+	≈	≈
Option 2.1	-[60]	-	+
Option 3	--[61]	≈	++

[60] Can only be fully assessed once all details of the GMBM are known
[61] Can only be fully assessed once all details of the GMBM are known

Magnitude of impact: ++ strongly positive; + positive; – – strongly negative; – negative; ≈ marginal/neutral; ? uncertain; n.a. not applicable. Cost-effectiveness is assessed by comparing costs and emisions reductions achieved.

7. HOW WOULD ACTUAL IMPACTS BE MONITORED AND EVALUATED?

The policy objectives identified in section 3 should be monitored through operational objectives as defined in the table below. Operational objectives and respective indicators for both the periods 2017-2020 and post-2020 can be defined jointly, as the nature of the policy objectives is similar.

Table 7-1: Operational objectives

Policy objectives	2017-2020	Post 2020	Operational objectives	Indicators
Objective 1: ***Environment***	Address aviation emissions to meet 2020 targets	Address aviation emissions to meet 2030 targets Maximize global impact through GMBM	Sufficiently reduce aviation emissions or contribute to EU (and global) efforts with reductions in other sectors.	Aviation emissions Reductions achieved in other sectors
Objective 2: ***Economic***	Maintain competitiveness including reduced administrative burden	Maintain competitiveness, including reduced administrative burden	Contain costs. Minimise divergence between current and future technical implementation rules	Units prices multiplied by offset emissions compared to aviation operational costs
Objective 3: ***ICAO***	Development and readiness for GMBM Acceptance of EU measure	Implementation of GMBM Acceptance of EU measure	Adoption of ICAO rules, actual implementation of GMBM. No rejection of EU measures and compliance with them.	Concrete international developments Compliance rates

The Commission will periodically assess the implementation and results of the chosen option. This will be done on the basis of quantified data as regards objectives related to the environmental and economic impacts, and from a more qualitative perspective as regards other objectives, as specified below. The EU ETS implementation provides transparent information that allow, by large, monitoring the abovementioned objectives; the GMBM is expected to provide additional information, notably on global international aviation emissions.

The general policy objective of ensuring the aviation sector's adequate contribution to reducing the impacts of climate change and meting the corresponding climate targets will be monitotred on a yearly basis through the information provided by compliance data under the EU ETS and, once implemented, under the GMBM as well.

Under the EU ETS, every year, aircraft operators will report their emissions and surrender the corresponding amount of allowances. Compliance actions take place electronically through the Union Registry, which allows collecting individual and aggregated information. The registry also includes data on the allocation issued under the EU ETS. This data will easily allow the monitoring:

(a) The evolution of aviation emissions covered by the EU ETS: the Union Registry provides annual emission data, as registered by the aircraft operators.

(b) The contribution of aircraft operators to foster emission reductions in other ETS sector. Apart from emissions data, the Union Registry also contains allocation data. This allows calculating the amount of additional units purchased by aircraft operators.
(c) The economic impacts of the system. As explained, the registry data allows calculating the amount of units companies would have to purchase. Unit prices are available through trading platforms as well as, in the case of allowances, from the periodic auctions that take place regularly throughout the year. This information makes possible estimating the actual economic impact of the system for aircraft operators.
(d) Compliance data.

Similar mechanisms, including a registry, are expected to be in place for the implementation of the GMBM, which should provide information on its functioning at global level.

The data mentioned above, available from the Union Registry, will allow under both periods the evaluation of the extent to which the aviation sector is contributing to meet the EU climate targets either by reducing emissions or through the purchase of units from other sectors under the EU ETS cap for stationary installations, as well as the economic impacts it represents. The Commission will periodically assess those aspects in its reports, including its annual Carbon Market Report.

The policy objectives of enabling the development of the GMBM (2017-2020) or facilitating its implementation from 2021 to maximize the global mitigation impact (post-2020), as well as to ensure the international acceptability of the EU ETS are of a different nature. Monitoring these objectives will require a qualitative assessment based on factual information, rather than a quantitative one. This will require the Commission to closely follow the international developments in the coming years, including the adoption of relevant Standards and Recommended Practices by ICAO. In this light, it is recommended that the Commission reports on these developments to the European Parliament and the Council, and makes proposals, as appropriate, to adapt to them.

ANNEX 1

PROCEDURAL INFORMATION

1. Organisation and Timing

The Directorate-General (DG) for Climate Action was leading the preparation of this initiative and the work on the impact assessment in the European Commission.

An inter-service steering group (ISG), chaired by DG Climate Action and the Secretariat-General was established in February 2016 for preparing this initiative. The ISG met four times in the period from February 2016 to October 2016. The following Directorates-General (DGs) participated in the work of the group: Secretariat-General (SG), Legal Service (SJ), EEAS, DG GROW, DG MOVE, DG ENER, DG ENV, RTD, DG REGIO, DG FISMA and DG TRADE.

An indicative roadmap was adopted in September 2015.

An online public consultation took place from 7 March to 30 May 2016 (see Annex 2).

2. Consultation of the Regulatory Scrutiny Board

The Regulatory Scrutiny Board received the draft version of the present impact assessment report on 27 October 2016 and following the Board meeting on 23 November 2016 issued a positive opinion on 25 November 2016. The Board made several recommendations. Those were addressed in the revised IA report as follows:

RSB recommendations	Modification of the IA report
The report should explain why there is a need to act now for the post-2020 period, given that several important features of the GMBM are still unknown. It should also clarify the timeline of the various decisions to be taken and the possible need for review clauses in the various options.	Subsection 1.2, on the problem definition, has been further developed to explain why a first assessment of the post-2020 scenario has been carried out. Section 6.7 of the impact assessment clarifies that no final decision is made on the post-2020 period. A new review will have to be carried out before implementing the GMBM. The timeline is also further clarified.
The report should better justify or reconsider its choice of baseline, which appears unrealistic and which the report in fact recommends discarding as a viable option.	The choice of the baseline has been better justified in section 4, explaining why the baseline (full-scope) corresponds to a "do-nothing" scenario.
The report should more thoroughly explain the legal compatibility between the envisioned GMBM and the EU ETS if both are to apply in parallel.	The structure of Section 5.5.2, on legal issues and the relationship with ICAO, has been reviewed to improve clarity and a specific box addressing the RSB recommendation has been added.
The report should clarify how each option would contribute to reaching the 2030 EU climate objectives and the Paris Agreement, and how other parallel policies contribute. The analysis should present the scale of the aviation	The EU 2030 climate objectives and the commitments under the Paris Agreement have been further explained under sections 1.2 and 1.3, including by clarifying the role of aviation. A specific subsection 6.1.3 has been included to clarify how the different post-2020 options

ETS, and explain what costs the options would impose on other sectors in the ETS system.	contribute to these goals. Section 5.1 includes a specific subsection on the impacts on other ETS sectors where additional explanations have been introduced to address the RSB comment.
The report should explain the differences in cost and benefit estimates that derive from the two quantitative models used and the implications of these results for the impacts and comparison of options.	Section 5 and Annex 4 have been completed with more information on the tools (AERO and PRIMES) used to model quantitative impacts and the implications this has.
The report should reflect stakeholders' views in a comprehensive and balanced way throughout the report, and the report should explain why it does not consider some stakeholder favoured options.	New content has been added throughout section 4, explaining which options are favoured by different stakeholders, and explain why some have been discarded.

3. Evidence and external expertise used

The underlying econometric modelling and analysis in this study was carried out by Ricardo-AEA Ltd. The modelling is based on the latest version of the AERO-MS tool, which uses flight operations for 2010 as its baseline and it includes scenario years of 2020, 2030 and 2040. See Annex 4 for further details on the model used. The results on direct environmental impacts (i.e. emissions from that aviation sector), the results were checked against data resulting from EUROCONTROL analysis on emissions forecasts.

As regards GHG emission forecasts/projections referred to in Annex 5, this study used the United Nations Enironmental Programme's Emission Gap Report 2015 and the fifth Assessment Report by the Intergovernmental Panel on Climate Change (IPCC) in relation to general international emissions forecast. For emissions from intenational aviation specifically, the study relied on the 2016 ICAO Environmental Report. In relation to overall EU GHG projections in Annex 5, reports from the European Environmental Agency were used as a basis.

Any GHG emission projections are always accompanied by uncertainties resulting from various sources, such as social, economic and technical trends.

Moreover, the study heavily relied on the previous Impact Assessment from 2013, in relation to the emission reduction potential from technical and operational measures, impact on tourism, as well as in relation to small emitters.

ANNEX 2

STAKEHOLDER CONSULTATION

1. Process and quantitative results of the public consultation

The European Commission organized a public online consultation from 7 March to 30 May 2016, i.e. 12 weeks on market-based measures to reduce the climate change impact from international aviation[62], which sought input on questions concerning the policy options currently being developed at the International Civil Aviation Organisation (ICAO) and in relation to the EU emissions trading system (EU ETS). The public consultation was carried out using the "General principles and minimum standards for consultation of interested parties by the Commission".

While the consultation was open to everyone, it received responses in particular from individuals/private persons, civil society organisations, private enterprises, professional organisations, international organisations and public authorities.

The public consultation consisted of a questionnaire in English with eight main questions that combined multiple choices with space limited to 4 000 characters to explain the choices made. Respondents were also given the opportunity to provide further comments at the end of the questionnaire. This report follows the structure of the eight main questions and the possibility for general comments in the consultation questionnaire. The individual stakeholder submissions can be downloaded on the consultation website.

2. Stakeholders' participation in the public consultation

The Commission received 108 formal replies from a broad spectrum of stakeholders (**see Figure II-1**), as shown in **Table II-1**, however no responses were received from airports, the aircraft manufacturing industry or technology suppliers.

Table II-1: Classification of stakeholders responding to the questionnaire

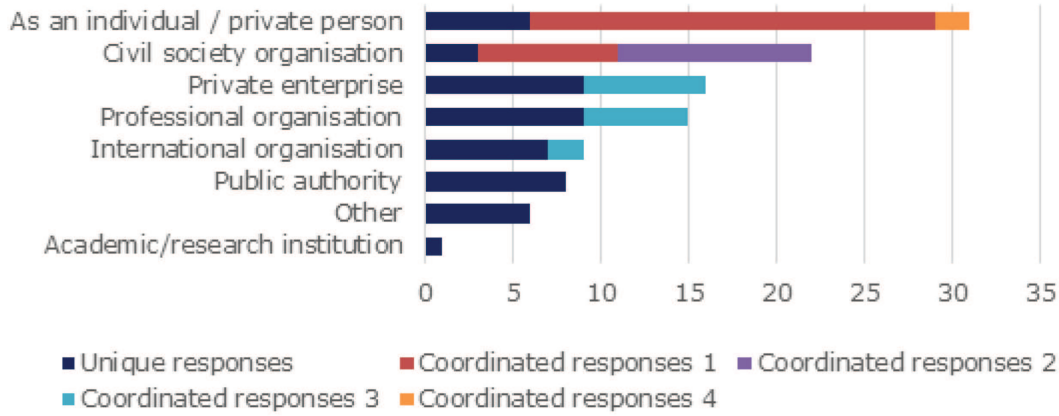
Stakeholder category	Number of responses	% of responses
As an individual / private	31	29%
Civil society organisation	22	20%
Private enterprise	16	15%
Professional organisation	15	14%
International organisation	9	8%
Public authority	8	7%
Other	6	6%
Academic/research	1	1%
Grand Total	**108**	**100%**

Notes: Other includes: an airline representative, a European industry association, an interest group (university lecturer and students), a non-governmental organisation - airline trade association, an organisation representing the outermost regions of the EU and a trade association.

