



NOTICE OF PROPOSED AMENDMENT (NPA) No 2008-15

“Essential Requirements for Civil Aviation Environmental Protection”

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A. Explanatory Note

I. General

1. The purpose of this Notice of Proposed Amendment (NPA) is to discuss and define how the EASA system could best contribute to the environmental compatibility of civil aviation in its extended scope of competence, taking into account the overall Community approach to environment protection. This could lead to amending Regulation (EC) No 216/2008¹, hereinafter referred to as the Basic Regulation, to define broader, performance based, essential requirements for environmental protection, as well as appropriate processes to ensure compliance therewith. The scope of this rulemaking activity is outlined in ToR BR.004 and is further described in more detail below.
2. The European Aviation Safety Agency (the Agency) assists the Commission in the preparation of proposals for amending the Basic Regulation to be presented to the European Parliament and to the Council. The Agency shall prepare drafts of the basic principles and essential requirements which are adopted as "Opinions" (Article 19(1)) to be submitted to the Commission.
3. When developing rules, the Agency is bound to follow a structured process as required by Article 52(1) of the Basic Regulation. Such a process has been adopted by the Agency's Management Board and is referred to as "The Rulemaking Procedure"².
4. This rulemaking activity is included in the Agency's rulemaking programme for 2008. It implements the rulemaking task BR.004: Essential requirements for environment and related issues.
5. The text of this NPA has been developed by the Agency. It is submitted for consultation of all interested parties in accordance with Article 52 of the Basic Regulation and Articles 5(3) and 6 of the EASA rulemaking procedure.

II. Consultation

6. To achieve optimal consultation, the Agency is publishing this Notice of Proposed Amendment on its internet site. Comments should be provided within three months in accordance with Article 6(5) of the Rulemaking Procedure. Comments on this proposal should be submitted by one of the following methods:

CRT:	Send your comments using the Comment-Response Tool (CRT) available at http://hub.easa.europa.eu/crt/
E-mail:	In case the use of CRT is prevented by technical problems these should be reported to the CRT webmaster and comments sent by email to NPA@easa.europa.eu .
Correspondence:	If you do not have access to internet or e-mail you can send your comment by mail to: Process Support Rulemaking Directorate EASA Postfach 10 12 53 D-50452 Cologne Germany

¹ Regulation (EC) No 216/2008 of the European Parliament and of the Council of 20 February 2008 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency, and repealing Council Directive 91/670/EEC, Regulation (EC) No 1592/2002 and Directive 2004/36/EC. (OJ L79, 19.3.2008, p. 1.)

² Decision of the Management Board amending and replacing Decision 7-03 concerning the procedure to be applied by the Agency for the issuing of opinions, certification specifications and guidance material ("rulemaking procedure"), EASA Management Board Decision 08-2007, MB meeting 13.6.2007.

7. Section IV of this document contains explanations related to this rulemaking task. It also includes several questions. The objective of these questions is to seek the opinion of stakeholders on key features of a possible new framework for the regulation of civil aviation environmental compatibility. It would be most appreciated that comments be related to these questions. However, the Agency welcomes also comments on any other point addressed in this NPA. Comments should be received by the Agency by 30-08-2008. If received after this deadline they might not be taken into account.

III. Comment response document

8. All comments received in time will be responded to and incorporated in a comment response document (CRD). This may contain a list of all persons and/or organisations that have provided comments. The CRD will be widely available on the Agency's website.

IV. Content of the Notice of Proposed Amendment

Background

9. This NPA is the prelude of a legal process that may or may not be undertaken by the European Commission to adapt the essential requirements of the Basic Regulation for Environmental Protection. As such this NPA is primarily intended to consult stakeholders on a new concept for such essential requirements. It will lead to the issuance of an Opinion by EASA to the European Commission, which will be of a general nature (although specific with respect to the proposed essential requirements). This Opinion may then be used by the European Commission as a starting point for drafting a legislative proposal. As such this NPA does not contain detailed proposals for amendment of the basic regulation but rather a more general discussion and related request for comments.
10. When adopting its proposal for a Regulation of the European Parliament and the Council on common requirements in the field of civil aviation and establishing the European Aviation Safety Agency³, the European Commission indicated that its proposal was aimed at providing the European citizen with a high uniform level of civil aviation safety and environmental protection. As a first step, however, it was only proposing the provisions necessary to ensure the airworthiness and environmental compatibility of products (such as aircraft and engines), because further work was needed to properly address other areas of civil aviation under a total system approach.
11. The European Parliament and the Council accepted the Commission's view, but insisted that work be undertaken with the view to extend the scope of the Basic Regulation to all other domains of civil aviation. They considered indeed such extension as absolutely necessary to ensure overall consistency of the regulatory framework under a total system perspective, all elements being interdependent. This would also prevent a complex and unclear sharing of responsibilities between the Community and its Member States, which could lead to loop-holes detrimental to the objective enshrined in the Basic Regulation, of a high and uniform level of aviation safety and environmental protection.
12. As a first step in meeting this objective, the Agency issued Opinion 3/2004⁴ on the regulation of pilot licensing, air operations and third country aircraft. Based on this opinion and along the lines taken in it, the Commission issued a legislative proposal⁵. The legislative process led to the adoption of the amended Basic Regulation. In parallel

³ COM(2000) 595 final of 27.9.2000 (OJ C 154, 29.5.2001).

⁴ Agency Opinion 3/2004 for amending Regulation (EC) No 1592/2002 on common rules in the field of civil aviation and establishing the European Aviation Safety Agency, to extend its scope to the regulation of pilot licensing, air operations and third country aircraft. Published on 16.12.2004.

⁵ COM(2005) 579 final of 15.11.2005. Proposal for a Regulation of the European Parliament and of the Council amending Regulation (EC) No 1592/2002 on common rules in the field of civil aviation and establishing the European Aviation Safety Agency (OJ C 49, 28.2.2006, p. 37).

the Agency initiated work on the safety and interoperability regulation of aerodromes, air traffic management (ATM) and air navigation services (ANS)⁶. It issued Opinion 3/2007⁷ including its proposals as regards aerodrome safety, which include the immediate vicinity and airspace above. It also published opinion 1/2008⁸ proposing the extension of the EASA system to the regulation of Air Management and Air Navigation Services (ATM/ANS). The Commission has indicated its intention to use the result of this work to propose in June 2008 legislation extending the EASA system to all these domains. It is envisaged that the total system approach would then be implemented by 2010 for all aspects of civil aviation safety.

13. Traditionally it has been considered appropriate to address at the same time the safety and environmental compatibility of aviation products as there are benefits in using the same certification processes to ensure compliance with both sets of requirements. ICAO has also realized that ensuring environmental compatibility of products is not enough to provide for an appropriate level of environmental protection and considers now necessary to act on other aspects of civil aviation. It is true indeed that only a balanced combination of measures involving the control of noise/emission source, the operation of aircraft, the design of aerodromes and route networks, as well as their use, together with land use planning and economical measures, can allow the aviation community addressing the challenges of sustainable development.
14. While the EASA system will soon cover all aspects of civil aviation safety, it seems appropriate to examine whether a similar total system approach would contribute to also better meet the objective of a high uniform level of environmental protection, using possible synergies between the two perspectives. Such is the subject of this consultation document. Comments received from stakeholders will allow the Agency to make the necessary proposals, and to assist the Community legislator in deciding, on the best means to regulate civil aviation environmental compatibility in the Community.
15. In addition to the above there are a few issues where clarification in the Basic Regulation would be helpful. These are addressed in this NPA as well.

Scope

16. As it has been recognised that the objectives of the Treaty establishing the European Community (Treaty of Rome) with respect to protection of the environment and the free movement of goods, services and persons could best be achieved by common rules or commitments, civil aviation environmental compatibility is already largely subject to Community competence. This is of course the case for aviation products and organisations, which are regulated by the Community under the EASA system. As regards aircraft operations, Directive 2006/93/EC⁹ precludes the use in the territory of Member States of aircraft that are not compliant with Chapter 3 of Volume I of Annex 16 to the Chicago Convention¹⁰ and Directive 2002/30/EC¹¹ establishes common criteria for

⁶ The term "Air Navigation Services" is used here in a broad sense to cover all elements of the so-called CNS/ATM system.

