

# Some Recent Developments in Aviation and Environmental Protection Regulation

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## INTRODUCTION

At the 33rd Session of the Assembly of the International Civil Aviation Organization (ICAO),<sup>1</sup> held in Montreal from 25 September to 5 October 2001, a resolution was adopted containing a consolidated statement of continuing policies and practices related to environmental protection.<sup>2</sup> This Resolution was a response to the need to incorporate new ICAO policies and guidance material regarding aircraft noise and other developments in that field since the 32nd Session, held in 1998, to achieve, in particular, a balanced approach to noise management. The Resolution also addressed, *inter alia*, the issue of aircraft engine emissions, including an increased and improved understanding of emissions, notably a possible means of limiting or reducing greenhouse gases from aviation.

Over the past decade, there has been continuing awareness that aviation may contribute to adverse environmental impacts on the world and that it behoves the world aviation community to achieve maximum compatibility between the safe and orderly development of civil aviation and the quality of the environment. This is particularly significant in the context of ICAO's role in developing international air transport so as to ensure safe, regular, efficient and economical air transport.<sup>3</sup> The philosophy of Resolution A33-7 is based on the fact that the adverse environmental effects of civil aviation activity can be reduced by integrated measures embracing technological developments, proper operating procedures, appropriate

organization of air traffic and strategic use of airport planning, land use planning and market based measures. ICAO's role, in this delicately balanced operation, is to achieve harmony between the benefit occurring to the world community through civil aviation and the harm caused to the environment in certain key areas through the progressive advancement of civil aviation.

## AIRCRAFT NOISE

With regard to aircraft noise, the Resolution, in Appendix B, makes reference to Annex 16 to the Convention on International Civil Aviation (Chicago Convention)<sup>4</sup> which contains noise certification standards for subsonic aircraft and *ICAO's Policies on Charges for Airports and Air Navigation Services* (Doc. 9082) which has policy guidance on noise-related charges. In the context of these documents, and particularly with regard to more stringent aircraft noise standards adopted by the Council in June 2001 for inclusion in Annex 16, the Assembly requested the Council to continue the work related to the development of Standards, Recommended Practices and Procedures and ensure that work conducted by the Council's Committee on Aviation Environmental Protection (CAEP) continues expeditiously in order that appropriate solutions can be developed as soon as possible.

In following up on revisions made by the Council in June 2001, the Assembly, through the Resolution, urged Contracting States to adopt a balanced approach to noise management, taking full account of ICAO guidance, applicable legal obligations, existing agreements, current laws and established policies, which should all be given

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due consideration when addressing noise problems at international airports. Contracting States are urged to adopt appropriate mechanisms to implement this balanced approach, notably: in establishing a transparent process based on objective, measurable criteria for the assessment of the noise problem; in evaluating likely costs and benefits of various measures with a view to achieving maximum environmental benefit; and in providing for dissemination of the evaluation results that may be used in consultation with stakeholders and dispute resolutions.

As part of the balanced approach, Resolution A33-7 encourages States, *inter alia*, to conduct studies, support research and technology programmes aimed at reducing noise at source and to work closely with each other to ensure that their noise management programmes are harmonized, taking into consideration the particular economic circumstances of developing countries and also taking particular care not to derogate the non-discrimination principle contained in Article 15 of the Chicago Convention.<sup>5</sup>

Resolution A33-7, in Appendix D, urges Contracting States not to introduce any phase-outs of subsonic jet aircraft which exceed noise levels contained in Volume 1 of Annex 16 to the Chicago Convention<sup>6</sup> before considering whether normal attrition of existing fleets of such aircraft will provide the necessary protection of noise climates around airports and whether necessary protection can be achieved by regulators preventing their operations from adding such aircraft to their fleets through either purchase, or lease/charter/interchange or by incentives to



accelerate fleet modernization. Before phasing out subsonic aircraft which may exceed the above noise levels, the Resolution also calls upon Contracting States to give careful thought to whether noise management can be effectively achieved by applying regulations preventing the operation of such aircraft at airports which have been identified and declared by these States as generating noise problems and during time periods when greater noise disturbance is caused. Finally, Contracting States are called upon to consider implications of any restrictions for other States concerned, through consultation and reasonable notification of the application of restrictions.

One of the most significant achievements of Resolution A33-7 lies in the skilful balance achieved in offering a compromise to Contracting States which, despite the above-mentioned criteria, decide to phase out aircraft that comply with noise certificates Standards in Volume 1, Chapter 2 of Annex 16 but which exceed the noise levels in Volume 1, Chapter 3 of Annex 16. This

compromise recommends that such States frame any restrictions so that Chapter 2-compliant aircraft of an individual operator which are operating at present to their territories may be gradually withdrawn from such operations, over a period of not less than seven years. The Resolution also requests Contracting States not to restrict before the end of the above period the operations of any aircraft less than 25 years after the date of issue of its first individual certificate of airworthiness, and not to restrict before the end of the period the operations of any presently existing wide-body aircraft or of any aircraft fitted with engines that have a by-pass ratio higher than 2 to 1. Contracting States are required to inform ICAO, as well as the other States concerned, of all restrictions imposed.

Finally, the Resolution urges States not to introduce measures to phase out aircraft which comply, through original certification or recertification, with the noise certification standards in Volume 1, Chapter 3 or 4 of Annex 16 and, in particular, not to impose any operating restrictions on Chapter 3-compliant aircraft, except as part of the balanced approach to noise management developed by ICAO and in accordance with Appendices C and E to the Resolution which address issues pertaining to the phase-out of subsonic aircraft and noise-related operations at airports.

