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## Subsidiary Body for Scientific and Technological Advice

Forty-fifth session

Marrakech, 7–14 November 2016

Item 10(b) of the provisional agenda

**Methodological issues under the Convention**

**Emissions from fuel used for international aviation and maritime transport**

### **Information relevant to emissions from fuel used for international aviation and maritime transport**

#### **Submissions from international organizations**

1. The Subsidiary Body for Scientific and Technological Advice (SBSTA), at its forty-fourth session, invited the secretariats of the International Civil Aviation Organization (ICAO) and the International Maritime Organization (IMO) to continue to report, at future sessions of the SBSTA, on relevant work on addressing emissions from fuel used for international aviation and maritime transport.<sup>1</sup>

2. The secretariat has received submissions from ICAO and IMO containing information on emissions from fuel used for international aviation and maritime transport. In accordance with the procedure for miscellaneous documents, these submissions are attached and reproduced\* in the language in which they were received and without formal editing.

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<sup>1</sup> FCCC/SBSTA/2016/2, paragraph 70.

\* These submissions have been electronically imported in order to make them available on electronic systems, including the World Wide Web. The secretariat has made every effort to ensure the correct reproduction of the texts as submitted.

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Paper no. 1: International Civil Aviation Organization

**UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE (UNFCCC)**

**The Forty-fifth Session of the UNFCCC Subsidiary Body for  
Scientific and Technological Advice (SBSTA45)**

**(7 to 14 November 2016 – Marrakesh, Morocco)**

**Agenda Item 10 (b): Emissions from fuel used for international aviation and maritime transport  
(Submission by the International Civil Aviation Organization (ICAO))**

**Executive Summary**

The 39th Session of the ICAO Assembly, which took place from 27 September to 6 October 2016 in Montreal, recognized significant progress for the development and implementation of a “basket of mitigation measures” to achieve the ICAO global aspirational goals of 2% annual fuel efficiency improvement and carbon neutral growth from 2020.

The basket of measures includes aircraft technology, operational improvements, sustainable alternative fuels and a global market-based measure. In early 2016, ICAO developed the first ever global certification CO<sub>2</sub> Standard for aeroplanes. Operational improvements also bear a significant CO<sub>2</sub> emissions reduction potential, including through the ICAO’s Aviation System Block Upgrades (ASBUs) strategy. The Assembly took stock of the tremendous progress in the area of sustainable alternative fuels for aviation, and called ICAO to encourage partnerships and define policies that would further promote the transition to clean, renewable sources of energy for aviation.

Intense discussions over the past six years on a global market-based scheme and ICAO’s efforts to undertake policy/technical discussions and outreach activities led to the landmark Assembly agreement on a global market-based measure for international aviation. The agreed Carbon Offsetting and Reduction Scheme for International Aviation (CORSA) is the first global market-based measure that addresses CO<sub>2</sub> emissions from any industry sector. To date, 66 States, representing more than 86% of international aviation traffic, have already volunteered to participate in the scheme from its outset.

To ensure the successful implementation of the CORSA, ICAO will develop necessary rules and guidance for a robust monitoring, reporting and verification (MRV) system, eligibility criteria for emissions units to be purchased by airlines, and registries for the scheme. ICAO will also provide capacity building and assistance to States, including regional seminars/training and support for necessary infrastructure development.

To undertake these capacity building and assistance activities, ICAO will build on the successful experience gained in the context of its “States’ Action Plan” initiative since 2010. To date, 102 States, representing more than 90% of international aviation traffic, have voluntarily prepared and submitted their action plans on CO<sub>2</sub> emissions reduction activities for international aviation to ICAO.

With the increasing engagement of Member States and in close cooperation with the aviation industry and other international organizations, ICAO will continue to take the lead in the efforts to reduce CO<sub>2</sub> emissions from international aviation.

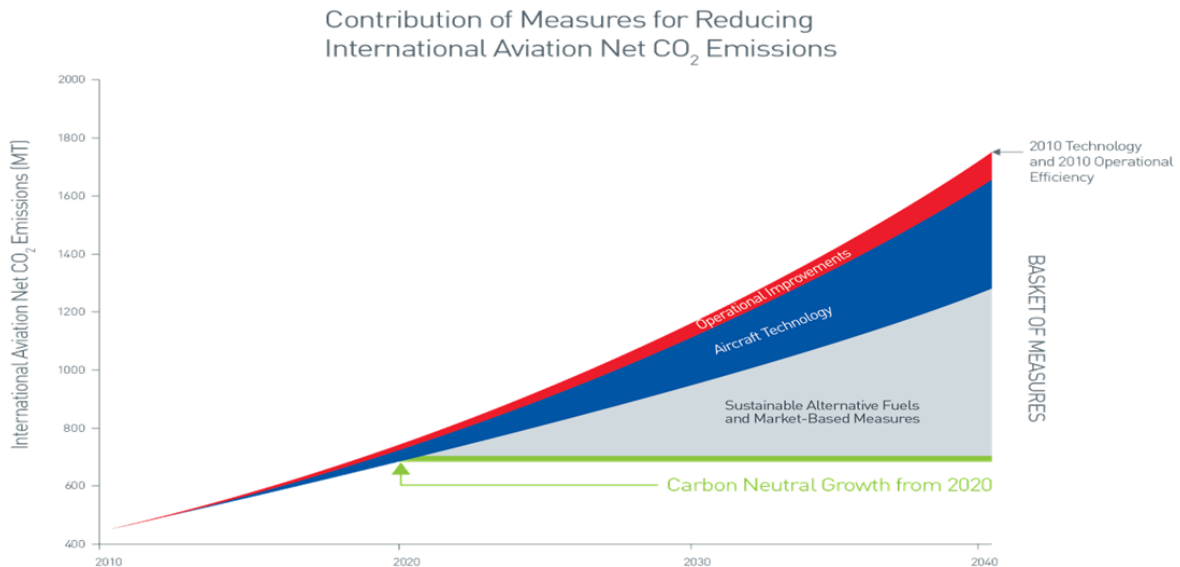
1. INTRODUCTION

1.1 The 39th Session of the ICAO Assembly – held from 27 September to 6 October 2016 adopted **Assembly Resolution A39-2, “Consolidated statement of continuing ICAO policies and practices related to environmental protection – Climate change”** (Appendix A), and **Assembly Resolution A39-3, “Consolidated statement of continuing ICAO policies and practices related to environmental protection – Global Market-based Measure (MBM) scheme”** (Appendix B).

1.2 The Assembly recognized ICAO’s substantial progress during the last triennium in addressing CO<sub>2</sub> emissions from international aviation, by developing and facilitating the implementation of “a basket of mitigation measures” in order to achieve ICAO’s global aspirational goals for the international aviation sector of improving fuel efficiency by 2 per cent per year and keeping its CO<sub>2</sub> emissions from 2020 at the same level (carbon neutral growth from 2020).