⁷ Agency Opinion 3/2007 for amending Regulation (EC) No 1592/2002 of the European Parliament and of the Council on common rules in the field of civil aviation and establishing a European Aviation Safety Agency, to extend its scope to the regulation of safety and interoperability of aerodromes. Published on 6.12.2007.

⁸ Agency Opinion 1/2008 for amending Regulation (EC) No 216/2008 of the European Parliament and Council on the common rules in the field of civil aviation and establishing a European Aviation Safety Agency to extend the EASA system to the regulation of Air Traffic Management and Air Navigation Services (ATM/ANS). Published on 17.04.2008.

⁹ Directive (EC) No 2006/93 of the European Parliament and of the Council of 12 December 2006 on the regulation of the operation of aeroplanes covered by Part II, Chapter 3, Volume 1 of Annex 16 to the Convention on International Civil Aviation, second edition (1988) (OJ L 374, 27.12.2006, p. 1).

¹⁰ The Convention on International Civil Aviation, signed in Chicago on 7 December 1944.

operating restrictions at Community aerodromes. Land use planning is indirectly addressed by Directive 2002/49/EC¹² on environmental noise, which takes into account all sources of noise around aerodromes. Emissions control is addressed by Council Directive 96/62/EC¹³ on ambient air quality, Regulation (EC) No 2037/2000¹⁴ on substances that deplete the ozone layer, Directive 2001/81/EC¹⁵ on national emissions ceilings and Decision 2002/358/EC¹⁶ on the approval of the Kyoto Protocol.

17. This patchwork of regulations, together with measures adopted by Member States to implement ICAO Standards and Recommended Practices in the aviation sector, clearly leaves a void in some areas and creates overlap and duplication of regulation in others. This is why Vice-President Jacques Barrot emphasised in the conclusions of the Conference on the Future of Aviation Regulation¹⁷ the need for a more coherent, proactive top down approach rather than the continuation of case-by-case legislative reactions. The EASA system could provide for such an approach, it is, however, unlikely that such a system is appropriate for all aspects of aviation related environmental protection. This will be further examined hereunder with the view to define what should be the products, infrastructures, organisations, operations and persons to be regulated under the EASA system.

Aeronautical products

18. Under the Basic Regulation, all aircraft are already subject to common environmental rules, except those defined in its Annex II; this implies that organisations and personnel involved in the design, manufacture and maintenance of these aircraft are also subject to common rules as appropriate. No changes are considered here.
19. The exclusion of Annex II aircraft was justified by the fact that it was considered they did not raise important safety concerns for the Community. With the development of technology, however, this may not be the case any more for ultralight aircraft, produced in an industrial manner, whose performances are increasing and which circulate all over the community. It is a fact also that some of these aircraft already pose serious environmental concerns. When adopting the extended Basic Regulation, the European Parliament and the Council stated in recital No 5 that such aircraft might be better regulated at Community level to provide for the necessary uniform level of safety and environmental protection. They also decided to immediately submit some of these aircraft to common rules when involved in commercial air transport.
20. In parallel, taking into account the need to better adapt certification requirements and procedures to the needs of General Aviation, the Agency had initiated work to achieve these objectives and intends to be able to make proposals therefore by the end of 2008.

¹¹ Directive (EC) No 2002/30 of the European Parliament and of the Council of 26 March 2002 on the establishment of rules and procedures with regard to the introduction of noise-related operating restrictions at Community airports (OJ L 85, 28.3.2002, p. 40).

¹² Directive (EC) No 2002/49 of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise (OJ L 189, 18.7.2002, p. 12).

¹³ Council Directive (EC) No 96/62 of 27 September 1996 on ambient air quality assessment and management (OJ L 296, 21.11.1996, p. 55). Directive as last amended by Regulation (EC) No 1882/2003 (OJ L 284, 31.10.2003, p.1).

¹⁴ Regulation (EC) No 2037/2000 of the European Parliament and of the Council of 29 June 2006 on substances that deplete the ozone layer (OJ L 244, 29.9.2000, p. 1). Regulation as last amended by Decision (EC) No 2007/540 (OJ L 198, 31.7.2007, p. 35).

¹⁵ Directive (EC) No 2001/81 of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants (OJ L 309, 27.11.2001, p. 22). Directive as last amended by Directive (EC) No 2006/105 (OJ L 363, 20.12.2006, p. 368).

¹⁶ Decision (EC) No 2002/358 of 25 April 2002 concerning the approval, on behalf of the European Community, of the Kyoto Protocol to the United Nations Framework Convention on Climate Change and the joint fulfilment of commitments there under (OJ L 130, 15.5. 2002, p. 1).

¹⁷ On 20.9.2006.

It is envisaged that these changes to Part-21¹⁸ would allow the extension asked for by the legislator. The revision of the Basic Regulation, which should be proposed as a result of the present consultation, probably provides a good opportunity to do so.

Question 1

The Agency is interested in knowing whether stakeholders agree that ultra light aircraft, produced in an industrial manner, should be subject to common environmental rules?

Aerodromes

21. Aerodromes are of course main contributors to aviation noise and downgrading of local air quality for their neighbours. Any action aiming at ensuring civil aviation environmental compatibility must then include the proper regulation of their design and any aviation operation at or near the aerodrome. As the EASA system will cover the safety regulation of these aspects, including in particular runway orientations and arrival/departure trajectories, synergies would be created if it addressed also at the same time their environmental dimension. The Agency envisages therefore proposing extending the EASA system to the environmental regulation of aerodromes design and operations. This would imply that organisations and personnel involved in the design and operation of aerodromes, including aerodrome equipment, would also be subject to common rules, as appropriate to implement the applicable essential requirements.
22. In addition other possible environmental impacts from the airport design or operation could be considered, such as power generation at aerodromes, building design, power delivery at parked aircraft, vehicles on the air side, minimisation of engine running time on the ground and disposal of oil or other substances used during aerodrome operations. However such activities are currently not generally foreseen to be covered under the safety remit of EASA and following the total system approach should not be covered by the EASA system for environmental protection either. In other words, the revised basic regulation would only cover the environmental protection aspects of airport operation and design for those subjects that are regulated for aviation safety by the EASA system.
23. As regards land use planning around aerodromes, it is to be noted that this subject is already covered in a horizontal manner by Directive 2002/49/EC and Council Directive 96/62/EC. In that context all sources of noise or pollution are taken into account so that the level of exposure at any point remains under an acceptable level. Such an approach allows local authorities to envisage trade-offs between various sources of noise or pollution, e.g. including the transportation modal split to access the aerodrome ground side. This may provide aerodromes with better opportunities than land use planning schemes that only address aviation environmental effects. It is questionable therefore whether aviation should engage in regulating itself in such a context. This does not mean that the Agency could not contribute to the development or administration of rules or regulations in this context, or provide data needed for the implementation of such regulations. However, the legal basis for these activities would be in other regulations than the Basic Regulation.

¹⁸ Regulation (EC) 1702/2003 of 24 September 2003 laying down implementing rules for the airworthiness and environmental certification of aircraft and related products, parts and appliances, as well as for the certification of design and production organisations (OJ L 243, 27/9/2003, p. 6). Regulation as last amended by Regulation (EC) No 375/2007 (OJ L 94, 4.4.2007, p. 3)

Question 2

a) The Agency is interested in knowing whether stakeholders agree that airport design and airport operations that are covered by safety regulation in the EASA system should also be regulated for their environmental impact through the EASA system.

b) The Agency is interested in knowing whether stakeholders agree that land use planning around aerodromes is better regulated at horizontal level, taking into account all sources of noise/pollution, rather than from an aviation perspective only.

