

EUROCONTROL Specification for Collaborative Environmental Management (CEM)

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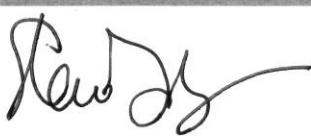
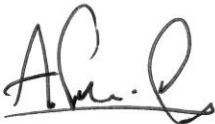
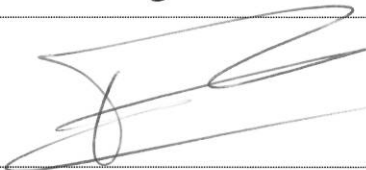
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Abstract			
This document is the EUROCONTROL Specification, developed under the EUROCONTROL Regulatory and Advisory Framework (ERAF), for Collaborative Environmental Management (CEM). The CEM Specification formalises collaboration among the core operational stakeholders at airports by setting out generic, high level requirements and recommended practices necessary to establish CEM working arrangements in a pragmatic protocol. CEM supports and benefits core operational stakeholders' common awareness and understanding of the interdependencies and constraints facing each other's business. This in turn can facilitate the development of shared environmental solutions, on which they can then collaborate in joint planning and implementation.			
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EXECUTIVE SUMMARY

Today Airport Operators, Air Navigation Service Providers (ANSPs) and Aircraft Operators are already investing significant effort in dealing with the environmental impacts resulting from their combined operations at and around airports. However, these impacts, in general noise and emissions, remain a significant constraining factor to efficient and sustainable operations.

Sustainable airport development is essential for improving European ATM capacity and flight efficiency. To facilitate and strengthen stakeholders' actions in this respect, and also to support the wider sustainable development of the aviation sector as a whole, this EUROCONTROL Specification for Collaborative Environmental Management (CEM) has been drafted together with them.

The CEM Specification formalises collaboration among the core operational stakeholders at airports by setting out generic, high level requirements and recommended practices necessary to establish CEM working arrangements in a pragmatic protocol.

CEM supports and benefits core operational stakeholders' common awareness and understanding of the interdependencies and constraints facing each other's business. This in turn can facilitate the development of shared environmental solutions, on which they can then collaborate in joint planning and implementation.

In addition, the CEM working arrangements facilitate a robust and transparent dialogue that benefits relations with National Regulators, local and regional authorities, land-use planning authorities, local communities (including Residents' Associations) and local businesses¹.

Furthermore, CEM can support stakeholders in respect of contributing to the realisation of the Single European Sky (SES) objective² on the sustainable development of the air transport system and improving the overall performance of air traffic management and air navigation services for air traffic in Europe, with a view to meeting the requirements of all airspace users.

CEM supports commitment both to regulatory and industry-led voluntary environmental impact reduction schemes.

EUROCONTROL Specifications have a voluntary status and are developed to support Member States and stakeholders. This specification may provide a possible means of compliance with certain requirements related to SES and aviation environment-related legislation.

¹ Non-exhaustive list and depends on local culture and circumstances

² Regulation EC No 549/2004 as amended by Regulation EC 1070/2009 Art.1 Objective and scope [1],[2]

1 INTRODUCTION

1.1 Context

This document is the EUROCONTROL Specification for Collaborative Environmental Management (CEM) at Airports. It has been developed in collaboration with stakeholders drawn from airport operators, aircraft operators, air navigation service providers, trade associations and interested parties. It recognises and builds upon the work already undertaken by the aviation sector to tackle environmental challenges.

It sets out a high level protocol that will support core operational stakeholders in their continued efforts to deal with environmental challenges at and around airports. More specifically, the protocol promotes a collaborative approach by formalising working arrangements between air navigation service providers³ (ANSP) (in particular, air traffic service providers (ATSPs)), airport operators and aircraft operators. For those stakeholders wishing to implement CEM working arrangements, Section 7 in this Specification sets out the requirements and recommended practices to enable this.

This Specification may also be used to facilitate compliance with certain requirements of:

- the Directive 2002/30/EC⁴ [3] of 26th March 2002 on the establishment of rules and procedures with regard to the introduction of noise-related operating restrictions at Community airports;
- the Directive 2002/49/EC [5] of 25th June 2002 relating to the assessment and management of environmental noise; and
- the Directive 2008/50/EC [6] of 21st May 2008 on ambient air quality and cleaner air for Europe.

In addition, it can support the Essential Requirements of the SES Interoperability Regulation⁵ [7], in particular the ‘sustainability and effectiveness of air navigation services’ and the ‘need to minimise environmental impact in accordance with Community legislation’.

Furthermore, the CEM protocol has been developed by EUROCONTROL in response to ESSIP⁶ objective ENV02⁷, which is recognised in the SESAR ATM Master Plan [8] as an enabler for environmentally optimising ATM systems at airports.

1.2 Maintenance of the Specification

This EUROCONTROL Specification has been developed under the EUROCONTROL Regulatory and Advisory Framework (ERAF) and is maintained by EUROCONTROL in accordance with this Framework.

³ In the context of this Specification the term ATSP is used; ‘air traffic services’ means the various flight information services, alerting services, air traffic advisory services and ATC services (area, approach and aerodrome control services)

⁴ Will be repealed with effect from 13 June 2016 by Regulation (EU) No 598/2014 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 April 2014 on the establishment of rules and procedures with regard to the introduction of noise-related operating restrictions at Union airports within a Balanced Approach [4]

⁵ Regulation (EC) No 552/2004 as amended by EC Regulation 1070/2009 – Annex II Essential Requirements - Part A: General requirements

⁶ European Single Sky ImPlementation <http://www.eurocontrol.int/articles/essip-report>

⁷ Stakeholder line of action ENV02-AGY01 of ESSIP Plan Edition 2012 (<http://www.eurocontrol.int/articles/endorsed-essip-plan>)

2 CONVENTIONS

EUROCONTROL Specifications are *voluntary in status*; however drafting conventions include ‘normative’ language to indicate which requirements must be complied with in order to claim compliance with the specification. Drafting conventions are used to indicate these requirements.

The following conventions are used in this EUROCONTROL Specification:

- a. **“Shall”** – indicates a statement of specification, the compliance with which is mandatory to achieve the implementation of this EUROCONTROL Specification.
- b. **“Should”** – indicates a recommendation or best practice, which may or may not be satisfied by all systems claiming conformity to this EUROCONTROL Specification.
- c. **“May”** – indicates an optional element.

Numbers within square brackets are used to identify reference documents listed in Section 8 e.g. [1] identifies the first document referenced in Section 8.

3 APPLICABILITY

This Specification on Collaborative Environmental Management is primarily targeted at the three core operational stakeholders at airports: Airport Operators; Aircraft Operators and Air Traffic Service Providers.

However, the CEM protocol also recognises that local working arrangements may include regulators as part of the core stakeholder group.

This Specification also addresses the relations with external stakeholders such as ground handling agents; local, regional and national authorities; local communities (including Residents’ Associations); local businesses; industry bodies; academia and the general public.

4 BACKGROUND

4.1 Social and Operational Constraints

Environmental sustainability is a pre-requisite for the aviation sector to grow. The improvement of European ATM capacity and flight efficiency also depends on the ability of aviation’s stakeholders to address their environmental impacts. There is, therefore, a much wider benefit to be achieved when addressing any constraints affecting sustainable airport development.

Many of these constraints relate to the environmental impacts arising from air traffic operations at and around airports. These are potentially the impact on the quality of life and health of local people (noise, local air quality) and the contribution to global climate change [9][10](greenhouse gas emissions).

Social and political pressures on airports are increasing in importance. With or without the anticipated growth in air traffic, mounting public concern and increasing regulations have made the management of these issues a critical priority for airport stakeholders.

For many years, operational stakeholders at airports have made significant efforts to address the environmental impacts that are caused by air traffic operations. Some of the most visible examples of these efforts can be seen in the work done together with local authorities and airport neighbours on securing their acceptance of an airport to operate and

grow in a sustainable manner (see Annex C for examples of collaboration).

It is vital to ensure that considering environmental impact becomes a part of the normal operational processes, in the same way as with safety. Thus, when operational stakeholders are working together, for example to improve operational efficiency or capacity, they should also work in partnership to understand and address the environmental impact of what is being proposed and, if necessary, jointly identify robust mitigation solutions that are acceptable to all parties. This is then captured in the management system of each stakeholder.

The CEM protocol has been developed:

- to focus on identifying the root causes of common environmental impacts;
- to further support awareness of business interdependencies among the core operational stakeholders; and
- to evaluate and manage potential solutions.

Furthermore, adoption of the protocol will facilitate the inclusion of relevant external stakeholders in CEM working arrangements and will ensure that the needs and concerns of local communities are taken into account.