1.3 In order to measure current and estimate future progress toward the achievement of the ICAO aspirational goals, the ICAO Committee on Aviation Environmental Protection (CAEP) develops and regularly updates the CO<sub>2</sub> trends assessment, which reflects the contribution of various categories of mitigation measures to reduce international aviation CO<sub>2</sub> emissions (e.g. aircraft technology, operational improvements, sustainable alternative fuels).

1.4 The 39th Assembly endorsed the environmental trends as the basis for decision-making on environmental matters, and requested that the next Assembly be provided with further updated trends. Another important future work over the next triennium is exploration of the scenarios for the contribution of international aviation to the 1.5°C/2°C temperature goals.



2. PROGRESS ON A BASKET OF MITIGATION MEASURES

2.1 The 39th Assembly recognized significant progress in supporting our Member States in taking further action on a basket of measures to reduce emissions from international aviation, including acceleration of the use of fuel-efficient aircraft technology, air traffic management modernization and other operational improvements, and the development and deployment of sustainable alternative fuels.

2.2 For example, ICAO CAEP/10 meeting in February 2016 finalized its recommendation on an aeroplane CO<sub>2</sub> emissions certification Standard. This new Standard, as the first global Standard for CO<sub>2</sub> emissions of any sector, will apply to new aeroplane type designs from 2020 and to aeroplane type designs that are already in-production in 2023. This means that if an in-production aeroplane design is changed at a time beyond 2023, the aeroplane would have to comply with the CO<sub>2</sub> emissions Standard. In 2028, there is a production cut-off, meaning that in-production aeroplanes that do not meet the standard from 2028 can no longer be produced, unless the designs are modified to meet with the Standard. The new CO<sub>2</sub> emissions Standard is recommended as being included in an entirely new Volume to Annex 16 (Volume III) to the Convention on International Civil Aviation, for adoption by the ICAO Council.

2.3 Recognizing that many of the operational improvements defined in the ICAO Global Air Navigation Plan (GANP) offer the potential to deliver fuel and CO<sub>2</sub> emissions reduction, an analysis of environmental benefits from the implementation of such measures has been conducted. Activities in the next triennium include the estimation of CO<sub>2</sub> reduction benefits from the implementation of Aviation System Block Upgrades (ASBUs) strategy – Block 1. Another important area of future work is the risk assessment of potential climate change impacts to airport infrastructure and aviation operations, and identification of possible adaptation measures.

2.4 The 39th Assembly recognized the continuing ICAO support to States and other stakeholders in their efforts to develop and deploy sustainable alternative fuels, including the facilitation of dialogues and information exchange, and regular updates to the ICAO Global Framework for Aviation Alternative Fuels (GFAAF)<sup>1</sup>, through which industry-wide progress has been registered, including the certification of five pathways for the production of aviation alternative fuels to date, and the two airport-hubs for such fuels.

2.5 The Assembly encouraged States to establish partnerships and to define policies that will further promote the transition to clean, renewable sources of energy for aviation, including sustainable alternative fuels. In this regard, the Assembly welcomed the convening of the ICAO High-level Conference on Aviation Alternative Fuels, to be held in 2017, with a view to developing the ICAO vision on this subject, through which States will be encouraged to take actions at the national and international levels in further developing and deploying sustainable alternative fuels for aviation. To accomplish this, a preparatory ICAO seminar will be held in Montreal from 8 to 9 February 2017, which will provide a forum for the exchange of information and will serve as a basis for the High-level ICAO Conference.

2.6 In addition, significant efforts have been made toward the landmark agreement by the 39th Assembly on a global market-based measure (MBM) scheme for international aviation (see Section 3 below).

### 3. GLOBAL MARKET-BASED MEASURE – CORSIA

3.1 The 39th Assembly adopted a global market-based measure (MBM) scheme for international aviation. The adopted Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)<sup>2</sup> is part of a broader package of mitigation measures to achieve the ICAO global aspirational goal of carbon neutral growth from 2020.

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<sup>1</sup> <http://www.icao.int/environmental-protection/GFAAF/Pages/default.aspx>

<sup>2</sup> <http://www.icao.int/environmental-protection/Pages/market-based-measures.aspx>

3.2 The CORSIA reflects the spirit of cooperation and three years of intensive efforts by ICAO and its Member States, in cooperation with the aviation industry and other stakeholders. It also represents the strong support for a global solution for the international aviation sector, as opposed to a possible patchwork of different measures.

3.3 The scheme has a phased implementation approach, with a pilot phase from 2021 through 2023; a first phase from 2024 through 2026; and a second phase from 2027 through 2035. For the first two phases from 2021 to 2026, participation by States is voluntary. By the end of 39th Assembly, 65 States – representing about 86.5% of international traffic – had announced their intention to participate in the CORSIA from its outset.

3.4 For the second phase from 2027, all States that have an individual share of international aviation activities in year 2018 RTKs higher than 0.5% of total RTKs or whose cumulative share in the list of States from the highest to the lowest amount of RTKs reaches 90% of total RTKs are required to participate, except Least Developed Countries (LDCs), Small Island Developing States (SIDS) and Landlocked Developing Countries (LLDCs) unless they volunteer.

3.5 The CORSIA is based on a route-based approach. This means that emissions from international flights between two States, where both the origin and destination States participate in the CORSIA, are covered by the offsetting requirements of the scheme. On the other hand, emissions from international flights between two States, where the origin and/or destination States do not participate in the CORSIA, are excluded from the offsetting requirements of the scheme.

3.6 Once participating States and air-routes between the participating States to be covered by the CORSIA are defined every year from 2021, as described above, the amount of CO<sub>2</sub> offsetting requirements for individual aircraft operators is calculated as follows:

- a) during the period from 2021 through 2029, the amount of CO<sub>2</sub> offsetting requirements is calculated by multiplying the operators' annual emissions with a single sectoral growth factor every year, following a so-called 100% sectoral approach; and
- b) from 2030, the amount of CO<sub>2</sub> offsetting requirements is calculated following a hybrid approach that takes into account both the sectoral growth factor and growth factors of individual operators: the individual factors' contribution to the calculation of CO<sub>2</sub> offsetting requirements will be at least 20% from 2030 to 2032; and at least 70% from 2033 to 2035.

3.7 Starting in 2022, the CORSIA will be periodically reviewed, every three years, by the ICAO Council. The review will include, among other features, the assessment of its impact on the growth of international aviation, and the results of this assessment will serve as an important basis for the Council to recommend, as appropriate, adjustments to the scheme for the consideration by the Assembly.

3.8 Implementation of the CORSIA relies on the completion of a related work programme by the Organization on an urgent basis. The Assembly requested the development of necessary rules for: a monitoring, reporting and verification (MRV) system; criteria for emissions units to be purchased by aircraft operators; and registries under the CORSIA, for adoption by the ICAO Council by 2018.