Air traffic management (ATM) and air navigation services (ANS)

24. One of the objectives of the Community when establishing the Single European Sky was to also contribute to the sustainable development of civil aviation by reducing congestion and optimising route networks. The aviation community is expecting much from the SESAR project's contribution to reducing fuel consumption. These are, however, not the only aspects under which the contribution of ATM and ANS to environment sustainability shall be assessed. Trajectories can in particular be adapted to avoid unnecessarily affecting the ozone layer or flying over sensitive areas; this may be necessary for supersonic flight or aircraft using open rotors, which cruise noise may be audible from the ground. It is therefore necessary that a proper regulation of the environmental impact of ATM and ANS be put in place.
25. As the EASA system will cover the safety regulation of the design and operation of ATM and ANS, synergies would be created if it addressed also at the same time their environmental dimension. The Agency envisages therefore proposing extending the EASA system to the environmental regulation of this domain. This would imply that organisations and personnel involved in the design and operation of ATM and ANS would also be subject to common rules, as appropriate to implement the applicable essential requirements.

Air operations

26. Safety regulation relies heavily on air operators to take measures to ensure that flights are conducted in accordance with the appropriate requirements and that staff involved in operations are well trained and keep current their ability. In the same manner procedures can be used to reduce the environmental impact of aviation, such as adapting the flight profile and the aircraft configuration wherever needed and possible without affecting flight safety. The Agency therefore considers it necessary to better regulate the environmental dimension of air operations and to develop dedicated requirements addressed to air operators and flight crews. An example would be the use of low noise procedures for parachute dropping or banner towing.
27. As the EASA system will cover the safety regulation of air operations, synergies would be created if it addressed also at the same time their environmental impact. The Agency envisages therefore proposing extending the EASA system to the environmental regulation of air operations. This would imply that organisations involved in the operation of aircraft would also be subject to common rules, as appropriate to implement the applicable essential requirements. An example could be the prohibition of carrying more fuel than needed only to profit from price differences between different regions as this practice leads to creating more emissions than necessary.

Environmental awareness of persons active in the aviation system

28. The acts of certain people in the aviation system can significantly influence the environmental impact of aviation. It might be therefore appropriate to include environmental knowledge requirements in their theoretical training. However, it is not considered necessary to address practical skills as the safety regulations can be considered as sufficient to provide for a level of skill that is adequate for any environmentally related activity. The Agency envisages therefore proposing extending the EASA system to the environmental regulation of the licensing of pilots, air traffic controllers and maintenance engineers, as well as the training of any other person active in the aviation system whose actions can have a significant effect on the noise exposure on the ground, the quantity of the emissions emitted and the subsequent environmental impact.

Operating restrictions

29. As indicated in paragraph 16, operating restrictions for environmental protection reasons are already subject to common rules. Adopted as directives, such rules create obligations that Member States shall implement at national level by regulating aerodromes and air operators. At the same time the EASA system is required to cover the regulation of the same entities for safety purposes. This will be done by the establishment of implementing rules, including in most cases approval schemes, directly applicable to aerodrome operators and air operators. It seems therefore that there could be synergies in transferring the regulation of such restrictions for environmental protection purposes under the EASA system. This will also contribute to a “level playing field” for fair competition as well as to reduced rulemaking costs.
30. This would present the advantage of reducing the regulatory burden on the affected organisations and to avoid an unclear sharing of responsibilities. This would also be more in line with ICAO practices in which enforcement of operational conditions is the role of the State with oversight responsibility rather than the State in which territory the operation takes place. Last but not least using the EASA system would provide for a more uniform implementation of operating restrictions. This should of course be done without, however, imposing such restrictions at every aerodrome by providing the necessary level of subsidiarity when appropriate.

Question 3

The Agency is interested in knowing whether stakeholders consider that operating restrictions should be subject to common rules under the EASA system.

Economic measures

31. Economic regulations such as noise or emission related charges are widely being used to reach environmental objectives. The proposal to include aviation in the Emission Trading Scheme is an example of this. However, economic measures are not part of the Agency's remit, as it was considered that trade-offs between safety and economic objectives should be made on political rather than on executive level. It is unlikely that the situation will change in a foreseeable future. The Agency does not think therefore that economic measures should be addressed under the EASA system. As with land use planning, this does not mean that the Agency could not contribute to the development or administration of rules or regulations in this context, or provide data needed for the implementation of such regulations. However, the legal basis for these activities would be in other regulations than the Basic Regulation.

Environmental objectives

32. Article 6(1) of the Basic Regulation currently defines essential requirements for environmental protection as *“the environmental protection requirements contained in*

Amendment 8 of Volume I and in Amendment 5 of Volume II of Annex 16 to the Chicago Convention as applicable on 24 November 2005, except for the Appendices to Annex 16". As a consequence they only include requirements for the design of types of aircraft or engines, which are specifically mentioned in that Annex. As per current practices, other aircraft or engines are not subject to environmental restrictions for international air traffic. This is understood, however, by some Member States as permitting them to impose on these aircraft national conditions to protect their environment. This could ultimately lead to different regulations within different Member States and is clearly not in line with the spirit of the Basic Regulation.

33. Using ICAO standards as essential requirements for regulating environmental protection in the Community presents also other drawbacks. They are generally understood as setting minimum standards; their transposition into Community law, however, makes it impossible to deviate from them at all. This deprives the Community from its right to decide on alternative systems. This would be of particular value if the main aircraft manufacturing states within ICAO could agree on a common policy to be more stringent than Annex 16, as is the case in several safety areas, thus taking a leading role in the development of more environmentally friendly aviation products. Moreover the absence of ICAO specifications for new technology, such as tilt rotors and open rotors, does not allow the Community to act while there is a clear need to do so to protect the environment. Last but not least, ICAO Standards do not address the full scope of measures, which need to be implemented in a balanced way to provide for the sustainable development of civil aviation.
34. For these reasons the Agency considers it more appropriate that the Community adopts its own dedicated essential requirements for environmental protection as it has done in the field of safety. As setting quantified targets would require a full legislative process every time technological developments allow the introduction of more environmentally friendly products or procedures, it is recommended that such requirements only prescribe the measures that shall be implemented to mitigate all significant environmental harmful effects of civil aviation at a high uniform level. They would then be implemented by means of Commission regulations and the Agency's certification specifications, as this is done in the field of safety, providing therefore the necessary flexibility to always provide for the best level of environmental protection. To allow, however, Member States fulfilling their ICAO obligations and avoid penalizing the European industry, these essential requirements and their implementation measures should be fully consistent with the ICAO framework.
35. On this basis, the Agency has developed the attached essential requirements, which are designed to appropriately mitigate health hazards, annoyance and climate effects related to noise and emissions from civil aviation within the scope described in the previous chapter. Flexibility has been incorporated in the requirements so as to allow implementing rules to be adapted to the size and nature of the problem. This will involve taking into account technical feasibility, economic aspects and the benefits for the environment. The level of detail has been tailored to permit the necessary judicial control of executive acts, or direct implementation if self-administration by the regulated entities is considered as more appropriate in certain cases. Care has also been taken to ensure their compatibility with the corresponding ICAO Standards and Recommended Practices.
36. The establishment of such high level essential requirements has an advantage in terms of providing guidance for industry when developing new activities or products. The detailed technical certification requirements for such activities or products will often not be determined until after the development, and will most likely be applied retroactively. The essential requirements would provide industry with a reference point on the estimated final level of stringency, thus informing any strategic decision on whether to go ahead, or not, with the development of a new product or activity.
37. Last but not least it has to be kept in mind that essential requirements for environmental protection come in addition, and not contrary, to other essential requirements, most importantly the essential requirements for safety. It may be the case that the

combination of environmental essential requirements and safety essential requirements, and possibly other requirements, make a certain aviation activity impossible. In such case it is necessary to find alternative solutions or accept that such activity is just not possible. None of the measures proposed in these essential requirements shall therefore be seen as incompatible with safety related essential requirements.

