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UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE

Subsidiary Body for Scientific and Technological Advice

Thirty-seventh session

Doha, 26 November to 1 December 2012

Item 11(d) 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, at its thirty-sixth session, invited the secretariats of the International Civil Aviation Organization (ICAO) and the International Maritime Organization (IMO) to continue to report, at its future sessions, on relevant work in relation to addressing emissions from fuel used for international aviation and maritime transport.¹
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.

¹ FCCC/SBSTA/2012/2, paragraph 85.

* 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.

FCCC/SBSTA/2012/MISC.20

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

The Thirty-seventh Session of the UNFCCC Subsidiary Body for

Scientific and Technological Advice (SBSTA37)

(26 November to 1 December 2012 – Doha, Qatar)

Agenda Item 11 (d)

Emissions from fuel used for international aviation and maritime transport

(Submission by the International Civil Aviation Organization (ICAO))

1. INTRODUCTION

1.1 Aviation plays a key role in society and is a driver of economic activity. In 2011, 2.8 billion passengers were transported safely by air and this figure is forecasted to grow to 5 billion by 2030. In addition, 5.3 trillion USD worth of cargo – approximately 35 per cent of world trade by value is carried annually by air. Air transport supports 3.5 per cent of the global GDP, including the employment of more than 56 million people worldwide.

1.2 Through the increased use of low-carbon technology, environmentally friendly materials, new aircraft systems and sustainable energy sources, the air transport sector is also making significant advances across the environmental pillar of sustainable development. Aircraft today are at least 70 per cent more fuel efficient than they were some 40 years ago.

1.3 Aviation's current contribution (domestic and international) to climate change is estimated to be approximately 2 per cent of global anthropogenic CO₂ emissions, of which 60 per cent is from international aviation. Nevertheless, the growth in air traffic is outstripping the enormous progress achieved in reducing emissions and ICAO has taken the lead in further addressing international aviation's contribution to climate change.

1.4 The Resolution A37-19 adopted by ICAO's 37th Assembly in 2010 was an important step towards a sustainable air transport future and made international aviation the first sector with global aspirational goals of improving annual fuel efficiency by 2 per cent and stabilizing its global CO₂ emissions at 2020 levels.

2. RECENT PROGRESS AND NEXT STEPS

2.1 ICAO and its Member States have been engaged in various initiatives and made important progress in the field of international aviation and climate change, focusing on four key areas: 1) States' action plans and assistance to States, 2) sustainable alternative fuels for aviation, 3) market-based measures, and 4) global aspirational goals, in order to move international aviation closer to a sustainable future.

States' Action Plans

2.2 The agreement by the 37th ICAO Assembly on the voluntary submission of Member States' action plans on CO₂ emissions reduction activities for international aviation to ICAO has led to a dynamic shift in the Organization's policy outlook on the environment from a "Standards and policies setting" phase to a more action-oriented "implementation" mode. The action plans allow States to identify their basket of mitigation measures and assistance needs to implement such measures. In turn, the compilation of information contained in the States' action plans enables ICAO to assess the progress toward achieving the global aspirational goals, as well as identify the areas of implementation support and assistance needed towards the provision of such assistance to States.

2.3 To assist States in the development of their action plans, ICAO developed guidance material and an interactive web-interface, as well as conducted seven hands-on training workshops. The ICAO Secretariat also continued to support States by making contact with individual States and providing specific tools and information related to the guidance material and interactive website.

2.4 By 5 November 2012, 53 member States representing 75 per cent of the global international air traffic have developed and submitted their action plans to ICAO. Additional action plans are expected to be submitted by the end of 2012, which will bring the total percentage of global international air traffic represented to 85 per cent. The ICAO Secretariat is also exploring the possibility with some groups of States on the development of a joint action plan by a group of States.

Assistance to States

2.5 ICAO is currently working on the compilation and analysis of information contained in the States' action plans received thus far. In this regard, the ICAO "Assistance for Action – Aviation and Climate Change" Seminar, held from 23 to 24 October 2012 in Montréal, Canada provided an opportunity for States and other stakeholders to exchange information and views on the assistance required to develop and implement action plans.