3.9 To ensure the timely implementation of the CORSIA, necessary actions to provide capacity building and assistance to States, including through the establishment of partnerships, need to be sought. The Assembly requested the expansion of the existing initiative for States' action plans (see Section 4 below), in

order to accommodate capacity building and assistance for implementation of the CORSIA 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.

#### **4. STATES' VOLUNTARY ACTION PLANS**

4.1 The 39th Assembly recognized that a substantial strategy for capacity building and other technical and financial assistance on environment was undertaken by ICAO, including for preparation and submission of States' action plans to reduce international aviation CO<sub>2</sub> emissions. As of October 2016, 102 States representing more than 90 per cent of global international aviation traffic, voluntarily submitted action plans to ICAO.

4.2 ICAO continues to further update the tools and guidance made available to support States in developing and improving their action plans. Also, a series of dedicated seminars will be organized in all ICAO regions from 2017 with the view to disseminating relevant guidance material and providing hands-on training to States.

4.3 The Assembly also welcomed the progress made under the two existing ICAO's environmental partnerships on capacity-building and assistance. The partnership with the European Union launched in 2013 has enabled all 14 selected States in Africa and the Caribbean to develop and submit their action plans to ICAO and to install a tailor-made Aviation Environmental System (AES) that supports robust monitoring, verification and reporting of data.

4.4 The partnership with the United Nations Development Programme (UNDP) and Global Environmental Facility (GEF) aims to provide the Small Island Developing States (SIDS) with guidance documents on cost-benefit analysis for mitigation measures, clean energy projects and environmental governance. This partnership will also allow for the installation of solar panels at the airport gate of two international airports in Jamaica, which creates the opportunity for other SIDS to replicate this project and multiply the associated environmental benefits.

4.5 The Assembly also noted the renewed support of the European Commission for a second phase the current ICAO-EU project, creating the prospects to further capacity-building and assistance activities in the area of environmental protection. In addition, ICAO is exploring more avenues to assist more States for the preparation and implementation of action plans, such as a partnership to support SIDS in the Asia Pacific region, and the accreditation of ICAO as an Implementation Entity under the Green Climate Fund (GCF).

#### **5. UNFCCC – CLIMATE FINANCE**

5.1 While the Paris Agreement and associated COP21 decision did not include reference to international aviation, one of the key elements in the Agreement is that developed country Parties should continue to take the lead in mobilizing climate finance from a wide variety of sources, instruments and channels, with a concrete roadmap to achieve the goal of jointly providing USD 100 billion annually by 2020 for mitigation and adaptation through 2025, while the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement (CMA) shall set a new financial goal prior to 2025 from a floor of USD 100

billion per year (Paris Agreement, Article 9, paragraph 3, and associated COP21 Decision, paragraphs 53 and 114).

5.2 It should be highlighted that in 2010, ICAO Member States adopted global aspirational goals for the international aviation sector of improving the sector’s fuel efficiency by 2 per cent per year and keeping its global CO<sub>2</sub> emissions from 2020 at the same level (carbon neutral growth from 2020), and these aspirational goals were affirmed by the 2013 and 2016 Sessions of the ICAO Assembly.

5.3 The achievement of the ICAO global aspirational goals requires adequate financial resources within the sector itself, enabling it to effectively respond to the global climate change challenge. It is of utmost importance that the adopted global MBM scheme for international aviation – CORSIA be treated as one element of a basket of mitigation measures to achieve the ICAO global aspirational goals, and not in isolation. The growing commitment of ICAO partners to support the ICAO’s capacity building and assistance efforts also demonstrates how critical these activities are to the achievement of the ICAO’s global aspirational goals.

5.4 In this regard, the 39th Assembly urged that “ICAO and its Member States express a clear concern, through the UNFCCC process, on the use of international aviation as a potential source for the mobilization of revenue for climate finance to the other sectors, in order to ensure that international aviation would not be targeted as a source of such revenue in a disproportionate manner” (Assembly Resolution A39-2, paragraph 16).

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**APPENDIX A****ICAO Assembly Resolution A39-2: Consolidated statement of continuing ICAO policies and practices related to environmental protection – Climate change**

*Whereas* ICAO and its member States recognize the critical importance of providing continuous leadership to international civil aviation in limiting or reducing its emissions that contribute to global climate change;

*Reemphasizing* the vital role which international aviation plays in global economic and social development and the need to ensure that international aviation continues to develop in a sustainable manner;

*Acknowledging* that the work of the Organization on the environment contributes to 10 of the 17 United Nations Sustainable Development Goals (SDGs), including SDG 13 “*Take urgent action to combat climate change and its impacts*”;

*Whereas* a comprehensive assessment of aviation’s impact on the atmosphere is contained in the special report on *Aviation and the Global Atmosphere*, published in 1999, which was prepared at ICAO’s request by the Intergovernmental Panel on Climate Change (IPCC);

*Whereas* the IPCC special report recognized that the effects of some types of aircraft emissions are well understood, it revealed that the effects of others are not, and identified a number of key areas of scientific uncertainty that limit the ability to project aviation’s full impacts on climate and ozone; the Organization will update the information contained in the IPCC special report;

*Acknowledging* that international aviation emissions, currently accounting for less than 2 per cent of total global CO<sub>2</sub> emissions, are projected to increase as a result of the continued growth of air transport;

*Whereas* the ultimate objective of the United Nations Framework Convention on Climate Change (UNFCCC) is to achieve stabilization of greenhouse gas (GHG) concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system;

*Whereas* the Kyoto Protocol, which was adopted by the Conference of the Parties to the UNFCCC in December 1997 and entered into force on 16 February 2005, calls for developed countries (Annex I Parties) to pursue limitation or reduction of greenhouse gases from “aviation bunker fuels” (international aviation) working through ICAO (Article 2.2);

*Whereas* the Paris Agreement, which was adopted by the Conference of the Parties to the UNFCCC in December 2015, enhances the implementation of the UNFCCC including its objective, and aims to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty, including by holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5 °C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change;

*Recognizing* the global aspirational goals for the international aviation sector of improving fuel efficiency by 2 per cent per annum and keeping the net carbon emissions from 2020 at the same level, as adopted by the ICAO Assembly at its 37th Session in 2010 and reaffirmed at its 38th Session in 2013, as well as the work being undertaken to explore a long term global aspirational goal for international aviation in light of the 2 °C and 1.5 °C temperature goals of the Paris Agreement;

*Recognizing* that the aspirational goal of 2 per cent annual fuel efficiency improvement is unlikely to deliver the level of reduction necessary to stabilize and then reduce aviation's absolute emissions contribution to climate change, and that goals of more ambition are needed to deliver a sustainable path for aviation;