#### Background to Noise Regulation

It is imperative that, for there to be a meaningful discussion on aircraft noise regulation, the various noise regulations referred to in A33-7 should be identified. In order to discuss these regulations, one has to refer to the origins of noise regulation in ICAO. The ICAO Assembly has adopted several Resolutions concerning aviation and the environment. At its 22nd Assembly, held in September/October 1977, the ICAO Assembly adopted Resolution A 22-12 which recognized, *inter alia*, the following:

- 1) advancing technology has caused aviation to become a significant influence on the environment;
- 2) many of the adverse environmental effects of civil aviation activity can be reduced by the application of integrated measures embracing technological improvements, appropriate noise abatement operating procedures, proper organization of air traffic and airport planning and land use control;
- 3) other international organizations are becoming involved in activities relating to noise abatement policies; and
- 4) in fulfilling its role, ICAO strives to achieve a balance between the benefits of civil aviation to the world community and the harm caused to the human environment in certain areas through the progressive advancement of civil aviation.

The Assembly therefore declared:

- 1) that ICAO is conscious of the adverse environmental impacts that may be related to aircraft activity and of its responsibility and that of its Contracting States to achieve maximum compatibility between the safe and orderly development of civil aviation and the quality of the human environment; and

- 2) that the Council should maintain its vigilance in the pursuit of aviation interests related to the human environment and also maintain the initiative in developing policy guidance on all aviation matters related to the human environment, and not leave such initiatives to other organizations.

The Assembly also invited States to continue their active support for ICAO's Action Programme Regarding the Environment on all appropriate occasions as their participation in civil aviation's contribution to the United Nations Environment Programme (UNEP) and authorized the ICAO Council, if and when it deems this desirable, to enter into cooperative arrangements with the United Nations Environment Programme for the execution of environmental projects financed by the United Nations Environment Fund. The Assembly urged States to refrain from unilateral measures that would be harmful to the development of international civil aviation.

At the same Session, the Assembly adopted Resolution A22-13 on airports and the environment, observing *inter alia* that:

- 1) the compatibility between the airport and its environment was one of the elements to be taken into account in long-term systems planning;
- 2) the problem of aircraft noise in the vicinity of many of the world's airports continued to arouse public concern and required appropriate action; and
- 3) the introduction of new aircraft types could increase and aggravate this noise unless action was taken to alleviate the situation.

The Assembly therefore requested the Council to continue its work on establishing Standards and Recommended Practices relating to the alleviation of the problem and urged contracting States to adopt, where appropriate, the applicable ICAO measures and procedures.

In the following Session (September/October 1980), the Assembly adopted Resolution A23-10 on aircraft noise and engine emissions from subsonic aircraft and requested contracting States not to allow the operation of foreign-registered subsonic jet planes that did not conform to ICAO's specifications on noise certification standards as specified in Annex 16 on 1 January 1988.<sup>7</sup> At the 28th Assembly Sessions held in October 1990, the ICAO Assembly observed that while certification standards for subsonic jet aircraft noise levels are specified in Volume 1, Chapter 2 and Chapter 3 of Annex 16 and that environmental problems due to aircraft noise continued to exist in the neighbourhood of many international airports, some States were consequently considering restrictions on the operations of aircraft which exceed the noise levels in Volume I, Chapter 3 of Annex 16. The Assembly also recognized that the noise standards in Annex 16 were not intended to introduce operating restrictions on aircraft and that operating restrictions on existing aircraft would increase the costs of airlines and would impose a heavy economic burden, particularly on those airlines which do not have the financial resources to re-equip their fleets. Therefore, considering that resolution of problems due to air-

craft noise must be based on the mutual recognition of the difficulties encountered by States and a balance between their different concerns, the Assembly, in Resolution A28-3, urged States not to introduce any new operating restrictions on aircraft which exceed the noise levels in Volume I, Chapter 3 of Annex 16 before considering:

- a) whether the normal attrition of existing fleets of such aircraft will provide the necessary protection of noise climates around their airports;
- b) whether the necessary protection can be achieved by regulations preventing their operators from adding such aircraft to their fleets through either purchase, or lease/charter/interchange, or alternatively by incentives to accelerate fleet modernization;
- c) whether the necessary protection can be achieved through restrictions limited to airports and runways, the use of which has been identified and declared by them as generating noise problems and limited to time periods when greater noise disturbance is caused; and
- d) the implications of any restrictions for other States concerned, consulting these States and giving them reasonable notice of intention.

The Assembly further urged States:

- a) to frame any restrictions so that Chapter 2-compliant aircraft of an individual operator which are presently operating to their territories may be gradually withdrawn from these operations over a period of not less than seven years;
- b) not to begin the above phase-in period for any restrictions before 1 April 1995;
- c) not to restrict before the end of the phase-in period the operations of any aircraft less than 25 years after the date of issue of its first individual certificate of airworthiness;
- d) not to restrict before the end of the phase-in period the operations of any presently existing wide-body aircraft or of any fitted with high by-pass ratio engines;
- e) to apply any restrictions consistently with the non-discrimination principle in Article 15 of the Chicago Convention so as to give foreign operators at least as favourable treatment as their own operators at the same airports; and
- f) to inform ICAO, as well as the other States concerned, of all restrictions imposed.