2.6 The Seminar highlighted the milestones achieved during the first phase of initiatives related to States' action plans. It showcased the synergies and active engagement between ICAO, its member States, other international organizations and stakeholders, toward the development and the implementation of action plans. During the financing session, eight speakers from six different international organizations discussed real opportunities to build partnerships to support assistance and financing requests identified by States in their action plans.

2.7 While the first phase of initiatives related to States' action plans was successful, ICAO has now entered the second phase, in an effort to build a robust, overarching strategy to support States that newly

develop their action plans; States that need their action plans to be reviewed by ICAO; and States that need assistance in implementing the actions identified in their plans.

Sustainable Alternative Fuels for Aviation

2.8 Sustainable alternative fuels for aviation offer one of the most exciting and promising opportunities for reducing the aviation sector's greenhouse gas (GHG) emissions, and ICAO has been providing a forum for the exchange of information on the state of worldwide activities in this area. Today, the use of drop-in biofuels in aviation has become a reality as they do not require changes to aircraft or fuel delivery infrastructure, and airlines are already using such fuels in commercial flights.

2.9 At the United Nations Conference on Sustainable Development (UNCSD, also known as the Rio+20 Conference) held in June 2012, ICAO demonstrated, in close cooperation with the industry partners, this global reality of sustainable alternative fuels for aviation through a series of four connecting flights from Montréal to Rio de Janeiro, which were all powered by sustainable alternative fuels. An ICAO report that summarizes this initiative: "Flightpath to a Sustainable Future", is available on the ICAO public website (www.icao.int/env).

2.10 Technological aspects have proven to be viable. The next challenge is to enable the availability of sustainable alternative fuels in a timely and commercially viable manner and in sufficient quantities for use in aviation. In June 2012, an ICAO expert group started its work to develop a set of policy recommendations to promote and further facilitate the development and deployment of such fuels for aviation. Building upon the existing policies and measures, and current initiatives and best practices undertaken by States and organizations, the expert group will develop its deliverables under four key themes, namely: 1) policies; 2) development and deployment;

3) sustainability criteria and emissions accounting; and 4) financing. The policy recommendations to be developed by the expert group will be considered by the ICAO Council in early 2013.

Market-based Measures (MBMs)

2.11 The 37th ICAO Assembly agreed on the development of a framework for MBMs, including the elaboration of the guiding principles adopted by the Assembly, and decided to explore a global MBM scheme for international aviation.

2.12 ICAO has been undertaking intensive work to develop a global solution on this subject, in cooperation with experts nominated by Member States and international organizations. In March 2012, the ICAO Council agreed to concentrate on four options for a global MBM scheme, and the evaluation criteria to assess these options were built upon the guiding principles. The following Session of the ICAO Council in June 2012 agreed to suspend further consideration of one option, and requested further evaluation of the remaining three options. It was also agreed that further progress would be made on the development of the framework for MBMs.

2.13 Further updates on the progress of work relating to MBMs at the next Session of the ICAO Council in November 2012 will be provided in due course.

Global Aspirational Goals

2.14 ICAO's Committee on Aviation Environmental Protection (CAEP) has continued its work on the CO₂ trends assessment by estimating the contribution of various categories of mitigation measures (aircraft-related technology development; improved air traffic management and infrastructure use; more efficient operations; and alternative fuels) in order to measure current and estimate future progress toward the achievement of global aspirational goals.

2.15 Work to estimate and verify the current global fuel consumption from international aviation directly supports the request of the 37th ICAO Assembly to regularly report CO₂ emissions from international aviation to UNFCCC. The methodologies used for and the results of estimating fuel consumption will be reviewed by CAEP.

2.16 In support of measuring future progress toward the achievement of global aspirational goals, the Secretariat has been compiling and interpreting the data contained in States' action plans to determine a global figure, which will be integrated with the CO₂ trends assessment being prepared by CAEP for the period of 2010 to 2050. The assessment will be finalized by CAEP in early 2013, and will support the review by the Council of the medium-term global aspirational goal and the exploration of a long-term global aspirational goal for international aviation.

