



Airport Environmental Partnership

“... a guide to implementing collaborative environmental management at airports”

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QUICK Start Guide

Purpose

This guidance assists operational stakeholders wishing to establish an Airport Environmental Partnership in dealing with shared environmental challenges at and around airports. It enables Collaborative Environmental Management (CEM) by operational stakeholders¹. This partnership is based upon four levels of collaboration:

- shared Understanding;
- shared Information;
- Consultation;
- joint Implementation.

Is this for me?

CEM applies to any aerodrome that already has or may soon face **aircraft operations related** environmental challenges

If your collaboration on shared environmental issues is already considered to be good at your airport, the document can still serve two purposes:

- As a benchmark to check that your approach reflect good practice;
- Demonstrating to the community, that your local approach to shared environmental challenges is robust and meets or exceeds independently recommended advice.

Scope

This document is intended for use by airport operational stakeholders¹ and applies to civil and military aerodromes.

In this guidance, CEM is limited to those impacts directly arising from aircraft operations (principally noise, fuel use, air quality and climate change). Aircraft operations cover operations on the airport surface and terminal airspace. However the principles of CEM can be applied to any environmental challenges shared by different organisations.

CEM is not an alternative to individual stakeholder Environmental Management Systems (EMS) but it is augmented by these and complements them.

CEM is a key SESAR enabler and the SESAR ATM Master Plan requires that CEM is widespread practice by 2013.

¹ *The 'operational stakeholders' are the Aircraft Operators, Air Navigation Service Providers and Airport Operators and optionally the Handling Agents. These may be supported by 'support stakeholders' such as the Aviation Regulator, Government Departments and Agencies, trade associations, aircraft manufacturers and industry, academia and research bodies, Community Relations processes*

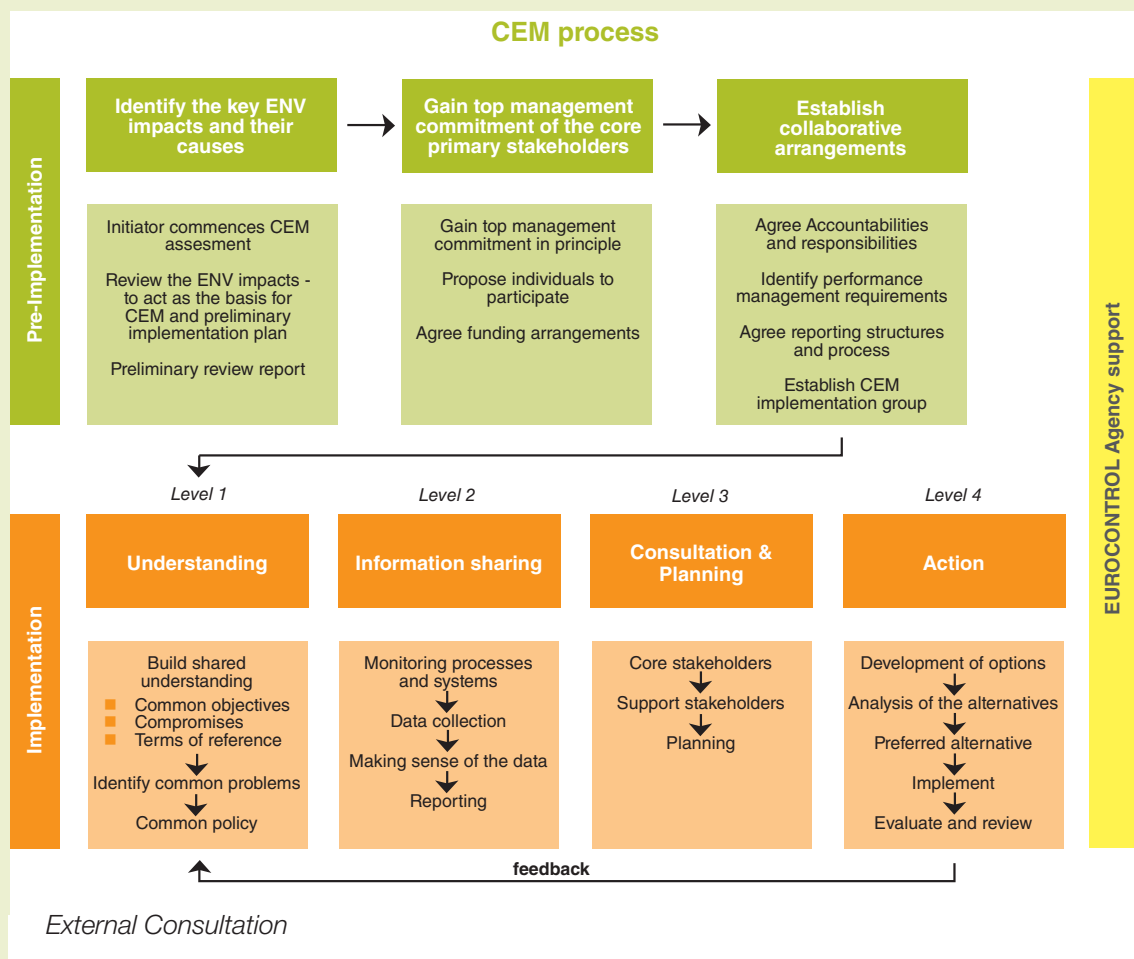
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What exactly is CEM?