The Assembly also strongly encouraged States to continue to cooperate bilaterally, regionally and inter-regionally with a view to:

- a) alleviating the noise burden on communities around airports without imposing severe economic hardship on aircraft operators; and
- b) taking into account the problems of operators of developing countries with regard to Chapter 2 aircraft presently on their register, which cannot be replaced before the end of the phase-in period, provided that there is proof of a purchase order or leasing contract placed for a replacement Chapter 3-compliant aircraft and the first date of delivery of the aircraft has been accepted.

The Assembly, while urging States, if and when any new noise certification standards are introduced which are more stringent than those in Volume I, Chapter 3 of Annex 16, not to impose any operating restrictions on Chapter 3 compliant aircraft, urged the Council to promote and States to develop an integrated approach to the problem of aircraft noise, including land-use planning procedures around international airports, so that any residential, industrial or other land use that might be adversely affected by aircraft noise is minimal. The Assembly further urged States to assist aircraft operators in their efforts to accelerate fleet modernization and thereby prevent obstacles and permit all States to have access to lease or purchase aircraft compliant with Chapter 3, including the provision of multilateral technical assistance where appropriate. This Resolution superseded Resolution A23-10, which was discussed above.

Resolution A28-3 represents a cautious balance between the concerns of the aircraft manufacturers, the airline industry and developing States who do not wish to lose the services of Chapter 2 aircraft which are already in use and service. Although aircraft manufactured prior to October 1977 that are included in Chapter 2 of Annex 16 and called 'Chapter 2 aircraft' are required to be phased out, the compromise in Resolution A28-3 allows States that have noise problems at airports to start phasing out operations by Chapter 2 aircraft from 1995 and to have all of them withdrawn by 2002, with some exceptions. The Resolution envisages that by 2002 only aircraft manufactured after October 1977 and described in Chapter 3 of Annex 16 (called 'Chapter 3 aircraft') would be in operation. Following this resolution, a number of developed States have already started to phase out Chapter 2 aircraft, while giving due recognition to the compromise reached in Resolution A28-3.

At its 32nd Assembly, held in September 1998, Assembly Resolution A32-8<sup>8</sup> containing a consolidated statement of continuing ICAO policies and practices related to environmental protection was adopted, making current the regulatory policies relating to aviation and the environment. Appendix B to the Resolution cites Annex 16, Volume 1 as comprising, *inter alia*, noise certification standards for future subsonic aircraft and mentions that aircraft manufacturers and operators need to note that future generations of aircraft have to be so designed as to operate efficiently and with the least possible environmental disturbance. Appendix C calls upon Contracting States and international organizations to recognize the leading role of ICAO in dealing with aircraft noise and requests the former to work closely together to ensure the greatest harmonization of work in the area of environmental protection as related to air transport. In Appendix G, which relates to the problem of sonic booms, the Assembly reaffirms the importance attached to ameliorating problems caused to the public by sonic booms as a result of supersonic flight, and invites States involved in the manufacture of supersonic aircraft to furnish ICAO with proposals that would meet specifications established by ICAO on the subject.

The most topical issue addressed by Resolution A32-8 is in its Appendix D which, whilst reiterating the time limits specified for the phasing out of Chapter 2 Aircraft and related dates, strongly encourages States to continue to cooperate bilaterally, regionally and inter-regionally with a view to alleviating the noise burden on communities and also to take into account the problems that may be faced by some operators in phasing out their Chapter 2 aircraft before the end of the specified period. The Resolution also urges States, if any new noise certification standards are introduced which are more stringent than those in Volume 1, Chapter 3 of Annex 16, not to impose any operating restrictions on Chapter 3-compliant aircraft. More importantly, States are urged to assist operators in their efforts at fleet modernization with a view to preventing obstacles and permitting all States to have access to lease or purchase aircraft compliant with Chapter 3.

The qualification in Resolution A32-8 seems to say that Chapter 2 aircraft which are converted to be compliant with Chapter 3 noise levels may be considered for operation at least until 1 April 2002. The Resolution urges States to consider the difficulties faced by operators of Chapter 2 aircraft who are unable to make them Chapter 3-compliant by the given date, implying that it would be in the economic interests of such operators to be given additional time in order to make the necessary replacements. Chapter 2 aircraft could be made Chapter 3-compliant and the aircraft could be recertified to Chapter 3 standards through re-engining or hush kitting. Chapter 2 aircraft which are likely to be re-engined or hush-kitted are Boeing 727s and 737s, DC-9s, BAC1-11s and some Boeing 747-100s.

It was against this backdrop that the 33rd ICAO Assembly considered the noise issue and adopted Resolution A33-7.

## AIRCRAFT ENGINE EMISSIONS

Resolution A33-7 also addressed growing concerns about environmental problems in the atmosphere such as global warming and depletion of the ozone layer, noting that the Agenda 21 action plan adopted by the 1992 United Nations Conference on Environment and Development calls on governments to address these problems with the cooperation of relevant United Nations bodies. Particular mention is made of the Kyoto Protocol, which was adopted by the Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) in December 1997 (referred to in some detail later in this article) which recognizes ICAO as the primary body responsible for the regulation of aviation-related environmental issues on aircraft engine emission, and which calls upon developed countries to pursue the limitation or reduction of greenhouse gas emissions from 'aviation bunker fuels' working through ICAO.