[62] The results of the public consultation are available at http://ec.europa.eu/clima/consultations/articles/0029_en.htm

A number of coordinated responses were received, indicating that respondents followed a template for answers. Four different templates were identified from the analysis of the sample, as shown in **Figure** 0-1. However, since respondents were free to adapt the answers to correspond with their own views all responses have been analysed individually in the following sections.

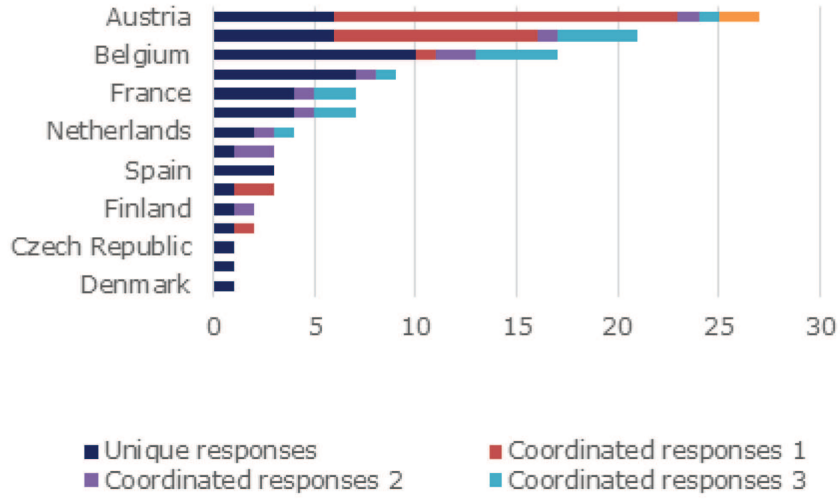
Figure 0-1: Distribution of the responses by stakeholder group - showing coordinated responses



A total of 24 responses were received from airlines or aviation associations. However, they identified themselves in a range of stakeholder groups – private enterprise (10), professional organisations (7), international organisation (6) and other (1). The majority of this report considers responses by the stakeholder categories that were listed in the survey (as shown in **Figure** 0-1), however, where appropriate, the responses given by the group of airlines and aviation associations are considered as well.

Responses were received from respondents residing in, or organisations based in, 13 EU Member States (Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Hungary, Italy, Netherlands, Portugal, Spain and the United Kingdom), while responses were also received from other non-EU locations such as Hong Kong, Kenya, Lebanon, Norway, Switzerland, United Arab Emirates and the United States. The distribution of responses by country of residence (for individuals) or by country of establishment (for organisations) is shown in **Figure** 0-2. In total, 44% of the responses were from Austria or Germany, while a high proportion of responses (16%) were also received from organisations located in Belgium. A total of 31 responses were received from individuals; of these, 27 (87%) were from Austria and Germany.

Figure 0-2: Distribution of the responses by country of residence/establishment



Notes: Other includes: Hong Kong, Kenya, Lebanon, Norway, Switzerland, United Arab Emirates and United States

3. Responses to the individual questions

a. Mitigation efforts from international aviation

Overall, most stakeholder groups agreed that ambitious targets for emissions reductions in international aviation should be agreed and that a MBM is one way to reduce emissions from international aviation. However, there were differences in relation to the desirable level of ambition and that appropriate mechanisms to reduce emissions. These are summarised in the following paragraphs.

Public authorities considered that the ambition level for emissions reductions in international aviation needs to be raised in order to limit the global temperature rise to below 2 °C. The responses consistently showed support for pursuing action through ICAO and most mentioned the need for net emissions not to exceed 2020 levels (CNG2020).

Civil society organisations considered that a more ambitious approach is required and were strongly in favour of increasingly ambitious targets over time, in line with achieving the 1.5 ºC Paris goal. As aviation emissions are projected to continue to grow, in-sector emissions reductions were seen to be important. Some organisations were of the opinion that emissions from flights to or from EU airports should not be offset by reductions in other sectors. Instead, improvements to technology and operations should be incentivised. Regarding the GMBM, six of the 22 organisations in the category recommended that aviation should pay for all external costs, not just those above 2020 levels and ten organisations considered that ICAO policies must not limit more ambitious policies by states and regions. Some organisations also felt that state aid and fuel subsidies should be withdrawn, while demand management (e.g. operating restrictions), Value Added Tax (VAT) and ticket taxes should be introduced. Additionally, most organisations believed that it is necessary to address the non-CO_2 impacts from aircraft, such as emissions of NOx and water vapour at high altitudes.

The responses from **individuals** similarly supported an ambitious approach. In particular, German and Austrian individuals emphasised that a business as usual approach with minor improvements will not be sufficient. Instead they proposed that a ‘polluter-pays’ principle

should be supervised by EU authorities, with closer monitoring of emissions necessary. Other comments included suggestions that offers for cheap flights should not be allowed and that airlines and fuel should not be subsidised. Individuals from other countries had a similar vision for international aviation in the future. For example, one individual suggested that aviation emissions should be included from all flights, that airlines should pay VAT on tickets and aviation fuel and that airports and airlines should not receive state aid. Meanwhile, another one individual suggested that the IATA 2050 targets should be converted into a binding commitment.

Private enterprises, professional organisations and international organisations responding to the questionnaire mainly included airlines, aviation associations and fuel manufacturers. These respondents supported the ICAO objective to cap the growth of net CO_2 emissions from international aviation from 2020, along with the goal to halve net CO_2 emissions by 2050 compared to 2005. **Airlines** commented that efforts to improve efficiency should be continued, while the potential of biofuels was also highlighted by some of them. There were calls for governments to reach an agreement on a single GMBM to replace the EU ETS for aviation. A global measure would limit the administrative complexity and ease the transition from the EU ETS legislation. However, it was noted that emissions should be reduced in line with what is economically and technically feasible and that a MBM should not hinder the growth of the aviation industry, distort competition or put unjustified burdens on airlines.

Responses from **other types of stakeholders** generally considered that efforts must be made to achieve emissions reductions in international aviation. An Austrian research institution, was of the opinion that tax exemptions (particularly with regards to value added and mineral oil tax) need to be phased out to support decarbonisation efforts. Meanwhile, a university lecturer and group of students supported ICAO's plans for a GMBM. However, it was recognised that ambitious limits and strict penalties must be set to ensure its effectiveness – at a minimum these limits could be the projected 2020 emissions level.

b. Elements of a robust GMBM

A number of points were frequently listed by respondents in all stakeholder groups concerning which elements should emerge from the 2016 ICAO Assembly to provide for the implementation of a robust GMBM by 2020. These are as follows:

- The GMBM should be a global system that does not discriminate between airlines on the same route to avoid introducing competitive distortion.
- It should be based on a robust MRV system that is consistent with United Nations Framework Convention on Climate Change (UNFCCC) guidelines to avoid double counting. The MRV system should begin as soon as is practicable.
- The GMBM should be clear and environmentally effective. It should also be easy to implement to reduce the administrative burden.

A review of the additional points raised by each stakeholder group and any differences in opinion is provided below.

Public authorities noted that the measure should be regularly reviewed to ensure that the objectives of the Paris agreement are achieved**.** Most respondents were of the opinion that for the measure to have good environmental integrity, the criteria for offsetting units must be clear and transparent and should only permit units with high environmental quality. Half of

the respondents in this group also stated that the Special Circumstances and Respective Capabilities (SCRC) principle should be accommodated.

Civil society organisations consistently stated that a legally binding agreement with strong political commitment should come into force. Most civil society organisations were of the opinion that a substantially more ambitious goal than the CNG2020 target is required, although others believe CNG2020 is a potential starting point. In relation to the allocation of emissions allowances, organisations consistently stated that these should be distributed equitably and that the allocation of free allowances should only occur in special circumstances. Six of the 22 respondents in this category also emphasised that more must be done to encourage in-sector emissions reductions, while five organisations suggested that routes between developed countries should be subject to more ambitious climate policies.

Individuals generally shared similar views to civil society organisations; this appears to be largely related to the large number of coordinated responses. In particular, individuals consistently stated that the measure must have high durability and efficacy and that credits to offset emissions must follow strict criteria in terms of environmental, social and developmental aspects.

Airlines and aviation associations emphasised the need for a scheme which is easy to implement to limit the administrative and cost burdens. The need for clear guidelines on MRV requirements and the eligibility criteria for emissions credits were also frequently stated, in addition to potential provisions for differentiation at route-level via phased implementation. There were also comments indicating that there is already a commitment to CNG2020 and that the GMBM should only apply to emissions above this target.

Several other points were raised by **other private enterprises, professional organisations and international organisations**. Fuels suppliers stated that ICAO's basket of measures to reduce aviation emissions should continue to be endorsed as a complementary measure, while an international industry body supporting emissions trading suggested that a centralised registry is necessary to track trades, avoid double counting, reduce transaction costs and enable greater liquidity. A private enterprise suggested that the GMBM should also include mechanisms to reduce the unpredictability and volatility of the carbon price – one way this could be achieved is to review emissions targets regularly.

Some additional points were raised by **other types of stakeholders.** For example, a non-EU trade organisation stated that there is a concern that the cost of offsetting will be fully passed on to consumers and suggested that the costs associated with a MBM should be shared between operators and consumers.

c. Actions to achieve climate goals

Respondents in most stakeholder groups stated that if MBMs are to be applied to domestic flights, they should closely follow the ICAO GMBM design. This will avoid additional complexity, administrative burdens and double counting. In addition to MBMs, a number of other potential actions to address emissions from domestic aviation were provided. A summary of the viewpoints expressed by each of the stakeholder groups is provided below.

Public authorities had varying points of view concerning whether domestic MBMs are appropriate but agreed that any such measures should be consistent with the ICAO GMBM. Opinions expressed by different authorities included:

- a Czech authority commented that the implementation of another complex measure at domestic level may not be appropriate for countries with limited internal flights;
- a Danish authority suggested that a voluntary extension to the GMBM to cover domestic aviation could be considered;
- a German authority suggested that domestic aviation emissions should be accounted for alongside other transport modes as part of national transport plans;
- a Finnish authority suggested that other actions, such as the optimisation of airspace use, fleet renewal and the deployment of sustainable alternative fuels should be explored further.

