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INFORMATION PAPER

GROUP ON INTERNATIONAL AVIATION AND CLIMATE CHANGE (GIACC)

FOURTH MEETING

Montréal, 25 to 27 May 2009

Agenda Item 2: Review of aviation emissions-related activities within ICAO and internationally

AVIATION AND CLIMATE CHANGE

(Presented by the International Coalition for Sustainable Aviation, ICSA)

1. INTRODUCTION

1.1 ICSA presented its views on aviation and climate change to the Group at GIACC/3. Since that meeting, ICSA has continued discussions with other NGOs working on bunker fuel issues and monitored developments within the industry and the scientific community.

1.2 The purpose of this information paper is to update the Group on ICSA's position on how to address greenhouse gas emissions from aviation.

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APPENDIX A

Aviation climate impacts remain unregulated and contribute almost 5% to global warming today. ICAO must act decisively now to reduce aviation emissions and help ensure the sector is brought into any Copenhagen climate agreement.

SUMMARY

The seriousness of climate change, the scale and growth of GHG emissions from aviation, and the need to present a credible mitigation plan for aviation bunker fuels to be included in the 2009 UNFCCC Copenhagen agreement all require ambitious action from GIACC/4. ICSA presented its views on these issues at GIACC/3. This Information Paper recalls ICSA's proposals to GIACC/3, and provides additional context to inform the Group's ongoing discussions. This paper is also supported by the Air Pollution and Climate Secretariat (AirClim), Seas at Risk, Bellona and WWF International. Environmental organisations from around the world are alarmed by both the unfettered growth in bunker fuel emissions and their continued absence from existing international climate change targets.

1. Introduction

1.1 2009 is a key moment in the history of attempts to tackle the urgent threat of climate change. New science suggests its impacts will be even more severe and felt far sooner than previously anticipated. The window of opportunity for avoiding dangerous levels of climate change is closing fast. All sectors have a responsibility to act and to act quickly to reduce their GHG emissions substantially. Bunker fuels, including those from international aviation, are in no sense an exception and must be brought into global GHG reduction plans and the UNFCCC Agreement in Copenhagen in December 2009. GIACC alongside ICAO, its member states and industry and civil society observers, has a solemn responsibility at this 11th hour to agree to effective proposals to this end.

2. Aviation's contribution to radiative forcing is 4.9% of the global total and exceeds shipping by 75%

2.1 ICSA's presentation to GIACC/3 highlighted aviation's contribution to climate change. Since the meeting, new evidence has been published by Lee et al which updates the IPCC's Fourth Assessment Report (4AR), providing results based on operational data for 2005 (IPCC 4AR was based on 2000 data). The report shows that global emissions of CO_2 from air transport grew over 45% between 1992 and 2005, reaching an estimated 733 million tonnes a year by the end of the period. Between 2000 and 2007 alone, aviation traffic grew at an annual average rate of 5.3%, leading to a 38% increase in passenger traffic. The European Environment Agency (EEA) moreover estimates that EU15 CO_2 emissions from aviation grew 102% between 1990 and 2006. Lee et al calculated that the CO_2 and non-CO_2 radiative forcing (RF) attributable to aviation in 2005 was 4.9% of the total RF

when best estimates for the effects of aviation induced cirrus cloud formation are included (Lee et. al. – see Appendix B). Without cloud effects, the figure was 3.5%. Estimates of total aviation RF (excluding cirrus) in 2050, using fuel usage growth factors of 2.7 to 3.9 over baseline year 2000, are 3 to 4 times greater than the 2000 value. The IPCC (1999) forecast that global aviation CO_2 emissions could reach 2,300 million tonnes annually (high estimate) by 2050 if left unmitigated. Lee et al's updated study reports the A1 emissions scenario as similar to the upper range IPPC (1999) level. The earth's capacity to absorb anthropogenic CO_2, and therefore the level to which emissions will have to be reduced in the long-term, is around 5,000 million tonnes annually (Stern) – around twice the estimated level for 2050 aviation emissions if left unmitigated.