The Assembly recognized that market-based measures, which will be described in some detail later in this article, are policy tools designed to achieve environmental goals at a lower cost and in a more flexible manner than tradi-

tional regulatory measures. Particularly in the context of controlling greenhouse gas emissions, the Assembly recognized that there has been increasing government recognition of the need for each economic sector to pay the full cost of the environmental damage it causes, and market-based measures for protecting the environment were particularly relevant in this regard. It was the Assembly's view that any charges imposed, based on the costs of the mitigating or environmental impact of aircraft engine emissions to the extent that such costs can be properly identified and directly attributable to air transport, should be applicable only insofar as they are consistent with Article 15 of the Chicago Convention and ICAO's policies on taxes and charges.<sup>9</sup> The Assembly noted with approval analyses conducted by CAEP, that an open emissions trading system, whereby the total amount of emissions would be capped and allowances in the form of permits to emit carbon dioxide could be bought and sold to meet emission reduction objectives, was a cost-effective measure to limit or reduce carbon dioxide emitted by civil aviation, particularly in the long term. Short-term voluntary measures, where industry and governments agree to a target and/or to a set of actions to reduce emissions, would serve as a first step towards such long-term measures.

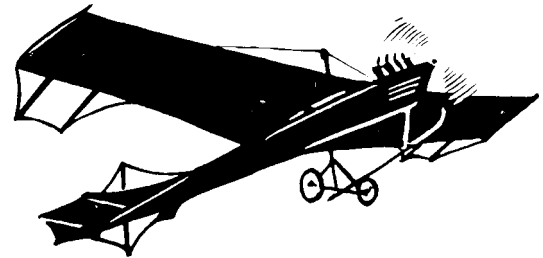
The Assembly required the ICAO Council to develop guidance for States on the application of market-based measures aimed at reducing or limiting the environmental impact of aircraft engine emissions, particularly with respect to mitigating the impact of aviation on climate changes. Above all, Contracting States and the Council are encouraged (through Resolution A33-7) to take into account the interests of all parties concerned, to evaluate the costs and benefits of various measures with the goal of addressing aircraft engine emissions in the most cost-effective manner and to adopt actions consistent with ICAO policies. The Assembly endorsed the development of an open emissions trading system for international aviation and requested that the Council develop guidelines for open emissions trading for international aviation as a matter of priority.

In making its recommendations and requests, the Assembly took into consideration the work of CAEP which, at its Fifth Meeting (CAEP/5), held from 8-17 January 2001, identified market-based measures as being policy tools that are designed to achieve environmental goals at a lower cost and in a more flexible manner than traditional regulatory measures. CAEP considered three types of measures: emissions-related levies (referring to charges and taxes); emissions trading (a system whereby the total level of emissions is capped and allowances in the form of permits are bought and sold to meet emission reduction objectives); and voluntary measures (mechanisms under which industry and governments agree to a target and/or a set of actions to reduce emissions).

Under emission-related levies three options were considered by CAEP: a fuel (or en-route emissions) tax with revenue going to the national treasury; a revenue-neutral aircraft efficiency charge; and an en-route emissions charge with revenue returned to the aviation sector.

The main findings of this analysis are that, a fuel tax raises legal issues concerning air services agreements and ICAO policies, and, if not applied worldwide, could lead to tankering practices (by which aircraft would carry extra fuel for later legs of a journey rather than purchasing the fuel locally). With regard to a revenue-neutral charge, CAEP felt that it would be consistent with ICAO policies but would require an acceptable method to be developed for defining aircraft efficiency, and could not be implemented in areas without en-route charges. An en-route emissions charge would be consistent with ICAO policies, assuming that revenues were recycled to the aviation sector, but, if not applied worldwide, could raise equity and competitiveness issues and would necessitate further guidance for the use and distribution of the revenue collected.

In designing an emission trading regime, CAEP believed that the key issues were the scope of trading (that is, open trading across sectors, or closed trading within



the aviation sector alone), and the distribution of emission permits or allowances (i.e. grand-fathering, based on past or current use, or auctioning through a bidding process). Since such a system is untested for the aviation industry, there would need to be rules for participation and the establishment of administrative mechanisms for recording trades and monitoring and ensuring compliance.

For voluntary measures, CAEP advised the ICAO Council that an industry initiative should be proposed, where a sequence of actions should be prescribed and/or a target to be met should be proposed, based on an agreement negotiated between industry and government.

The main findings were that voluntary measures alone cannot achieve an ambitious emission reduction target. They would have to be used in conjunction with other measures. In addition, these voluntary measures would allow the aviation industry to enhance its ability to undertake activities related to 'capability building'. They are primarily seen as transitional measures. A key issue is the need to ensure that any such action would be to the advantage of the participants if market-based or other regulatory measures were imposed at a later date.

CAEP/5 concluded that a closed emissions trading system does not show cost-benefit results to justify further consideration, and felt that an open emissions trading system would be a cost-effective solution for CO<sub>2</sub> emission reductions in the long term, but cannot be implemented until the Kyoto Protocol has entered into force

and an emissions cap has been agreed. Further work is necessary to develop an emissions trading system and to study the consequences for developing countries, and ICAO should continue to play a leadership role, particularly in the development of proposals for caps, consistent with the responsibility given to ICAO in Article 2.2 of the Kyoto Protocol.

### Emissions trading as a market-based measure

The essential philosophy of emissions-trading in environmental protection is based on a certain flexibility allowed to market forces to reach the lowest cost involved in an operation whilst at the same time achieving an environmental target which has been already set. The word 'trading' correctly denotes an exchange and, when applied to the aviation context, means a trade-off between high-polluting and low-polluting airlines. The trade-off could take the form of a 'purchase' by the high-polluting airline of the reduction level of the low-polluting airline. Emissions trading would encourage airlines to seek innovation in technology and to reduce their emission levels.