Question 4

The Agency is interested to know whether stakeholders consider that the attached essential requirements meet the criteria described here above and whether they constitute a good basis for the regulation of aviation environmental protection within the envisaged scope of the extended EASA system. The Agency also welcomes any suggestion to improve the essential requirements.

Implementation means

38. As a matter of principles the extended Basic Regulation shall specify how compliance with essential requirements is to be implemented and verified. This includes specifying whether issuance of an official certificate or showing to a third party or self-declaration should be used to demonstrate compliance. Details should also be provided on how such demonstration of compliance is to be made. If such details are too complex or lengthy, executive powers should be given to the Commission to adopt the necessary implementing rules. When appropriate, the bodies in charge with the issuing of the certificate, or to which compliance is to be shown, should be identified. They can be the Agency itself, national administrations or appropriately accredited entities. In the last case, criteria for accreditation would need to be specified and accreditation authorities nominated. These aspects will be discussed further in the present chapter.
39. When doing so it must be kept in mind that Community competence is largely established for most domains subject to the present consultation. The related rules, in particular the Basic Regulation, have already established implementation means, which should be kept untouched unless there are good reasons to modify them. Moreover, as one of the objectives is to best use synergies between the safety and environmental certification processes to reduce regulatory burden on the industry, the implementation means already agreed for safety oversight should be given preference wherever possible and provided such means do not have a negative impact on the effectivity of the requirements environmental protection. It is in this context that possible implementation means are examined hereunder for the various domains subject to this consultation.

Product design, manufacture and maintenance

40. The EASA system is already well established for product design approvals. This includes the issuing of implementing rules (Part-21) and certification specifications (CS-34¹⁹ and CS-36²⁰) to further describe what is awaited from the applicant to meet the essential requirements, and certification by the Agency. Verification of the compliance of each individual example of a product with the EASA approved design is the responsibility of National Aviation Authorities, which issue noise certificates. In principle there should be no change to these implementation means.
41. However, as the essential requirements suggested here above are of a different nature than the ICAO Standards referred to in the current Article 6 of the Basic Regulation, it

¹⁹ Decision no. 2003/3/RM of the executive director of the Agency of 17 October 2003 on certification specifications providing for acceptable means of compliance for aircraft engine emissions and fuel venting (« CS-34 »)

²⁰ Decision no. 2003/4/RM of the executive director of the Agency of 17 October 2003 on certification specifications providing for acceptable means of compliance for aircraft noise (« CS-36 »). Decision last amended by decision no 2007/007/R of the executive director of the European aviation safety agency of 02 April 2007

will be necessary to further elaborate the content of Part-21 to specify the quantified limits contained in Annex 16 and develop Community requirements for products not covered by this Annex; conversely adjustments to CS-34 and CS-36 will have to provide for full transposition of Annex 16 in consistency with the revised Part-21.

42. When doing so the opportunity should be taken to review some provisions of the Basic Regulation. This affects the provisions of Article 5 related to the issuing of type-certificates, restricted type-certificates and permits to fly, as well as those of Article 20 related to the role of the Agency in issuing certification bases and noise certificates
43. It is not clear from the current text of Article 5 of the Basic Regulation that a product must meet the appropriate environmental requirements. The requirement for a type certificate is introduced under the header "Airworthiness", and Article 5 does not refer to the environmental requirements, thus suggesting that only compliance with the airworthiness requirement is sufficient for the issuance of a type certificate; this is clearly not the case as reflected in Part-21. For the sake of clarity and legal certainty, compliance with environmental requirements should be introduced in Article 5 as condition for the issuing of type-certificates and restricted type-certificates. For the same reasons, Article 20 should clarify that the certification basis must include the applicable environmental protection requirements.
44. The current provisions related to the issuing of permits to fly do not allow exempting from the environmental protection requirements for products. This is clearly unpractical, as there are many cases where it is necessary and, with appropriate limitations, possible to do so. Therefore, Article 5 should be modified to clarify what environmental requirements are needed for the issuing of permits to fly and provide for an appropriate flexibility when doing so.
45. The current drafting of Article 20(1)(h) is ambiguous and has been interpreted by some to mean that noise certificates for individual aircraft should be issued by the Agency. As rightly reflected in Part-21, the intent of Article 20(1)(h) was to specify that the role of the Agency is to determine the noise certification levels for aircraft designs and to issue Type Certificate Data Sheets for Noise as part of the Type Certificate. For the sake of clarity and legal certainty the text of Article 20(1)(h) should be revised accordingly.
46. Until now the environmental aspect of production and maintenance (including repair) of aircraft is not regulated at Community level. It was generally considered that the system in place for regulating safety was sufficient to provide compliance with environmental requirements. This is, however, not clearly specified in the obligations of the involved organisations, nor part of their approval process. This should be better reflected in the provisions of Article 5 related to these organisations.
47. Paragraph 20 here above explains the work undertaken by the Agency to better adapt the regulatory framework to the needs of General Aviation. When doing so the Agency envisaged that some certification tasks for aircraft below 2000 kg would be executed by the industry itself, through accredited assessment bodies, including federations of aircraft owners and trade associations, as this is currently done in several Member States and in the United States of America for light sport aircraft. This would likely further reduce the administrative burden for the certification of aircraft. Such an option, however, was not pursued because it required the change of the Basic Regulation and could not provide for a short term solution sought for by the Agency and industry. As the expected benefit of that option would be particularly relevant for the assessment of conformity of aircraft below 2000 kg with environmental protection requirements, the opportunity of the present rulemaking activity could be taken to make the necessary changes to the Basic Regulation to establish such assessment bodies and to define the criteria for their accreditation²¹. As their activities would be in the field of design, it seems legitimate that accreditation be done by the Agency itself.

²¹ It shall be noted that the Basic Regulation includes in its Annex V criteria for the accreditation of qualified entities that are also fully valid for the accreditation of assessment bodies.

Question 5

The Agency is interested to know whether stakeholders agree that powers should be given to assessment bodies to verify that aircraft below 2000 kg comply with the environmental requirements and to issue the related approvals. Conversely do stakeholders agree that accreditation of such assessment bodies should be done by the Agency?

Aerodromes

48. The design of aerodromes, aerodrome related equipment, operational procedures and aerodrome management will be subject to detailed rules implementing the safety essential requirements. It would seem logical to complement them to implement the environmental protection requirements at the same time. Thus, where aerodromes or aerodrome operators are subject to certification, the necessary demonstration of compliance would include the environmental aspects, avoiding costly multiple certification processes. As for safety aspects, Member States' competent authorities would be responsible for the oversight of the regulations, the role of the Agency being limited to standardisation and rulemaking. When developing the related implementing rules, due consideration will need to be given to subsidiarity so as to allow Member States adapting such rules to their local needs and peculiarities under proper Community control.

Air traffic management (ATM) and air navigation services(ANS)

49. The high level of the proposed environmental protection essential requirements for ATM and ANS does not give enough detail to provide for direct implementation by airspace users and service providers. Such detail should therefore be developed in implementing rules. As in the previous cases, the related requirements could be integrated in the implementing system for safety and subject to the same implementation means so as to avoid duplication of processes and overlap of responsibilities. When developing the related implementing rules, due consideration will need to be given to subsidiarity so as to allow Member States adapting such rules to their local needs and peculiarities under proper Community control.

Air operations

50. Aircraft operations will be subject to detailed rules implementing the safety essential requirements. It would seem logical to complement them to implement the environmental protection requirements at the same time. Thus, where air operators are subject to certification/oversight, the necessary demonstration of compliance would include environmental aspects. As the Basic Regulation covers also third country operators (operating into, within or out of the Community), they will be subject to the same environmental rules that the European operators without prejudice to the right and obligations of Contracting States under the Chicago Convention.