4.2 Core Operational Stakeholders

4.2.1 Airport Operators

Up to 70% of medium to large airports across Europe are currently facing challenges to grow and/or capacity constraints for environmental reasons [11]. A higher number anticipate difficulties in securing planning approval to grow as a direct result of environmental concerns. Many airports are also facing increasing social and regulatory pressure when renewing environmental permits, the contents of which may lead to further limitations on airport capacity. The challenges facing larger airports are increasingly applicable to smaller ones due in part:

- to the decrease in public tolerance of environmental nuisance and potential health concerns; and
- to the growth of traffic during peak and off-peak hours.

Although numerous stakeholders operate at an airport, the public generally views the airport operator as the responsible entity for the environmental impacts. In many instances the airport operator also has legal responsibility for the airport's impact. Ultimately an airport will aim to maximise its sustainable development as a fixed asset.

4.2.2 Aircraft Operators

Aircraft operators are subject to important performance, economic and political pressures. One of their key objectives is to reduce fuel consumption as it contributes to lowering operating costs and reducing emissions and may contribute to lowering compliance costs with emissions-related market-based measures.

Operating restrictions and constraints to airport growth can have a negative impact on the competitiveness of aircraft operators; such measures hinder connectivity, increase operating costs, can cause delay and ultimately reduce operational flexibility thereby undermining customer satisfaction.

Collaboration and partnership with other airport stakeholders can be instrumental in improving an aircraft operator's performance, predictability and reducing operating costs. For example, avoiding track deviations after take-off can reduce the impact of operations - particularly on perceived noise levels, maintain the engagement and trust of local communities and obviate the need for more restrictive measures.

4.2.3 Air Traffic Service Providers

Air Traffic Service Providers (ATSPs) are responsible for the safe and expeditious movement of air traffic at and around airports. At the same time they can contribute to the redesign of improved arrival and departure routings and improvements to airport infrastructure and operational practise. Their expertise can also contribute to understanding the need for possible compromise between reducing aircraft noise (which may require extensions of flight tracks) whilst at the same time reducing fuel burn/emissions (which would imply shortening the flight tracks). See Section 4.3 on Interdependencies for more detail.

Improving the performance of air traffic at the airport (e.g. reduction in taxi times) and in the airspace in its immediate vicinity is best achieved through collaboration and partnership with the aircraft operators and the airport operator. Improved efficiencies can in turn contribute to a reduction in aircraft fuel usage and potentially noise, thereby achieving a more acceptable balance between environmental constraints and operational efficiency. In addition this can contribute to meeting the needs and concerns of local communities and local, regional and national authorities.

4.3 Interdependencies

Operational changes are often made on the basis of a wide range of strategic, economic, operational and impact-related information which are interdependent. Such interdependencies can be positive (synergies) or negative (trade-offs).

Issues of capacity, efficiency, safety, spatial planning and environmental impacts are often intertwined such that the true impact of an operational change may not be visible unless the relevant stakeholders are able to collaborate together. However, safety considerations will always remain the priority in any operational change.

Typically, a compromise or balance is required to ensure that a negative impact in one area does not outweigh the value of a positive impact in another area. However, positive and negative impacts may also be found between different aspects of the same impact area. Examples include (but are not limited to):

- Noise versus fuel burn/CO₂ emissions: The development of Noise Preferential Routes (NPRs) may reduce the population affected by noise but may increase fuel burn and CO₂ due to the additional track miles to be flown.
- Fuel burn/CO₂ emissions versus capacity: Optimizing the route structure to enable flights to fly closer to the user-preferred trajectory may result in a complicated route structure which has a negative impact upon capacity.
- Noise versus noise: The concentration of aircraft trajectories in a particular area due to advanced navigation performance may result in a reduction in the total population exposed to noise but increase the noise impact on the population that will be exposed.
- Noise versus noise: The use of Noise Abatement Departure Procedures (NADPs) may reduce the noise exposure on a certain community near to the airport but increase the noise concentration on communities further from the airport.
- Capacity versus fuel burn/CO₂ emissions: An increase in airport capacity may result in a more efficient operation when measured by reduced emissions per flight; however, such an increase in capacity may inevitably lead to an increase in total emissions.
- Fuel burn/CO₂ emissions versus fuel burn/CO₂ emissions: An optimisation of trajectories in the TMA may result in reduced track miles to be flown in the TMA (reduced fuel burn) but not necessarily lead to a more efficient transition to en-route

airspace outside of the TMA, which could result in an overall increase in trajectory inefficiency and consequently to increased fuel burn.

Consideration of the interdependencies and trade-offs between the different impacts of an operational change can only be truly determined at the local level. The priorities of the stakeholders will differ according to local requirements, conditions and expectations. An acceptable compromise for all parties can only thus be achieved through effective collaboration among all the relevant stakeholders.

The CEM working arrangement should allow core operational stakeholders to identify synergies, quantify impacts and reach compromises from an environmental perspective. In addition the collaborative approach of the CEM working arrangement can support the search for solutions that ensure the maximum potential for the sustainable growth of the airport.

4.4 Environmental Management Systems

Stakeholders at airports may have their own specific Environmental Management Systems (EMS) embedded in daily processes; these can influence many aspects of their operations.

The CEM protocol shall not be seen as a replacement for an EMS or other means of complying with environmental and social responsibility standards such as ISO 14001 and ISO 26000. It can, however, complement and build on existing systems deployed by individual stakeholders.

5 SCOPE

The EUROCONTROL Specification for CEM covers all air transport operations and their environmental impact at and around an airport (i.e. on the ground and in the air). It is not bound to a specific airport size or number of movements.

More specifically, it covers aircraft-related noise management (e.g. enhanced noise track adherence), the reduction in atmospheric emissions (both local air quality and greenhouse gas emissions), fuel conservation (as a scarce resource) and reduced engine running times.

CEM covers topics ranging from simply responding to complaints to implementing major mitigation projects such as Continuous Descent Operations (CDO) [12], or looking at increasing the usage of Fixed Electrical Ground Power (FEGP).

CEM also covers other locally determined air transport-related environmental issues such as water management, waste management, soil and groundwater contamination, the operational impact of de-icing solutions, third-party risk issues, bird hazard management and bio-diversity.

6 PURPOSE

The purpose of the EUROCONTROL Specification for CEM is to support and facilitate collaboration among the three core operational stakeholders in order to tackle the environmental challenges they face resulting from their combined air traffic operations at and in the vicinity of an airport. In Section 7: CEM Protocol, the requirements and recommended practices to formalise collaborative working arrangements are set out.

The working arrangements specified in the CEM protocol can:

- ensure that all operational stakeholders at airports meet together in partnership to develop and manage collaborative solutions to their common Environmental challenges;

- facilitate the understanding of interdependencies when exploring and agreeing upon solutions;
- ensure that there is an internal focus and understanding of environmental impacts and solutions before involving external stakeholders;
- facilitate commitment to any voluntary or regulatory environmental impact reduction scheme or initiative that requires a collaborative approach;
- be used as a means of facilitating compliance with regulations that deal with current and future environmental challenges at and around airports associated with air traffic and airport operations;
- help to organise and support cooperation and communication with external stakeholders e.g. with National Regulators, local and regional authorities, land-use planning authorities, local communities (Residents Associations) and local businesses.

Once implemented, CEM can also be used to identify which service partners (e.g. ground handling agents) should become involved to inform, advise or take action.

In addition, CEM can support coordinated action to improve environmental performance and contribute to the sustainable development of the airport and the aviation industry as a whole.

In turn, this will facilitate, if needed, individual compliance with local, national and European legislation relating to the environmental impact of air transport; SESAR⁸ operational improvements for airport operations; and application of the EUROCONTROL ESSIP [13] objective ENV02. Furthermore, it can contribute to the preparation of the necessary environmentally-related legislative deliverables as listed in Section 1.1. (See Annex A – Legislative Framework, Policy and Initiatives and Annex B – Traceability to Legislation for more information).

The CEM protocol has been developed in anticipation of the recently published Noise Regulation 598/2014 that enters into force on 13 June 2016, repealing Directive 2002/30/EC. In particular, Article 17 of this Regulation calls for enhanced collaboration amongst airport stakeholders.