Emissions trading of levels of pollution between airlines differs fundamentally with the existing expectation of each airline maintaining a standard level of emission by its aircraft. When airlines trade emission levels, the rates at which their aircraft pollute the atmosphere are taken as a whole and are applicable to a whole fleet, so that an airline which is over and above its permitted pollution level could join with another airline which is below the standard level of pollution required of it, thus making the average pollution between the two more acceptable than if taken individually. This mechanism encourages a low-polluting airline to achieve even lower standards, in order to trade its levels with high-polluting airlines.

The Third Conference of the Parties to the United Nations Framework Convention on Climate Change (Climate Change Convention)<sup>10</sup> was held from 1-11 December 1997 at Kyoto, Japan. Significantly, the States parties to the Convention adopted a protocol (Kyoto Protocol)<sup>11</sup> on 11 December 1997 under which industrialized countries agreed to reduce their collective emissions of six greenhouse gases<sup>12</sup> by at least 5 per cent by 2008-2012. Ambassador Raul Estrada-Oyuela, who had chaired the Committee of the Whole established by the Conference to facilitate the negotiation of a Protocol text, expressed the view that the agreement will have a real impact on the problem of greenhouse gas emissions and that 11 December 1997 should be remembered as the 'Day of the Atmosphere' (see also article on page 14 on UNFCCC-COP7).<sup>13</sup>

The Kyoto Protocol, in Article 1(a)(v), calls each State Party to achieve progressive or phasing out of market imperfections, fiscal incentives, tax and duty exemptions and subsidies in all greenhouse gas emitting sectors that run counter to the objective of the Convention and application of market instruments. The subject of emissions leading to trading is first addressed in Article 3 of the Protocol, which requires States Parties to ensure that their ag-

gregate anthropogenic carbon dioxide equivalent emissions of the greenhouse gases listed in Annex A do not exceed their assigned amounts, calculated pursuant to their quantified emission limitation and reduction commitments inscribed in Annex B. The provision also requires States parties to the Protocol to reduce their overall emissions of greenhouse gases to at least 5 per cent below 1990 levels between 2008 and 2012. Article 3(6) goes further, in providing that States Parties shall be allowed a certain degree of flexibility in implementation of Article 3 and the reduction of their emission standards.

The subject of emissions trading is explicitly addressed in Article 6 which states that for the purpose of meeting its commitments under Article 3, any Party included in Annex 1 may transfer to, or acquire from, any other such Party emission reduction units resulting from projects aimed at reducing anthropogenic emissions by sources or enhancing anthropogenic removals by sinks of greenhouse gases in any sector of the economy, provided the parties concerned approve of such trading and, *inter alia*, such trading actually results in a reduction in emission by sources.

Article 17 sets out that the Conference of the Parties shall define the relevant principles, modalities, rules and guidelines, in particular for verification, reporting and accountability for emissions trading. It also provides that the parties included in Annex B to the Protocol may participate in emissions trading for the purposes of fulfilling their commitments under Article 3. Such trading shall be supplemental to domestic actions for the purpose of meeting qualified emission limitation and reduction commitments under Article 3.<sup>14</sup>

Once the Protocol has entered into force,<sup>15</sup> Annex I parties must submit an annual inventory of emissions to the Convention Secretariat,<sup>16</sup> enabling expert review teams to provide a full assessment of such parties' compliance with the Protocol.<sup>17</sup> These expert assessments will be reviewed by the Conference of the Parties serving as the meeting of the parties to the Protocol,<sup>18</sup> which will adopt decisions on implementation.<sup>19</sup>

Article 12 of the Protocol is also noteworthy in that it defines a clean development mechanism (CDM) which introduces the concept of joint implementation by a developed country and a developing country.<sup>20</sup> The mechanism admits of the advantage afforded to the parties concerned, in developed countries gaining the benefit of the partnerships in emissions trading with developing countries which are more cost-effective in financing such projects. The CDM achieves the dual goal of enabling developing countries to operate projects which result in emission reductions, thus contributing to the objectives of the UNFCCC<sup>21</sup> – and also enabling countries specified in Annex I of the Kyoto Protocol which finance such projects through the CDM to use emissions reductions to reduce their own emissions *in toto*.<sup>22</sup>

The mechanism is supervised by an executive board and the responsibility of establishing procedures to make certain that proper verification of projects is achieved in a transparent manner devolves to the Conference of the Parties to the Protocol.<sup>23</sup> By virtue of Articles 12(10) and

3(12), Annex I countries could contribute to their own emission reduction targets under the Protocol by using emission reductions from jointly implemented projects under the CDM during the period 2000-2008.

A watershed provision of the Kyoto Protocol lies in Article 2.2 which stipulates that Parties included in Annex II shall pursue limitation or reduction of emissions of greenhouse gases not controlled by the Montreal Protocol<sup>24</sup> from aviation and marine bunker fuels, working through the International Civil Aviation Organization and the International Maritime Organization respectively. This lays the regulatory responsibility for emissions trading with regard to aircraft engine emissions squarely on ICAO.

Resolution A32-8 of ICAO, referred to earlier, and containing a consolidated statement of continuing ICAO policies and practices related to environmental protection, urges States to refrain from unilateral environmental measures that would be harmful to the development of international civil aviation. On the subject of aircraft engine emissions, the Resolution, in its Appendix F, mentions the fact that the Kyoto Protocol calls for developed countries to pursue limitation or reduction of greenhouse gases from aviation bunker fuels, working through ICAO, and invokes Appendix A which calls upon the ICAO Council to maintain the initiative in developing policy guidance on all aviation matters related to the environment and not leave such initiatives to other organizations.