CO₂ Certification Standard for Aircraft

2.17 Another major area of activity in the field of international aviation and climate change is the development of a technical CO₂ certification Standard for aircraft, which is one of the most challenging tasks in the CAEP work programme. Significant efforts were directed for the agreement of a CO₂ metric system at the CAEP Steering Group meeting in July 2012. This agreement allows CAEP to move to the next stages, including the definition of certification procedures and the Standard's scope of applicability, to be followed by the analysis of an appropriate regulatory limit for the Standard.

3. LONG-TERM CLIMATE CHANGE FINANCE

3.1 The Durban Conference recalled that developed country Parties to the UNFCCC committed to a goal of mobilizing USD 100 billion per year by 2020 to address the needs of developing countries. While the Durban Conference did not agree on the specific sources of such revenue, it decided to analyze options from a wide variety of sources, drawing upon relevant reports, including the report of the High-level Advisory Group on Climate Financing (AGF) and that of the World Bank (WB)/International Monetary Fund (IMF) under the G20 process. The WB/IMF report explored global carbon charges of USD 25 per tonne of CO₂ on international transport, which it suggests could raise USD 12 billion per year by 2020 from international aviation.

3.2 It should be highlighted that the global aspirational goals for the international aviation sector, adopted by the 37th ICAO Assembly, will require 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 design and implementation of market-based measures for international aviation be treated as one element of a basket of

mitigation measures to achieve the global aspirational goals, as part of a global solution for the sustainable future of international aviation, and not in isolation.

3.3 In addition, discussions on climate change need to strike a good balance among the three pillars of social, economic and environmental sustainability which, once applied to the international aviation sector, will allow this sector to grow in an environmentally sustainable manner and at the same time, will continue to ensure the connectivity and access to mobility and to facilitate the exchange of cultural and educational experiences.

4. CONCLUSIONS

4.1 ICAO has been working actively towards developing global solutions to address GHG emissions from international aviation. ICAO Assembly Resolution A37-19 is a clear demonstration of the willingness of ICAO and its Member States to take concrete steps relating to climate change towards the sustainable development of international aviation.

4.2 ICAO expects the UNFCCC process to deliver an agreement that acknowledges ICAO's achievements as the specialized agency for international aviation in the area of climate change, and encourages its Member States to work further through ICAO.

APPENDIX

ICAO Assembly Resolution A37-19

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;

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);

Acknowledging that international aviation emissions, currently accounting for less than 2 per cent of total global CO₂ emissions, are projected to grow as a result of the continued development of the sector;

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) in collaboration with the Scientific Assessment Panel to the Montreal Protocol on Substances that Deplete the Ozone Layer;

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;

Whereas ICAO requested that the IPCC include an update of the main findings of the special report in its Fourth Assessment Report, published in 2007 and its Fifth Assessment Report to be published in 2014;

Noting the scientific view that the increase in global average temperature above pre-industrial levels ought not to exceed 2°C;

Acknowledging the principles and provisions on common but differentiated responsibilities and respective capabilities, and with developed countries taking the lead under the UNFCCC and the Kyoto Protocol;

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 and its Kyoto Protocol nor represent the position of the Parties to the UNFCCC and its Kyoto Protocol;

Noting that, consistent with Assembly Resolution A36-22, the High-level Meeting on International Aviation and Climate Change in October 2009 (HLM-ENV/09) endorsed the Programme of Action on International Aviation and Climate Change which included global aspirational goals in the form of fuel efficiency, a basket of measures and the means to measure progress;

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 will need to be considered to deliver a sustainable path for aviation;

Noting that, to promote sustainable growth of aviation, a comprehensive approach, consisting of work on technology and standards, and on operational and market-based measures to reduce emissions is necessary;

Noting that the HLM-ENV/09 declared that ICAO would establish a process to develop a framework for market based measures in international aviation, taking into account the conclusions of the HLM-ENV/9 and outcome of the UNFCCC COP 15 and bearing in mind relevant ICAO Assembly resolutions and the appendices with a view to complete this process expeditiously;