2.2 If, by way of contrast, we consider the shipping sector, the second IMO GHG study (released April 2009), set shipping CO_2 emissions at 1046 million tonnes or 3.3% of global CO_2 emissions in 2007. Estimates of the RF from CO_2 from shipping are put at 2.8 % of total anthropogenic CO_2 in 2005. This latest IMO study projects that, left unmitigated, 2050 shipping emissions will represent 12% to 18% of the total global emissions of CO_2 permissible that year to limit the global average temperature increase to 2º under the WRE450 stabilisation scenario. It should be noted though, that recent science including the Fourth IPPC Assessment Report, estimates that even deeper cuts than this scenario will be required to limit warming to 2º which would, in turn, increase these percentages. The calculation of a corresponding 2050 percentage for aviation is not yet available, but it can be expected to be considerably higher than today's 4.9%.

2.3 Aviation's contribution is NOT limited to the 2 to 3 percent of carbon emissions that is so often repeated. GIACC, ICAO and the industry itself must respond now to avoid having to make even more significant cuts at a later date, with likely far reaching economic consequences for airlines. With aviation traffic having grown at over 5% a year during the last decade, and with similar trends forecast in the future, controlling and mitigating GHG emissions from aviation is an enormous challenge. ICSA reiterates the need for urgent action on both aircraft CO_2 and non-CO_2 impacts.

3. The opportunity for ICAO and the GIACC to act

3.1 Emissions from international aviation were left out of UNFCCC targets in 1997 but the Kyoto Protocol made clear that the responsibility for limiting or reducing aviation GHG emissions rested with Annex 1 Parties working through ICAO. ICSA has previously highlighted that, in the twelve years since the adoption of the Kyoto Protocol, ICAO has failed to agree on a single binding measure to reduce GHG emissions from aircraft. Resolutions, studies, "draft interim voluntary guidelines" and, in particular, "aspirational goals" are an abrogation of responsibility and no substitute for ambitious binding measures to cap and reduce emissions.

3.2 Emissions from bunker fuels (international shipping and aviation) are approaching 10% of the global emissions problem and remain uncontrolled at a global level. The UNFCCC negotiations in Copenhagen must address this situation resolutely. The question in respect of aviation is whether this will be on the basis of proposals from ICAO or not. If ICAO member states continue to thwart a collective and meaningful climate response, UNFCCC Annex I countries will still have an obligation to act and the result will be the kind of fragmented and uncoordinated approach that ICAO was set up to avoid. ICAO uniquely claims the necessary technical and political competence to handle international aviation and environmental regulations. The international community is expecting it to act now and to act in a manner consistent with the scale of the climate change threat and mitigation needs. Failure to do so will result in serious and permanent damage to the organisation's credibility and standing as well as to aviation's already tarnished image.

4. **Action Plan for ICAO**

4.1 Timetables

4.1.1 GIACC must agree to credible, absolute targets for the sector at Copenhagen, and a work plan to ensure that measures are adopted by the end of 2010 and implemented by 2012.

4.2 Targets

4.2.1 Target setting is an integral and obvious part of any emissions reduction plan. It has been and remains ICAO's clear responsibility to prepare short, medium and long-term targets for the aviation sector and to communicate them now for adoption by the UNFCCC in Copenhagen. If such targets are not addressed by ICAO, many NGOs are prepared to support and work towards targets set by the UNFCCC. The aviation industry as a whole is by any measure a mature and well-developed industry and as such its targets must be consistent with those of developed countries. Although there is a diversity of opinions on the question of target stringency, a consensus is emerging amongst environmental NGOs that international aviation GHG emissions must be at least 40% below 1990 levels by 2020 and at least 80% below 1990 levels by 2050. These figures are consistent with the latest estimates of reductions required to limit global warming to below 2ºC. The target for 2020 is attainable only with access to CDM credits and emissions trading, although these should only be accessible once GIACC's proposed efficiency goals in any given year have been met. This would spur innovation and ensure emissions reductions within the sector. In the longer term, the declining global carbon budget will mean that airlines can rely less and less on imported credits, and the 2050 target will require radical technological developments.

4.3 Equity & CBDR

4.3.1 The question of reconciling ICAO principles of non-discrimination and equal and fair opportunities and the need within the UNFCCC for climate change measures to recognise the principle of "common but differentiated responsibilities and respective capabilities" should be addressed and resolved within GIACC. Various proposals have been put forward ranging from exclusions of certain routes, phase-ins and exemptions for less developed countries to the differentiated use of funds raised for adaptation and mitigation. The following principles could govern ICAO's approach in this regard:

- Measures should apply to all aircraft/operators on a given route.
- Proceeds of any auctioning of permits under emissions trading or from international levies should be directed to developing countries for adaptation and mitigation. A maximum of 5% of such funds could be retained by ICAO for environmental projects related to international aviation channelled through an appropriate Fund.
- Schemes should be global or near-global in scope with consideration given to (a) *de minimis* thresholds for small emitters, and (b) exclusions on routes to the most vulnerable or remote States.