⁸ Single European Sky ATM Research (SESAR) operational improvement steps AO-0703, AO-0705 and AO-0706
<http://www.eurocontrol.int/articles/endorsed-essip-plan>

7 CEM PROTOCOL

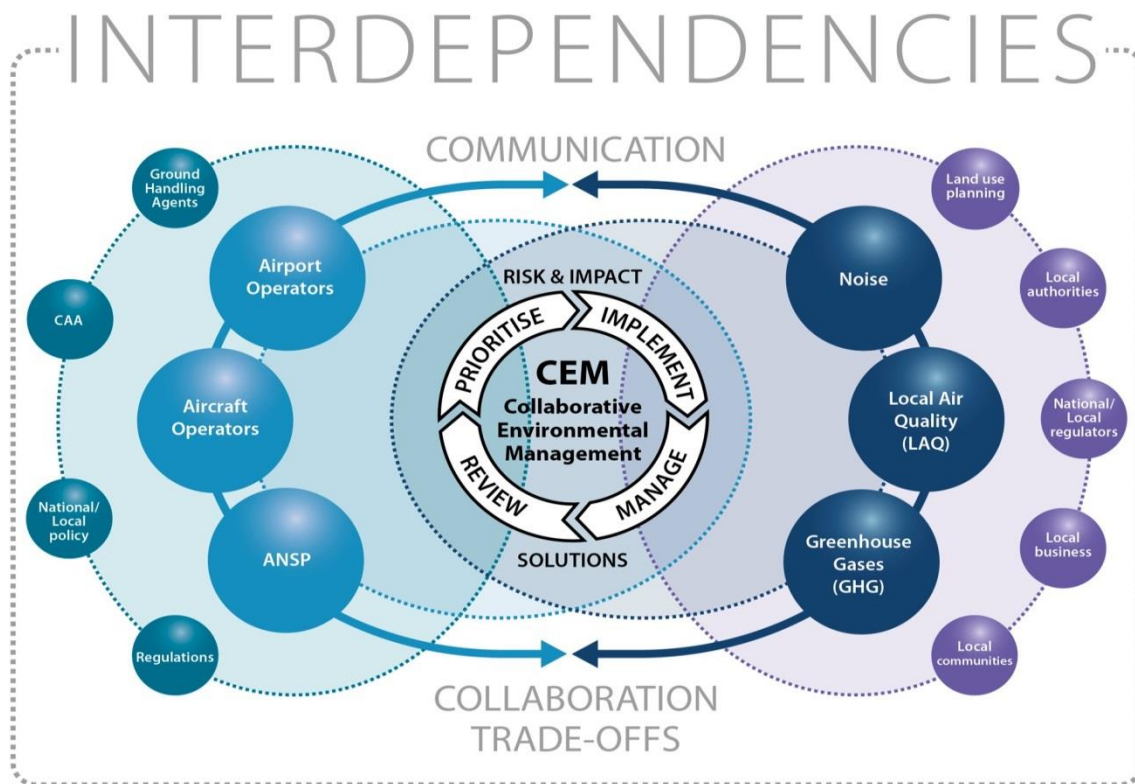


Figure 1 - High level CEM overview

Figure 1 illustrates how the core operational stakeholders, by adopting a collaborative approach and understanding the interdependencies involved, can achieve sustainable solutions to their collective impacts through the CEM protocol's working arrangements. It also highlights the need for the involvement of other stakeholders in order to make informed decisions and identify trade-offs.

7.1 Introduction

A number of critical factors influence the successful outcome of any collaborative process:

- Establishment of agreed working arrangements between the collaborating parties;
- Recognition of problems/issues and the contributing factors, including the involvement of each party;
- Awareness and understanding of interdependencies;
- Identification of the resources available to support the collaborative process; and
- An agreed outcome and delivery.

The objective of this section is to list the requirements and recommended practices establishing the CEM protocol at airports, whose core operational stakeholders wish to take the voluntary decision to implement such a collaborative working arrangement to deal with environmental issues. Where similar arrangements already exist, the requirements in this section must be satisfied to claim compliance with this Specification.

7.2 General Requirements

7.2.1 A CEM working arrangement **shall** be established to deal with environmental matters comprising of personnel drawn from the following core operational stakeholders:

- Airport Operator;
- Aircraft Operators;
- Air Traffic Service Provider.

7.2.2 Depending on specific circumstances, local, regional or national regulatory bodies **may** form part of the core CEM working arrangements and **should** be mentioned in the terms of reference.

7.2.3 These personnel **shall** possess the appropriate authority and understanding of the issues to represent their organisations on environmental matters and to take decisions that commit their organisations to act.

Note: The CEM Specification's requirements, if implemented, must work within the context of national legislation and measures.

7.2.4 The Airport Operator **should** initiate the establishment of the CEM working arrangement.

7.2.5 The CEM working arrangement **may** be convened by any one of the core operational stakeholders at any time.

7.2.6 The CEM working arrangement **shall** have:

- Approved rules of procedure;
- Agreed roles and responsibilities of each participating stakeholder;
- Agreed rules on confidentiality – providing for specific arrangements amongst the CEM stakeholders that would allow disclosure of commercially sensitive information e.g. fuel burn;
- Agreed terms of reference focusing on environmental challenges generated by air traffic operations at and in the vicinity of the airport;
- A minimum frequency of meetings – depending on the topics to be dealt with;
- Documented meeting reports (recording decisions and the status of actions).

7.2.7 Additional airport stakeholders such as 'Ground Handling Agents' **should** be invited to the CEM working arrangement when appropriate.

7.2.8 The following topics **shall** be part of the terms of reference of the CEM working arrangements where relevant:

- Noise;
- Local Air Quality (LAQ);
- Greenhouse gas emissions;
- Identification of applicable local, national and European legislation;
- The review and coordination of the introduction of new concepts of operations to improve the environmental sustainability of the airport;
- Identification of interdependencies between impacts and between their potential solutions;
- Modifications to airport and CNS/ATM infrastructure;
- Interaction with external stakeholders;
- Communication;
- Any other environmental issue that impacts on operations, capacity or both.

7.2.9 The following topics⁹ **should** be part of the terms of reference of the CEM working arrangement where relevant:

- De-icing;
- Waste management and refuse management in general;
- Wildlife hazard management;
- Protection of biodiversity;
- Areas of Special Scientific Interest or their equivalent;
- Renewable energy possibilities such as:
 - wind turbines;
 - bio-mass;
 - solar panels, etc.

7.2.10 Given their potential impacts on operational and environmental performance, the following topics **may** be part of the terms of reference of the CEM working arrangement where relevant:

- Land use in the vicinity of the airport;
- Third Party Risk.

7.2.11 The CEM working arrangement **shall** put in place specific processes to monitor and assess the following key environmental parameters where relevant:

- Noise;
- Local Air Quality:
 - NO_x emissions;
 - Particulate Matter (PM) including Ultra-fine Particles (UFPs);
 - Black Carbon;
- Fuel burn;
- CO₂ emissions.

Note: The Performance Plans¹⁰, at FAB (Functional Airspace Block) or National level may set additional KPIs (Key Performance Indicators) to address the specific airport ANS-related environmental issues. In this context the CEM working arrangement provides a platform upon which the core operational stakeholders can take a proactive approach to consider potential processes for monitoring and assessment purposes.

7.2.12 The CEM working arrangement **should** make use of recognised models and tools to monitor and assess key environmental parameters at and around airports.

Note: Annex D lists selected implementation support models and tools.

7.2.13 Operational stakeholders within the CEM working arrangement **shall** provide mutual support to each other to facilitate successful compliance with the environmental legislation to which each is subject.

7.2.14 The CEM working arrangement **shall** identify and monitor compliance with all environmental regulations applicable to the airport and those with the potential to influence air traffic operations.

7.2.15 Core operational stakeholders **shall** communicate the status of their compliance with relevant environmental regulations to the CEM working arrangement.

⁹ This list of topics is non-exhaustive – local conditions will determine what should be added or deleted at any one time

¹⁰ Commission Implementing Regulation (EU) No 390/2013 of 3 May 2013 laying down a performance scheme for air navigation services and network functions

7.2.16 Core operational stakeholders **should** bring forward any environment-related issues and identify potential conflicts within the CEM working arrangement to determine collaborative solutions.

7.2.17 The CEM working arrangement **may** propose the development of an Environmental Charter or similar document that describes the core operational stakeholders' collective commitment to dealing with environmental issues at and around the airport. This may include, for example, wider commitments to sustainable development and corporate social responsibility. This can serve to demonstrate these stakeholders' collaborative efforts to engage with the concerns of the airport's neighbours and regulators.

7.2.18 Long term environmental issues **should** be addressed by the CEM working arrangement to develop a strategic plan which **may** be part of the Environmental Charter or any other relevant document.

7.2.19 The CEM working arrangement **may** propose that the core operational stakeholders participate in voluntary initiatives to reduce the airport's environmental impact and it **should** provide appropriate support.

7.2.20 Individual core operational stakeholders' management systems **should** be modified to implement processes contributing to commonly agreed solutions that mitigate environmental impact(s).