*Affirming* that addressing GHG emissions from international aviation requires the active engagement and cooperation of States and the industry, and *noting* the collective commitments announced by Airports Council International (ACI), Civil Air Navigation Services Organisation (CANSO), International Air Transport Association (IATA), International Business Aviation Council (IBAC) and International Coordinating Council of Aerospace Industries Associations (ICCAIA) on behalf of the international air transport industry, to continuously improve CO<sub>2</sub> efficiency by an average of 1.5 per cent per annum from 2009 until 2020, to achieve carbon neutral growth from 2020 and to reduce its carbon emissions by 50 per cent by 2050 compared to 2005 levels;

*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;

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

*Noting* that, to promote sustainable growth of international aviation and to achieve its global aspirational goals, a comprehensive approach, consisting of a basket of measures including technology and standards, sustainable alternative fuels, operational improvements and market-based measures to reduce emissions is necessary;

*Acknowledging* the significant technological progress made in the aviation sector, with aircraft produced today being about 80 per cent more fuel efficient per passenger kilometre than in the 1960's;

*Welcoming* the agreement by the Committee on Aviation Environmental Protection (CAEP) on the CO<sub>2</sub> emissions certification Standard for aeroplanes;

*Recognizing* the work being undertaken to consider the environmental aspects of aircraft end-of-life such as through aircraft recycling;

*Recognizing* that air traffic management (ATM) measures under the ICAO's Global Air Navigation Plan contribute to enhanced operational efficiency and the reduction of aircraft CO<sub>2</sub> emissions;

*Welcoming* the assessment of the environmental benefits of the Aviation System Block Upgrades (ASBUs) completed for Block 0 and being undertaken for Block 1;

*Noting* that the Conference on Aviation and Alternative Fuels in November 2009 (CAAF/09) endorsed the use of sustainable alternative fuels for aviation, particularly the use of drop-in fuels in the short to mid-term, as an important means of reducing aviation emissions;

*Also noting* that the CAAF/09 established an ICAO Global Framework for Aviation Alternative Fuels (GFAAF) through which progress has been registered, including five pathways for the certification of aviation alternative fuels to date, and the first airport-hub for such fuels;

*Recognizing* that the technological feasibility of drop-in sustainable alternative fuels for aviation is proven and that the introduction of appropriate policies and incentives to create a long-term market perspective is required;

*Acknowledging* the need for such fuels to be developed and deployed in an economically feasible, socially and environmentally acceptable manner and the progress achieved in the harmonization of the approaches to sustainability;

*Acknowledging* the need to explore and facilitate civil aviation sector's access to renewable energy including through its cooperation with the Sustainable Energy for All (SE4ALL) initiative, as part of the Organization's contribution to SDG 7 "*Ensure access to affordable, reliable, sustainable and modern energy for all*";

*Recalling* that Assembly Resolution A37-19 requested the Council, with the support of member States, to undertake work to develop a framework for market-based measures (MBMs) in international aviation, including further elaboration of the guiding principles listed in the Annex to A37-19, and that the guiding principles were elaborated as listed in the Annex to Assembly Resolution A38-18, which are reproduced in the Annex to this Resolution;

*Noting* that, consistent with Assembly Resolution A38-18, a substantial strategy for capacity building and other technical and financial assistance was undertaken by the Organization, in line with the No Country Left Behind (NCLB) initiative, to assist the preparation and submission of States' action plans, including the holding of regional seminars, the development and update of ICAO Doc 9988, *Guidance on the development of States' Action Plans on CO<sub>2</sub> Emissions Reduction Activities*, an interactive web-interface, the ICAO Fuel Savings Estimation Tool (IFSET) and the ICAO Environmental Benefits Tool (EBT);

*Welcoming* that, as of 8 June 2016, 94 member States that represent more than 88 per cent of global international air traffic voluntarily prepared and submitted action plans to ICAO;

*Recognizing* the different circumstances among States in their capacity to respond to the challenges associated with climate change and the need to provide necessary support, in particular to developing countries and States having particular needs;

*Affirming* that specific measures to assist developing States as well as to facilitate access to financial support, technology transfer and capacity building should be initiated as soon as possible;

*Recognizing* the assistance provided by ICAO in partnership with other organizations to facilitate Member States' action to reduce aviation emissions, as well as continuous search for potential assistance partnerships with other organizations;

*Recognizing* the importance of work being undertaken to identify the potential impacts of climate change on international aviation operations and related infrastructure; and

*Recognizing* the progress made by ICAO in its implementation of the Climate Neutral UN initiative and the significant support provided by ICAO to the initiative, in particular through the development of the ICAO Carbon Emissions Calculator, to support the assessment of emissions from passengers travelling by air and welcoming its expansion to add air cargo emissions;

*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 A39-3: *Consolidated statement of continuing ICAO policies and practices related to environmental protection - Global Market-based Measure (MBM) Scheme*, supersede Resolutions A38-17 and A38-18 and constitute the consolidated statement of continuing ICAO policies and practices related to environmental protection;

2. *Requests* the Council to:

- a) ensure that ICAO exercise continuous leadership on environmental issues relating to international civil aviation, including GHG emissions;
- b) continue to study policy options to limit or reduce the environmental impact of aircraft engine emissions and to develop concrete proposals, encompassing technical solutions and market-based measures, and taking into account potential implications of such measures for developing as well as developed countries; and
- c) continue to cooperate with organizations involved in policy-making in this field, notably with the Conference of the Parties to the UNFCCC;

3. *Reiterates* that:

- a) ICAO should continue to take initiatives to promote information on scientific understanding of aviation's impact and action undertaken to address aviation emissions and continue to provide the forum to facilitate discussions on solutions to address aviation emissions; and
- b) emphasis should be on those policy options that will reduce aircraft engine emissions without negatively impacting the growth of air transport especially in developing economies;

4. *Resolves* that States and relevant organizations will work through ICAO to achieve a global annual average fuel efficiency improvement of 2 per cent until 2020 and an aspirational global fuel efficiency improvement rate of 2 per cent per annum from 2021 to 2050, calculated on the basis of volume of fuel used per revenue tonne kilometre performed;

5. *Agrees* that the goals mentioned in paragraph 4 above would not attribute specific obligations to individual States, and the different circumstances, respective capabilities and contribution of developing and developed States to the concentration of aviation GHG emissions in the atmosphere will determine how each State may voluntarily contribute to achieving the global aspirational goals;

6. *Also resolves* that, without any attribution of specific obligations to individual States, ICAO and its member States with relevant organizations will work together to strive to achieve a collective medium term global aspirational goal of keeping the global net carbon emissions from international aviation from 2020 at the same level, taking into account: the special circumstances and respective capabilities of States, in particular developing countries; the maturity of aviation markets; the sustainable growth of the international aviation industry; and that emissions may increase due to the expected growth in international air traffic until lower emitting technologies and fuels and other mitigating measures are developed and deployed;