Appendix H of A32-8 refers to ICAO's policies on charges and taxes<sup>25</sup> and the policy statement issued by the ICAO Council on 9 December 1996 in the form of a Council Resolution of an interim nature, and urges States to follow the current guidance of the Council on emission-related levies. The Council is similarly exhorted by the Assembly, through A32-8, to continue to pursue the question of emission-related levies with a view to reaching a conclusion prior to the next ordinary Session of the Assembly in 2001.

The policy statement of the Council dated 9 December 1996 takes into consideration the fact that a number of States consider it desirable to use a levy to reflect environmental costs associated with air transport, while other States do not consider it appropriate to impose such a levy under the present circumstances. The Council goes on to state that it considers the development of an internationally agreed environmental charge or tax on air transport (that all States would be expected to impose) to be impracticable at this time, given the differing views of States and the significant organization and practical implementation problems that would be likely to arise.

According to the Council Statement, ICAO is seeking to identify a rational common basis on which States wishing to introduce environmental levies on air transport could do so. The Council strongly recommends in its Statement that any environmental reviews on air transport which States may introduce should be in the form of charges rather than taxes and that the funds collected should be applied in the first instance to mitigating the environmental impact of aircraft engine emissions, for example by:

a) addressing the specific damage caused by these emissions, if this can be identified;

- b) funding scientific research into their environmental impact; or
- c) funding research aimed at reducing their environmental impact, through developments in technology and new approaches to aircraft operations.

Finally, the Council urges States that are considering the introduction of emission-related charges to take into account the non-discrimination principle in Article 15 of the *Convention on International Civil Aviation* and the work in progress within ICAO and, in the meantime, to be guided by the general principles in the *Statements by the Council to contracting States on Charges for Airports and Air Navigation Services* (Doc 9082/4) and the following principles adapted from those agreed by the 31st Session of the ICAO assembly: that there should be no fiscal aims behind the charges; the charges should be related to costs; and the charges should not discriminate against air transport compared with other modes of transport.

As part of its efforts to monitor the issue of emissions and economic instruments in that regard, and also to reach a conclusion prior to the next Assembly Session of ICAO in the year 2004, the Council of ICAO is actively pursuing the issue through its Committee on Aviation Environmental Protection (CAEP).

CAEP, at its 4th meeting (CAEP/4) held in April 1998, identified as an integral part of its work programme the need to address emissions inventories for future scientific assessments; long-term emissions burden estimates used for quantifying benefits of regulatory charges; and the effectiveness of operational measures to reduce aircraft emissions and their effects on the atmosphere.<sup>26</sup> The meeting also noted that further work was necessary on market-based options for reducing emissions.

The CAEP/4 Report, which was considered by the 32nd Session of the ICAO Assembly, presented an extensive report on emissions-related levies. Basically, CAEP/4 envisioned four options for levies: a fuel levy, ticket levy, route levy and an airport levy. With regard to the application of a levy, the Report considered a revenue neutral application, a general taxation application, a levy application based on a preventive-cost approach and an application involving paying damages or compensation for third party injury. The Report also considered the efficacy of each levy option and application as well as implementation aspects of environmental levies both in the context of their relation to levy collection as well as to the application of levies. As a pivotal point to the whole exercise, CAEP/4 examined the role of ICAO with regard to such levies.

The 33rd Session of the Assembly, in considering both the work of CAEP/4 and CAEP/5, endorsed the development of an open emissions trading system for international civil aviation and requests the Council to develop, as a matter of priority, guidelines for open emissions trading for international aviation focusing on establishing the structural and legal basis for aviation's participation in an open trading system, and including key elements such as reporting, monitoring and compliance, while proving flex-

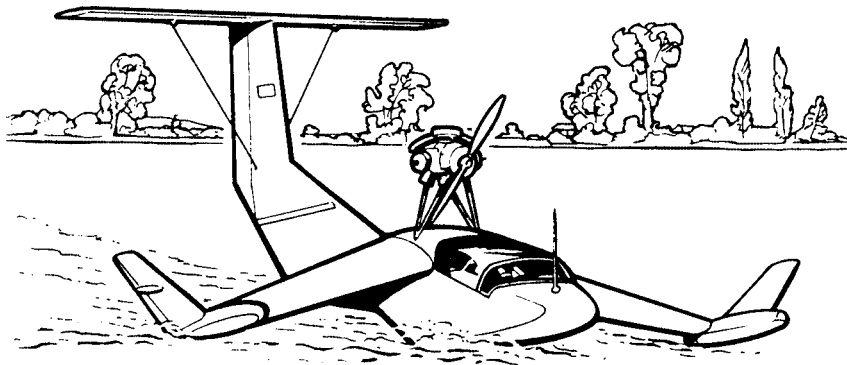
ibility to the maximum extent possible consistent with the UNFCCC process.

## CONCLUSION

There is no room for doubt that development in aviation and the environment over the years has now led the international community in general, and the aviation community in particular, to a point where a delicately balanced formula between market demand and sustainability has to be reached. This is true both in the contexts of aircraft noise and engine emissions.