7.3 Relationships with external stakeholders

7.3.1 The CEM working arrangement **shall** identify all of its external stakeholders concerned by the environmental impacts resulting from their combined operations at and around the airport. These **should** include:

- Airport neighbours and communities (e.g. Resident Associations, local businesses, schools, hospitals);
- Local, Regional and National Authorities;
- State-designated competent authorities and bodies responsible for environmental legislation;
- Other airports (for example those in close proximity and/or in the same operating group if relevant).

7.3.2 The CEM working arrangement **shall** establish a dialogue with representatives of external stakeholders when appropriate.

7.3.3 Prior to any formal dialogue with such representatives the CEM working arrangement **shall** agree on the purpose, form and content of any subject matter to be communicated.

7.3.4 Such subject matters **should** include:

- a pro-active approach/policy to operational procedures that will affect local communities in both the short and long term;
- land use and spatial planning in the vicinity of the airport;
- the early involvement of external stakeholders in the planning of operational changes that may affect them;
- the sharing of operational environmental data;
- the establishment of communication channels with external stakeholders; and
- the need for regular meetings with external stakeholders.

7.3.5 CEM working arrangement communication material **shall** be clearly identified, whenever possible, as having been jointly prepared by the core stakeholders.

7.3.6 The CEM working arrangement **should** nominate focal points to liaise with authorities¹¹ and other designated bodies responsible for environmental legislation.

7.3.7 The CEM working arrangement **shall** support the relevant authorities¹² and bodies to assist in describing, compiling and/or assessing environmental information as needed to support compliance with both current and future legislative requirements and/or national arrangements.

7.4 Relations with Competent Authorities

Under EU legislation, States have responsibility for nominating Competent Authorities on a variety of issues including air transport and the environment. Given the applicability of environmentally-related legislation to airports and air traffic operations, and the fact that different Competent Authorities may be involved, it is likely that a collaborative approach will facilitate working with them.

7.4.1 The CEM working arrangement **shall** support the Competent Authorities and bodies as designated in EU Directive 2002/30/EU in implementing the 'Balanced Approach' to assist in describing, compiling and/or assessing environmental information as needed to support compliance for the purposes of :

- taking into account likely costs and benefits of the various measures available;
- contributing to the description of the environmental objectives of the airport;
- contributing to the description of measures already taken to reduce aircraft noise;
- contributing to the assessment of the cost/effectiveness or cost/benefit of specific measures taking into account the socio-economic effects on airport users and local communities;
- contributing to an overview of the possible environmental effects of the proposed measures on other airports etc.;
- taking into account the relationship of the Directive 2002/49/EU on the assessment and management of environmental noise and any noise maps or action plans that may have been prepared.

7.4.2 The CEM working arrangement **shall** support the Competent Authorities and bodies as designated in EU Directive 2002/49/EC in describing, compiling and/or assessing environmental information as needed to support compliance for the purposes of:

- the preparation of the strategic noise map of the airport;
- the review every five years of the strategic noise map of the airport;
- the preparation of the noise action plan of the airport;
- the preparation of proposals for the noise action plan taking into account the concerns of external stakeholders;
- the review, every five years, of the noise action plan of the airport.

7.4.3 The CEM working arrangement **shall** support the Competent Authorities and bodies as designated in EU Directive 2008/50/EC in describing, compiling and/or assessing environmental information/data as needed to support compliance for the purposes of:

- the monitoring and assessment of ambient air quality data;

¹¹ Concerned authorities will vary according to each State

¹² Authorities as designated by Member States in the relevant legislative requirements and/or national measures

- the preparation of the local, regional or national air quality plans for improvement in ambient air quality;
- Public Information made available by Member States to the general public on ambient concentrations of the pollutants covered by this directive.

7.5 Information sharing

7.5.1 Core operational stakeholders who, through existing collaborative working arrangements at airports, already meet or surpass the requirements of this Specification **should** contribute to pan-European harmonisation by sharing relevant case studies and practical information which may be documented in future editions of this Specification.

8 REFERENCES

1. Regulation (EC) No 549/2004 of the European Parliament and of the Council of 10 March 2004 laying down the framework for the creation of the single European sky (the framework Regulation).
2. Regulation (EC) No 1070/2009 of 21 October 2009 amending Regulations (EC) No 549/2004, (EC) No 550/2004, (EC) No 551/2004 and (EC) No 552/2004 in order to improve the performance and sustainability of the European aviation system.
3. Directive 2002/30/EC¹³ 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.
4. Regulation (EU) No 598/2014 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 April 2014 on the establishment of rules and procedures with regard to the introduction of noise-related operating restrictions at Union airports within a Balanced Approach and repealing Directive 2002/30/EC.
5. Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise.
6. Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe.
7. Regulation (EC) No 552/2004 of the European Parliament and of the Council of 10 March 2004 on the interoperability of the European Air Traffic Management network (the interoperability Regulation).
8. European Air Traffic Management Master Plan, Edition 2 – October 2013 – www.atmmasterplan.eu.
9. ICAO Environmental Report 2010, Aviation's Contribution to Climate Change, Chapter 1.
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11. Thomas, C.S. and Hooper, P.D. (2013) Airport Environmental Capacity and Sustainable Development. In Ashford, N., Stanton, H. and Moore, C. (Eds.), Airport Operations (Third Edition) McGraw Hill.
12. European Joint Industry CDA Action Plan – March 2009.
13. ESSIP Report 2013 – A pan-European assessment of progress in the implementation of the ESSIP objectives – EUROCONTROL Reference N° 14/06/24-50 July 2014.
14. **ICAO**
 - a) Annex 16, Environmental Protection. Volume I – Aircraft Noise to the Convention on International Civil Aviation;
 - b) Assembly Resolution A37-18: Consolidated statement of continuing ICAO policies and practices related to environmental protection – General provisions, noise and local air quality (ICAO Doc 9958);
 - c) Guidance on the Balanced Approach to Aircraft Noise Management (ICAO Doc 9829).

¹³ Will be repealed with effect from 13 June 2016 by 'Regulation (EU) No 598/2014 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 April 2014 on the establishment of rules and procedures with regard to the introduction of noise-related operating restrictions at Union airports within a Balanced Approach'

9 ABBREVIATIONS

ACI	Airports Council International
A-CDM	Airport – Collaborative Decision Making
ANS	Air Navigation Services
ANSP	Air Navigation Service Provider
ATAG	Air Transport Action Group
ATSP	Air Traffic Service Provider
AO	Aircraft Operator
ATM	Air Traffic Management
ATC	Air Traffic Control
CAA	Civil Aviation Authority
CANSO	Civil Air Navigation Services Organisation
CEM	Collaborative Environmental Management
CDO	Continuous Descent Operations
CNS	Communications, Navigation and Surveillance
CO ₂	Carbon Dioxide
EC	European Commission
ECAC	European Civil Aviation Conference
EEA	European Economic Area
EP or EUP	European Parliament
EMS	Environmental Management System
ERAF	EUROCONTROL Regulatory and Advisory Framework
ESSIP	European Single Sky ImPlementation
EU	European Union
FAB	Functional Airspace Block
FEGP	Fixed Electrical Ground Power
GHG	Green House Gas(es)
ICAO	International Civil Aviation Organisation
IATA	International Air Transport Association
KPI	Key Performance Indicator
LAQ	Local Air Quality
LTO	Landing and Take Off
NADP	Noise Abatement Departure Procedure
NO _x	Nitrogen Oxides
NPR	Noise Preferential Route
OI	Operational Improvement

PM	Particulate Matter
PI	Performance Indicator
SES	Single European Sky
SESAR	Single European Sky ATM Research
SWIM	System Wide Information Management
TMA	Terminal Manoeuvring Area
UFPs	Ultra-fine Particles

ANNEX A - LEGISLATIVE FRAMEWORK, POLICY AND INITIATIVES

This annex contains a high level description of all key policies and initiatives relating to CEM.

A.1 Overview

The following diagram and table illustrate and describe some of the different legislation and measures that affect core operational stakeholders at airports. Only key global and European legislation related to the environmental impact of airport operations is described. Different legislation will apply to individual airports depending on the local, regional and national contexts.



Figure 2 - Overview of Levels of legislation

SCALE OF APPLICABILITY	TYPE OF INSTRUMENT	LEGAL STANDING
GLOBAL	ICAO Annex 16 [14]	Obligatory for Contracting States: notification of any differences compulsory.
	Guidance material	Advising/supporting States to achieve global harmonisation.
EUROPEAN	Regulations	Directly applicable, effective and binding in the EU Member States,
	Directives	Binding as to the result to be achieved; must be transposed into EU Members States' national legislation.
NATIONAL	Legislation	Directly applicable, effective and binding. May incorporate EU Regulations and Directives in application of the EEA ¹⁴ and ECAA ¹⁵ agreements.