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);

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;

Whereas the Kyoto Protocol provides for different flexible instruments (such as the Clean Development Mechanism — CDM) which would benefit projects involving developing States;

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), and International Coordinating Council of Aerospace Industries Associations (ICCAIA) on behalf of the international air transport industry to continuously improve CO₂ efficiency by an average of 1.5 per cent per annum from 2009 until 2020, to achieve carbon neutral growth from 2020 and reducing its carbon emissions by 50 per cent by 2050 compared to 2005 levels;

Recognizing the need to monitor and report the potential impacts of climate change on international aviation operations and related infrastructure;

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 a common methodology for calculating GHG emissions from air travel;

The Assembly:

1. *Resolves* that this Resolution, together with Resolution A37-18: Consolidated statement of continuing ICAO policies and practices related to environmental protection - General provisions, noise and local air quality, supersede Resolution A36-22 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 and provide advice as soon as possible to the Conference of the Parties of the UNFCCC, 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:

- a) the special circumstances and respective capabilities of developing countries;
- b) that the different circumstances, respective capabilities and contribution of States to the concentration of aviation GHG emissions in the atmosphere will determine how each State may contribute to achieving the global aspirational goals;
- c) that some States may take more ambitious actions prior to 2020, which may offset an increase in emissions from the growth of air transport in developing States;
- d) the maturity of aviation markets;
- e) the sustainable growth of the international aviation industry; and
- f) 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. *Agrees* to review, at its 38th Session, the goal mentioned in paragraph 6 above in light of progress towards the goal, new studies regarding the feasibility of achieving the goal, and relevant information from States;

8. *Requests* the Council 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 38th 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.

9. *Encourages* States to submit their action plans outlining their respective policies and actions, and annual reporting on international aviation CO₂ emissions to ICAO;

10. *Invites* those States that choose to prepare their action plans to submit them to ICAO as soon as possible preferably by the end of June 2012 in order that ICAO can compile the 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 their respective national capacities and circumstances, and information on any specific assistance needs;

11. *Requests* the Council to facilitate the dissemination of economic and technical studies and best practices related to aspirational goals and to provide guidance and other technical assistance for the preparation of States' action plans prior to the end of June 2012, in order for States to conduct their necessary studies and to voluntarily submit their action plans to ICAO;

12. *Resolves* that a *de minimis* threshold of international aviation activity of 1 per cent of total revenue ton kilometres should apply to the submission of States' action plans as follows:

- a) States below the threshold are not expected to submit action plans towards achieving the global goals; and

- b) States below the threshold but that otherwise have agreed to voluntarily contribute to achieving the global goals are expected to submit action plans;

13. *Requests* 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, for consideration by the 38th Session of the ICAO Assembly;

14. *Urges* States to respect the guiding principles listed in the Annex, when designing new and implementing existing MBMs for international aviation, and to engage in constructive bilateral and/or multilateral consultations and negotiations with other States to reach an agreement;

15. *Resolves* on a *de minimis* threshold of international aviation activity, consistent with the guiding principles in the Annex, of 1 per cent of total revenue ton kilometres to MBMs as follows:

- a) commercial aircraft operators of States below the threshold should qualify for exemption for application of MBMs that are established on national, regional and global levels; and
- b) States and regions implementing MBMs may wish to also consider an exemption for other small aircraft operators;

16. *Requests* the Council to review the *de minimis* threshold to MBMs in paragraph 15, taking into account specific circumstances of States and potential impacts on the aviation industry and markets, and with regard to the guiding principles listed in the Annex, by the end of 2011;

17. *Urges* States to review existing and planned MBMs for international aviation to ensure their consistency with the guiding principles listed in the Annex and the provisions in paragraphs 15 and 16 above;

18. *Requests* the Council, with the support of member States and international organizations, to continue to explore the feasibility of a global MBM scheme by undertaking further studies on the technical aspects, environmental benefits, economic impacts and the modalities of such a scheme, taking into account the outcome of the negotiations under the UNFCCC and other international developments, as appropriate, and report the progress for consideration by the 38th Session of the ICAO Assembly;