7. *Recognizes* the many actions that ICAO member States have taken and intend to take in support of the achievement of the collective aspirational goals, including air traffic management modernization, acceleration of the use of fuel-efficient aircraft technologies, and the development and deployment of sustainable alternative fuels, and *encourages* further such efforts;

8. *Agrees* to review, at its 40th Session, the goal outlined in paragraph 6 above in light of progress towards the goal, studies regarding the feasibility of achieving the goal, and relevant information from States;

9. *Requests* the Council to continue to explore the feasibility of a long term global aspirational goal for international aviation, through conducting detailed studies assessing the attainability and impacts of any goals proposed, including the impact on growth as well as costs in all countries, especially developing countries, for the progress of the work to be presented to the 40th Session of the ICAO Assembly. Assessment of long term goals should include information from member States on their experiences working towards the medium term goal;

10. *Further encourages* States to submit voluntary action plans outlining respective policies and actions, and annual reporting on international aviation CO<sub>2</sub> emissions to ICAO;

11. *Invites* those States that choose to prepare or update action plans to submit them to ICAO as soon as possible preferably by the end of June 2018 and once every three years thereafter, in order that ICAO can continue to compile the quantified information in relation to achieving the global aspirational goals, and the action plans should include information on the basket of measures considered by States, reflecting respective national capacities and circumstances, quantified information on the expected environmental benefits from the implementation of the measures chosen from the basket, and information on any specific assistance needs;

12. *Encourages* States that have already submitted action plans to share information contained in action plans and build partnerships with other member States in order to support those States that have not prepared action plans, and to make the submitted action plans available to the public, taking into account the commercial sensitivity of information contained in States' action plans;

13. *Requests* the Council to facilitate the dissemination of economic and technical studies and best practices related to aspirational goals and to continue to provide guidance and other technical assistance for the preparation and update of States' action plans prior to the end of June 2018, in order for States to conduct necessary studies and to voluntarily submit action plans to ICAO;

14. *Requests* the Council to maintain and enhance appropriate standard, methodologies and a mechanism to measure/estimate, monitor and verify global GHG emissions from international aviation, and States support the work of ICAO on measuring progress through the reporting of annual data on traffic, fuel consumption and CO<sub>2</sub> emissions;

15. *Requests* the Council to request States to continue to support the efforts of ICAO on enhancing the reliability of measuring/estimating global GHG emissions from international aviation, and to regularly report CO<sub>2</sub> emissions from international aviation to the UNFCCC, as part of its contribution to assessing progress made in the implementation actions in the sector based on information approved by its member States;

16. While recognizing that no effort should be spared to obtain means to support the reduction and stabilization of CO<sub>2</sub> emissions from all sources, *urges* that ICAO and its member States express a clear

concern, through the UNFCCC process, on the use of international aviation as a potential source for the mobilization of revenue for climate finance to the other sectors, in order to ensure that international aviation would not be targeted as a source of such revenue in a disproportionate manner;

17. *Requests* the Council to:

- a) continue to play a pivotal role in providing assistance to its member States through the dissemination of the latest information on best practices and the provision of guidance and other technical assistance to enhance capacity building and technology transfer, including through the ICAO Technical Cooperation Programme;
- b) build further partnerships with other international organizations to meet the assistance needs of ICAO's member States, including through the ICAO Action Plan Buddy Programme, and facilitate access to existing and new financial resources, technology transfer and capacity building, to developing countries and report on results achieved as well as further recommendations, preliminarily by the end of 2018 and at the 40th Session of the Assembly; and
- c) continue to initiate specific measures to assist developing States as well as to facilitate access to financial resources, technology transfer and capacity building;

18. *Requests* States to:

- a) promote scientific research aimed at continuing to address the uncertainties identified in the IPCC special report on Aviation and the Global Atmosphere and in the Assessment reports, and ensure that future assessments undertaken by IPCC and other relevant United Nations bodies include updated information, if any, on aircraft-induced effects on the atmosphere;
- b) consider policies to encourage the introduction of more fuel efficient aircraft in the market, and work together through ICAO to exchange information and develop guidance for best practices on aircraft end-of-life such as through aircraft recycling;
- c) accelerate investments on research and development to bring to market more efficient technology by 2020;
- d) accelerate the development and implementation of fuel efficient routings and air navigation procedures to reduce aviation emissions, and work with ICAO to bring the environmental benefits to all regions and States, taking into account the Aviation System Block Upgrades (ASBUs) strategy;
- e) reduce legal, security, economic and other institutional barriers to enable implementation of the new air traffic management operating concepts for the environmentally efficient use of airspace;
- f) set a coordinated approach in national administrations for policy actions and investment to accelerate the appropriate development, deployment and use of clean and renewable energy sources for aviation, including the use of sustainable alternative fuels, in accordance with their national circumstances;

- g) consider the use of incentives to encourage the deployment of clean and renewable energies sources for aviation, including sustainable alternative fuels;
- h) consider measures to support research and development as well as processing technology and feedstock production in order to decrease costs and support scale-up of sustainable production pathways up to commercial scale, taking into account the sustainable development of States;
- i) recognize existing approaches to assess the sustainability of all alternative fuels in general, including those for use in aviation which should achieve net GHG emissions reduction on a life cycle basis, contribute to local social and economic development; competition with food and water should be avoided; and
- j) adopt measures to ensure the sustainability of alternative fuels for aviation, building on existing approaches or combination of approaches, monitor, at a national level, the sustainability of the production of alternative fuels for aviation, and work together through ICAO and other relevant international bodies, to exchange information and best practices, including for the harmonization on the sustainability criteria of aviation alternative fuels;

19. *Requests* the Council to:

- a) continue to develop and keep up-to-date the guidance for member States on the application of policies and measures aimed at reducing or limiting the environmental impact of emissions from international aviation, and conduct further studies with respect to mitigating the impact of international aviation on climate change;
- b) encourage States to cooperate in the development of predictive analytical models for the assessment of aviation impacts;
- c) continue evaluating the costs and benefits of the various measures, including existing measures, with the goal of addressing aircraft engine emissions in the most cost-effective manner, taking into account the interests of all parties concerned, including potential impacts on developing world;
- d) assist member States with studies, evaluations and development of procedures, in collaboration with other States in the region, to limit or reduce GHG emissions on a global basis and work together collaboratively to optimize the environmental benefits that can be achieved through various programmes;
- e) adopt the CO<sub>2</sub> emissions certification Standard for aeroplanes as soon as possible;
- f) update medium and long term technological goals for aircraft fuel burn;
- g) maintain and update guidance on operational measures to reduce international aviation emissions, and place emphasis on increasing fuel efficiency in all aspects of the ICAO's Global Air Navigation Plan (GANP); encourage States and stakeholders to develop air traffic management that optimizes environmental benefits, and promote and share best practices applied at airports;