Civil society organisations emphasised that measures for domestic aviation must complement the GMBM so that all aviation emissions are covered. This could be achieved by establishing domestic caps/targets consistent with the goals of the Paris Agreement. They considered that the GMBM should act as a minimum level of ambition and that states should use it as a platform for more ambitious goals. Furthermore, the GMBM should not prohibit states from implementing more ambitious measures (such as addressing non-CO_2 emissions or implementing stricter standards). Many stakeholders also believed that the potential to transfer short distance air travel (for both passengers and freight) to more climate-friendly modes should be investigated.

Individuals from Germany and Austria shared very similar opinions to civil society organisations, primarily due to the coordinated responses. Additionally, one citizen considered that the use of renewable jet fuel should be promoted (e.g. through mandates, variable ATM and airport fees), while another one considered that international and domestic aviation should follow the same rules.

Airlines and aviation associations consistently noted that as the ICAO GMBM will cover all international flights (including cross-border intra-EU flights), there will no longer be a need for an EU ETS for aviation. Many organisations remarked that some factors contributing to aviation emissions are outside the direct control of aircraft operators. It was suggested that domestic actions should first focus on infrastructure improvements, efficient airspace design, air traffic management system upgrades, airport improvements and sustainable alternative fuels. Within Europe, tangible progress on the Single European Sky would also make a large contribution towards addressing aviation emissions at the domestic, regional and international scales. One airline suggested that all European countries should treat domestic emissions consistently.

Several **other private enterprises, professional organisations and international organisations** commented that as CO_2 emitted during both domestic and international flights contributes to climate change, mitigation measures should be largely similar. One organisation suggested that domestic aviation should ideally be included within the GMBM but they recognised that this may be difficult to agree. On the other hand, biofuels producers consider that governments should encourage investment to develop more sustainable aviation fuels. Another organisation suggested that the ICAO Assembly Resolution should not prohibit countries from implementing more ambitious measures (e.g. addressing non-CO_2 emissions).

Other types of stakeholders suggested different domestic level actions. For example, one suggested that a carbon-based ticket tax could be implemented. This has greater potential for implementation compared to the taxation of fuel which, although it is not 'outlawed' by international agreements such as the Chicago Convention (which only states that fuel already

on board an aircraft should not be taxed), would require changes to bilateral air service agreements that generally discourage taxation.[63] Another commented that countries are already obliged to submit state plans to ICAO on aviation carbon emissions. If national governments wish to impose additional measures on domestic flights they have the power to do so.

d. Principles and criteria for EU ETS after 2016

The comments received for this question largely focus on whether the inclusion of aviation in the EU ETS will be appropriate after the implementation of the ICAO GMBM. Contrasting opinions were expressed depending on the stakeholder group. Some stakeholders consider that EU action must continue if the ICAO GMBM does not enable the achievement of the EU emission reduction targets. However, as indicated earlier, many organisations believe that the introduction of the GMBM will remove the need for inclusion of aviation within the EU ETS and that compliance with two MBMs would be challenging. The differences in opinion among stakeholder groups are presented below.

Public authorities consistently stated that a review of the EU ETS should assess the advantages and disadvantages of continuing the system for aviation. The following factors to consider were suggested:

- the extent to which the ICAO GMBM is in line with EU ambitions and the targets set in the Paris Agreement;
- whether the ICAO resolution places restrictions on the EU ETS;
- the potential impact of continuing the EU ETS on competitive distortion between operators;
- the additional complexity and administrative burden on operators;
- the environmental effectiveness.

One authority also raised the issue that, in its original scope, the EU ETS caused problems for many operators due to difficulties with overflight permits. A similar situation should be avoided.

Civil society organisations strongly believe that a review of the EU ETS should be guided by whether combined ICAO and EU action allows for a fair contribution to both the 1.5 °C Paris target and EU 2030 targets. Organisations consistently stated that the EU should ensure a level playing field between transport modes in the single market and that flights departing or arriving in the EU must not be offset with carbon credits from other sectors. Many civil society organisations stated the need for the EU ETS to regain credibility and effectiveness by permanently removing surplus certificates from the market. This should help to develop an effective price for emissions. Additionally, approaches to allow for non-CO_2 emissions to be included were also considered important by a number of organisations.

A few **individual citizens** that responded to this question suggested that a review of the EU ETS should ensure that it is compatible with the GMBM. Many generally share similar views to civil society organisations. A citizen stated that it is important to ensure that all emissions

[63] The removal from Air Service Agreements of limitations on the ability to apply taxation is Commission policy, but has been slow to be implemented in practice.

are counted, while another one suggested that the review should ensure that detailed data on aviation is collected to enable progress to be tracked.

Almost all **European airlines and aviation associations** expect that the adoption and implementation of a GMBM will lead to the replacement of the EU ETS for aviation. Respondents noted that the EU ETS should therefore be amended to allow for an appropriate transition mechanism and to ensure that operators do not have to comply with two separate (and possibly overlapping) schemes. However, one airline, stated that aviation should be part of a single simple and efficient scheme that covers both international and domestic flights. Non-EU airlines and aviation associations consistently stated that a review of the EU ETS should ensure that it is aligned with the GMBM and only applies to flights within Europe.

In addition to opinions that the EU ETS is likely to be replaced by the GMBM, **other private enterprises, professional organisations and international organisations** listed different guiding principles. For example, an air charter company suggested that the EU ETS should be replaced with a CO_2 tax, while an international organisation recommended that a review of the ETS should be orientated towards a cost-effective reduction in GHG emissions produced by domestic aviation.

Other types of stakeholders were generally of the opinion that a review should consider whether the inclusion of aviation in the EU ETS is still appropriate after the ICAO GMBM is implemented.

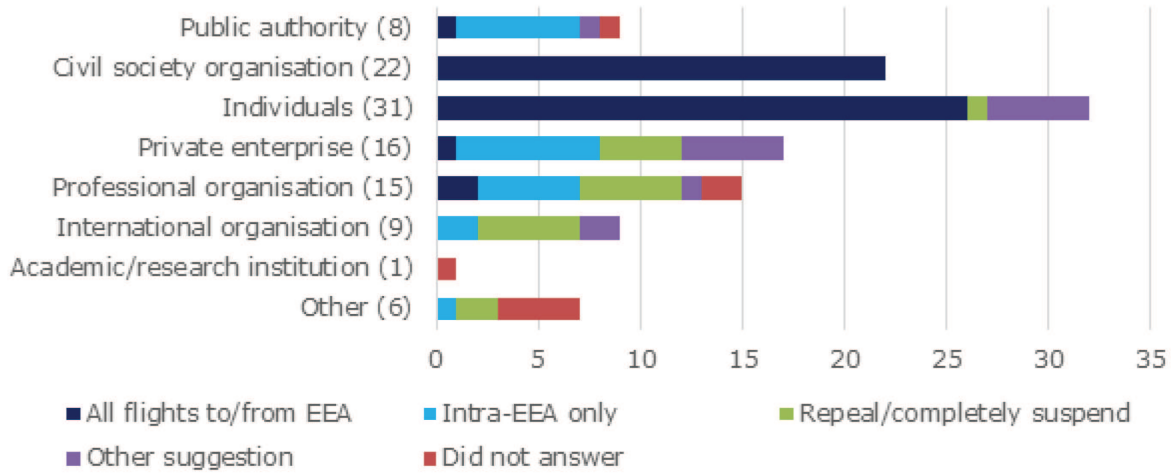
e. Options for EU ETS 2017-2020

The responses to this question could be categorised under three main options as follows:

- Revert to the original scope of the EU ETS from the 1st January 2017, as stipulated by Regulation 421/2014. This would mean inclusion of all flights into and out of the European Economic Area (EEA).
- Extend the current 'stock the clock' derogation. This would mean inclusion of only intra-EEA flights (excluding flights to and from different outermost regions).
- Repeal the EU ETS for aviation, or completely suspend its application.

In addition, stakeholders suggested a number of other potential options to be considered, while respondents also frequently stated that the options should depend on the outcomes of the 2016 ICAO Assembly. The results vary significantly by stakeholder group and are presented in **Figure II-3**.

Figure II-3: Which options should be considered for the EU ETS for aviation for the period 2017-2020?



Notes: n=108. The total number of respondents by stakeholder group is indicated next to its label on the y-axis. A total above this number reflects cases where multiple options were suggested.

Public authorities generally suggested that the EU ETS should only cover intra-EEA flights. A German public authority also suggested that closer attention should be given to flights involving airports geographically close to but not inside the EEA to avoid a competitive disadvantage for airlines operating within the EEA.

All **civil society organisations** believed that the EU ETS for aviation should revert back to its original scope to contribute to the pre-2020 ambition of the Paris Agreement. In their opinion, free allocations for air operators should also be greatly limited.

Individuals mostly shared the same opinion as civil society organisations. However, one citizen stated that the suspension of EU ETS for intra-EEA flights is an option.

Private enterprises, professional organisations and international organisations offered a more diverse range of opinions. Among airlines and aviation associations, 12 out of 24 (50%) considered that the EU ETS for aviation should be suspended or repealed as the ICAO GMBM is expected in 2020. This would prevent discrimination against air carriers operating within Europe. However, 9 respondents suggested that the intra-EU scope should continue if ICAO does not agree targets for international aviation, or if a pre-implementation phase and MRV system is not established. A suggestion by one airline that only flights departing in the EEA should be included was also received. No consensus was visible among other types of private enterprises, professional organisations and international organisations.

Other types of stakeholders suggested the EU ETS should be completely suspended, proposed that the current derogation for flights to and from third countries should continue up to 2020 or did not have a clear view on this question,

f. Options for EU ETS post-2020

Beyond 2020, many respondents noted that options for the EU ETS should depend on the scope and environmental integrity of the agreement reached at the 2016 ICAO Assembly. The views of each stakeholder group are summarised below.

Public authorities generally considered that it is preferable for a single global measure to be in operation. However, a number of respondents noted that should the GMBM be insufficient to achieve the Paris Agreement goal, other options could be explored. Two options suggested are the inclusion of domestic flights in the EU ETS, or the continuation of the EU ETS for intra-EEA flights with a higher level of ambition than the GMBM. It was acknowledged that this second option must be approached sensitively, so as not to undermine the efforts of ICAO.

Civil society organisations expect that the GMBM will offer an incomplete solution which may not be suitably ambitious or cover all emissions sufficiently. For this reason, it was consistently stated that international flights must continue to be included in the EU ETS and that EU 2030 targets for aviation should be consistent with other ETS sectors. Many organisations believe it is particularly important for the EU ETS to be retained for intra-EU routes to avoid market distortions between different transport modes. Other options were also suggested such as: targeting the same reductions in aviation emissions as for stationary sites, reviewing the number of allowances alongside the goals of the Paris Agreement, addressing non-CO_2 emissions via a multiplier or by imposing a levy, and removing VAT exemptions, fuel tax exemptions and airport subsides (as these work at cross-purposes to the ETS).