19. *Recognizes* that in the short term voluntary carbon offsetting schemes constitute a practical way to offset CO₂ emissions, and *invites* States to encourage their operators wishing to take early actions to use carbon offsetting, particularly through the use of credits generated from internationally recognized schemes such as the CDM;

20. *Requests* the Council to collect information on the volume of carbon offsets purchased in relation to air transport, and to continue to develop and disseminate best practices and tools, such as the ICAO Carbon Emissions Calculator, that will help harmonize the implementation of carbon offset programmes;

21. *Requests* the Council to regularly report CO₂ 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;

22. *Requests* the Council to:

- a) study, identify and develop processes and mechanisms to facilitate the provision of technical and financial assistance, as well as facilitate access to existing and new financial resources, technology transfer and capacity building, to developing countries and report on its progress, including processes and mechanisms developed, results achieved as well as further recommendations, preliminarily by the end of 2012 and at the 38th Session of the Assembly; and
- b) initiate specific measures to assist developing States as well as to facilitate access to financial resources, technology transfer and capacity building;

23. *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 Fourth Assessment report;
- b) ensure that future international assessments of climate change undertaken by IPCC and other relevant United Nations bodies include updated information, if any, on aircraft-induced effects on the atmosphere;
- c) accelerate investments on research and development to bring to market even more efficient technology by 2020;
- d) accelerate the development and implementation of fuel efficient routings and procedures to reduce aviation emissions;
- e) accelerate efforts to achieve environmental benefits through the application of satellite-based technologies that improve the efficiency of air navigation and work with ICAO to bring these benefits to all regions and States;
- f) reduce legal, security, economic and other institutional barriers to enable implementation of the new ATM operating concepts for the environmentally efficient use of airspace;
- g) develop policy actions to accelerate the appropriate development, deployment and use of sustainable alternative fuels for aviation;
- h) work together through ICAO and other relevant international bodies, to exchange information and best practices; and
- i) consider measures to support sustainable aviation alternative fuels research and development, investments in new feedstock cultivations and production facilities, as well as incentives to stimulate commercialisation and use of sustainable alternative fuels for aviation to accelerate the reduction of aviation CO₂ emissions;

24. *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 aviation, and conduct further studies with respect to mitigating the impact of 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) provide the necessary guidance and direction to ICAO's Regional Offices to 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 their various programmes;
- e) develop a global CO₂ Standard for aircraft aiming for 2013;
- f) further elaborate on relevant fuel efficiency metrics, including for international business aviation, and develop medium and long term technological and operational goals for aircraft fuel burn;
- g) encourage member States and invite industry to actively participate in further work on sustainable alternative fuels for aviation;
- h) 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;
- i) continue to develop the necessary tools to assess the benefits associated with ATM improvements, and intensify its efforts on the development of new guidance on operational measures to reduce international aviation emissions;
- j) implement an emphasis on increasing fuel efficiency in all aspects of the ICAO's Global Air Navigation Plan, and encourage States and stakeholders to develop air traffic management that optimize environmental benefits and to promote and share best practices applied at airports in reducing the adverse effects of GHG emissions of civil aviation;
- k) identify 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 and fuel consumption;

- l) request States to continue to support the efforts of ICAO on enhancing the reliability of measuring/estimating global GHG emissions from international aviation;
- m) undertake a study on the possible application of CDM of the Kyoto Protocol to international aviation;
- n) monitor and disseminate relevant information on the potential impacts of climate change on international aviation operations and related infrastructure, 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, 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 CO₂ emissions should be accounted for only once;
- g) MBMs should minimize carbon leakage and market distortions;
- 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 CO₂ 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; and
- o) where emissions reductions are achieved through MBMs, they should be identified in States' emissions reporting.