- h) continue to develop and update the necessary tools and guidance to assess the benefits associated with air traffic management improvements, and assess the environmental benefits associated with the implementation of the Aviation System Block Upgrades (ASBUs) strategy;
- i) encourage member States and invite industry, financial institutions and other international organizations to actively participate in exchange of information and best practices, and facilitate the establishment of partnerships and the definition of policies that will further promote the transition to clean, renewable sources of energy for aviation, including sustainable alternative fuels, through regional seminars;
- j) continue to maintain the ICAO Global Framework for Aviation Alternative Fuels (GFAAF);
- k) continue to give a global view of the future use of alternative jet fuels and to account for changes in life cycle GHG emissions in order to assess progress toward achieving global aspirational goals;
- l) work with financial institutions to facilitate access to financing infrastructure development projects dedicated to sustainable aviation alternative fuels and incentives to overcome initial market hurdles;
- m) cooperate with other relevant international initiatives, including the Sustainable Energy for All (SE4ALL) initiative, to facilitate the aviation's access to renewable energy;
- n) identify the potential impacts of climate change on international aviation operations and related infrastructure and identify adaptation measures to address the potential climate change impacts, in cooperation with other relevant international organizations and the industry; and
- o) continue to cooperate with the Climate Neutral UN initiative, remain at the forefront of developing methods and tools for quantifying aviation's GHG emissions with respect to the initiative, including the ICAO Carbon Emissions Calculator that also incorporates cargo emissions, and further develop and implement the strategy for reducing GHG emissions and enhancing in-house sustainability management practices of the Organization.

### **Annex**

The guiding principles for the design and implementation of market-based measures (MBMs) for international aviation:

- a) MBMs should support sustainable development of the international aviation sector;
- b) MBMs should support the mitigation of GHG emissions from international aviation;
- c) MBMs should contribute towards achieving global aspirational goals;
- d) MBMs should be transparent and administratively simple;
- e) MBMs should be cost-effective;
- f) MBMs should not be duplicative and international aviation CO<sub>2</sub> emissions should be accounted for only once;
- g) MBMs should minimize carbon leakage and market distortions;



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- h) MBMs should ensure the fair treatment of the international aviation sector in relation to other sectors;
  - i) MBMs should recognize past and future achievements and investments in aviation fuel efficiency and in other measures to reduce aviation emissions;
  - j) MBMs should not impose inappropriate economic burden on international aviation;
  - k) MBMs should facilitate appropriate access to all carbon markets;
  - l) MBMs should be assessed in relation to various measures on the basis of performance measured in terms of CO<sub>2</sub> emissions reductions or avoidance, where appropriate;
  - m) MBMs should include *de minimis* provisions;
  - n) where revenues are generated from MBMs, it is strongly recommended that they should be applied in the first instance to mitigating the environmental impact of aircraft engine emissions, including mitigation and adaptation, as well as assistance to and support for developing States;
  - o) where emissions reductions are achieved through MBMs, they should be identified in States' emissions reporting; and
  - p) MBMs should take into account the principle of common but differentiated responsibilities and respective capabilities, the special circumstances and respective capabilities, and the principle of non-discrimination and equal and fair opportunities.

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**APPENDIX B****ICAO Assembly 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 CO<sub>2</sub> 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 Resolution 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 CO<sub>2</sub> 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 CO<sub>2</sub> emissions reductions to address the growth of international air traffic, in time to achieve the global aspirational goal of keeping the global net CO<sub>2</sub> 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 CO<sub>2</sub> 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 CO<sub>2</sub> 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 CO<sub>2</sub> 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 entrant<sup>3</sup> 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 CO<sub>2</sub> 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;

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<sup>3</sup> 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 CO<sub>2</sub> 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 Emissions Unit Criteria (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 CO<sub>2</sub> 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;

— END —

Paper no. 2: International Maritime Organization

**Note by the International Maritime Organization to the forty-fifth session of the Subsidiary Body for Scientific and Technological Advice (SBSTA 45)  
Marrakesh, Morocco, 7 to 14 November 2016**

**Agenda item 10(b)  
Emissions from fuel used for international aviation and maritime transport**

**UPDATE ON IMO'S WORK TO ADDRESS GHG EMISSIONS FROM FUEL USED FOR  
INTERNATIONAL SHIPPING**

**SUMMARY**

IMO's Marine Environment Protection Committee (MEPC) has for some time now been considering, as an integral part of its agenda, actions to address greenhouse gas (GHG) emission from ships engaged in international trade. It met for its seventieth session (MEPC 70) from 24 to 28 October 2016, at IMO Headquarters in London, with the participation of 96 Member States, two associate members, two United Nations bodies, four intergovernmental organizations and 44 non-governmental organizations.

The Committee, at its sixty-ninth session (MEPC 69), welcomed the Paris Agreement on Climate Change and recognized it as a major achievement by the international community. It also unanimously recognized IMO's own role in mitigating the impact of GHG emissions from international shipping and acknowledged the current efforts and the measures already introduced by IMO to enhance the energy efficiency of ships.

MEPC 70 continued to demonstrate the Organization's commitment to climate change mitigation by adopting amendments to chapter 4 of MARPOL Annex VI, requiring ships to record and report their fuel oil consumption and additional data on proxies for the "transport work" undertaken by the ship. This requirement is expected to enter into force in early 2018. The establishment of the IMO Ship Fuel Oil Consumption Database is the first in a three-step approach in which analysis of the data collected (second step) would provide the basis for an objective, transparent and inclusive policy debate in the MEPC (third step). MEPC 70 also approved a roadmap for developing a "Comprehensive IMO strategy on reduction of GHG emissions from ships".

IMO is also continuing its efforts with regard to technical co-operation and capacity-building to ensure effective implementation and enforcement of the aforementioned regulations worldwide and, importantly, activities to support the implementation of resolution MEPC.229(65) on *Promotion of technical co-operation and transfer of technology relating to the improvement of energy efficiency of ships*.

**Introduction**

1 International shipping plays an essential role in the facilitation of world trade as the most cost-effective and energy-efficient mode of mass cargo transport, making a vital contribution to international trade and being a key pillar of the development of a sustainable global economy.

2 The International Maritime Organization (IMO) was established by Governments as a specialized agency under the United Nations to provide the machinery for intergovernmental cooperation in the field of regulation of ships engaged in international trade. IMO is responsible for the global regulation of all aspects of international shipping and has a key role in ensuring that lives at sea are not put at risk, including security of shipping, and that the environment is not polluted by ships' operations – as summed up in IMO's mission statement: **Safe, secure and efficient shipping on clean oceans.**

3 The mandatory energy efficiency requirements for international shipping have now been in force for over three years. Data presented to MEPC 70 clearly identifies the improvements made, significant in many cases, in the energy efficiency of ships being designed and delivered today. This is a significant success story and once again demonstrates the IMO's important role as the global standard setter for international shipping. However, the complexity of optimizing the energy efficiency of existing ships requires that any future action is taken so following the analysis of robust data.