German and Austrian **individuals** submitted similar responses to civil society organisations. In addition, one citizen considers that three options are possible for beyond 2020:fully integrate the EU ETS with the ICAO GMBM, exempt aviation from the EU ETS or subject intra-EEA flights to the EU ETS and exempt them from the ICAO GMBM.

Airlines and aviation associations generally consider that MBMs should not be duplicative, therefore international aviation should be subject to only one measure. It was frequently highlighted that MBMs are one out of a basket of measures to reduce emissions. Other reductions are envisaged to come from the CO_2 efficiency standard for new aircraft, operational measures and sustainable alternative fuels. However, some airlines suggested that the EU should provide assistance to countries that wish to use the GMBM to cover their domestic aviation emissions.

Several comments were received from **private enterprises, professional organisations and international organisations**, stating that from 2020, emissions allowances for aviation should be auctioned, rather than being given away for free.

In the **other types of stakeholders** category, one further point was made by an organisation representing the outermost regions of the EU, suggesting that, after 2020, the European Commission should maintain the special status of the outermost regions with regards to aviation emissions, which would help to support their economy.

g. Improvements to the EU ETS for aviation

A range of suggestions were submitted concerning which elements could be considered for the EU ETS in order to improve its environmental effectiveness and take into account international developments. Differing views were submitted depending on the stakeholder group, as described below.

Public authorities provided a range of options that could be considered for the EU ETS. To improve its environmental effectiveness, the ETS should be reformed to reduce the current surplus of emission allowances in addition to lowering the emissions cap. To take into consideration international developments, one authority suggested evaluating whether any

adjustments are needed to include the new international offset mechanism established by the Paris Agreement.

Civil society organisations frequently raised three main points in relation to improving the system's effectiveness. These are to bring the EU ETS target in line with the ambition of the Paris Agreement, to reduce/stop free allowances and to maintain the principle of not relying on international offset credits (to avoid market distortions). However, other organisations suggested that international offsets could be utilised if their environmental integrity is guaranteed. Many organisations also suggested that the EU should cooperate with ICAO to allow for a single, high quality MRV scheme to be implemented.

Individuals supported a reduction in the number of allowances and a stricter regulation of the auctioning of allowances. One citizen stated that in addition to the EU ETS, other measures should be considered if the environmental impact of aviation is to be contained in line with the target of the Paris Agreement.

Airlines and aviation associations emphasised their wish that the GMBM replaces the EU ETS for aviation. It was suggested that EU ETS requirements concerning domestic flights should be aligned with the GMBM. Many airlines also noted that any changes to the allocation or auctioning of allowances should be thoroughly assessed so as not to adversely affect the financial situation of domestic and regional carriers. One non EU airline organisation noted that the EU has severely limited the use of carbon offsets under the EU ETS, yet the GMBM is expected to be an offsetting scheme. It suggested that EU Member States and other countries should take steps to promote carbon offset projects worldwide to stimulate a robust market and to achieve further emissions reductions.

Private enterprises, professional organisations and international organisations listed a variety of options to consider. For example, several organisations (such as an energy company and a railway association) suggested that the allocation and auctioning of allowances should be evaluated. An aircraft operator risk management company also noted that ICAO GMBM proposals may be detrimental to current environmental effectiveness and may cause distortion within the EU ETS. However, another professional organisation suggested that the ICAO GMBM should replace the EU ETS for aviation and that this could be the first step for a truly global emissions trading system.

Other types of stakeholders did not suggest any options in relation to this question.

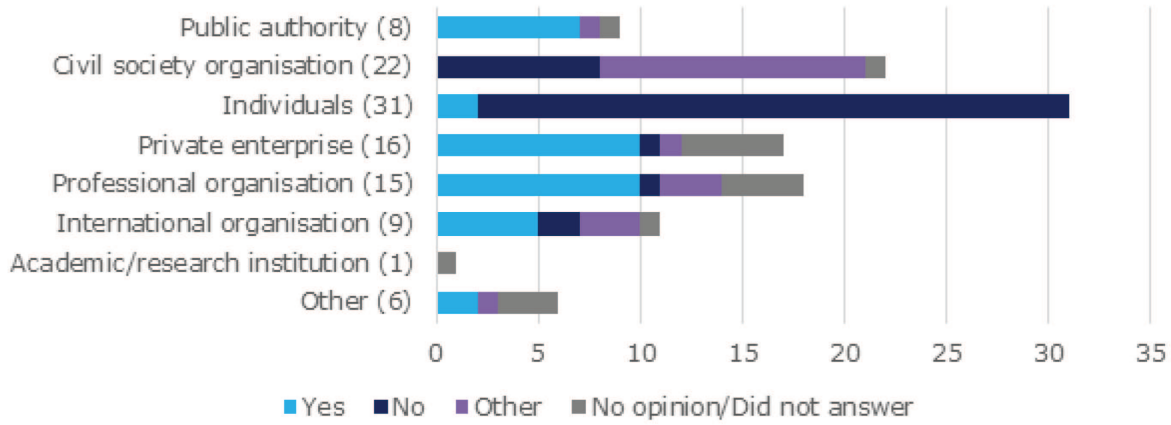
h. Small emitters exemption

The responses to this question can be categorised into the following main groups:

- Yes - the exemption should continue (36 responses);
- No - there should be no exemptions (41 responses);
- Other - alternative measures are suggested (22 responses);
- No opinion, or did not answer this question. (16 responses).

A number of the respondents also provided some conditions, or explanations to their answers. These are summarised in the text below. In addition, a number of respondents suggested that more than one option is feasible. As the **Figure II-4** shows, opinions varied depending on the stakeholder group.

Figure II-4: Should small non-commercial operators continue to be exempted from 2021 onwards?



Notes: Notes: n=108. The total number of respondents by stakeholder group is indicated next to its label on the y-axis. A total above this number reflects cases where multiple options were suggested.

Public authorities generally considered that small non-commercial aircraft operators (emitting less than 1 000 tonnes of CO_2 per year) should continue to be exempted from the EU ETS after 2020 to avoid a disproportionate administrative burden. The French authorities considered that small commercial operators should also be exempt and that the exemptions should be harmonised between the EU ETS and the GMBM. Belgian authorities also suggested that small non-commercial operators should pay an emission charge, based on the EU ETS support facility data, or that such operators should be obliged to use a certain percentage of sustainable fuels.

Civil society organisations either indicated that exemptions should be avoided, or that other measures such as fuel taxation and/or VAT would be more effective.

Individuals consistently stated that exemptions should be avoided; however, where necessary, simplified measures with regards to emissions calculation and reporting could be considered. One German citizen suggested that small non-commercial aircraft operators with operations in the public interest or running demonstration flights to test technology should continue to be excluded but privileged persons flying for private use should not be exempted. Alternatively, one citizen suggested that a fuel tax could be considered.

The majority of **private enterprises, professional organisations and international organisations (including airlines and aviation associations)** indicated that exemptions to the EU ETS should continue; however, a number of other comments were received. Among these were options such as a fuel tax, a phased-in approach, use of a forfaiting system, or a simplified compliance method.

Other types of stakeholders seemed to be less decisive, with 50% of respondents in this category not answering this question.

i. Other comments

Additional comments were received from many stakeholders. Those most relevant to this study are summarised below.

Public authorities provided further comments to be considered when reviewing the EU ETS for aviation. For example, French authorities suggested that broad international consensus is important to achieve the highest environmental efficiency, while multilateral discussions to promote European ambitions in reducing CO_2 emissions must also take place. Belgian authorities suggested that there are regular occurrences of a large aircraft operator, not normally flying intra-EEA flights, having a single flight diverted (e.g. due to weather) within the EEA (hence creating an intra-EEA flight) and having to perform a full verification of that single flight. The scope of the EU ETS should be reassessed to remove such flights from the scope (if the EU ETS continues to apply only to intra-EEA flights).

Civil society organisations emphasised that in addition to ICAO measures, action at EU level is still required to ensure that reduction efforts are suitably ambitious. In this respect, complementary measures such as fuel taxation and improved efficiency standards were frequently noted.

Individuals most notably commented on the potential for the implementation of VAT on air tickets and for a fuel tax to ensure equal competition between transport modes in the EU. Although not directly related to the EU ETS, several other suggestions were received, including calls for greater visibility of CO_2 emissions on flight tickets (to increase consumer awareness), extra fees on ineffective technology and greater investment in research to reduce the climate damaging effects of aviation.

Airlines and aviation associations called for greater clarity and further consultation on the future of the EU ETS after 2016 to ensure that the correct planning and investment decisions can be made. One airline also called for the removal of the EED which duplicates the current measures. Comments from other **private enterprises, professional organisations and international organisations** mainly related to the supporting research to promote in-sector reductions and the importance of reducing emissions from aviation via measures that are clear and have high environmental integrity.

ANNEX 3

WHO IS AFFECTED BY THE INITIATIVE AND HOW

Who is affected	How are they affected?
Member States	With the initiative's continued contribution to achieve the target under the EU ETS, Member States will not be responsible for emissions from the aviation sector to meet their national emissions target under the Effort Sharing legislation for non-ETS sectors. In the period up to 2020, only flights within outermost regions will be covered by the EU ETS, which results in negligible impact on those regions compared to the baseline scenario. But even if flights to and from outermost regions were to be covered, the impact would be insignificant due to the low allowances costs of flights within EU ETS/GMBM. 15% of allowances under the EU ETS aviation cap are auctioned by Member States. In 2020, the auction revenues under the initiative are expected to be around €123.6 million and in 2030 around €302.3 million.
National Competent Authorities	National competent authorities are significantly involved in the implementation and enforcement of the initiative, which results in an administrative burden, which relates to the training of staff, the approval of monitoring plans, the allocation of allowances, the checking of emission reports and verification statements, as well as to ensure compliance. In the period up to 2020, the resulting administrative costs will be lower than under the baseline scenario due to the lower share of flights covered. Post-2020, the administrative costs for intra-EEA flights will be the same under the initiative, as under the baseline scenario. The administrative burden resulting from the application of GMBM to extra-EEA flights cannot yet be fully estimated due to the GMBM implementing rules, in particular in relation to MRV, still having to be developed.
Aircraft Operators	Aircraft operators also have to implement the initiative, which results in an administrative burden of elaborating monitoring plans, monitoring and reporting emissions, paying fees to third party verifiers to verify their monitored emissions. In the period up to 2020, the resulting administrative costs will be lower than under the baseline scenario due to the lower share of flights covered. Post-2020, the administrative costs for intra-EEA flights will

	be the same under the initiative, as under the baseline scenario. The administrative burden resulting from the application of GMBM to extra-EEA flights cannot yet be fully estimated due to the GMBM implementing rules, in particular in relation to MRV, still having to be developed. The implementation of the initiative also means that aircraft operators are responsible for their emissions under the EU ETS for intra-EEA flights and as of 2021 under the GMBM for extra-EEA flights. Under the EU ETS, 85% of allowances falling within the EU ETS aviation cap are allocated for free. Under the GMBM, only those emissions above the CNG2020 target must be offset. They can be offset with international credits. [Due to the reduced scope of the initiative up to 2020 and the application of the GMBM to extra-EEA flights post 2020, the costs resulting from the purchasing of allowances/international credits will be lower than under the baseline scenario.] [However, due to the low prices of allowances and international credits, the overall costs of flights per RTK will only be impacted minimally by this initiative. Consequently, also in the very few situations where there is a potential risk of distortion of competition, this risk is of a purely theoretical nature.] All costs that incurred by aircraft operators due to this initiative are likely to be passed through to the end-consumers.
Tourism (tourist destinations and consumers)	There is a potential that the options result in higher prices for flights because of aircraft operators passing-through the incurred costs to the end consumers. However, due to the low price of allowances and international credits, the increase in flight prices by 2030 is considered to be so insignificant that it will have no impact on tourism, i.e. neither distort competition between tourism destinations nor prevent end-consumers from travelling.
SMEs (smaller airlines)	The administrative burden of implementing the options is higher on small airlines. This is due to the fact that larger airlines have tools available that small airlines do not, which facilitate the performance of the administrative tasks resulting from the initiative. Investment in such tools is not profitable for smaller airlines. Therefore the initiative foresees the continued application of lighter rules to smaller airlines as regards the MRV of emissions. Moreover, it extends the exemption of small, non-commercial aircraft operators post 2020.
General Public	The general public will benefit from the emission reductions achieved through the initiative, as well as the slight increase in employment. The initiative is expected to have no negative impact on low income groups due to insignificant increase in prices resulting from the measure.