As for market demand, it is incontrovertible that, notwithstanding the short-term effects that may be felt as a result of recent setbacks, economic analysts believe that air transport is still the most expensive of all modes of transport (road, rail, air and sea) to operate in terms of per kilogram of mass carried.<sup>27</sup> This essentially means that commercial air transport is predominantly offered to the high value/high yield end of the market, i.e. to the business community, the tourism industry and the time-critical freight industry dealing with overnight documents and high value/high perishable items.

The total scheduled traffic (domestic and international) carried by the airlines of contracting States of ICAO in



1999 is estimated to have been at about 369 billion tonne-kilometres performed, an increase of about 6 per cent over 1998.<sup>28</sup> The airlines of these States carried a total of 1558 million passengers and some 28 million tonnes of freight in 1999. The freight figure compares with 26 million tonnes carried in 1998.<sup>29</sup> Compared with previous years, the carriage of international freight showed an increase of 9 per cent in 1999.

ICAO records that between 1989 and 1998 the reported number of commercial aircraft in service increased by about 60 per cent from 11,253 to 18,139 aircraft. In 1998, 1463 jet aircraft were ordered, compared with 1309 in 1997, and 929 were delivered compared with 674 aircraft in 1997. In 1998, the total scheduled traffic carried by airlines of the 185 Contracting States of ICAO amounted to a total of 1462 million passengers and 26 million tonnes of freight. In 1988-1999 the total tonne-kilometres performed, or total scheduled airline traffic, grew at an

nual rate of 5.2 per cent.<sup>30</sup> Passenger kilometre growth during this decade was 4.6 per cent and freight tonne-kilometre growth was 6.6 per cent for the same period.<sup>31</sup> These figures<sup>32</sup> reflect the increased frequency of aircraft movements at airports, calling for drastic management of aircraft movements in terms of noise and airport capacity.

In 2000, world gross domestic product (GDP) grew by approximately 4.4 per cent in real terms. Industrialized countries showed a 4 per cent increase, with North America showing a robust 5.3 per cent growth and Europe achieving 3-5 per cent. Africa's economy achieved 3.6 per cent growth within an overall growth for developing countries which was at 5.6 per cent. Asian and Pacific countries reflected a significant 6.7 per cent and South America and the Caribbean recovered to post a healthy 4.3 per cent GDP growth.<sup>33</sup> General views on the future of aviation offered by both the Organization for Economic Cooperation and Development (OECD) and the World Tourism Organization after the September 2001 crisis are encouraging, in that the GDP of countries, which is essentially measured by consumerism, is expected to stabilize by mid-2002 and increase in 2003.

In the air transport sector, the total scheduled traffic carried by airlines amounted to a total of 1647 million passengers and some 30.2 million tonnes of freight. This was an 8 per cent increase from 1999 figures.<sup>34</sup> Countries continued to expand the international air transport network by concluding 73 bilateral air services agreements in 2000, compared to 67 in 1999. Over 70 per cent of these agreements showed a marked trend toward liberalization, with 17 'open skies' agreements concluded, within an overall figure of 83 such agreements concluded at the time of writing. With these figures and prognoses one can be reasonably confident that market demand for air transport will increase its momentum, and the demand for aircraft and services will increase in the near future.

With regard to sustainability, regulators of the environmental impact of aviation will necessarily have to bear in mind the significance of the balanced approach suggested by Resolution A33-7. 'Sustainable development' in the context of environmental protection means 'development which the environment can sustain without being polluted'. The notion that environment is an inextricable and integral part of sustainable development and that environmental issues are not *sui generis* or stand-alone issues but are incontrovertibly linked to their economic, political and social contexts is critical in the context of aviation and environmental protection. Environmental issues are the necessary corollaries to social processes and should be addressed on the basis of equity, care for nature and natural resources and development of society.

Environmental management is therefore the key to



effective sustainable development. This should involve a necessary diversion from mere cleaning up or repairing damage to being a sustained social activity which brings to bear the need to force development to keep pace with the environmental equilibrium and stability of the world.

Another integral part of sustainable development is economics, and it is in this broad context that a link can be drawn between sustainability and market demand in the field of commercial aviation. Economics not only plays a key role in societal decision-making, but it also integrates environmental issues with distribution, ownership and control, identifying economic development and social issues as major elements in the management of a society. Another aspect of its role in sustainable development is reflected in the very nature of sustainable development itself, in that it requires a delicate balance between the needs of the present generation and the long-term environmental wellbeing of society. If, for instance, the alienation of environmental assets were to enrich the present generation, but would adversely affect future generations, the management of this dichotomy could be addressed by considering the economic implications of unsustainable development.

Another factor which influences sustainable development is globalization, which calls for intervention at an international level to ensure that development can be sustained environmentally. In this context, in addition to the implementation of international environmental agreements, it becomes necessary to critically analyse the impact of the global economy and the liberalization of trade on environmental issues.

In any aspect of trade, including trade related to the aviation industry, any bifurcation of environment and sustainable development becomes arbitrary and cosmetic. With this in view, sustainable development in aviation should be internationally managed in three component ways:

- (a) environmental assessment: through evaluation and review, research and monitoring, and the frank exchange of views on the environment;
- (b) environmental management: through comprehensive planning that takes into account the effects of human-kind's activities on the environment; and
- (c) supporting measures: through education, training and public information as well as through financial assistance and organizational arrangements.

Any balanced approach toward environmental management should be based on the above guidelines.