CEM is a commonly agreed strategic management process for establishing an airport environmental partnership, between the key operational stakeholders at an airport. This partnership will prioritise and meet environmental challenges caused by the direct environmental impacts of aircraft operations.

CEM is a key SESAR enabler and the SESAR ATM Master Plan requires that CEM is widespread practice by 2013.

This CEM management process is summarised in the following diagram:



In more mature CEM levels, the stakeholders at an airport will work collaboratively to enhance an airport's environmental performance, by introducing a range of practical improvements. Key CEM aims include:

- a more unified and co-ordinated interface between airport operational stakeholders;
- reduction of the risk of environmentally related conflict between the stakeholders;
- to facilitate links between CEM airports to foster sharing of good practice.

Why An Airport Environmental Partnership?

No single operational stakeholder can optimise aircraft operations at and around an airport; and the same is true for the resulting environmental impacts.

A united Airport Environmental Partnership will improve airport sustainability by:

- setting commonly agreed environmental priorities with full buy-in;
- enhancing community relations by providing a united airport presence;
- improving environmental performance, and making airport socio-economic benefits more sustainable;
- supporting airport development;
- improving cost efficiency (e.g. fuel and mitigation costs).

A united Airport Environmental Partnership negotiates more effectively with external decision makers².

A united Airport Environmental Partnership reduces the risk of:

- undeliverable promises being made to external stakeholders;
- the development of poor practice that may be counter productive in another key performance area (e.g. capacity or efficiency);
- duplicating effort made at other airports;
- prioritising marginal or ineffective solutions;
- conflict with other stakeholder plans.

What can CEM Support?

Aircraft related environmental impacts, chiefly noise, local air quality and climate change, contribute significantly to the total adverse impact of an airport. Furthermore the efficient use of scarce resources such as fuel is becoming increasingly important from both environmental sustainability and cost-reduction perspectives.

CEM can help to develop a shared vision for environment at and airport and can help to prioritise, implement or gain environmental recognition for any operational improvement that can mitigate environmental impacts. A limited list of topics that CEM can support includes:

- Continuous Descent Approach and Low Power Low-Drag;
- more efficient airfield operations (e.g. Collaborative Decision Making);
- improved adherence to noise routes;
- preferred runway configuration management;
- airspace changes;
- new navigation methods (e.g. P-RNAV);

² e.g. planning authorities, environmental regulators, local rule makers, national aviation policy bodies etc

QUICK Start Guide

- Improved sequencing methods (e.g. Point Merge techniques can reduce the impacts of aircraft movements at and around airports.

No single stakeholder can achieve these ATM environmental improvements unilaterally. An Airport Environmental Partnership, which employs Collaborative Environmental Management (CEM) has demonstrated that joint action can significantly enhance the environmental performance of an airport, and hence its reputation.)

Failure by operational stakeholders to collaborate effectively to meet an airport's key environmental challenges can result in:

- increased operational costs;
- environmental-related conflicts between stakeholders;
- development of poor practice;
- inability to counter or effectively negotiate externally imposed regulations or local agreements;
- non compliance with local agreements = sanctions;
- inappropriate environmental trade-offs (additional costs);
- non-optimal operational practice and reduced capacity;
- excessive mitigation scheme costs.

Who should start CEM?

CEM can be initiated by a representative of any airport operational stakeholder:

- Airport operator;
- Air Navigation Service Provider;
- Aircraft Operator.