ANNEX 4

ANALYTICAL MODELS USED IN PREPARING THE IMPACT ASSESSMENT

The quantitative assessment of the impacts of the different policy options is based on the AERO Modelling System (AERO-MS)[64]. The AERO-MS model was selected as providing a mechanism for modelling the economic and environmental impacts of policies without the need for assumptions (for example, regarding the impact of changes in airline costs on demand or technology development).

AERO-MS was also used for the analyses performed as part of the previous study in 2013[65]. Since that time, the tool has been updated and now uses a base year of 2010 and it includes forecast years of 2020, 2030 and 2040.

The primary requirements for this study are to produce results for the years 2020 and 2030. However, there are benefits in being able to present cumulative impacts (e.g. total CO_2 emissions saved) over the period up to 2030. To improve the calculation of the results for intervening years, the analyses of the policies have also included calculations for years 2010 and 2040.

The approach to performing the analysis of a policy option includes a requirement for specifying the additional airline costs that would be incurred. As both the EU ETS and GMBM mechanisms place additional cost burdens on the airlines directly related to the CO_2 emissions they produce, which are themselves directly related to the fuel consumed, the additional costs are implemented in the model as an additional cost per kg of fuel consumed.

Because of the varying number of free allowances, offsets and purchases of EU allowances that are required to cover the actual CO_2 emissions produced, the approach that has been adopted includes an iterative approach:

- calculate the additional fuel cost based on the CO_2 emissions from the no-policy-option case;
- use AERO-MS to calculate the effect of the additional fuel cost on demand and, hence, fuel consumption and CO_2 emissions;
- update the additional fuel cost calculation using the fuel consumption values from this AERO-MS calculation;
- recalculate the effects on fuel consumption and CO_2 emissions using AERO-MS with the updated additional fuel cost values;
- confirm that the changes in fuel consumption are sufficiently small.

The calculations to date have been checked and it has been confirmed that, whilst the updates to the calculated additional fuel cost can be of the order of a few percent, the resulting change to the fuel consumption is of the order of a few hundredths of a percent. It is therefore

[64] EASA (2010) Research Project EASA.2009/OP15 Study on Aviation and Economic modelling (SAVE)
[65] Technical assessment of possible amendments of the EU ETS Directive for aviation – Final Report (Ricardo-AEA/R/ED58833, 2013) and SWD(2013) 430 final, http://ec.europa.eu/clima/policies/transport/aviation/docs/swd_2013_430_en.pdf

considered that this 'two iteration' approach gives sufficiently self-consistent results for the purposes of this study.

The economic and environmental impacts are obtained from the results of the second AERO-MS calculation described above. The impacts on income to the EU ETS and GMBM mechanisms (through the purchases of allowances and offsets) are derived from the fuel consumption results from the second AERO-MS calculation and the additional fuel cost values used as input to it.

The updated descriptions of the options for the EU ETS beyond 2020 were provided in Section 4. The implementation of those options in the analysis involves identifying the additional cost to the airlines of each option (based on the assumed cost of carbon credits) and applying it as an uplift to the fuel cost. The costs of carbon credits from auctions are proportional to the CO_2 emitted (e.g. the costs are related to a fixed price per tonne of CO_2 emitted) and the relationship between CO_2 emitted and fuel consumed is one of direct proportionality (3.16 kg of CO_2 is emitted per kg of fuel consumed). Therefore, the approach of applying the additional cost as if it was an additional cost per kg of fuel consumed is valid for the analyses that are being performed.

The application of these additional costs takes account of the geographical scope of the option. For example, when considering the analysis for the year 2020, during which only the EU ETS will be in force, the additional cost is only applied to flights which depart from or arrive at EU airports (for the option in which the EU ETS applies to all flights to and/or from EU airports in the period 2017 to 2020). The AERO-MS tool operates on the basis of a set of flight stages, which represent flights between city-pairs by particular categories of aircraft, so this approach to limiting the geographical scope of a policy option is feasible in the modelling.

To ensure consistency with other recent policy developments, notably the legislative proposal for the Effort Sharing Regulation and ongoing considerations for the appropriate energy efficiency target (27% or 30%), the following range was applied for the EU allowance price assumptions.

Carbon price ETS sectors	**2010**	**2015**	**2020**	**2025**	**2030**
With EE 27%	11.2	7.5	15.0	25.0	42.0
With EE 30%	11.2	7.5	15.0	23.5	27.0

For the price assumptions for international credits a range was applied between a 50% discount of EU allowance price assumptions and prices starting with the current price of certified emission reduction units linearly increasing up to 50% of 2030 EU allowance prices.

CER price	**2015**	**2020**	**2025**	**2030**
Linear increase	0.30	4.5	9	13.5
50%	3.75	7.5	12.5	21

As explained in Section 5, a sensitivity scenario is also applied using aviation emission projections from the PRIMES models. PRIMES energy model is not aviation specific. It derives its growth rates on the basis of aviation fuels sold in the EU and simulates the European energy system and markets on a country-by-country basis and across Europe for the entire energy system. The model provides amongst others projections of CO_2 emission over the 2015-2050 period in 5-years intervals. The data is based on Eurostat statistics for the years 2000-2010. PRIMES has been used as a model for the revision of the EU ETS and for establishing binding reduction targets for EU Member States for non-ETS sectors under the Effort Sharing Regulation for the 2021-2030 period. The main differences between PRIMES and AERO-MS are due to different growth rates (and different rates of energy efficiency improvement).

Due to the application of low aviation emission growth sensitivity besides the strong growth scenario, as well as the application of ranges for the carbon price projections, the risks of relying on these estimates can be considered to be negligible. The real future growth rate, as well carbon prices can be expected to fall within the considered growth and price ranges.

ANNEX 5

STRONG GROWTH OF CLIMATE CHANGE IMPACTS FROM THE AVIATION SECTOR

Aviation is one of the fastest growing sources of GHG emissions, globally and within the EU, with the large majority of these emissions coming from international flights. Aviation also has non-CO_2 impacts, such as emissions of NO_X and water vapour at high altitudes, which have been estimated to have several times the impact of aviation's CO_2 emissions.[66]his impact assessment does not further consider these impacts.

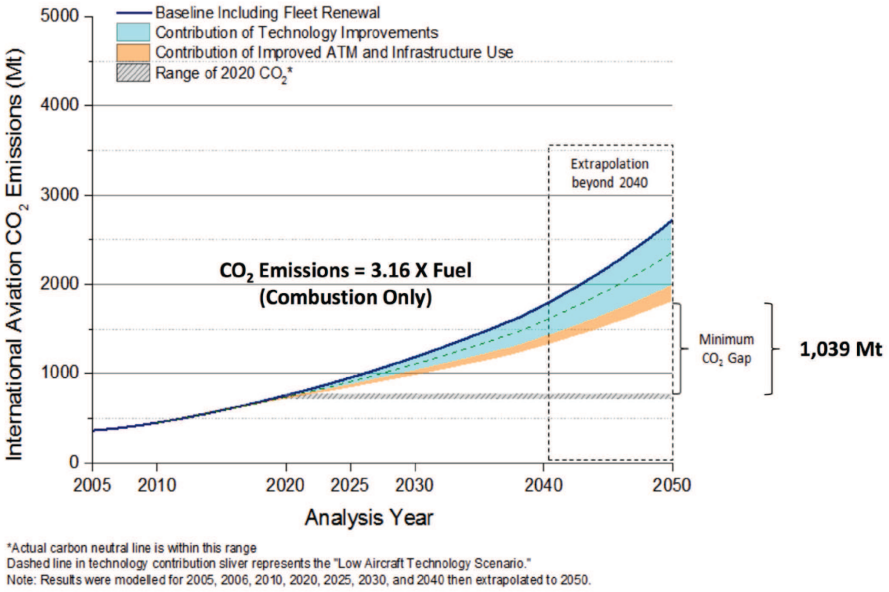
1. INTERNATIONAL PROJECTIONS

According to the International Energy Agency, global CO_2 emissions from international and domestic civil aviation stood at 740 million tonnes per annum in 2010, amounting to 2.5% of global CO_2 emissions. Emissions from aviation strongly depend on economic activity, which in turn triggers transport demand. Due to the predicted continued global economic growth, aviation emissions are also expected to continue increasing. ICAO forecasts in its 2016 Environmental Report[67] that in comparison to 2010, when annual international aviation emissions stood at 448Mt, international aviation emissions will increase by 52% to 68% (estimated annual emissions of 682Mt to 755Mt) by 2020, between 169% and 185% (estimated annual emissions of 1205Mt to 1278Mt) by 2040 and up to 284% to 300% (estimated annual emissions of 1721Mt to 1794Mt) by 2050 depending on the level of technological and operational improvements (see Figure 1). Thus, even under the most optimistic scenario about the effectiveness of technical and operational measures, aviation CO_2 emissions in 2050 are still expected to be 3.8 times higher than 2010 emissions due to the forecasted strong increase in aviation activities. Technical and operational measures are therefore on their own insufficient to achieve CNG from 2020 (see **Figure V-1**).