Environmental awareness of persons active in the aviation system

51. Paragraph 28 concluded that environmental knowledge should become part of the licensing requirements of pilots, air traffic controllers and maintenance engineers. Establishing a dedicated licensing scheme would seem, however, disproportionate. For pragmatic reasons knowledge requirements for environmental purposes should instead take the form of additional knowledge requirements for personnel subject to licensing for safety reasons. Organisations involved in the training of these personnel should be required to demonstrate, as part of their approval process, that they employ appropriately qualified training staff.
52. The same paragraph also suggested that other personnel whose activities may affect the environmental impact of civil aviation should possess an appropriate environmental knowledge. As no licensing schemes have been established for these personnel, the related requirement for environmental knowledge should be imposed, through common rules on professional competence schemes, on organisations employing them and part of their approval process when such a process exists.

Operating restrictions

53. If, as suggested in question 3, it were decided to use the EASA system to regulate operating restrictions, it would seem here again appropriate to use the safety implementing rules applicable to air operators, aerodromes, aerodrome operators and ANS providers to also implement the environmental essential requirements related to such restrictions. As already mentioned in paragraph 30, such implementing rules should include nevertheless the necessary level of subsidiarity to allow Member States deciding themselves where and what operational restrictions shall apply. Using then the implementation means designed for safety would ensure the proper enforcement of such decisions in a uniform and efficient manner.

Functions of the Agency

54. When considering the text of the Basic Regulation, in particular its Article 17, it seems that safety was mainly driving its drafting while environmental protection only appeared as a second class objective. This impression has to be corrected as the intention of the legislator was that the Agency should also ensure the proper functioning and development of all areas of the aviation system that are within its competence, and not just the safety aspects. Article 17 needs therefore some re-draft to also reflect environmental protection.

B. Draft Essential Requirements

I. Description of the essential requirements²²

Introduction

1. Aviation environmental protection essential requirements are the conditions to be fulfilled by a product, an infrastructure, a person or an organisation acting in the aviation system to mitigate all significant harmful effects from their operations or activities to the environment or human health and welfare. Adverse environmental effects can either be caused directly by the effect of noise and emissions or indirectly, such as through climate change. A high level of protection of the environment and human health and general improvement in the environment and quality of life is one of the aims of the 6th Community Environment Action Programme as published with Decision No 1600/2002/EC²³.
2. The essential requirements address therefore the various approaches by which the system's environmental impact can and shall be eliminated or reduced to an acceptable level. In that context it must be made clear that certification processes are not mitigating measures; they are the verification that a mitigating measure is being implemented. As far as mitigating measures are concerned, it is also important to insist that they must be proportionate to the environmental objective. Proportionate means that the measures must not go beyond what is necessary to achieve the expected environmental benefit, and should not create undue restrictions that are not justified by their objective.
3. The essential requirements take into account the human sensitivity to noise and emissions. This means that the requirements for noise during the night must be different from those during daytime; this also means that they must take into account that human ear is more sensitive to certain frequencies and to sound with a tonal character. For emissions, this is reflected in the different ambient air quality limits for various emissions species.
4. The essential requirements have been drafted with the view to allow alternative implementation means, which could vary depending on the type of approach and the part of the aviation system that is addressed. It would be possible, therefore, to develop implementing rules based on material developed by ICAO or to build on other forms of regulation.
5. Within the envisaged scope for the EASA system, adverse environmental effects can be caused in several ways:
 - i) Inappropriate product design, production or maintenance
 - ii) Inappropriate design, including arrival and departure procedures, or operation of an aerodrome
 - iii) Inappropriate air traffic management or air navigation service
 - iv) Inappropriate use of aircraft
 - v) Lack of proper awareness of environmental impact of those acting in the system
 - vi) Operation of inappropriate aircraft

In the following paragraphs, various mitigation means addressing these are proposed.

²² For information purposes only.

²³ Decision (EC) No 1600/2002 of the European Parliament and of the Council of 22 July 2002 laying down the Sixth Community Environment Action Programme (OJ L 242, 10.9.2002, p. 1).

Product design, manufacture and maintenance

6. The designer has a significant influence on the noise and emissions generated during the aircraft's operational lifetime. Designing as quiet and clean as possible has been a cornerstone of all policies to reduce aviation's environmental impact, and has indeed led to significant reductions of noise and emissions at the source. If the design is not optimised, this has a subsequent impact at the local, regional and global scale. This is addressed in paragraph 1 of the listing of the essential requirements (see section II below).
7. For jet and turbine engines this includes shaping the rotating engine parts such that noise is minimized, as well as optimizing the number of blades and spacing of the fan and turbine with respect to the static elements in the engine. Propellers should also be designed for low noise, optimizing the number of blades and the blade form to minimise the noise. It is particularly important to prevent supersonic speeds of the blade tips. In designing helicopters similar considerations apply for the main and, if applicable, tail rotor.
8. The combustor, the compressor and the turbine should also be designed for low noise. For jet engines it is of importance to reduce the velocity and temperature of the jet exiting the engine by maximising the bypass ratio (BPR), the ratio of the air going around the engine and the air going through the core. Increasing BPR leads to lower overall velocities and temperature of the jet. All these elements are addressed at a high level in 1.a.1.
9. In addition to this it is important to absorb and shield the noise from the aircraft and engine as much as possible, using acoustic liners inside the engine ducts and other techniques that prevent the noise from radiating from the engine. In piston engines, the air intake and exhaust should be equipped with mufflers when appropriate. This is addressed in 1.a.2.
10. Airframe noise is the noise from air flowing at high speed over the airframe but also through and over landing gear, flaps and slats and landing lights. Since modern engines have become quieter, the noise from the airframe has become increasingly significant and cannot be ignored. This aspect is covered in 1.a.3.
11. Regarding emissions it is important to be clear about which species are considered. When doing so, only those species that are universally recognised as having a demonstrated detrimental effect on the environment have been taken into account. They are listed in paragraph 1.b. If and when further scientific evidence shows that other species need to be controlled, proper adjustments of the essential requirements will have to be made.
12. Paragraphs 1.c and 1.d address the design of the power plant, especially the combustor, which plays a major role in the overall aircraft emissions performance. The combustor is optimized taking into account geometry and size, fuel flow, core flow, temperature, pressure and the mixture and distribution of fuel and air. All of these parameters have to be traded carefully against one another in order to identify the optimum fuel burn performance which mitigates various emissions species (e.g. NO_x and CO₂) across a range of operating conditions. The individual efficiencies of all other engine components (e.g. propeller, intake, compressor, turbine and nozzle) are also maximised, thereby reducing specific fuel consumption and overall emissions. Paragraph 1.c addresses in particular the trade-off between designing for low fuel consumption and for low emissions.
13. Often a design change that affects noise will also affect the emissions of the aircraft and measures to mitigate one emission species can affect other emissions. It is thus important to take into account such trade-offs as well, which is what is specified in paragraph 1.d.
14. Airframes' design characteristics such as aerodynamics, lift and drag, weight and operational design points (range, top of climb, cruise altitude and Mach number)

influence the required thrust from the power plant. A light weight structure and good aerodynamics, which reduce drag and improve performance, enable the aircraft to quickly take off and climb away from noise sensitive areas. It also requires less thrust from the power plant contributing to significant reductions in an aircraft's noise and exhaust emissions. This is why in 1.e an optimized aerodynamic performance is listed as an essential requirement.