4 This document provides an update of previous submissions by IMO to SBSTA, including document FCCC/SBSTA/2016/MISC.2.

### **Work on control of GHG emissions from international shipping**

5 Measures to improve the energy efficiency of international shipping were adopted by Parties to Annex VI of the International Convention for the Prevention of Pollution from Ships (MARPOL) at MEPC 62 in July 2011 and entered into force on 1 January 2013. The *Regulations for energy efficiency of ships* apply to internationally trading ships of 400 gross tonnage and above, and make mandatory the:

- .1 Energy Efficiency Design Index (EEDI) for new ships; and
- .2 Ship Energy Efficiency Management Plan (SEEMP) for all ships.

6 The EEDI is a non-prescriptive, performance-based mechanism that leaves the choice of technologies to use in a specific ship design to the industry. As long as the required energy-efficiency level is attained, ship designers and builders are free to use the most cost-efficient solutions for a ship to comply with the regulations.

7 All ships of 400 gross tonnage and above engaged in international trade are required to implement and maintain a SEEMP which establishes a mechanism for operators to improve the energy efficiency of ships. This should be achieved by monitoring the energy efficiency performance of a ship's transportation work and by considering new technologies and practices to improve energy efficiency at regular intervals.

8 MEPC 70 considered a report of its correspondence group reviewing the status of technological developments relevant to implementing Phase 2 of the EEDI regulations. MEPC 70

agreed to retain the EEDI requirements for Phase 2 (except for ro-ro cargo ships and passenger ships that are to be considered further at MEPC 71) and on the need for a thorough review of EEDI Phase 3 (1 January 2025 and onwards) requirements, including discussion on its earlier implementation and the possibility of establishing a Phase 4. Currently, Phase 3 requirements provide that new ships be built to be 30% more energy efficient compared to the baseline.

### **Third IMO GHG Study 2014**

9 MEPC 67 (October 2014) approved the Third IMO GHG Study 2014, providing updated estimates for GHG emissions from ships. According to current estimates presented in this study, international shipping emitted 796 million tonnes of CO<sub>2</sub> in 2012, which accounts for no more than about 2.2% of the total emission volume for that year. By contrast, in 2007, before the global economic downturn, international shipping was estimated to have emitted 885 million tonnes of CO<sub>2</sub> which represented 2.8% of the global emissions of CO<sub>2</sub> for that year. These percentages are all the more significant when considering that shipping is the principal carrier of world trade, carrying as much as 90% by volume and therefore providing a vital service to global economic development and prosperity.

10 Updated emission estimates are considered necessary, in general, to provide a better foundation for future work by IMO to address GHG emissions from international shipping especially as the Business as Usual scenarios, depending on future economic and energy developments, forecast a growth in CO<sub>2</sub> emissions for international maritime transport of between 50% to 250% in the period up to 2050. Sea transport is fuel-efficient and without these updated figures it would be difficult to provide a meaningful baseline to illustrate the steadily on-going improvement in fuel efficiency due to improved hull design, more effective diesel engines and propulsion systems and more effective utilization of individual ships resulting from the introduction of mandatory technical and operational measures.

11 The executive summary and the full report of the Third IMO GHG Study 2014 in English, as well as the executive summary translated into French and Spanish, have now been published and are available on the IMO website at:

<http://www.imo.org/OurWork/Environment/PollutionPrevention/AirPollution/Pages/Greenhouse-Gas-Studies-2014.aspx>

### **Further technical and operational measures to enhance the energy efficiency of ships**

12 MEPC 68 (May 2015) agreed that the development of a data collection system for ships should follow a three-step approach: data collection, data analysis, followed by decision-making on what further measures, if any, are required. This approach was re-affirmed by MEPC 69 (April 2016).

13 MEPC 68 noted that one purpose of the data collection system was to analyze energy efficiency and that for this analysis to be effective some transport work data needs to be included. In this regard, MEPC 68 agreed that data collected by the IMO, particularly that related to transport work, needs to be confidential and not publicly available, and that there is a need to address resulting administrative burdens, impact on industry and the variables that influence energy efficiency. MEPC 69 further agreed that confidentiality of data is crucial and no third-party access to the data should be permitted.

14 MEPC 70 adopted mandatory MARPOL Annex VI requirements for ships to record and report their fuel oil consumption. Under the amendments, ships of 5,000 gross tonnage and above (representing approximately 85% of the total CO<sub>2</sub> emissions from international shipping) will be required to collect consumption data for each type of fuel oil they use, as well as other, additional, specified data including proxies for “transport work”. The aggregated data will be reported to the flag State after the end of each calendar year and the flag State, having determined that the data has been reported in accordance with the requirements, will issue a Statement of Compliance to the ship. Flag States will be required to subsequently transfer this data to an IMO Ship Fuel Oil Consumption Database. IMO will be required to produce an annual report to the MEPC, summarizing the data collected.

### **Reduction of GHG emissions from ships**

15 MEPC 69 welcomed the Paris Climate Agreement and acknowledged the major achievement of the international community in concluding the agreement. It also unanimously recognized IMO’s own role in mitigating the impact of GHG emissions from international shipping and acknowledged the current efforts and the measures already introduced by IMO to enhance the energy efficiency of ships.

16 MEPC 70, having considered several submissions and established the Working Group on the Reduction of GHG emissions from international shipping, approved a Roadmap for developing a *Comprehensive IMO strategy on reduction of GHG emissions from ships*, which foresees an initial GHG reduction strategy to be adopted in 2018. The Roadmap contains a list of activities, including further IMO GHG studies and significant intersessional work, with relevant timelines and provides for alignment of those new activities with the ongoing work on the aforementioned three-step approach to ship energy efficiency improvements. This alignment provides a way forward to the adoption of a revised strategy in 2023 to include short-, mid-, and long-term further measures, as required, including implementation schedules.

### **Technical co-operation and transfer of technology**

17 Regulation 23 (Promotion of technical co-operation and transfer of technology relating to the improvement of energy efficiency of ships) of chapter 4 of MARPOL Annex VI requires Administrations, in co-operation with the IMO and other international bodies, to promote and provide, as appropriate, support directly or through IMO to Member States, especially developing States that request technical assistance. It also requires the Administration of a Party to MARPOL Annex VI to co-operate actively with other Parties, subject to its national laws, regulations and policies, to promote the development and transfer of technology and the exchange of information to States which request technical assistance, particularly developing States.