[66] See Directive 2008/101/EC; recital 19

[67] ICAO Environnemental Report 2016, page 17, available at: http://www.icao.int/environmental-protection/Documents/ICAO%20Environmental%20Report%202016.pdf

Figure V-1: CO_2 Emissions Trends from International Aviation, 2005 to 2050



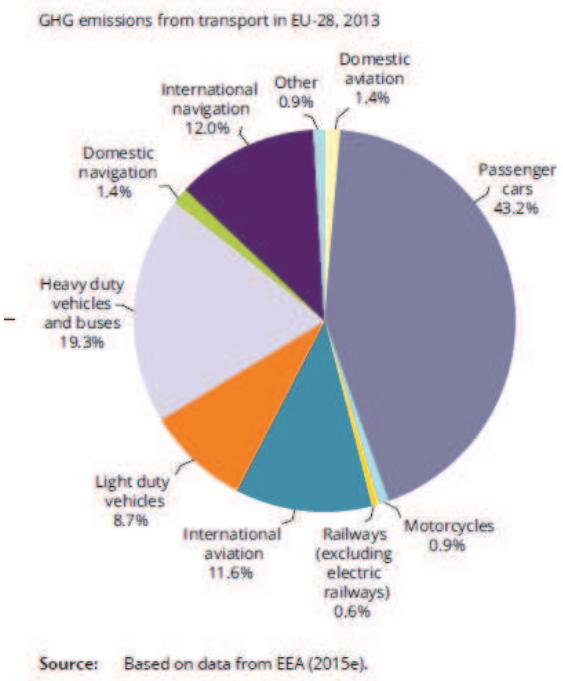
Source: 2016 ICAO Environmental Report

2. CONTRIBUTION OF AVIATION ACTIVITIES TO TOTAL EU GHG EMISSIONS

Since 1990, GHG emissions (excluding LULUCF) decreased by 24.4% in the EU, reaching the lowest level since 1990 in 2014 with 4282 $MtCO_2eq$. From 1990 to 2013, EU GHG emissions decreased in all of the main sectors with the exception of transport emissions, which increased by 19.4% over the same period, corresponding to almost one quarter (24.4%) of total EU GHG emissions in 2013. During this period, emissions from international aviation in the EU almost doubled.[68] In 2013, GHG emissions from aviation were 16% higher than in 2000 and accounted for 12.9% (11.6% international aviation; 1.4% domestic aviation) of all EU GHG emissions from transport and for 3% of the EU's total GHG emissions.[69] In the EU, aviation is projected to significantly increase its contribution by 2050 (**see Figure V-2**).[70]

[68] European Environmental Agency, "Evaluating 15 Years of Transport and Environmental Policy" (2015), available at: http://www.eea.europa.eu/publications/term-report-2015
[69] SWD(2016) 244 final
[70] European Environmental Agency, "Evaluating 15 Years of Transport and Environmental Policy" (2015), available at: http://www.eea.europa.eu/publications/term-report-2015

Figure V-2: Contribution of the different modes of transport to EU transport GHG emissions in 2013



3. THE NEED FOR EARLY ACTION

Scientific views are generally in agreement that the well below 2 degrees Celsius objective under the Paris Agreement can be achieved but that it requires early and significant global mitigation action. Pursuant to the Emissions Gap Report 2010 by the United Nations Environment Programme (UNEP), the growth of global GHG emissions must be reversed before 2020 and decline thereafter, reaching at least 50 % below 1990 levels by 2050. The UNEP Emission Gap Report 2015 highlighted that in order to still be meet the well below 2°C objective, pre-2020 action had to be enhanced and emission reduction potentials realised by 2020 and 2030 so as to reach net zero CO_2 emissions globally between 2045 and 2075. The fifth Assessment Report by the Intergovernmental Panel on Climate Change (IPCC) also confirmed that the only pathways that do hold warming to below 2°C with a likely chance (>66%), or return warming to below 1.5°C by 2100 require starting ambitious global mitigation action no later than 2020. It highlights that delays in mitigation through 2030 or beyond could substantially increase mitigations costs.

ANNEX 6

RESOLUTION A39-3: CONSOLIDATED STATEMENT OF CONTINUING ICAO POLICIES AND PRACTICES RELATED TO ENVIRONMENTAL PROTECTION – GLOBAL MARKET-BASED MEASURE (MBM) SCHEME

Whereas Assembly Resolution A38-18 decided to develop a global market-based measure (GMBM) scheme for international aviation, for decision by the 39th Session of the Assembly;

Recalling that Assembly Resolution A38-18 requested the Council, with the support of Member States, to finalize the work on the technical aspects, environmental and economic impacts and modalities of the possible options for a GMBM scheme, including on its feasibility and practicability, taking into account the need for development of international aviation, the proposal of the aviation industry and other international developments, as appropriate, and without prejudice to the negotiations under the UNFCCC;

Also recalling that Assembly Resolution A38-18 requested the Council, with the support of

Member States, to identify the major issues and problems, including for Member States, and make a recommendation on a GMBM scheme that appropriately addresses them and key design elements, including a means to take into account special circumstances and respective capabilities, and the mechanisms for the implementation of the scheme from 2020 as part of a basket of measures which also include technologies, operational improvements and sustainable alternative fuels to achieve ICAO's global aspirational goals;

Recognizing that ICAO is the appropriate forum to address emissions from international aviation, and the significant amount of work undertaken by the Council, its Environment Advisory Group (EAG) and its Committee on Aviation Environmental Protection (CAEP) to develop a recommendation for a GMBM scheme and its design elements and implementation mechanisms, including the analyses of various approaches for distribution of obligations;

Further recalling that Assembly Resolution A38-18 requested the Council, with the support of Member States, to organize seminars, workshops on a GMBM scheme for international aviation participated by officials and experts of Member States as well as relevant organizations;

Recognizing the convening of two rounds of Global Aviation Dialogues (GLADs) seminars held in 2015 and 2016 for all regions;

Noting the support of the aviation industry for a single global carbon offsetting scheme, as opposed to a patchwork of State and regional MBMs, as a cost effective measure to complement a broader package of measures including technology, operations and infrastructure measures;

Recognizing that MBMs should not be duplicative and international aviation CO2 emissions should be accounted for only once;

Emphasizing that the decision by the 38th Session of the Assembly to develop a global MBM scheme for international aviation reflects the strong support of Member States for a global solution for the international aviation industry, as opposed to a possible patchwork of State and regional MBMs;

Reaffirming the concern with the use of international civil aviation as a potential source for the mobilization of revenue for climate finance to the other sectors, and that MBMs should ensure the fair treatment of the international aviation sector in relation to other sectors;

Recalling the UNFCCC and the Paris Agreement and *acknowledging* its principle of common but differentiated responsibilities and respective capabilities, in light of different national circumstances;

Also acknowledging the principles of non-discrimination and equal and fair opportunities to develop international aviation set forth in the Chicago Convention;

Welcoming the adoption of the Paris Agreement under the UNFCCC and *recognizing* that the work related to a global MBM scheme for international aviation and its implementation will contribute to the achievement of the goals set out in the Paris Agreement;

Whereas the UNFCCC and the Paris Agreement provide for mechanisms, such as the Clean Development Mechanism (CDM) and a new market mechanism under the Paris Agreement, to contribute to the mitigation of GHG emissions to support sustainable development, which benefit developing States in particular;

Welcoming the cooperation between the United Nations Framework Convention on Climate Change (UNFCCC) and ICAO on the development of CDM methodologies for aviation;

Recognizing that this Reslution does not set a precedent for or prejudge the outcome of negotiations under the UNFCCC, the Paris Agreement, or other international agreements, nor represent the position of the Parties to the UNFCCC, the Paris Agreement, or other international agreements;

The Assembly:

1. *Resolves* that this Resolution, together with Resolution A39-1: *Consolidated statement of continuing ICAO policies and practices related to environmental protection - General provisions, noise and local air quality* and Resolution A39-2: *Consolidated statement of continuing ICAO policies and practices related to environmental protection – Climate change*, supersede Resolutions A38-17 and A38- 18 and constitute the consolidated statement of continuing ICAO policies and practices related to environmental protection;

2. *Acknowledges* the progress achieved on all elements of the basket of measures available to address CO2 emissions from international aviation, including aircraft technologies, operational improvements, sustainable alternative fuels and a GMBM scheme and any other measures, and *affirms* the preference for the use of aircraft technologies, operational improvements and sustainable alternative fuels that provide the environmental benefits within the aviation sector;

3. *Also acknowledges* that, despite this progress, the environmental benefits from aircraft technologies, operational improvements and sustainable alternative fuels may not deliver sufficient CO2 emissions reductions to address the growth of international air traffic, in time to achieve the global aspirational goal of keeping the global net CO2 emissions from international aviation from 2020 at the same level;

4. *Emphasizes* the role of a GMBM scheme to complement a broader package of measures to achieve the global aspirational goal, without imposing inappropriate economic burden on international aviation;

5. *Decides* to implement a GMBM scheme in the form of the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) to address any annual increase in total CO2 emissions from international civil aviation (i.e. civil aviation flights that depart in

one country and arrive in a different country) above the 2020 levels, taking into account special circumstances and respective capabilities;

6. *Requests* the Council to continue to ensure all efforts to make further progress on aircraft technologies, operational improvements and sustainable alternative fuels be taken by Member States and reflected in their action plans to address CO2 emissions from international aviation, and to monitor and report the progress on implementation of action plans, and that a methodology should be developed to ensure that an aircraft operator's offsetting requirements under the scheme in a given year can be reduced through the use of sustainable alternative fuels, so that all elements of the basket of measures are reflected;

7. *Request* the Council to continuously monitor the implementation of all elements of the basket of measures, and consider the necessary policies and actions to ensure that progress is achieved in all of the elements in a balanced way with an increasing percentage of emissions reductions accruing from non- MBM measures over time;

8. *Acknowledges* special circumstances and respective capabilities of States, in particular developing States, in terms of vulnerability to the impacts of climate change, economic development levels, and contributions to international aviation emissions, among other things, while minimizing market distortion;

9. *Decides* the use of a phased implementation for the CORSIA to accommodate the special circumstances and respective capabilities of States, in particular developing States, while minimizing market distortion, as follows:

a) Pilot phase applies from 2021 through 2023 to States that have volunteered to participate in the scheme. States participating in this phase may determine the basis of their aircraft operator's offsetting requirements from paragraph 11 e) i) below;

b) First phase applies from 2024 through 2026 to States that voluntarily participate in the pilot phase, as well as any other States that volunteer to participate in this phase, with the calculation of offsetting requirements in paragraph 11 a) below;

c) All States are strongly encouraged to voluntarily participate in the pilot phase and the first phase, noting that developed States, which have already volunteered, are taking the lead, and that several other States have also volunteered;

d) The Secretariat will make public on the ICAO website updated information on the States that volunteered to participate in the pilot phase and first phase;

e) Second phase applies from 2027 through 2035 to all States that have an individual share of international aviation activities in RTKs in year 2018 above 0.5 per cent of total RTKs or whose cumulative share in the list of States from the highest to the lowest amount of RTKs reaches 90 per cent of total RTKs, except Least Developed Countries (LDCs), Small Island Developing States (SIDS) and Landlocked Developing Countries (LLDCs) unless they volunteer to participate in this phase;

f) States that are exempted or have not yet participated are strongly encouraged to voluntarily participate in the scheme as early as possible, in particular those States that are members of a regional economic integration organization. States who decide to voluntarily participate in the scheme, or decide to discontinue the voluntary participation from the scheme, may only do so from 1 January in any given year and they shall notify ICAO of their decision by no later than 30 June of the preceding year;

g) Starting in 2022, the Council will conduct a review of the implementation of the CORSIA every three years, including its impact on the growth of international aviation, which serves

as an important basis for the Council to consider whether it is necessary to make adjustments to the next phase or compliance cycle and, as appropriate, to recommend such adjustments to the Assembly for its decision;