15. Paragraph 1.f addresses that the designer should concentrate efforts on those operating conditions where indeed the noise of the aircraft is perceived as problematic. For noise, the post take-off and the pre-landing phase are most important. For most aircraft cruise at high altitude does not need to be considered, the noteworthy exception of course being supersonic aircraft, where the sonic boom, a special case of airframe noise, can be very significant. As the human ear is more sensitive to certain noise frequencies and also particularly sensitive to tonal content, a good design will avoid those and thus minimize the perceived noise. For emissions both the standard Landing and Take-Off (LTO) cycle and the cruise phase are important. What is problematic depends on the character and place of deposition of the emissions.
16. All of these aspects are currently addressed directly or indirectly in Annex 16 of the Chicago Convention. The noise standards of Annex 16, Volume I cover the design aspects by setting limits to the maximum noise from the aircraft when flying procedures that are relevant to day to day operation. The noise is measured in units that take into account human sensitivity and include measuring conditions that take into account the aerodynamic performance of the aircraft. Compliance with the ICAO Annex 16, Volume II emissions certification requirements is performed during the engine type certification based on a standard LTO cycle. Although it does not directly take into account the engine emissions in cruise, a recent study concluded that for current technology, reductions in LTO emissions resulted in corresponding reductions in aircraft emissions during cruise conditions. It can thus be concluded that these essential requirements are in line with Annex 16.
17. Besides the specific environmental parameters addressed above, it is important to create several more general requirements. This is necessary as many aspects of the regulation and control for environmental protection will make use of principles, mechanisms and procedures that are very similar to those established for safety regulation. In order to extend these mechanisms with legal certainty such essential elements are included when deemed necessary. In those cases where the requirements for safety will always be sufficient to cover the environmental domain they have not been repeated. Examples of the latter are requirements for the manoeuvrability or for structural strength.
18. In paragraph 1.g.1, a requirement is introduced that no aircraft may have design features or details that are particularly harmful to the environment. This requirement safeguards that the legal basis is available when needed, in analogy to a similar safety requirement in Annex 1 of the Basic Regulation.
19. In recent years, more and more elements of an aircraft design have no safety function but are there purely for environmental protection reasons. This tendency is increasing and the complexity of such systems also appears to be increasing. This is why it is necessary to ensure the reliability of such elements, which is the objective of paragraph 1.h.
20. Similarly, information provided for the sole reason of environmental protection must meet the same requirements for clarity as is required for safety related information, which is provided in paragraph 1.i. In the same vein, any matters like establishing periodic maintenance intervals, inspections and related manuals are addressed in paragraph 1.i.
21. As for safety, there is an important role for the organisations and any subcontractors involved in design, production and maintenance with respect to environmental issues that are not already covered under the general provisions. This is why specific requirements are made explicit in paragraphs 1.j and 1.k.

Aerodromes

22. When designing an aerodrome the environmental aspects are very important. Runway configuration and in particular runway direction have a significant impact on where noise and emissions will be directed. Distance between aerodrome related activities and residential areas must also be taken into account. This is covered in paragraph 2.a.
23. The operator of an aerodrome has a responsibility to use the aerodrome in the most environmentally friendly way. For instance he should, when possible, minimize engine running time on the ground and use runways that cause minimum environmental nuisance. This is the objective of paragraph 2.b.
24. Most of the environmental problems around aerodromes are caused by the aircraft movements in and out of aerodromes, as in these phases of flight aircraft operate at low level and often in conditions and configurations that result in increased noise and emissions. Examples are the take-off condition where high power is used, and the approach where the aircraft is flying low and in a high drag configuration for landing. It is thus important and desirable to design the related procedures as quiet and clean as possible, as envisaged in paragraph 2.c. This includes new navigation techniques allowing more flexibility in trajectories. This paragraph also provides the basis for any measures to minimize the environmental impact based on the environmental characteristics of the aircraft and/or the distance to the aerodrome.
25. As for product design, it is important to establish general requirements for environmental protection purposes in line with the framework of the safety regulations. This is addressed in paragraphs 2.d through 2.j.
26. When aerodromes have equipment that is of importance for the particular purpose of environmental protection it is important that this will be reliably available. This is called in via paragraph 2.d. Paragraph 2.e has the objective to make sure that all data needed is available and provided. Examples are publications about minimum noise operating procedures and noise curfews, which of course must be clear to operators that intend to use the aerodrome.
27. Where the aerodrome operator has an important role and responsibility to operate the aerodrome in an environmentally compatible way it is important that he also has the means needed for this. This is the subject of paragraph 2.f. The operator is also responsible to verify that any measures taken at his aerodrome are indeed complied with. If this is not the case, corrective action must be taken and communicated to the users of the aerodrome. This is the subject of paragraph 2.g.
28. Where the aerodrome operator interfaces with other organisations for activities that involve environmental protection it is important to create an explicit transfer of responsibility in that area, which is the subject of paragraph 2.h.
29. Paragraph 2.i is a general requirement aimed to create legal basis for measures preventing unacceptable environmental effects of the aerodrome operation. As an example the location of an area for pre-flight engine run-ups close to residential housing, or the use of operational procedures involving fuel or oil discharges that would contaminate the environment could be prevented invoking this paragraph.
30. Paragraph 2.j is to create a clear legal basis for prohibiting any use of the aerodrome for which it was not intended and designed from an environmental protection perspective. As such it is not a duplication of a similar requirement in the proposed Aerodrome related essential requirements as these address safety only. It also creates a clear responsibility on the operator for judging when this would be the case.

Air traffic management and air navigation services

31. The Air traffic management/air navigation services (ATM/ANS) functions and services have an important role in reducing noise and emissions as much as possible. This is why this aspect is mentioned in paragraph 3.a.
32. Paragraph 3.a.1 focuses on the design and use of the airspace structures, as these can have a significant effect on the environmental effects of aviation activities. It is extremely important that the ATM/ANS system is able to support and facilitate operational measures aimed at reducing noise and emissions. In particular, challenging but effective techniques such as Continuous Descent Approach (CDA) are only possible if the ATM system is designed to be able to cope with them. Another example is the location and use of holding areas, which has obvious effects on both noise perceived on the ground as well as the amount of emissions created by aviation.
33. Paragraph 3.a.2 addresses the importance of taking into account all data needs and effective data exchange in and with the ATM system for environmental reasons. Decision makers, such as flight dispatchers, aerodrome operators, pilots and air traffic controllers, must have the necessary information. This is often provided by the aeronautical information services (AIS) and it is likely that the importance of this information will increase in future and will go beyond what is already provided for safety reasons. An example is the possible provision of data to the flight management system on the location of noise sensitive areas, which can then be used to optimize departure procedures. On top of that, the ATM system is probably the most important source of information needed for more wider uses, such as policy making, impact analysis or provision of information to the general public and, last but not least, for enforcement.
34. Paragraph 3.a.3 creates the basis for capacity management for environmental reasons, which is of course crucial in any situation where the total capacity of a (sub) system is constrained or coordinated for environmental reasons. A significant environmental benefit from an efficient ATM system is the reduction in fuel burned, emissions and subsequent environmental impact. Optimum flight paths should be available to operators, and if demand is too high to handle the traffic in an environmentally compatible way, the concept of operations as described in NPA No. 2007-16 should be available as a control tool. Also, future real time collaborative decision-making may help identify environmental risks associated with air traffic operating in certain regions of the atmosphere with specific local meteorological conditions, and the implementation of appropriate mitigation measures. The balanced consideration of the environmental impact stemming from the ground side (e.g. transportation modes used to access the aerodrome) will be covered by more general EU or local legislation on environmental impact and not through rules in the EASA system.
35. Paragraphs from 3.b to 3.f establish the general requirement to operate in accordance with the essential requirements in analogy with the similar requirements for safety. They address the general obligation to adhere to the essential requirements (3.b), to make sure that all equipment needed is on board and used (3.c), conditions on the quality, timeliness of data (3.d) tools and resources for compliance by organisations (3.e) and any subcontractors (3.f). Note that paragraph 3.e also obliges ANS providers to make data available when required for environmental monitoring by appropriate entities.

Air operations

36. A further important method to minimize noise and emissions from aviation are operational measures to ensure that the aircraft operate as quietly as possible and with minimum emissions. These can be for example the optimization of execution of flights from environmental perspective in terms of routing or fuel management. This is the objective of paragraph 4..
37. First of all, the responsibility and authority of the pilot in command for operating the aircraft in accordance with environmental rules and regulations is established in

paragraph 4.a.1. Also a high level requirement ensuring mitigation of environmental risk due to the transport of articles or substance that are extremely dangerous are provided in 4.a.2.