18 Linked to the implementation of energy efficiency measures, MEPC 65 (May 2013) adopted resolution MEPC.229(65) on *Promotion of technical co-operation and transfer of technology relating to the improvement of energy efficiency of ships*, which, among other things, requests the IMO, through its various programmes, to provide technical assistance to Member States to enable cooperation in the transfer of energy efficient technologies to developing countries in particular; and further assist in the sourcing of funding for capacity building and support to States, in particular developing States, which have requested technology transfer.

19 MEPC 66 (April 2014) discussed the implementation of resolution MEPC.229(65) and established, in accordance with the resolution, an Ad Hoc Expert Working Group on Facilitation of Transfer of Technology for Ships (TT-EG). The TT-EG, during its first meeting, agreed on the methodology for conducting its work, as well as on a work plan which was endorsed by the MEPC.

20 MEPC 69 noted that a comprehensive update of the Train the Trainer package on “Energy Efficient Ship Operation” had been undertaken to include a new module on the regulatory framework related to the energy efficiency of ships, an EEDI Calculator for training purposes, and other related updated information, such as the findings from the Third IMO GHG Study 2014. Member Governments and other interested delegations were encouraged to make use of it. Details of the course, including training materials such as presentations, can be downloaded from the following website:

<http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Pages/IMO-Train-the-Trainer-Course.aspx>

21 In line with the IMO’s High-level Action Plan and Strategic Direction 9 which identifies that “IMO will pay special attention to the shipping needs of Small Island Developing States (SIDS) and the least developed countries (LDCs)”, the MEPC has noted the need for timely scheduled voyages, in particular to SIDS dependent upon maritime transport, and that such a special need should be carefully considered to ensure SIDS are not penalized by any measures developed and adopted in respect of operational energy efficiency. In this regard, MEPC has also noted that the Organization’s technical cooperation activities would seek to address specific needs of LDCs and SIDS with regard to implementation of ship energy efficiency requirements. MEPC reaffirmed its view at MEPC 70 that SIDS and LDCs have special needs.

22 MEPC 70 was informed of the establishment of an information portal for energy efficiency technologies for ships which provides users with information on existing energy efficiency technologies and highlights the wide spectrum of ways to potentially reduce ship fuel oil consumption. The portal can be accessed through the following link: <http://glomeep.imo.org/resources/energy-efficiency-techologies-information-portal/>

### ***Technical cooperation activities***

23 To ensure effective implementation and enforcement of the new energy efficiency regulations worldwide, IMO has also been focusing its efforts on technical co-operation and capacity building, and has been undertaking a series of regional and national workshops on implementation of the measures to address emissions from international shipping. Under the Integrated Technical Co-operation Programme (ITCP) of IMO, further capacity-building activities are currently planned, in order to sustain the level of technical cooperation interventions in various regions for the effective implementation and enforcement of energy efficiency measures for ships.

24 Furthermore, with financial support from the Global Environment Facility (GEF), UNDP and IMO are cooperating in a global effort to transform the shipping industry towards a lower carbon future, through a project entitled “*Transforming the global maritime transport industry towards a low carbon future through improved energy efficiency*” ([GloMEEP Project](#)). Having received the support and commitment of ten Lead Pilot Countries, this two year global project is assisting developing countries in the implementation of the energy efficiency measures adopted by IMO.

25 The GEF-UNDP-IMO GloMEEP Project was officially launched during the Future-Ready Shipping 2015 Conference (<http://future-readyshipping.com>), a joint IMO-Singapore International Conference on Maritime Technology Transfer and Capacity Building, held in Singapore on 28 and 29 September 2015. About 200 maritime leaders and professionals attended the conference, which kick-started a global dialogue on removing barriers to energy-efficiency technologies and measures. Speakers at the conference gave presentations spanning the entire spectrum of technology development, technology transfer and capacity building as well as policy, economic and regulatory developments. The speakers shared views on the creation of enabling environments; the current state of green ship technology and what might be expected in the future; and how to continue to promote and sustain capacity building and technology cooperation.

26 Attending the Future-Ready Shipping 2015 Conference were representatives of the GloMEEP Lead Pilot Countries: Argentina, China, Georgia, India, Jamaica, Malaysia, Morocco, Panama, Philippines and South Africa. Within the framework of the GloMEEP Project, these countries are currently being supported in taking a fast-track approach to pursuing relevant legal, policy and institutional reforms, driving national and regional government action and industry innovation to support the effective implementation of IMO's energy efficiency requirements.

27 Also, IMO is working to establish a global network of Maritime Technology Cooperation Centres (MTCCs), which seeks to promote the uptake of low-carbon technologies and operations in maritime transport. This four-year project, administered by the IMO with €10 million in funding from the European Union, is designed to help beneficiary countries limit and reduce GHG emissions from their shipping sectors through technical assistance and capacity building, while encouraging the uptake of innovative energy-efficiency technologies among a large number of users through the widespread dissemination of technical information and know-how.

## Summary

28 International maritime transport is the most energy efficient mode of mass cargo transport and indispensable to the world. A global approach to further improvements in energy efficiency and work to address GHG emissions from ships is considered necessary as sea transport is predicted to grow significantly in the coming years in line with expected future growth in world trade.

29 MEPC 69 welcomed the Paris Agreement on Climate Change and recognized it as a major achievement by the international community. It also unanimously recognized IMO's own role in mitigating the impact of GHG emissions from international shipping and acknowledged the current efforts and the measures already introduced by IMO to enhance the energy efficiency of ships.

30 MEPC 70 continued the Organization's commitment to climate change mitigation by adopting amendments to chapter 4 of MARPOL Annex VI, requiring ships to record and report their fuel consumption, which is expected to come into force in early 2018. The establishment of the IMO Ship Fuel Oil Consumption Database is the first in a three-step approach in which analysis of the data collected (second step) would provide the basis for an objective, transparent and inclusive policy debate by the MEPC (third step).

31 MEPC 70, having established the Working Group on the Reduction of GHG emissions from international shipping to hold an in-depth discussion and recommend an appropriate way forward, approved a roadmap for developing a "Comprehensive IMO strategy on reduction of GHG emissions from ships". Under the roadmap, and to provide a long-term vision for the shipping

sector, the MEPC has to address a number of important questions, such as what role the international shipping sector should have in supporting the goals of the Paris Agreement.

32 IMO continues to develop its adopted framework of technical and operational measures that now serves as a mandatory performance standard for increased energy efficiency in international shipping. The framework builds on IMO's enforcement and control provisions (flag State implementation and port State control), and provides a suite of comprehensive technical guidelines for their effective implementation.

33 IMO is advancing its technical cooperation activities to stimulate the uptake of innovative energy-efficiency and low-carbon technologies for international shipping through the widespread dissemination of information and technology transfer.

34 IMO, as the global regulator of international shipping, will continue its endeavours to reduce environmental impacts from international maritime transport, a vital industry to world trade and sustainable development, and keep relevant bodies of the UNFCCC informed of its progress.

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