10. *Decides* that the CORSIA shall apply to all aircraft operators on the same routes between States with a view to minimizing market distortion, as follows:

a) all international flights on the routes between States, both of which are included in the CORSIA by paragraph 9 above, are covered by the offsetting requirements of the CORSIA;

b) all international flights on the routes between a State that is included in the CORSIA and another State that is not included in the CORSIA by paragraph 9 above are exempted from the offsetting requirements of the CORSIA, while retaining simplified reporting requirements; and

c) all international flights on the routes between States, both of which are not included in the CORSIA by paragraph 9 above, are exempted from the offsetting requirements of the CORSIA, while retaining simplified reporting requirements;

11. *Decides* that the amount of CO2 emissions required to be offset by an aircraft operator in a given year from 2021 is calculated every year as follows:

a) an aircraft operator's offset requirement = [% Sectoral × (an aircraft operator's emissions covered by CORSIA in a given year × the sector's growth factor in the given year)] + [% Individual × (an aircraft operator's emissions covered by CORSIA in a given year × that aircraft operator's growth factor in the given year);

b) where the sector's growth factor = (total emissions covered by CORSIA in the given year – average of total emissions covered by CORSIA between 2019 and 2020) / total emissions covered by CORSIA in the given year;

c) where the aircraft operator's growth factor = (the aircraft operator's total emissions covered by CORSIA in the given year – average of the aircraft operator's emissions covered by CORSIA between 2019 and 2020) / the aircraft operator's total emissions covered by CORSIA in the given year;

d) where the % Sectoral = (100% – % Individual) and;

e) where the % Sectoral and % Individual will be applied as follows:

i) from 2021 through 2023, 100% sectoral and 0% individual, though each participating State may choose during this pilot phase whether to apply this to:

a) an aircraft operator's emissions covered by CORSIA in a given year, as stated above, or

b) an aircraft operator's emissions covered by CORSIA in 2020;

ii) from 2024 through 2026, 100 % sectoral and 0% individual;

iii) from 2027 through 2029, 100 % sectoral and 0% individual;

iv) from 2030 through 2032, at least 20% individual, with the Council recommending to the Assembly in 2028 whether and to what extent to adjust the individual percentage;

v) from 2033 through 2035, at least 70% individual, with the Council recommending to the Assembly in 2028 whether and to what extent to adjust the individual percentage;

f) the aircraft operator's emissions and the total emissions covered by CORSIA in the given year do not include emissions exempted from the scheme in that year;

g) the scope of emissions in paragraphs 11 b) and 11 c) above will be recalculated at the start of each year to take into account routes to and from all States that will be added due to their voluntary participation or the start of a new phase or compliance cycle;

12. *Decides* that a new entrant1 is exempted from the application of the CORSIA for three years or until the year in which its annual emissions exceed 0.1 per cent of total emissions in 2020, whichever occurs earlier. From the subsequent year, the new entrant is included in the scheme and treated in the same way as the other aircraft operators.

13. *Decides* that, notwithstanding with the provisions above, the CORSIA does not apply to low levels of international aviation activity with a view to avoiding administrative burden: aircraft operators emitting less than 10,000 metric tonnes of CO2 emissions from international aviation per year; aircraft with less than 5,700 kg of Maximum Take Off Mass (MTOM); or humanitarian, medical and firefighting operations;

14. *Decides* that the emissions that are not covered by the scheme, as the results of phased implementation and exemptions, are not assigned as offsetting requirements of any aircraft operators included in the scheme;

15. *Notes* the work of the Council, with the technical contribution of CAEP, on: a) the monitoring, reporting and verification (MRV) system; b) recommended criteria for emissions units to be purchased by aircraft operators that take into account developments in the UNFCCC process; c) and registries under the CORSIA, and *requests* the Council, with the technical contribution of CAEP, to complete its work as soon as possible including the provision of capacity building and assistance, so as to enable the full implementation of the CORSIA from 2020;

16. *Decides* a three year compliance cycle, starting with the first cycle from 2021 to 2023, for aircraft operators to reconcile their offsetting requirements under the scheme, while they report the required data to the authority designated by the aircraft operator's State of registry every year;

17. *Decides* on the need to provide for safeguards in the CORSIA to ensure the sustainable development of the international aviation sector and against inappropriate economic burden on international aviation, and *requests* the Council to decide the basis and criteria for triggering such action and identify possible means to address these issues*;*

1 A new entrant is defined as any aircraft operator that commences an aviation activity falling within the scope of the scheme on or after its entry into force and whose activity is not in whole or in part a continuation of an aviation activity previously performed by another aircraft operator.

18. *Decides* that a periodic review of the CORSIA is undertaken by the Council, for consideration by the Assembly, every three years from 2022 for the purpose referred to in paragraph 9 g) above and to contribute to the sustainable development of the international aviation sector and the effectiveness of the scheme. This will involve, inter alia:

a) assessment of: progress towards achieving the ICAO's global aspirational goal; the scheme's market and cost impact on States and aircraft operators and on international aviation; and the functioning of the scheme's design elements;

b) consideration of the scheme's improvements that would support the purpose of the Paris Agreement, in particular its long-term temperature goals; and update the scheme's design elements to improve implementation, increase effectiveness, and minimize market distortion, taking into account the consequential impact of changing the scheme's design elements, e.g., to MRV requirements; and

c) a special review by the end of 2032 on termination of the scheme, its extension or any other improvements of the scheme beyond 2035, including consideration of the contribution made by aircraft technologies, operational improvements and sustainable alternative fuels towards achieving the ICAO's environmental objectives;

19. *Determines* that the CORSIA or any other scheme decided by the Assembly is to be the market based measure applying to CO2 emissions from international aviation;

20. *Requests* the following actions be taken, with a view to establishing necessary mechanisms for implementation of the CORSIA from 2020:

Regarding the implementation of the MRV system,

a) the Council to develop, with the technical contribution of CAEP, the SARPs and related guidance material for the implementation of the MRV system under the CORSIA, including simplified MRV procedures, for adoption by the Council by 2018;

b) all Member States whose aircraft operator undertakes international flights to develop the necessary arrangements, in accordance with the MRV SARPs, for implementation from 1 January 2019;

Regarding the Emissions Unit Criteria (EUC),

c) the Council to develop, with the technical contribution of CAEP, the SARPs and related guidance material for Emissions Unit Criteria (EUC) to support the purchase of appropriate emissions units by aircraft operators under the scheme, taking into account relevant developments in the UNFCCC and Article 6 of the Paris Agreement, for adoption by the Council as soon as possible but not later than 2018;

d) the Council to establish, with the technical contribution of CAEP, a standing technical advisory body on the EUC to make recommendations to the Council on the eligible emissions units for use by the CORSIA;

e) the Council, with the technical contribution of CAEP, to periodically review the EUC SARPs and related guidance material, as appropriate, to promote compatibility with future relevant decisions under the Paris Agreement;

Regarding the establishment of Registries,

f) the Council to develop, with the technical contribution of CAEP, policies and related guidance material to support the establishment of registries under the scheme, for adoption by the Council by 2018;

g) the Council to establish a consolidated central registry under the auspices of ICAO, for operationalization no later than 1 January 2021;

h) Member States to develop necessary arrangements for the establishment of their own registries or group registries established by groups of States, or to arrange for participation in other registries, in accordance with the ICAO guidance;

Regarding the governance of the CORSIA,

i) the Council to oversee the functioning of the CORSIA, with support provided by the standing technical advisory body and CAEP as needed;

Regarding the regulatory framework,

j) Member States to take necessary action to ensure that the necessary national policies and regulatory framework be established for the compliance and enforcement of the scheme by 2020.

21. *Decides* that emissions units generated from mechanisms established under the UNFCCC and the Paris Agreement are eligible for use in CORSIA, provided that they align with decisions by the Council, with the technical contribution of CAEP, including on avoiding double counting and on eligible vintage and timeframe;

22. *Decides* that ICAO and Member States take all necessary actions in providing the capacity building and assistance and building partnerships for implementation of the CORSIA from 2020, including:

Regarding the implementation of the MRV system,

a) the Council to take necessary action to expand the provision of capacity building and assistance for the preparation and implementation on Member States' action plans, in order to accommodate capacity building and assistance for implementation of the MRV system by Member States from 1 January 2019, including organization of seminars and training in all regions from 2017, and facilitation of financial support where needed, in particular for those States that volunteer to participate in the pilot phase and require support to do so;

b) Member States to build partnerships among themselves to cooperate on the implementation of the MRV system;

Regarding the establishment of Registries,

c) the Council to take necessary action to expand the provision of capacity building and assistance for the preparation and implementation on Member States' action plans, in order to accommodate capacity building and assistance for establishment of registries by States, including organization of seminars and training in all regions from 2017, and facilitation of financial support where needed, in particular for those States that volunteer to participate in the pilot phase and require support to do so;

d) Member States to build partnerships among themselves to cooperate on the establishment of their own registries or group registries established by groups of States, and possible pilot implementation;

23. *Decides* that the CORSIA will use emissions units that meet the Emissions Unit Criteria (EUC) in paragraph 20 above;

24. *Requests* the Council to promote the use of emissions units generated that benefit developing States, and *encourages* States to develop domestic aviation-related projects;

25. *Requests* the Council to explore further development of aviation-related methodologies for use in offsetting programmes, including mechanisms or other programmes under the UNFCCC, and *encourages* States to use such methodologies in taking actions to reduce aviation CO2 emissions, which could further enable the use of credits generated from the implementation of such programmes by the CORSIA, without double-counting of emissions reduction;

ANNEX 7

DEVELOPMENTS IN ICAO IN THE RUN-UP TO THE 2016 ICAO ASSEMBLY

After the agreement at the 38th ICAO Assembly to develop a GMBM to limit CO_2 emissions from international aviation, the ICAO Council agreed on a clear process and roadmap, with expected milestones and necessary governance structure, for the development of the GMBM, including the establishment of:

i. Environmental Advisory Group (EAG) comprised of 17 ICAO Council members, which steered the work on a global MBM and addressed the policy aspects of the global MBM.

ii. Global Market Based Measure Technical Task Force (GMTF) under the Committee for Aviation Environmental Protection (CAEP), which provided technical support working on two key technical elements of a global MBM: Monitoring, Reporting and Verification of aviation emissions and eligibility criteria for emissions units.