38. In addition, it is clear that no flight should be commenced if it could not be executed in accordance with environmental requirements or if the necessary means to that end would not be available (4.b.1), nor if the aircraft would not be equipped and certified properly (4.b.2). Although it is rare today, it is not impossible that in future certain aerodromes or flight levels could only be used if the meteorological conditions are favourable. If so the meteorological conditions must be verified (4.b.3).
39. Paragraph 4.c.1 and 4.c.2 establish the general obligation to execute the flight in an environmentally compatible manner.
40. Paragraphs 4.d. provides the requirements for operation within operating limitations. It imposes the obligation to execute the flight in accordance with the environmental documentation (such as the noise certificate), but also in accordance with all limitations in the AFM that are of importance for environmental protection reasons, such as operating speeds, flap limitations and maximum take-off and landing masses. No specific requirements for aircraft performance are set as it is assumed that the requirements for safety will cover any environmental needs.
41. Paragraph 4.e.1 imposes the proper equipment and instrumentation. An example could be advanced flight management systems enabling the aircraft to execute particular quiet take-offs or approaches if these would be conditional for use of a particular aerodrome. An example of the information required in 4.e.2# is the information needed to perform the applicable minimum noise departure procedures.
42. The continued environmental compatibility is the analogy of similar requirements on continued airworthiness and is addressed in paragraphs 4.f.1 through 4.f.5. These ensure that environmental issues should be taken into account in the pre-flight checks and also require a maintenance programme such that the aircraft remains in the conditions needed to conform to the original design. Examples could be the inspection and replacement of mufflers or acoustic liners, as part of the maintenance schedule if these deteriorate or can be damaged in normal operation.

Environmental awareness of persons active in the aviation system

43. It is fully recognised that safe operations within the aviation system requires knowledgeable and well trained people with all practical skills needed to fly the aircraft in a safe way. This principle also holds for noise and emissions reduction. It is not considered necessary to require additional special skills to fly the aircraft in an environmental compatible way. Any manoeuvres of the aircraft needed for environmental protection reasons should require piloting skills that are within the competency of the pilot and consistent with the need to operate the aircraft safely. For this reason no specific skill requirements are included in here. The same reasoning is followed with respect to medical fitness.
44. On the knowledge side, however, some additional areas of knowledge are considered necessary. Ignorance or misunderstanding of environmental aspects may cause unnecessary nuisance that should be prevented where possible. Understanding the sources of noise and emissions, their propagation and environmental impact, ultimately helps the mitigation of environmental problems. As an example, decisions taken by pilots can significantly affect the noise on the ground, and thus it is logical to require that pilots have an understanding of how their behaviour influences this. For this reason theoretical knowledge requirements are included. Maintenance personnel and air traffic controllers should also have sufficient knowledge of noise and emissions issues to understand their role and responsibilities in the system. This is the objective of paragraphs 5.a.1 to 5.a.4.

45. Paragraph 5.b. ensures that such knowledge will be verified as necessary using practices and procedures similar to those used for safety related knowledge.
46. Such knowledge will in most cases be provided and assessed by training organisations, instructors and assessors. It is evident that they must have the necessary knowledge and means to do this, as provided for in paragraph 5.c.

Operating restrictions

47. In certain cases the best method to prevent, limit or reduce the adverse environmental impact is to restrict certain operations. These restrictions can take several forms, which are addressed in the subsections of paragraph 6. Paragraph 6.a.1 could for instance be the basis for increasing minimum flight altitudes (higher than those needed for safety) to reduce fly-over noise or for excluding of flight levels where meteorological conditions would lead to formation of cirrus if these are shown to be problematic. Another example of an operating restriction is the prohibition of flights over quiet areas, established in particular to safeguard tranquil rural areas. (6.a.2). The phase-out of old technology aircraft, the prohibition of supersonic flight or the establishment of night curfews are examples of the operating restrictions addressed in paragraphs 6.a.3, 6.a.4 and 6.a.5 respectively. Often combinations of several of these aspects will be used, for instance to reduce the annoyance from banner towing. One could consider this could be restricted during the weekend, above certain cities, with noisy aircraft and below certain altitudes.

II. Essential Requirements

1. Product design, manufacture and maintenance

- 1.a. Aviation products must be designed to be as quiet as possible. The design must include at least the following elements:
 - 1.a.1. Minimization of the noise generated by the primary process of generating thrust and/or lift by the power plant.
 - 1.a.2. The application of absorbing elements, shielding elements or other noise control systems to reduce the noise radiated from the aircraft and power plant.
 - 1.a.3. Reduction of the noise generated by the air flow interacting with the airframe of the aircraft.
- 1.b. The following emissions species shall be mitigated as much as possible:
 - 1.b.1. Nitrous Oxides NO_x (Nitrogen Dioxide NO₂ and Nitric Oxide NO).
 - 1.b.2. Carbon Monoxide (CO).
 - 1.b.3. Unburned Hydrocarbons (UHC).
 - 1.b.4. Smoke.
- 1.c. Features of power plants intended to minimise specific fuel consumption, such as staged fuel management systems and combustor architecture which reduces cooling air requirements and residence times, must be designed in such a way to minimise trade-offs in the production of emissions species.
- 1.d. Any trade-offs between design measures for different emissions species, and between noise and emissions, must be taken into account.
- 1.e. The aircraft aerodynamic performance must be optimized taking into account noise and emissions.
- 1.f. The total range of normal operating conditions, and areas where the aircraft noise and emissions are of concern, shall be considered when minimising noise and emissions.
- 1.g. An aviation product must not have design features or details that are particularly harmful to the environment.
- 1.h. The aircraft systems, equipment and associated appliances installed for environmental protection reasons must be designed, produced and maintained to function as intended under any foreseeable operating condition throughout the relevant operational envelope of the aircraft and their reliability must be adequate in relation to their intended effect on the environmental compatibility of the product.
- 1.i. Any instructions, procedures, means, manuals, limitations and inspections needed to ensure continuing compliance of an aviation product with these requirements for environmental protection must be established and provided to the intended users in a clear unambiguous manner.
- 1.j. The organisations involved in design, production and maintenance of aviation products must have all means necessary to ensure compliance of an aviation product with these requirements for environmental protection.
- 1.k. Such organisations must establish arrangements with other relevant organisations as necessary to ensure compliance of an aviation product with these requirements for environmental protection.

2. Aerodromes²⁴

- 2.a. The design of an aerodrome movement area and other operating areas must be such that noise and emissions from its aviation activities are minimized as much as possible.
- 2.b. Aerodromes must be equipped and operated in a way that minimizes noise and emissions from its aviation activities as much as possible and at least in accordance with operational requirements established for environmental protection.
- 2.c. Landing and departure procedures must be designed in a way that minimizes as possible noise and emissions from aircraft operations around aerodromes. This will include area navigation, management of thrust, flaps, speed, altitude and track over the ground or the use of specific operational procedures based on the aircraft type's environmental characteristics and the environment of the aerodrome.
- 2.d. Under operating conditions, or in case of failure, aerodrome equipment and aids must provide all functionality needed for reduction of noise and emissions and their reliability and protection from disturbance or damage must be adequate with respect to their intended function.
- 2.e. Data needed for reduction of noise and emissions from aviation activities related to the aerodrome must be established and kept current. It shall be accurate, readable, complete and unambiguous. It must be made available in a timely manner, using a sufficiently secure, incorruptible and expeditious method of communication with the user.
- 2.f. The aerodrome operator must have directly or through contracts all means necessary to sustain the operation of the aerodrome in accordance with measures or procedures aimed at noise and emissions reduction and must aim for continuous and proactive reduction of noise and emissions from the aerodrome's aviation activities.
- 2.g. The aerodrome operator must verify that the requirements of this section are complied with at all times or take appropriate measures to mitigate the effects of any non compliance. Procedures must be established and applied to make all users aware of such measures in a timely manner.
- 2.h. The aerodrome operator must establish arrangements with other relevant organisations to ensure compliance with these requirements for environmental protection.
- 2.i. An aerodrome and its aviation activities may not constitute or create any particular unacceptable risk for, or damage to, the environment.
- 2.j. Except for aircraft emergency situations, when diverting to an alternate aerodrome, or under other conditions specified in each case, an aerodrome or parts thereof must not be used by aircraft for which the aerodrome design and operating procedures are not normally intended, without the consent of the aerodrome operator.