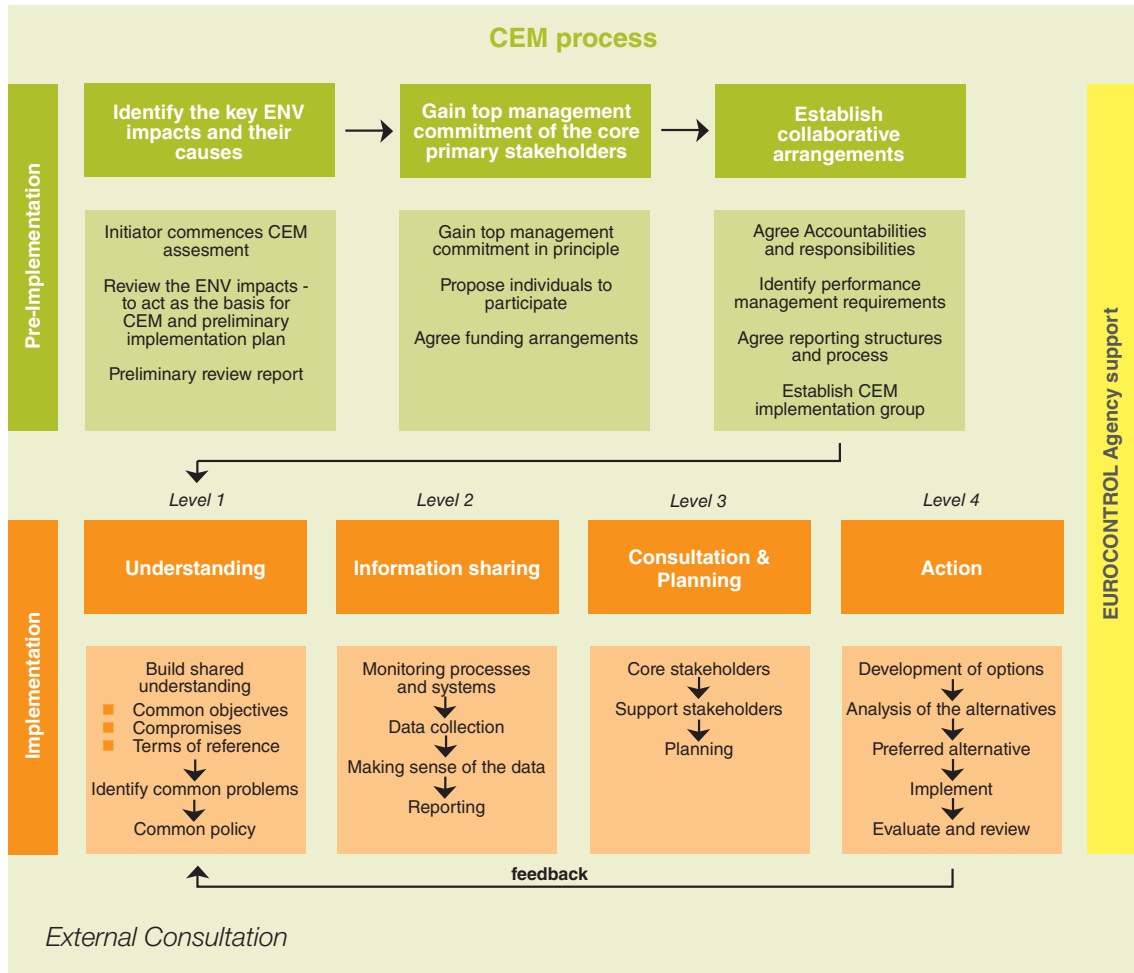
Although it is the airport operator that typically 'owns' and airport's environmental impacts, CEM may support an airline's fuel efficiency drive or an ANSP's airspace change.

Potential Operational Topics for CEM

- Departure-track keeping;
- Noise preferred runway;
- Non-standard procedure;
- Arrival management;
- Continuous descent approach (CDA);
- Departure noise abatement;
- Fleet management;
- Operational restrictions;
- Market-based measures;
- Airspace design;
- Mitigation measures;
- Dispersion vs. Concentration.

CEM Process

CEM Process Overview



The CEM process comprises two phases:

CEM Phase one is the crucial 'Pre-implementation' phase whereby CEM is initiated and developed to a point where full top level commitment to implement CEM is achieved. CEM phase one can be initiated by any airport stakeholder.