¹⁴ EEA - European Economic Area Agreement, which entered into force on 1 January 1994

¹⁵ ECAA - European Common Aviation Area Agreement

LOCAL	Airport-specific rules and local planning law requirements etc.	Often mandatory
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A.2 European Regulation

Following the adoption of ICAO's 'Balanced Approach' the European Union adopted Directive 2002/30/EC on the introduction of noise-related operating restrictions at European Union airports. The revision of Noise Directive 2002/30/EC (which will be repealed by the recently published Noise Regulation (EU) 598/2014 coming into force from 13 June 2016) will have implications on how competent authorities manage noise and consult with external stakeholders. In addition, Directive 2008/50/EC¹⁶ implementing a common approach to ambient air quality and cleaner air for Europe, applies to the management of local air quality problems at and around airports.

The objective of the SES as stated in the framework Regulation [1] sets out to "contribute to the sustainable development of the air transport system". Furthermore, in the Essential Requirements under Environmental Constraints of the interoperability Regulation, it is stated *'that systems and operations of the EATMN shall take into account the need to minimise the environmental impact in accordance with Community legislation'*.

Note: The Performance Plans¹⁷, at FAB (Functional Airspace Block) or National level may set additional KPIs (Key Performance Indicators) to address the specific airport ANS-related environmental issues. In this context the CEM working arrangement provides a platform upon which the core operational stakeholders can take a proactive approach to consider potential processes for monitoring and assessment purposes.

A.3 SESAR

The SESAR (Single European Sky ATM Research) programme is the technological pillar of the SES initiative. Within this technological pillar is the European ATM Master Plan (The Master Plan) [8], which sets out the agreed roadmap connecting research and development with deployment. The Master Plan has three levels that combine high level planning, research and practical implementation objectives. The level three view (implementation) is represented by the ESSIP Plan that enables stakeholders to achieve their performance targets by linking SESAR Operational Improvements (OI) steps and ESSIP objectives.

CEM is part of the ESSIP ENV02 Objective that supports the following three SESAR OIs:

[AO-0703 Aircraft Environmental Impact Management and Mitigation at and around Airports](#)

[AO-0705 Reduced Water Pollution](#)

[AO-0706 \(Local\) Monitoring of Environmental Performance](#)

CEM is described in the ESSIP ENV02¹⁸ objective as follows:

"Formal working partnership arrangements between ANSP, Airport and Aircraft Operators will be established at individual airports to enable:

- *the minimisation of noise and atmospheric emissions (including fuel burn); and*
- *the management of aircraft and airfield de-icing resulting from combined aircraft operations at the terminal airspace and ground.*

¹⁶ OJEU L 152, 11.6.2008, p. 1–44

¹⁷ Commission Implementing Regulation (EU) No 390/2013 of 3 May 2013 laying down a performance scheme for air navigation services and network functions

¹⁸ ESSIP ENV 02 Objective - <http://www.eurocontrol.int/sites/default/files/content/documents/official-documents/reports/2012-essipplan2012.pdf>

These formal working arrangements will enable understanding and awareness of interdependencies and facilitate jointly agreed solutions for environmental improvements.”

A.4 Industry Collaboration

Industry partners and trade associations in related policy documents and position papers (e.g. IATA¹⁹, CANSO²⁰, ACI²¹, ATAG²²) have recognised that a collaborative approach will facilitate the sustainable development of airports and ensure that the associated environmental impacts are understood and addressed by their members and external partners.

ATAG Summit declaration extract

We believe that our commitments to work in partnership with governments, other industries and civil society will deliver an efficient aviation sector, fit to meet the needs and provide the services required by the world economy. We strongly encourage others to join us in this endeavour.

March 2012 in Geneva, Switzerland

The economic importance of air transport to regions and countries as generators of business and employment is widely recognised. It has been estimated that, in Europe, air transport supports 8.7 million jobs (direct, indirect, induced, and catalytic impacts); as identified by ATAG²³, 519,000 people work for airlines or handling agents, 220,000 people directly for airport operators, while 827,000 work on-site at airports for government agencies such as customs and security, or provide services in retail outlets, restaurants, hotels, etc.

To maintain these economic benefits through airports being allowed to grow sustainably (whilst complying with regulations), collaboration and partnership of operational stakeholders needs to follow a widely accepted and robust process that local authorities, regulators and local businesses and communities can trust and engage with.

¹⁹ Carbon Neutral Growth from 2020: FOUR-PILLAR STRATEGY, IATA, June 2007

²⁰ Accelerating Air Traffic Management Efficiency : A call to Industry, CANSO, February 2012

²¹ Environment & Airports and the Environment ACI Position Brief, ACI, March 2007

²² Towards Sustainable Aviation 2012 Position Paper 6th Aviation & Environmental Summit, ATAG March 2012

²³ Air Transport Action Group, Aviation Benefits Beyond Borders, March 2012, www.aviationbenefitsbeyondborders.org

ANNEX B - TRACEABILITY TO LEGISLATION

This annex contains traceability tables between relevant European legislation and the CEM Protocol requirements with regard to EU environment-related legislative provisions affecting operational activities at and around airports. The collaborative working arrangement set out in the CEM Protocol can also be adopted by any group of stakeholders to support and/or facilitate coordinated action to fulfil current or future legislative requirements:

- The first column identifies the individual legislation;
- The second column identifies legislative requirements that the CEM working arrangement can facilitate compliance with;
- The third column identifies requirements in section 7: CEM Protocol that can facilitate compliance with legislation.

This table will be revised to provide traceability to the recently published Noise Regulation (EU) 598/2014 in future editions of this Specification.

Legislation	Legislative Requirements	CEM Specification requirement N°
EU Directive 2002/49/EC – the Environmental Noise Directive relating to the management and assessment of environmental noise	<i>Article 4</i> Implementation and responsibilities 1. Member States shall designate at the appropriate levels the competent authorities and bodies responsible for implementing this Directive, including the authorities responsible for:	• 7.3.6 • 7.3.7 • 7.4 (intro-para) • 7.4.2
	(a) making and, where relevant, approving noise maps and action plans for agglomerations, major roads, major railways and major airports;	• 7.4.2
	(b) collecting noise maps and action plans.	• 7.4.2
	<i>Article 7</i> Strategic noise mapping 3. The strategic noise maps shall satisfy the minimum	• 7.3.7 • 7.4.2

	requirements laid down in Annex IV.	
	5. The strategic noise maps shall be reviewed, and revised if necessary, at least every five years after the date of their preparation.	• 7.3.7 • 7.4.2
	<i>Article 8</i> Action plans 1. Member States shall ensure that no later than 18 July 2008 the competent authorities have drawn up action plans designed to manage, within their territories, noise issues and effects, including noise reduction if necessary for:	• 7.3.7 • 7.4.2
	(a) places near the major roads which have more than six million vehicle passages a year, major railways which have more than 60 000 train passages per year and major airports;	• 7.3.7 • 7.4.2
	5. The action plans shall be reviewed, and revised if necessary, when a major development occurs affecting the existing noise situation, and at least every five years after the date of their approval.	• 7.3.7 • 7.4.2
	7. Member States shall ensure that the public is consulted about proposals for action plans, given early and effective opportunities to participate in the preparation and review of the action plans, that the results of that participation are taken into account and that the public is informed on the decisions taken. Reasonable time-frames shall be provided allowing sufficient time for each stage of public participation.	• 7.3.1 • 7.3.7 • 7.4.2

	<i>ANNEX IV</i> MINIMUM REQUIREMENTS FOR STRATEGIC NOISE MAPPING referred to in Article 7 3. Strategic noise maps for agglomerations shall put a special emphasis on the noise emitted by: — road traffic, — rail traffic, — airports, — industrial activity sites, including ports.	• 7.3.7 & 7.4.2
DIRECTIVE 2002/30/EC 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	<i>Article 1</i> Objectives The objectives of this Directive are (a) to lay down rules for the Community to facilitate the introduction of operating restrictions in a consistent manner at airport level so as to limit or reduce the number of people significantly affected by the harmful effects of noise; (b) to provide a framework which safeguards internal market requirements; I to promote development of airport capacity in harmony with the <i>environment</i>; (d) to <i>facilitate</i> the achievement of specific noise abatement objectives at the level of individual airport(s) to enable measures to be chosen from those available with the aim of achieving	