3. Air traffic management and air navigation services²⁵

- 3.a. Air traffic management and air navigation services must promote and enable the mitigation of the effects of noise and emissions from aviation to the maximum extent possible. This must include at least the following elements:

²⁴ The proposed essential requirements related to aerodromes are based on the current state of affairs with respect to the extension of the Agency's remit to aerodromes. Changes incurred in the rulemaking process may affect these proposals.

²⁵ The proposed essential requirements related to air traffic management and Air Navigation Services are based on the current state of affairs with respect to the extension of the Agency's remit in this area. Changes incurred in the further rulemaking process may affect these proposals.

- 3.a.1. To take into account the minimization of noise and emissions when designing and using airspace structure, air traffic management procedures and air space management procedures.
- 3.a.2. Where possible, to provide actors inside and outside the ATM/ANS system with all information and data that will enable them to take noise and emissions mitigation into account in their actions.
- 3.a.3. To ensure that where appropriate a maximum environmental airspace capacity is defined, if necessary according to type of operations, and that this is not exceeded.
- 3.b. All aircraft, in all phases of flight or on the movement area of an aerodrome shall be operated in accordance with common general operating rules and any procedure specified for the use of that airspace in accordance with these essential requirements.
- 3.c. All aircraft must be equipped with all suitable appliances required by these essential requirements and operated accordingly. Appliances, for their use in the ATM/ANS system, are considered as constituents and shall also comply with the related essential requirements.
- 3.d. Air navigation services must provide and use aeronautical, meteorological, surveillance and air traffic flow management information that is needed for purposes of environmental protection, of adequate quality and provide it in a timely manner, using a sufficiently secure, incorruptible and expeditious method of communication with the user.
- 3.e. Service providers must have all means necessary to ensure compliance of their services with these requirements for environmental protection. This includes, but is not limited to, systems and constituents, facilities, management structure, personnel, equipment and its maintenance, documentation of tasks, responsibilities and procedures, access to relevant data and record keeping.
- 3.f. Such organisations must establish arrangements with other relevant organisations as necessary to ensure compliance of their services with these requirements for environmental protection.

4. Air operations

4.a. General

- 4.a.1. The pilot in command must be responsible for the operation of the aircraft in accordance with measures or procedures aimed at noise and emissions reduction, including but not limited to those specified in the flight manual, or where required the operations manual. The pilot in command must have the authority to give all commands and take any appropriate actions for the purpose of securing the operation in an environmentally compatible way.
- 4.a.2. Articles or substances, which are capable of posing a significant risk to the environment, such as radioactive material or poisonous material must not be carried on any aircraft, unless specific procedures and instructions are applied to mitigate the related risks.

4.b. Flight preparation

- 4.b.1. A flight must not be commenced unless it has been ascertained by every reasonable means available that adequate facilities, directly required for the operation of the aircraft in an environmentally compatible way, are available for the execution of the flight, including communication facilities and navigational aids, taking into account available aeronautical information service documentation.

- 4.b.2. The pilot in command must be satisfied that the aircraft meets the applicable environmental protection requirements, that the appropriate environmental certificates are on board the aircraft, that all instruments and equipment required for the execution of the flight in accordance with environmental protection requirements are installed and are operative, unless waived by the applicable MEL or equivalent document, and that the aircraft operating limits related to environmental protection will not be exceeded at any time during the flight.
- 4.b.3. The meteorological conditions for departure, destination and, where applicable, alternate aerodromes, as well as en route conditions, must be such that the aircraft can be operated within any restrictions imposed for environmental protection.
- 4.c. Flight operation
 - 4.c.1. Aircraft must be operated in a way that minimizes as much as possible the impact of its noise, its emissions and any subsequent environmental impacts. The operation must at least be in accordance with operational requirements established for environmental protection. This may include the use of specific operational procedures based on the aircraft environmental characteristics.
 - 4.c.2. A flight must not be continued unless known conditions continue to be at least equivalent to those in point 4.b
- 4.d. Aircraft operating limitations
 - 4.d.1. An aircraft must be operated in accordance with all operating procedures and limitations as expressed in its approved flight manual that are relevant for environmental protection and in accordance with applicable environmental documentation. The relevant parts of the AFM or equivalent documentation and the environmental documentation must be available to the crew and kept up to date for each aircraft.
- 4.e. Instruments, data and equipment
 - 4.e.1. An aircraft must be equipped with all navigation, communication and other equipment necessary for executing the intended flight in accordance with requirements for environmental protection, taking account of related air traffic regulations and rules of the air applicable during any phase of the flight.
 - 4.e.2. All data necessary to this end for the execution of the flight by the crew must be updated and available on board the aircraft taking account related applicable air traffic regulations, rules of the air, flight altitudes and routes/areas of operation.
- 4.f. Continuing environmental compatibility
 - 4.f.1. The aircraft must not be operated unless:
 - i The aircraft complies with the applicable environmental protection requirements;
 - ii any applicable environmental document of the aircraft is valid; and
 - iii the maintenance of the aircraft is performed in accordance with its maintenance programme.
 - 4.f.2. Before each flight or consistent series of consecutive flights, the aircraft must be inspected, through a pre-flight check, to determine whether, from an environmental protection perspective, it is fit for the intended flight.
 - 4.f.3. The maintenance programme must contain in particular maintenance tasks and intervals, especially those that have been specified as mandatory in the

instructions for continuing compliance with the environmental protection requirements.

- 4.f.4. The aircraft must not be operated unless it is maintained and released to service by persons or organisations qualified for these tasks.
- 4.f.5. All modifications and repairs must comply with the essential requirements for environmental protection. The substantiating data supporting compliance with the requirements for environmental protection requirements must be retained.

5. Environmental awareness of persons active in the aviation system

- 5.a. Persons active in the aviation system whose actions can have a significant effect on the noise exposure on the ground, the quantity of the emissions emitted by aviation activities or the subsequent environmental impact, shall have sufficient knowledge of these aspects to enable them to take these into account within their roles. To this end, they must acquire and maintain at least the following theoretical knowledge:
 - 5.a.1. General understanding of aviation noise generation and propagation.
 - 5.a.2. General understanding of effects of aviation noise on human health and welfare.
 - 5.a.3. General understanding of aviation emissions sources and environmental impacts of aviation emissions.
 - 5.a.4. Knowledge of their personal role and responsibility in minimizing noise and emissions from aviation.
- 5.b. The knowledge must be demonstrated by continuous assessment during training, and where appropriate by examinations. An appropriate level of competence in knowledge must be maintained and demonstrated by regular assessments, examinations, tests or checks. The frequency of those must be proportionate to the significance the activities with respect to noise and emissions.
- 5.c. Organisations, instructors, examiners and assessors involved in training, examining and assessing the persons mentioned in 5.a must have the related necessary environmental knowledge and the means to teach or evaluate such knowledge.

6. Operating restrictions

- 6.a. When the combined implementation of the essential requirements prescribed here above do not provide for a sufficient mitigation of the impact of civil aviation on the environment or on human health and welfare, combinations of the following operating restrictions must be imposed as a whole or locally, without discrimination on the basis of nationality, taking into account the principles of subsidiarity and proportionality:
 - 6.a.1. limitation or prohibition of flight at certain altitudes
 - 6.a.2. limitation or prohibition of flights over certain areas
 - 6.a.3. limitation or prohibition of flights of certain aircraft
 - 6.a.4. limitation or prohibition of flights using certain operational procedures
 - 6.a.5. limitation or prohibition of flights at certain times.