4.4 Technical measures

4.4.1 The Information Paper submitted to GIACC/3 by ICSA in February detailed the range of measures and standards that civil society believes ICAO needs to adopt, including the need for a fuel efficiency standard. GIACC should note and support the recent WG3 conclusion that work can begin immediately to develop a CO_2 standard for new aircraft, while expressing the desire that a standard be set as soon as technically feasible and no later than at CAEP/9 (2013). In addition, GIACC should consider the case for a GHG rather than CO_2 only standard through the inclusion of aviation NOx.

The science on an aviation NOx GWP is converging and a suitable metric could also be finalised during CAEP/9 given sufficient research funding. In the interim, CAEP work on standard design could proceed by using an upper and lower bound for a NOx GWP to reflect uncertainty, while addressing the science of cruise NOx and contrails directly by sponsoring the research that scientists say is needed to reach definitive conclusions, At a minimum, ICAO should set a GHG standard that does not penalise new aircraft designs with reduced climate impact due to lower design cruise altitudes and speeds.

4.5 Market-based instruments

4.5.1 As ICAO has recognised, “market-based measures, including the use of emissions trading, are policy tools that are designed to achieve environmental goals at a lower costs and in a more flexible manner than traditional regulatory measures”. Market-based approaches must be part of any serious strategy that GIACC recommends.

4.5.2 In addition to ICSA’s broad support for the introduction of market-based measures expressed at GIACC/3, ICSA wishes to highlight a number of specific elements that should be applied:

- Apply to all air carriers, with differentiation only on the basis of agreed exceptions and only so long as they do not amount to more than 2% of global emissions (see above).
- Contain a cap on emissions that is consistent with the broader global deal on reducing GHG emissions.
- Revenues used for mitigation and adaptation in the developing world, technical cooperation, and R&D into energy efficiency etc.

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APPENDIX B

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Aviation and global climate change in the 21st century

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Abstract

Aviation emissions contribute to the radiative forcing (RF) of climate. Of importance are emissions of carbon dioxide (CO2), nitrogen oxides (NOx), aerosols and their precursors (soot and sulphate), and increased cloudiness in the form of persistent linear contrails and induced-cirrus cloudiness. The recent Fourth Assessment Report (AR4) of the Intergovernmental Panel on Climate Change (IPCC) quantified aviation's RF contribution for 2005 based upon 2000 operations data. Aviation has grown strongly over the past years, despite world-changing events in the early 2000s; the average annual passenger traffic growth rate was 5.3% yr^{-1} between 2000 and 2007, resulting in an increase of passenger traffic of 38%. Presented here are updated values of aviation RF for 2005 based upon new operations data that show an increase in traffic of 22.5%, fuel use of 8.4% and total aviation RF of 14% (excluding induced-cirrus enhancement) over the period 2000–2005. The lack of physical process models and adequate observational data for aviation-induced cirrus effects limit confidence in quantifying their RF contribution. Total aviation RF (excluding induced cirrus) in 2005 was w55 mW m^{-2} (23–87 mW m^{-2}, 90% likelihood range), which was 3.5% (range 1.3–10%, 90% likelihood range) of total anthropogenic forcing. Including estimates for aviation-induced cirrus RF increases the total aviation RF in 2005–78 mW m^{-2} (38–139 mW m^{-2}, 90% likelihood range), which represents 4.9% of total anthropogenic forcing (2–14%, 90% likelihood range). Future scenarios of aviation emissions for 2050 that are consistent with IPCC SRES A1 and B2 scenario assumptions have been presented that show an increase of fuel usage by factors of 2.7–3.9 over 2000. Simplified calculations of total aviation RF in 2050 indicate increases by factors of 3.0–4.0 over the 2000 value, representing 4–4.7% of total RF (excluding induced cirrus). An examination of a range of future technological options shows that substantive reductions in aviation fuel usage are possible only with the introduction of radical technologies. Incorporation of aviation into an emissions trading system offers the potential for overall (i.e., beyond the aviation sector) CO2 emissions reductions. Proposals exist for introduction of such a system at a European level, but no agreement has been reached at a global level.

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