	<i>maximum environmental benefit</i> in the most cost-effective manner.	
	<i>Article 3</i> Competent authorities Member States shall ensure that there are competent authorities responsible for matters falling within the scope of this Directive.	• 7.3.1 • 7.3.7 • 7.4.1
	<i>Article 4</i> General rules on aircraft noise management 2. When considering operating restrictions, the competent authorities shall take into account the likely costs and benefits of the various measures available as well as airport-specific characteristics.	• 7.2.12 • 7.3.1 • 7.3.7 • 7.4.1
	<i>Article 5</i> Rules on assessment 1. When a decision on operating restrictions is being considered, the information as specified in Annex II shall, as far as appropriate and possible, for the operating restrictions concerned and for the characteristics of the airport, be taken into account.	• 7.2.12 • 7.3.7 • 7.4.1
	<i>ANNEX II</i> Information referred to in Article 5(1)	

	1. Current inventory 1.2. A description of the environmental objectives for the airport and the national context.	• 7.2.13 • 7.2.14 • 7.3.7 • 7.4.1
	1.4. A description of measures to reduce aircraft noise already implemented: for example, information on land-use planning and management; noise insulation programmes; operating procedures such as PANS-OPS; operation restrictions such as noise limits, night limits/curfew, noise charges; preferential runway use, noise preferred routes/ track-keeping, and noise monitoring.	• 7.2.11 • 7.2.12 • 7.2.13 • 7.2.14 • 7.3.1 • 7.3.7 • 7.4.1
	3. Assessment of additional measures 3.2. Assessment of the cost/effectiveness or cost/benefit of the introduction of specific measures, taking account of the socio-economic effects of the measures on the users of the airport: operators (passenger and freight); travellers and local communities.	• 7.2.11 • 7.2.13 • 7.3.1 • 7.3.2 • 7.3.3 • 7.3.4 • 7.3.7 • 7.4.1

	3.3. An overview of the possible environmental and competitive effects of the proposed measures on other airports, operators and other interested parties.	• 7.2.11 • 7.2.15 • 7.3.1 • 7.3.2 • 7.3.3. • 7.3.4 • 7.3.7 • 7.4.1
	4. Relation with the Directive of the European Parliament and of the Council on the assessment and management of environmental noise. 4.1. When and where noise maps or action plans have been prepared under the terms of the said Directive these will be used for providing the information required in this Annex.	• 7.2.13 • 7.3.7 • 7.4.1 • 7.4.2
DIRECTIVE 2008/50/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 21 May 2008 on ambient air quality and cleaner air for Europe		• The air quality standards do not refer specifically to air traffic. However, as air traffic and any other traffic on the TMA can be considered as a contributing source to LAQ depending on the local requirements – CEM outputs can contribute to air quality plans. • 7.2.8 • 7.2.11

		• 7.2.13 • 7.2.14 • 7.2.15 • 7.3.2 • 7.3.7 • 7.4.3
Regulation EC No 549/2004 as amended by Regulation EC 1070/2009	<i>'Article 1</i> Objective and scope 1. The objective of the single European sky initiative is to enhance current air traffic safety standards, to contribute to the <u>sustainable development</u> of the air transport system and to improve the overall performance of air traffic management (ATM) and air navigation services (ANS) for general air traffic in Europe, with a view to meeting the requirements of all airspace users. This single European sky shall comprise a coherent pan-European network of routes, network management and air traffic management systems based only on safety, efficiency and technical considerations, for the benefit of all airspace users. In pursuit of this objective, this Regulation establishes a harmonised regulatory framework for the creation of the single European sky.	
Regulation (EC) No 552/2004 as amended by EC Regulation 1070/2009	ANNEX II - ESSENTIAL REQUIREMENTS Part A: General requirements 2. Support for New concepts of operations 'The EATMN, its systems and their constituents shall support, on a coordinated basis, new agreed and validated concepts of operation that improve the quality, <i>sustainability</i> and effectiveness of air navigation services, in particular in terms of	• 7.2.8 • 7.2.13 • 7.3.7

	safety and capacity...	
	5.Environmental constraints Systems and operations of the EATMN shall take into account the need to minimise environmental impact in accordance with Community legislation.	• 7.2.8 • 7.2.11 • 7.2.13 • 7.2.14 • 7.3.1 • 7.3.4 • 7.3.6 • 7.3.7 • 7.4
COMMISSION REGULATION (EU) No 691/2010 of 29 July 2010 laying down a performance scheme for air navigation services and network functions and amending Regulation (EC) No 2096/2005 laying down common requirements for the provision of air navigation services	Whereas: (1) Regulation (EC) No 549/2004 requires that a performance scheme for air navigation services and network functions be set up by means of implementing rules. (2) The performance scheme should contribute to <i>the sustainable development</i> of the air transport system by improving overall efficiency of the air navigation services <i>across the key performance areas</i> of safety, <i>environment</i>, capacity and cost-efficiency, in consistency with those identified in the Performance Framework of the ATM Master Plan, all having regard to the overriding safety objectives. CHAPTER I GENERAL PROVISIONS <i>Article 1</i> Subject matter and scope 1. This Regulation lays down the necessary measures to improve the overall performance of air navigation services and network functions for general air traffic within the ICAO EUR	

	and AFI regions where Member States are responsible for the provision of air navigation services with a view to meeting the requirements of all airspace users.	
	2.2. As from the second reference period, a third European Union-wide environment KPI shall be developed to address the specific airport air navigation services (ANS)-related <i>environment issues</i> .	• 7.2.13 • 7.3.7
DIRECTIVE 2001/81/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 October 2001 on national emission ceilings for certain atmospheric pollutants	Article 2 Scope This Directive covers emissions in the territory of the Member States and their exclusive economic zones from all sources of the pollutants referred to in Article 4 which arise as a result of human activities. Article 3 Definitions For the purposes of this Directive: (g) .landing and take-off cycle. means a cycle represented by the following time in each operating mode: approach 4,0minutes; taxi/ground idle 26,0 minutes, take-off 0,7minutes; climb 2,2 minutes; Emission inventories and projections 1. Member States shall prepare and annually update national emission inventories and emission projections for 2010 for the pollutants referred to in Article 4. Article 8 Reports by the Member States	• CEM can help to support stakeholders at airports with their reporting obligations under this directive • 7.2.11 • 7.2.12

	1. Member States shall each year, by 31 December at the latest, report their national emission inventories and their emission projections for 2010 established in accordance with Article 7 to the Commission and the European Environment Agency.	• 7.2.13 • 7.2.14 • 7.3.7 • 7.4 (intro-para)
REGULATION (EC) No 761/2001 OF THE EUROPEAN PARLIAMENT AND OF THE OF 19 March 2001 allowing voluntary participation by organisations in a Community eco-management and audit scheme (EMAS)	<i>Article 1</i> The eco-management and audit scheme and its objectives 2. The objective of EMAS shall be to promote continual improvements in the environmental performance of organisations: (c) the provision of information on environmental performance and an open dialogue with the public and other interested parties; <i>Article 2</i> Definitions For the purposes of this Regulation (b) ‘continual improvement of environmental performance’ shall mean the process of enhancing, year by year, the measurable results of the environmental management related to an organisation’s management of its significant environmental aspects, based on its environmental policy, objectives and targets; the enhancing of, the results need not take place in all spheres of activity simultaneously;	CEM formalises working arrangements that could support an airport which is already part of the EMAS scheme or wishes to become registered. A CEM working arrangement can facilitate the involvement of the relevant stakeholders in order for the airport to fulfil its obligations and contribute to its continual environmental performance improvements and reporting requirements.
	<i>Article 3</i> Participation in EMAS	CEM helps organises the participants to give outputs that can contribute to Art. 3 Annex 1

	1. EMAS shall be open to the participation of any organisation dedicated to improving its overall environmental performance.	• 7.2.11 • 7.2.13 • 7.2.14 • 7.3.7 • 7.4 (intro-para)
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ANNEX C - EXAMPLES OF COLLABORATION AT AIRPORTS AMONG CORE OPERATIONAL STAKEHOLDERS

The following case studies demonstrate real life active collaboration between the core operational stakeholders at airports in tackling their environmental challenges. These examples clearly show the feasibility and benefits of implementing collaborative working arrangements. In addition, sharing experience and good practise between airports can enhance existing working arrangements and/or provide practical guidance for establishing new ones. These and future case studies will be made available online once this Specification is published.

C.1 Vienna: Relations with External Partners

Vienna Airport had a Mediation Forum since 2000. The Mediation Forum was one of the outcomes of the Master Plan 2015 published in 1998 calling for the development of Vienna Airport to meet increasing future traffic needs. One of the needs identified was the addition of a third runway.

In the Forum the following parties take part in discussions about possible improvements to the environmental situation and the future development of the airport and its surroundings.

- ATC
- Austrian Airlines
- Vienna Airport
- Mayors of the surrounding communities
- Politicians from different parties
- Association of NGOs

In addition to this, ATC-OPS meetings are held on a regular basis with ATC, Airlines, Airport and the Ministry of Transport where mainly practical operational questions are discussed. These meetings can also be used to negotiate environmental matters. Other meetings are held with airlines as customers of the airport.