**Submission by the International Maritime Organization to the thirty-seventh session of the
Subsidiary Body for Scientific and Technological Advice (SBSTA 37)
Doha, Qatar, 26 November to 1 December 2012**

**Agenda item 11(d)
Emissions from fuel used for international aviation and maritime transport**

IMO'S WORK TO ADDRESS GHG EMISSIONS FROM INTERNATIONAL SHIPPING IN 2012

SUMMARY

IMO's Marine Environment Protection Committee (MEPC) has been considering as an important part of its agenda actions to address greenhouse gas (GHG) emission from ships engaged in international trade. MEPC 63 in February/March 2012 and MEPC 64 in October 2012 each had the participation of more than 900 delegates from over 90 Member States, several United Nations bodies, intergovernmental organizations and over 40 non-governmental organizations with consultative status with IMO.

MEPC 63 adopted important guidelines aimed at supporting implementation of the mandatory measures to increase energy efficiency and reduce GHG emissions from international shipping, paving the way for the regulations on EEDI and SEEMP to be smoothly implemented by Administrations and industry upon their entry into force on 1 January 2013.

MEPC 63 also continued its discussion on Market-Based Measures for GHG emissions from international shipping and MEPC 64, noting that uncertainty exists in the estimates and projections of emissions from international shipping, agreed on the need for an update study of the GHG emissions estimate to base its future decisions.

IMO is now focusing its efforts on technical co-operation and capacity building to ensure smooth and effective implementation and enforcement of the new regulations worldwide and has been undertaking a series of workshops in all regions of the world on implementation of the measures to address GHG emissions from international shipping.

Introduction

1 International shipping plays a vital role in the facilitation of world trade as the most cost-effective and energy-efficient mode of mass transport, making a significant contribution to global prosperity in both developing and developed countries.

2 IMO was established by governments as a specialized agency under the United Nations to provide machinery for intergovernmental cooperation in the field of regulation of ships engaged in international trade. IMO is responsible for the global regulation of all facets pertaining to international shipping and has a key role in ensuring that lives at sea are not put at risk 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 global character of shipping has resulted in the adoption of global regulation that applies universally to all ships irrespective of the country of ship registration, in line with the basic principle of non-discrimination set out in IMO's constitutive Convention. The global nature of shipping is demonstrated with the following table which identifies the fleet statistics for annex 1 and non-annex 1 countries. In accordance with IHS Fairplay's database², as per 1 July 2012, the distribution by flag of the world merchant fleet of ships above 100GT was as follows:

	Number of ships	GT	DW
Annex I flag States	16,692 (30.5%)	258,851,019 (25.5%)	354,798,310 (23.3%)
Non-Annex I flag States	38,112 (69.5%)	757,789,972 (74.5%)	1,169,762,562 (76.7%)
Total	54,804	1,016,640,991	1,524,560,872

Work on control of GHG emissions from international shipping

4 Measures to improve energy efficiency of international shipping were adopted by Parties to Annex VI of the Convention on the Prevention of Pollution from Ships (MARPOL) at MEPC 62 in July 2011. The *Regulations for energy efficiency of ships*, apply to internationally trading ships of 400 gross tonnage and above, and make mandatory the Energy Efficiency Design Index (EEDI) for new ships, and the Ship Energy Efficiency Management Plan (SEEMP) for all ships. The measures will enter into force on 1 January 2013. For comprehensive information on the breakthrough adoption of mandatory technical and operational measures, please refer to IMO's submission to SBSTA 35 (FCCC/SBSTA/2011/MISC.9), as well as IMO's website: www.imo.org.

5 These mandatory measures address ship types responsible for 70% of GHG emissions from international shipping. MEPC 63 also agreed an updated work plan for the development of further guidelines and the development of energy efficiency frameworks for those ships not covered by the current EEDI regulations.

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. So long as the required energy-

² Calculating conditions:

- As a general rules, non-propelled ships, ships of less than 100 gross tonnage, pleasure craft, naval auxiliaries, the US Reserve Fleet, and ships restricted to harbour service or river/canal service are not included in the IHSF's world fleet statistics.
- Merchant fleets – cargo carrying ships, in the world fleet statistics published by IHSF were used in the above calculation. Cargo carrying ships include gas carriers, oil and chemical tankers, bulk carriers, general cargo ships, container ships, refrigerated cargo carriers, ro-ro cargo ships, and passenger ships.
- Merchant fleets – ships of miscellaneous activities, in the world fleet statistics published by IHSF were excluded. Ships of miscellaneous activities include fishing vessels, offshore supply vessels, research vessels, towing/pushing vessels, dredging vessels, and other miscellaneous purpose ships.

efficiency level is attained, ship designers and builders are free to use the most cost-efficient solutions for the ship to comply with the regulations.