## Notes

- 1 The International Civil Aviation Organization is a specialized agency of the United Nations charged with regulating international civil aviation. ICAO has 187 Contracting States.
- 2 See ICAO Resolution A33-7, Consolidated Statement of Continuing ICAO Policies and Practices related to Environmental Protection, A33-7, *Resolutions Adopted by the Assembly*, Provisional Edition, October 2001, p. 15.
- 3 See Convention on International Civil Aviation, Doc. 7300/8, Eighth Edition 2000, Article 44(d).
- 4 *Supra*, note 3.
- 5 Article 15, *inter alia*, generally requires that any charges that may be imposed or permitted to be imposed by a Contracting State for the use of airports and

air navigation facilities by aircraft shall not be higher than those that are payable by national aircraft of the State imposing such charges.

6 These noise levels will be discussed in detail later in this article.

7 See *Assembly Resolutions in Force* (as of 6 October 1989), ICAO Doc. 9558 at II-18.

8 *Assembly Resolutions in Force*, (As of 2 October 1998), ICAO Doc. 9730, ICAO: Montreal, at 1-36.

9 ICAO's policies on taxes and charges are contained in Doc. 8632. These policies recommend, *inter alia*, the reciprocal exemption from all taxes levied on fuel taken on board by aircraft in connection with international air services, and reduction, to the fullest possible extent, or elimination of taxes related to the sale or use of international air transport.

10 (1992) 31 I.L.M.849. On the negotiations and text of the Climate Change Convention see D. Bodansky, 'The United Nations Framework Convention on Climate Change: A Commentary' (1993) 18 Yale J. Int. L. 451-558. See also J. Barrett, 'The Negotiation and Drafting of the Climate Change Convention', in R. Churchill and D. Freestone (eds), *International Law and Global Climate Change* (1991), pp. 183-200.

11 Kyoto Protocol to the United Nations Framework Convention on Climate Change, UN Doc. FCCC/CP/1997/L.7/Add.1.

12 Carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride.

13 UN Environment Programme (UNEP) Press Release, 11 Dec 1997.

14 The subject of emissions-trading falls within the purview of the Intergovernmental Panel on Climate Change (IPCC), which was established in 1988 by the World Meteorological Organization and the United Nations Environment Programme (UNEP) to assess the scientific basis and impact of climate change. The IPCC's first scientific report was published in 1990 and recommended the negotiation of a framework convention to combat global warming. The United Nations Framework Convention on Climate Change (UNFCCC) was adopted on 9 May 1992 and the treaty entered into force on 21 March 1994. This article, being a legal one, will not address details of these bodies. For an extensive treatment of the IPCC's work and the UNFCCC, see Colin Warbrick and Dominic McGoldric (eds) *Global Warming and the Kyoto Protocol*, 47 ICLQ, April 1998 at pp. 446-462.

15 The Protocol will enter into force 90 days after 'not less than 55 Parties to the [Climate Change] Convention, incorporating Parties included in Annex 1 which accounted in total for at least 55% of the total carbon dioxide emissions for 1990 of the Parties included in Annex 1' have ratified (Art. 24 of the Protocol).

16 *Id.*, Art.7(1). The Secretariat is located in Bonn, Germany. Its postal address is PO Box 260 124, D-53153, Bonn, Germany.

17 *Id.*, Art. 8(1).

18 *Id.*, Art. 8(5). When the Conference of the Parties meets as the meeting of Parties to the Protocol, those States that are party to the Convention but not to the Protocol may participate but only as non-voting observers (*idem*, Art. 13(1) and (2)). Parties to the Protocol will meet annually (Art. 13(6)) to review the implementation of the Protocol (Art. 13(4)).

19 *Id.*, Art. 8(6).

20 See J.K. Parikh, 'Joint Implementation and North South Cooperation for Climate Change', 1995, 7(1) *International Environmental Affairs*, at pp 22-41.

21 *Supra*, see note 10.

22 See Article 12(3) of the Kyoto Protocol.

23 Article 8 of the Protocol.

24 Montreal Protocol on Substances that Deplete the Ozone Layer (1987) 26 I.L.M. 1550. The Montreal Protocol controls gases such as chlorofluorocarbons, which not only have ozone-depleting characteristics but also contribute to the greenhouse effect. The Kyoto Protocol has, by explicitly excluding the Montreal Protocol's role in ICAO's mandate, included carbon dioxide, nitrogen oxides and compounds of sulphur emissions within ICAO's purview. (See also article on the Kyoto Protocol on page 14.)

25 As contained in Doc. 9082 (*Statements by the Council to Contracting States on Charges for Airports and Air Navigation Services*) and Doc. 8632 (*ICAO's Policies on Taxation in the Field of International Air Transport*).

26 CAEP/4, Committee on Aviation Environmental Protection, Fourth Meeting, Montreal, 6-8 April 1998, ICAO: Montreal, at p. i-8.

27 *The Supply of Air Freight Capacity to Asian Markets*, Working Paper 42, Bureau of Transport Economics, Commonwealth of Australia, 200, at p. 1.

28 *The World of Civil Aviation 1999-2002*, ICAO Circular 279-AT/116, International Civil Aviation Organization, Montreal, at p. 27.

29 *Ibid.*

30 *The World of Civil Aviation 1999-2002 supra*, at para. 5.11.

31 *Ibid.*

32 The above figures were extracted from *The Annual Report of the Council - 1998*, ICAO: Montreal, Doc 9732, p. 6.

33 *Annual Report of the Council 2000*, International Civil Aviation Organization, Doc. 9770, at p. 1. Also Airline Financial Results Remain Positive in 2000 Despite Soaring Fuel Prices, ICAO News Release P10 05/01.

34 *Id.* *Annual Report* at p. 2.