Vienna Airport founded its Dialog Forum in 2005 as an outcome of the Mediation Forum created in 2000. Within this Forum there is the opportunity to discuss issues of concern with neighbouring communities, political parties and NGOs together with ATC and Airlines. Other issues such as possible improvements of the environmental situation and the future development of the airport are also raised. For example the construction of the third runway and its aftermath will be on the agenda.

Benefits from the Dialog Forum can be seen in the acceptance of the airport and its future development plans by the surrounding communities and local authorities. Each complaint from residents is now brought forward to the relevant working group in such a way that the complainant gets an answer to his/her concerns. Mitigation is possible, as the relevant stakeholders are at the table and decide on measures which can be taken to improve the situation.

In Austria land use planning authorities are not obliged to take aircraft noise zones into account. However, Vienna Airport has been proactive in making contacts with this authority thus avoiding development of populated areas in the surroundings of the airport. In addition there is now a contract with the surrounding authorities that they do not create new housing areas within certain noise contours.

C.2 Manchester: Operational Improvements

Manchester Airport has had an active policy of using collaborative forums to address the environmental aspects of flight operations for many years now mostly focussed on noise, track keeping and CDO. A good example of this collaborative approach involving the local authorities and residents associations was the construction of its second runway in 2001 known as Runway 23L/05R. Despite public reaction and protest camps the Airport and its core operational stakeholders through this collaboration received planning permission in 1997. Part of this work involved the moving and replanting of ancient woodlands and the runway being built over a major road – the road traffic was diverted into new tunnels under the runway.

A formal CEM group has been established since 2010 with the active partnership of the Airport Operator (the Environment Manager chairs the meeting), ATSP, CAA and several airlines. Ground handling agents are invited on a case by case basis.

Typical issues that are on the agenda include:

- Consultation on Night Noise Policy review
- Draft Aviation Policy Framework
- Airspace Changes
- Changes in fleet of airlines (possible public interest)
- Reduced engines taxiing
- Non-essential use of APU / Increasing the usage of FEGP
- Recuperation and recycling of de-icing fluids

One of the earliest outcomes emanating from the CEM group was initiated by a former Thomas Cook pilot called the “Optimum Flight Project”. The project was implemented in April 2013 when the first bench mark and optimised flights were flown from EGCC (MAN) to GCRR (ACE) using an Airbus 320. The project’s objectives are:

- to measure the operational efficiency of the airline and the environment that it operates in;
- to ensure operations are achieving the optimum level of performance possible; and
- to investigate potential avenues for greater operational efficiencies for routine operations.

This project involved close collaboration and communication between Thomas Cook, Airbus, NATS, MAG and French, Spanish, Portuguese and Moroccan ANSPs, EUROCONTROL’s Single Sky and Network Manager Directorates and now involves the UK’s Sustainable Aviation.

Another outcome can be seen in the optimised usage of FEGP at the Airport. Manchester Airport tabled this as an agenda item at a CEM meeting. The ensuing discussions between stakeholders with the inclusion of ground handling agents identified the issues surrounding the usage of APUs versus FEGP. Actions have been taking including a reinforced training of the ground handling agents and an awareness campaign for pilots. This item will be monitored for its impact and reduction in both noise and emissions.

C.3 Stockholm: Arlanda – Bromma - Green Approaches & Noise Reduction Initiatives

Stockholm Arlanda: Curved Approaches and reduced charges for quieter aircraft

Sweden's largest airport Stockholm Arlanda has been working internally in partnership with its core operational stakeholders to look at various ways to reduce aircraft noise; and with local communities to ensure that the least amount of people are disturbed by it. Internally the Swedavia (the airport), airlines and LFV (ANSP) cooperated together in the 'Green Flights' project initiated in 2007.

Additionally Stockholm Arlanda also worked using the "Stenvändarprocessen" (Swedish for "the stone turning process") – an extensive project in which the airport was "turning every stone" to find new ways of reducing noise disturbances from air traffic. Although this project is now closed many measures that were identified are now in use. One example is the yearly updating of the Airports Noise Management Plan.

Lower take-off charges for aircraft with cleaner and quieter engines and the use of green approaches are examples of some of the measures Swedavia and its partners are working with in order to reduce the environmental impact of air traffic. Sweden was one of the first countries in the world to introduce this type of charging. The purpose is to persuade airlines with older planes or old aircraft engines to replace them with more environmentally friendly alternatives. The introduction of green approaches reduces noise, fuel consumption and thus atmospheric emissions.

At the end of March 2010 SAS became the first airline to be granted formal permission by the Swedish Transport Agency to use "curved approaches" with the SAS Boeing 737NG at Stockholm Arlanda's third runway, 01R. Since early 2006 more than 40,000 Green Approaches have been made and the results show that each approach can save up to 100-150 kg of fuel.

Open dialogue and heightened environmental awareness

In addition to measures aimed at limiting noise, the airport also carries out measurements and test flights as well as programmes aimed at helping air traffic controllers and pilots further increase their environmental awareness. An open dialogue with Stockholm Arlanda's neighbours is another important element of the process. The airport endeavours to locate its flight paths where the noise will cause the least disturbance to the fewest people possible. The homes most heavily exposed to noise are noise-proofed.

Cooperation with noise abatement associations

Stockholm Arlanda Airport meets representatives of the noise abatement associations in nearby communities such as Upplands Väsby, Sollentuna and Rosersberg several times per year. Outcomes of these meetings have resulted in a number of suggestions for noise-reduction measures, some of which have been implemented or are in the process of being implemented.

Stockholm Bromma – Noise reduction initiatives

Stockholm Bromma Airport works together with the City of Stockholm, County Administration, and the Swedish Transport Administration to define areas where houses can be built with regard to the airport's future noise curves and height restrictions. This work contributes to a better understanding of the needs of the airport and the City of Stockholm. It is expected that the resulting reports which will include information on height restrictions of buildings and the influence of noise will be used by all parties over the coming years to secure both the functioning of the airport and the City of Stockholm's requirements to build new housing.

The City of Stockholm and the airport are also working together on a specific project, close to the airport; the objective in the first instance is to lower ground noise levels by looking at

the planning of non-residential buildings as shields against noise. Also evaluated will be the effect that the buildings will have on shielding against take-off noise

Stockholm Bromma Airport is a city airport with a high focus on noise issues. The airport has an approach angle of 3.5 degrees. To evaluate which effect a steeper angle could have on the noise levels a project was introduced including the main airline operators and the ANSP (LFV) at the airport. One part of the project included test flights with an angle of 4.25 degrees. The results were evaluated. However, due to some airlines indicating problems with a steeper approach it was not possible to introduce this at the airport. Nevertheless the project entailed a close and valuable collaboration that involved discussions on other noise reduction activities.

C.4 CDO: Groningen Airport Eelde

Groningen Airport Eelde is the regional airport for the northern Netherlands. It is a public limited company with shareholders the provinces of Groningen and Drenthe, and the municipalities of Groningen, Assen and Tynaarlo.

The sustainable development of the airport is its top priority. Future plans for the development of the airport consider 'greening' or in other words the reduction of its environmental impact as a key factor. To support the sustainable ambition of Groningen the international project 'Green Sustainable Airports' (GSA) was initiated. Within GSA, regional airports, local and regional government authorities, small and medium enterprises and knowledge institutes work together to stimulate innovation on the subject of sustainability at airports. Topics that are investigated within this project include noise abatement, reduction of CO₂ emissions and fuel saving measures.

Within this context Groningen Airport decided to implement CDA/CDO which is an aircraft operating technique in which an arriving aircraft descends from an optimal position with minimum thrust and avoids level flight. It is designed to reduce fuel consumption and noise compared with a conventional approach.

Depending on local circumstances, the effects of aircraft noise and atmospheric emissions can impact on the quality of life of communities close to an aerodrome. Fuel is also a major airline cost element. CDA/CDO therefore offers environmental and economic advantages.

In order to realize the successful implementation of CDA/CDO at Groningen Airport close collaboration was necessary with all parties involved i.e. Air Traffic Control the Netherlands (LVNL), EUROCONTROL, the National Aerospace Laboratory (NLR) and transavia.com.

In 2010 Air Traffic Control the Netherlands (LVNL) was requested by Groningen Airport to develop a procedure for CDA/CDO. In February 2012 the first CDA flight took place.

In order to assess the environmental and economic benefits of flying CDA/CDOs at Groningen Airport the National Aerospace Laboratory (NLR) is conducting research into the preliminary impact on noise reduction, emissions and fuel consumption.