7 All ships of 400 gross tonnes and above engaged in international trade will be 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 at regular intervals considering new technologies and practices to improve energy efficiency.

8 Four important guidelines intended to assist in the implementation of the mandatory regulations on Energy Efficiency for Ships in MARPOL Annex VI have been adopted as follows:

- .1 *resolution MEPC.212(63) – 2012 Guidelines on the method of calculation of the attained Energy Efficiency Design Index (EEDI) for new ships;*
- .2 *resolution MEPC.213(63) – 2012 Guidelines for the development of a Ship Energy Efficiency Management Plan (SEEMP);*
- .3 *resolution MEPC.214(63) – 2012 Guidelines on survey and certification of the Energy Efficiency Design Index (EEDI); and*
- .4 *resolution MEPC.215(63) – Guidelines for calculation of reference lines for use with the Energy Efficiency Design Index (EEDI).*

9 MEPC 64 approved amendments to these important guidelines that support implementation of the mandatory measures to increase energy efficiency and reduce emissions of greenhouse gases (GHGs) from international shipping, paving the way for the regulations on EEDI and SEEMP to be smoothly implemented by Administrations and industry upon entry into force on 1 January 2013.

Technical co-operation and transfer of technology

10 Regulation 23 of chapter 4 of MARPOL Annex VI on *Promotion of technical co-operation and transfer of technology relating to the improvement of energy efficiency of ships* requires Administrations, in co-operation with the Organization 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 exchange of information to States which request technical assistance, particularly developing States.

11 Linked to the implementation of energy efficiency measures is the development of a draft MEPC resolution on the *Promotion of technical co-operation and transfer of technology relating to the improvement of energy efficiency of ships*, which was further considered at MEPC 64. Significant progress with the draft resolution text was made and an interim agreement text, that will provide the basis for finalization of the Resolution at MEPC 65 (May 2013), was drafted.

Work on Market-Based Measures (MBMs) for international shipping

12 MEPC 63 continued its consideration of proposed MBMs, which would complement the technical and operational measures already adopted. The MBM proposals under review range from a contribution or levy on all CO₂ emissions from international shipping or only from those ships not meeting the EEDI requirement, via emission trading systems, to schemes based on a ship's actual efficiency, both by design (EEDI) and operation (SEEMP), some of which were further elaborated at MEPC 64. Further consideration of all MBM proposals is expected at MEPC 65.

13 MEPC 63 agreed on the need to undertake an impact assessment of the MBM proposals with focus on possible impacts on consumers and industries in developing countries, in general, and in particular, least developed countries, small islands developing States and remotely located developing countries with long trading distances, and considered in detail the methodology and criteria it should be based on. A consolidated draft Terms of Reference for the impact assessment will be considered further by MEPC 65 in May 2013.

14 MEPC 64 noted that uncertainty exists in the estimates and projections of emissions from international shipping and agreed that further work should take place to provide the Committee with reliable and up-to-date information to base its decisions. The Committee, in principle, endorsed a draft outline (document MEPC 64/5/5) for an update study of the GHG emissions estimate and agreed that an expert workshop be held in 2013 to further consider the methodology and assumptions to be used in the update.

15 An updated GHG inventory is considered necessary as the current estimate, contained in the Second IMO GHG Study (2009), does not take account of the economic downturn experienced globally since 2008. The update would be a technical exercise, building on the methodology developed under the Second IMO GHG Study 2009 and based on available data on fleet composition and size as well as on other technical ship-particular data. The inventory would include current global emissions of GHGs and relevant substances emitted from ships of 100 GT and above, engaged in international transport.