The ICAO Council endorsed a working method based on a "strawman" approach. The "strawman", initially developed by the ICAO Secretariat, proposed a mandatory offsetting system without revenue generation aimed at achieving CNG2020. Under the proposal aircraft operators should report emissions from 2020 on and compensate part of them (above a certain level) with emission units purchased in the carbon markets.

Between 2014 and January 2016, the EAG met 15 times to discuss and analyse the "strawman" to better understand the advantages and disadvantages of different alternatives for and improvements to key design elements to address in particular Special Circumstances and Respective Capabilities of countries and the distribution of obligations amongst airlines.

In parallel, the GMTF conducted seven meetings between 2014 and 2015 where it developed recommendations on the eligibility criteria for emissions units to be used for the global MBM and on an MRV system for a global MBM, which CAEP endorsed in February 2016.

In December 2015, building on the discussions at the EAG, the ICAO President submitted a concrete GMBM-proposal in the form of a draft Assembly Resolution, which, in line with the "strawman" approach, suggested an offsetting system to compensate international aviation emissions above 2020 levels. The draft resolution proposed addressing differentiation through a route-based approach where routes to and from certain countries would be exempt, and some others would be phased-in over time.

The following rounds of discussion took place in a more political setting in the first half of 2016. First, the President set up a "High-level Group" (HLG) which was composed by representatives of 18 ICAO States. The HLG met twice. This was followed by a High-level Meeting (11-13 May 2016) to which all 191 ICAO states were invited. Among the 60 ICAO Member States that participated some convergence emerged on some technical, implementation related paragraphs. However, strongly divergent views were expressed on the key design elements, namely the grouping of states to address differentiation and the distribution of obligations among operators.

Finally, following informal meetings during the summer and a so called "Friends of the President" meeting in August 2016, the ICAO Council endorsed a proposal for a resolution to be discussed at the 2016 Assembly. The proposal kept the concept of an offsetting system aimed at achieving CNG 2020, but it included important flexibilities, such as voluntary participation of states during the period 2021-2026 (opt-in and opt-out) and exemptions for routes to and from countries pertaining to certain categories (Least Developed Countries,

Small Island Developing States and Land-locked Developing Countries) and those with lower aviation activity.

ANNEX 8

INTEGRATION OF AVIATION IN THE EU'S EMISSIONS TRADING SYSTEM

1. INITIAL FULL SCOPE INCLUSION

In view of the 2004 ICAO Assembly's unanimous decision not to develop a GMBM but to favour inclusion of aviation into open regional systems, the Commission proposed in 2006 to integrate aviation into the EU ETS covering emissions from flights to and from all EU Member States. Directive 2008/101/EC amended the EU ETS Directive 2003/87/EC and included aviation activities within the scope of the ETS:

- Total emissions are covered from intra-EEA flights and extra-EEA flights.
- The emission cap for aviation from 2013 onwards has been set at 95 % of the average historic aviation emissions (corresponding to the period from 2004 to 2006).
- Aircraft operators have been obliged to start emissions reporting in 2010 and full compliance – including surrendering of allowances – in 2012.

The inclusion of aviation into the EU ETS was based on the 2006 Impact assessment[71] that covered in detail the environmental, economic, and social impacts. It was based on an extensive public consultation. It concluded that the broadest possible geographic scope of all departing and arriving flights would give the highest environmental benefits without neither significantly affecting the demand for aviation services nor the competitive position of individual airlines.

2. INTERNATIONAL REACTIONS

The inclusion of aviation into the EU ETS led to diplomatic objections from a number of countries including China, India, and the US, which opposed the EU ETS alleging that the EU would have no competence to oblige their operators to participate in the EU ETS.[72] On 2 November 2011, the ICAO Council endorsed a statement by 26 of its 36 Member States repeating parts of these declarations.[73] Moreover, the Air Transport Association of America (ATA) and major US airlines challenged the legality of the EU ETS before the European Court of Justice (ECJ), which confirmed that the EU was entitled to extend the EU ETS to the full distance of flights which depart or arrive at EU airports.[74]

3. DECISION NO. 377/2013/EC

Prior to the 2013 ICAO Assembly, the 2012 ICAO Council decided to set up a High-level Group on Climate Change (HGCC) that would develop guidance for a GMBM for international aviation emissions and a framework for national and regional MBMs. In recognition of this positive development, and in order to provide time for the 2013 ICAO

[71] SEC(2006) 1684

[72] Joint Declaration signed on 30 September 2011 in New Delhi and Joint Declaration signed on 23 February 2012 in Moscow on the inclusion of international civil aviation in the EU ETS

[73] 2012 ICAO Council Decision endorsing the Delhi Declaration, available at: http://ec.europa.eu/clima/policies/transport/aviation/docs/minutes_icao_en.pdf

[74] Case C-366/10

Assembly to agree on a GMBM, the EU adopted the "stop-the-clock" decision to temporarily defer the enforcement of the EU ETS compliance obligations for flights to and from most third countries for 2012 unless airlines chose to remain with full scope (which a number of airlines chose to do, including airlines based outside the EEA), while maintaining the application of the system for all airlines in relation to intra-EEA flights.[75]

4. THE 2013 ICAO ASSEMBLY

The EU's "stop-the-clock" decision was welcomed by many countriesThe temporarily reduced scope of the EU ETS for aviation was instrumental to trigger the 2013 ICAO Assembly to move forward on the development of a GMBM. The 2013 ICAO Assembly adopted a roadmap, which had been proposed by the EU, to develop a GMBM by 2016 to be implemented from 2020.[76]

5. REGULATION 421/2014

To take account of the outcome of the 2013 ICAO Assembly, Regulation (EU) No 421/2014 was adopted by the European Parliament and the Council, amending the EU ETS Directive 2003/87/EC. In order to sustain the momentum reached at the 2013 ICAO Assembly, the regulation introduces article 28a in the EU ETS Directive to temporarily derogate the application of the EU ETS to extra-EEA flights, as well as to intra-EEA flights to outermost regions between 1 January 2013 and 31 December 2016 period. It also requires the Commission to report on the outcome of the 2016 ICAO Assembly to the European Parliament and to the Council and consider and, if approprite, include proposals in reaction to the ICAO developments on the appropriate scope for coverage of emissions from extra EEA-flights from 2017 onwards.

The EU ETS for aviation has been succesfully implemented in the period 2013-2016. Compliance with the system has been very close to 100% in terms of emissions. More than 100 commercial airlines based in third countries, including from those countries who opposed the full scope of the EU ETS in the past, have fulfilled their reporting and compliance obligations.Verified CO_2 emissions from ETS aviation activities between EEA airports amounted to 56.9 million tonnes of CO_2 in 2015. Taking into account an annual allocation close to 39 million allowances, it can be concluded that the EU ETS contributes to more than 17 million tonnes of emission reductions annually.

[75] Decision No 377/2013/EU

[76] 2013 ICAO Assembly Resolution A38-18, available at: http://www.icao.int/environmental-protection/Documents/A38-17_A38-18.pdf

ANNEX 9

FEATURES OF THE EU ETS

The EU ETS is a cap and trade system where operators from different sectors (power generation, industry, aviation) annually report their GHG emissions and surrender a number of units (typically, EU allowances) equivalent to the amount of emissions they are responsible for.

Under the EU ETS, aircraft operators are responsible for the emissions generated by aviation activities covered by the EU ETS Directive. Emissions from all flights departing from or arriving at aerodromes in the European Economic Area (EEA) are covered by the EU ETS. However, between 2013 and 2016 the scope has been temporarily limited to flights between airports located in the EEA.

Member States' competent authorities are responsible for administering aircraft operators. Each Member State administers operators to which they have issued the corresponding operating licence as well as those aircraft operators from third countries performing aviation activities in Europe attributed to them in accordance with the Directive. Competent Authorities approve monitoring plans from aircraft operators, receive their verified emissions reports and track compliance with their surrendering obligations.

Aircraft operators submit before 30 March their verified emissions reports corresponding to the previous year. Before 30 April they must surrender the equivalent amount of allowances. Emissions are electronically inscribed in the Union Registry, through which allowances are also surrendered by the operators.

Aircraft operators receive some allowances free of charge. Free allocation is distributed between aircraft operators on the basis of an efficiency benchmark. They can also purchase allowances from auctions. (See table below). Aircraft operators can use specific aviation allowances and general allowances from other sectors. They can also use an amount of international credits (Certified Emission Reductions from the Kyoto Protocol´s Clean Development Mechanism) up to 1.5% of their emissions.

Allowances can be traded. An aircraft operator can purchase allowances from other markets players and can sell its allowances if it has them in excess. This way, the EU ETS incentivises emission reductions: aircraft operators that are able to reduce emissions can obtain a benefit from selling their allowances, whilst those that increase their emissions will face higher compliance costs by having to purchase additional units.

Aircraft operators not complying with its EU ETS obligations face enforcement measures taken by Member States' competent authorities. If aircraft operators do not annually surrender the corresponding allowances they can be sanctioned with fines amounting €100 per tonne of CO_2 they are responsible for.

Key features of the EU ETS for aviation in the period 2013-2020

EU ETS feature	Description
Geographical coverage	European Economic Area (EEA) which includes the 28 EU Member States, Iceland, Norway and Liechtenstein. The 13 territories that are part of the EU are included in the EU ETS for aviation: Guadeloupe, French Guiana, Martinique, Reunion, the Azores, Madeira, the Canary Islands, Aland Islands, Akrotiri, Dhekelia, Ceuta, Melilla and Gibraltar All other territories of Member States that are not part of the EU are outside of the scope of EU ETS for aviation (e.g. Greenland or Channel Islands)
Flights covered	All flights landing at or departing from EEA airports.
Surrendering requirements	All CO_2 emissions released during the whole flight.
Open or closed system	Aviation is regulated under the same rules as the general EU ETS i.e. as an open system, but allowances are specific to the aviation sector.
Aviation cap	95% of the average 2004-2006 aviation emissions
Allocation of allowances	82% of allowances are allocated for free to operators based on a benchmark in line with their activity levels in 2010. 15% of allowances can be auctioned. A special reserve ensures access to the market for new aircraft operators and assists aircraft operators with a sharp increase in number of tonne-kilometres.
International credits	Aircraft operators may use Certified Emission Reductions and Emission Reduction Units for up to 1.5 % of the number of allowances they are required to use for compliance up to 2020.
Exclusions	Commercial airlines that operate fewer than 243 flights per period for three consecutive four-month periods or flights with total annual emissions lower than 10,000 tonnes per year. Activities performed by a non-commercial aircraft operator operating flights with total annual emissions lower than 1 000 tonnes per year. Other types of special purpose aircrafts are also excluded. A full list is in Annex I to the Directive.
MRV approach	CO_2 emissions are based on applying an agreed emission factor (tCO_2/km) to fuel consumption measured by considering tank levels at specific points in time as well as fuel uplift at the airport. A simplified approach is available for small emitters with emissions considered as verified if the emissions were determined the small emitters tool approved under Regulation (EU) No 606/2010 and populated by Eurocontrol with data from its ETS support facility.