ANNEX D - IMPLEMENTATION SUPPORT

D.1 Models, Tools, Concepts & Training

There are many private, industry and regulatory initiatives available that can support operational stakeholders in their efforts to deal with environmental challenges in and around their airport(s). The most appropriate mitigation solution or joint initiative will vary depending on local imperatives. At the time of this Specification's publication the following list offers an overview of EUROCONTROL initiatives that can be used to support the implementation of CEM.

EUROCONTROL intends to make available on the CEM implementation support website up-to-date information on how stakeholders could access these models and tools, in order to support the implementation of CEM working arrangements

<http://www.eurocontrol.int/articles/single-sky-and-environment>.

D.2 Generic Support Page

Documents:

Implementation material for airport stakeholders who may need more structured support

- No. 1: CEM briefing note and FAQs
- No. 2: CEM Model Generic Terms of Reference
- No. 3: CEM Model Generic Environmental Vision Document
- No. 4: CEM Checklist for setting up working arrangements

Note: The Checklist can be used to assess to what extent the current working arrangement at an airport already maps to the requirements as set out in Section 7: CEM Protocol Alternatively it can be used to make a gap analysis or serve as a blueprint for setting up CEM working arrangements.

The above guidance will be made available online once this Specification is published.

D.3 Environmental Impact Assessment Models

The CEM Implementation Support website should be consulted for up-to-date details of the environmental impact modelling capabilities that EUROCONTROL offers. At the time of publication, this covered:

Aircraft Assignment Tool (AAT)

The Aircraft Assignment Tool (AAT) is a fleet and operations forecasting model jointly developed by EUROCONTROL, the European Commission and the European Aviation Safety Agency (EASA). The tool converts an aggregated demand forecast into detailed operations by aircraft type and airport pair for a given future year and scenario.

Airport Local Air Quality Studies (ALAQs) Model

Open-ALAQs is the newer version of the Airport Local Air Quality Studies (ALAQs) v2.0 model. It was developed by EUROCONTROL in the context of SESAR to assist the project's partners in their local air quality assessments. It relies on an open-source GIS which provides further flexibility in the definition of the airport layout and removes the tool's dependence on proprietary software.

IMPACT

IMPACT is a web-based environmental modelling system developed by EUROCONTROL in the context of SESAR. It builds upon the already existing EUROCONTROL fuel/emissions and noise assessment models, respectively AEM and STAPES. It allows the consistent assessment of trade-offs between noise and gaseous emissions owing to a common aircraft performance model based on a combination of the Aircraft Noise and Performance (ANP) database and the latest release of EUROCONTROL's Base of Aircraft Data (BADA 4).

D.4 Environmental Impact Assessment Tools

V-PAT (Vertical Profile Analysis Tool)

The Vertical Profile Analysis Tool has been developed to support the assessment of flight compliance with continuous climb and descent profiles in the vicinity of airports. V-PAT has been further developed in the context of SESAR AIRE projects to support large-scale studies.

D.5 SOPHOS Emissions Estimator

SOPHOS is a web-based emissions estimator that can support stakeholders in a CEM working arrangement by supplying estimation data via the SOPHOS portal. The 'LTO²⁴ fuel and emissions estimator' function combines operational data such as engine-tail number, taxi data and emissions factors (e.g. ICAO emissions databank or ALAQS data) to produce fuel and emissions values for ECAC airport operations.

The main purpose is to provide ECAC-wide airport-related fuel cost and emissions data for aircraft operations on the ground and close to airports (<3000ft) in accordance with the ICAO Landing and Take-Off (LTO) cycle.

A selection of reports is available and can be downloaded for further external customisation, covering the following estimated parameters:

- Fuel use;
- Fuel cost;
- CO₂;
- NO_x.

Operational Stakeholders at an airport with access to EUROCONTROL's extranet can have access to SOPHOS. Stakeholders can only have access to their own information or information within their own operating group.

Further information:

sophos@eurocontrol.int

<http://www.eurocontrol.int/sophos>

²⁴ ICAO LTO = Landing & Take off cycle below 3000ft <http://www.icao.int/environmental-protection/Pages/local-air-quality.aspx>

D.6 Training

The following training gives a high level broad overview of the general issues associated with the environmental impact of aviation from a unique multi-stakeholder approach; and the measures that can be taken to improve the sustainability of the aviation business.

E-learning Modules

Environmental Awareness (ENV-AWR) – 6 modules totalling 5 hours

This e-learning Environmental Awareness training package is designed to highlight to ATM personnel and related partners the growing importance of environmental issues within the aviation industry.

Introduction to the Environment (ENV-INTRO) – module of 1 hour

This short 'Introduction to Environment' e-learning package aims to give regulatory, operational and non-operational staff a good understanding of the general issues associated with environment and aviation. In addition, specific indications of what actions they can take in their daily work to help mitigate the impact of aviation on the environment are addressed.

Environment Co-ordinators Training (NMO-E-ENV) – package of various e-learning courses

Provides an easy to access repository of available ATFCM related online Web Based Training packages suitable for Environment Co-ordinators.

Classroom Taught Course

Environment in Air Traffic Management (ENV-ENV)

The aim of this taught course is to introduce the environmental implications of air transport and their potential to constrain current operations and future growth.

The role of stakeholders and in particular the ATM community in mitigating these issues are discussed in the context of safety, capacity, costs and performance. Aviation's future sustainability can only be achieved if these elements are properly balanced both strategically and operationally.

The four-day course is delivered through lectures, workshops, interactive learning, debates and case studies of good practice. The key issues of climate change, noise, greenhouse gas and local air quality emissions are introduced along with methods of measurement, management and mitigation.

Participants who have attended this course will be able to understand:

- the consequences of their day-to-day decisions on the environment;
- the interdependencies with other stakeholders; and
- the measures they can take to minimise (mitigate) environmental impacts whilst ensuring the safe and expeditious handling of air-traffic.

Access and restrictions:

All stakeholders and interested parties.

Further information:

<https://trainingzone.eurocontrol.int/env-catalogue.htm>

D.7 Concepts and Information Management

SWIM

Description and scope

SWIM (System Wide Information Management) consists of standards, infrastructure and governance enabling the management of ATM information and its exchange between qualified parties via interoperable services. SWIM can only be a success if interoperability is achieved. It is an emerging concept.

What does it do?

Ensuring that an airport's information, communications and technology infrastructure is SWIM-compliant will enable the core operational stakeholders (air navigation service providers, aircraft operators, the airport operator, and potentially other organisation such as ground handling agents) to share relevant data in real time by providing and consuming standardised ATM information services.

In particular, the situational awareness aspects enabled by SWIM, including its common time component, will allow users to co-ordinate the movement of the various airborne and surface vehicles in a more efficient manner. This will facilitate the transition to time-based separation of aircraft for arrival and departure; a more predictable and optimal use of taxiways, gates and stands; and the delivery of service vehicles to aircraft in the right place at the right time.

Overall, this will deliver substantial fuel and emissions savings in the longer term, reducing the airport's impact on climate change and ambient air quality for a given number of air traffic movements. It could also reduce ground noise impact in the vicinity of the airport.

Further information and access to the SWIM concept:

<http://www.eurocontrol.int/services/system-wide-information-management-swim>;
www.sesarju.eu/swim,

http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/atc_comms_services/swim/ ;

www.swim.aero (from Sep 14)

A-CDM

Description and scope

The Airport CDM (A-CDM) project integrates procedures, processes and systems aiming at improving the overall efficiency of operations at European airports, particularly focusing on the aircraft turn-round and pre-departure sequencing process. A-CDM means a step forward from “first come, first served” to “best planned, best served”. Any airport regardless of size can implement A-CDM.

What does it do?

A-CDM is about partners - airport operators, aircraft operators, ground handlers, air traffic control and the Network Manager - working together more efficiently and transparently by sharing information beneficial to each other.

Working in this way allows for better decision making, based on more accurate and timely information, with all airport partners having the same operational picture. This enables more efficient use of resources at airports.

More predictability in the departure process can lead to less congestion on the apron and taxiways, resulting in reduced taxi times and queues at the runway. This translates into reduced fuel burn during taxi and runway holding, which has both economic and environmental benefits.

The benefits are visible at a network level, with more accurate take-off information feeding into the air traffic flow and capacity management system run by EUROCONTROL's Network Management, allowing the ATM Network to run more fluently. The Network Manager will be able to use the available Network capacity more efficiently, meaning more effective use of slots resulting in reduced delays and improved predictability of events during a flight.

Further information, support and access to A-CDM

<https://www.eurocontrol.int/a-cdm> or by contacting the EUROCONTROL A-CDM team at airport-cdm@eurocontrol.int



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