Technical assistance related to improvement of energy efficiency in shipping

16 The Vice-Chairman of MEPC undertook in 2009, in accordance with relevant IMO provisions, a preliminary assessment of the capacity building needs related to the then proposed new chapter 4 of MARPOL Annex VI, which made the following observations and recommendations:

- .1 it will be necessary to update national legislation and developing countries may need technical assistance to do this;
- .2 there will be a need to train seafarers in use of new technologies;
- .3 there will be a need to train flag and port State control officers to ensure effective and uniform implementation and enforcement; and
- .4 that it is necessary to instil in the industry an energy efficiency culture both onboard ships and in the land-based organizations.

17 It was suggested in the preliminary assessment that IMO's Integrated Technical Cooperation Programme (ITCP) should allocate funding for the recommended training and that such activities should be implemented before the entry into force of the amendments. IMO allocated US \$400,000 for the 2012/2013 biennium and has developed training courses and material in response to the identified needs as set out below:

- .1 **Awareness raising of energy efficiency and CO₂ emissions from international shipping:** Regional and national workshops to raise awareness of GHG emissions from ships and their link to climate change, and in particular on the mandatory technical and operational measures in Chapter 4 of MARPOL Annex VI.
- .2 **Energy Efficient Ship Design:** Regional and national workshops to enable participants to identify the elements influencing the energy efficiency of a given ship design and to use relevant tools for calculation of a ship's EEDI value.
- .3 **Energy Efficient Ship Operations:** Regional and national workshops Aimed at training personnel on full and effective implementation and optimization of operational energy efficiency measures on board ships.
- .4 **Enforcement by port States related to energy efficiency and GHG emissions under MARPOL Annex VI:** Regional workshops for port State control officers to raise awareness of the MARPOL Annex VI requirements on energy efficiency and to enhance their global and uniform implementation and enforcement.

18 A comprehensive portfolio of training material has been produced under each of the abovementioned activities and a train-the-trainer course is being developed. In addition to funding through IMO's technical cooperation programme (ITCP), IMO in April 2011, signed an agreement with the Korean International Cooperation Agency (KOICA) for implementation of a project on "Building Capacities in East Asian countries to address GHG emissions from Ships". A total of 12 workshops and training courses have been implemented this year in **Bulgaria, Indonesia, Malaysia, Philippines, Thailand, Uruguay, and Vietnam** and IMO is seeking additional funding from various sources to scale up the activities.

19 In this context, and as part of the UN's commitment to developing Sustainable Development Goals, IMO is also currently developing sustainable development goals for shipping and the maritime industries focusing on eight pillars:

- .1 safety culture and environment stewardship;
- .2 **energy efficiency;**
- .3 new technology and innovation;
- .4 maritime education and training;
- .5 maritime security and anti-piracy actions;
- .6 maritime traffic management;
- .7 maritime infrastructure development; and
- .8 adoption and implementation of global standards by IMO.

Summary

20 Although international maritime transport is the most energy efficient mode of mass transport and only a modest contributor to worldwide CO₂ emissions (2.7% in 2007), a global approach for further improvements in energy efficiency and emission reduction is considered necessary as sea transport is predicted to continue growing significantly in pace with expected future growth in world trade.

21 IMO has developed and adopted a framework of technical and operational measures that will serve as mandatory performance standards for increased energy efficiency in international shipping. The framework builds on IMO's enforcement and control provisions (flag and port State controls) and includes also ship management aspects such as monitoring, verification and reporting, as well as guidelines for effective implementation.

22 In view of projections for future growth in world trade and the overall GHG emission reductions needed to meet the two degrees target, IMO and its Member Governments, are considering a possible market-based measure that could enable international shipping contribute to this goal.

23 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.

24 It is for the reasons outlined above, that IMO participates in COP 18/CMP 8 and SBSTA 37 expecting that, as the Kyoto Conference did fifteen years ago, the global community will continue to place its confidence on the Organization for an effective contribution, from the shipping point of view, to the objectives this Conference pursues. IMO will endeavour to do its duty in pursuing the mandate of its Assembly and Marine Environment Protection Committee and within any target or timeframe the present Conference may decide.