CEM Phase two is the joint implementation process itself, where four CEM 'levels' are envisaged:

CEM Level 1: Understanding

This achieves a common understanding of all local environmental issues. Whilst CEM Level 1 may be revisited from time to time in the light of progress, it is the essential starting point and foundation for more active CEM levels.

CEM Level 2: Information Sharing

Based upon the common understanding, CEM Level 2 ensures that appropriate performance information and monitoring systems are established to track progress. Level 2 ensures that all involved are aware of relevant environmental decisions and initiatives undertaken by each other.

CEM Process

CEM Level 3: Consultation and Planning

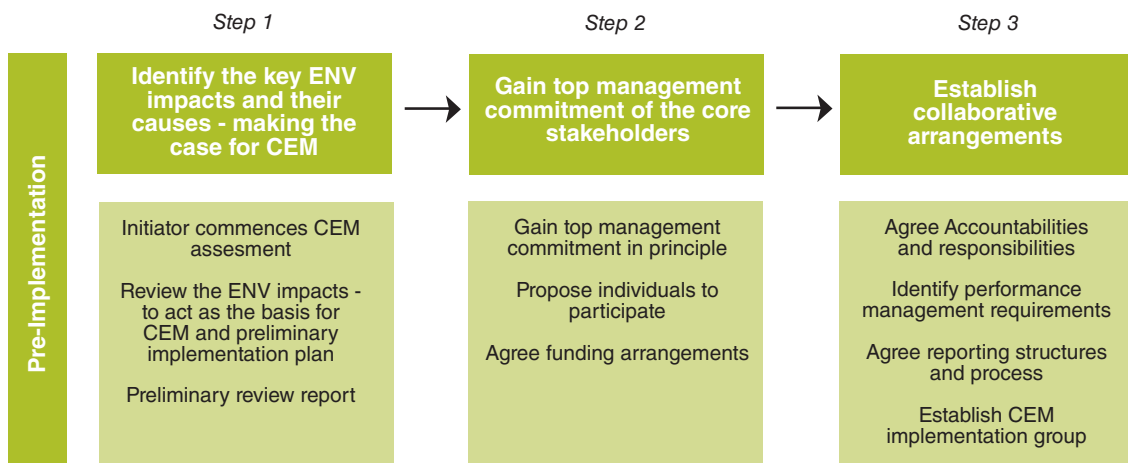
CEM Level 3 provides processes to facilitate joint decision making. CEM Level 3 determines the overall plan to address the priorities agreed in Level 1. CEM Level 3 also establishes the agreed two-way communications channels with interested parties.

CEM Level 4: Action

Level 4 is where stakeholders implement the planned operational improvements agreed in CEM level 3.

Pre-Implementation

Pre-implementation diagram:



Pre-implementation Step 1: Preliminary Review

The preliminary CEM review will serve to confirm whether CEM is appropriate, will identify the broad scope and priorities for CEM, will support the business case.

The preliminary environmental review may be defined as a baseline survey and an opportunity for the initiator to answer the questions:

- What are the key environmental impacts relating to ATM activities at the airport and its associated airspace?
- What significant issues need to be managed within the scope of CEM?
- Who are the best people from each core stakeholder to deal with the issues (CEM implementation group)?
- Which support stakeholders will need to be involved directly or indirectly?
- What broad justification exists for tackling the environmental impact in a collaborative way?

CEM Process

The result of this process is a report detailing the findings of the environmental review and setting out a high level business case with which to gain the support and commitment for CEM implementation.

The CEM 'initiator' (with support if available) undertakes and documents a high level preliminary review answering the following questions:

- what are the main environmental aspects³ related to aircraft operations?
- what the impacts are and how significant could these be?
- which stakeholders are responsible for and are in the best position to influence these impacts⁴?
- what individual mitigation activities are already underway where collaboration is required, and how effective is this collaboration?
- how effective is the airport-wide strategic collaboration between operational stakeholders on setting environmental priorities?
- in the light of the above, what broad justification exists for undertaking the above work in a more collaborative way?

Thought Provoker

Who should write the report? – Typically, the initiator would write up the preliminary environmental review report in partnership with other core stakeholders that are willing to participate; will peer review make the report a more robust?

How should the report be processed? – The report will need to be submitted to top management of different stakeholders at the airport. How can Top Managers be helped to offer a unified response? Is there a mechanism for such cross-stakeholder consideration? What processes will be needed to get approval for different stakeholders? Who should take responsibilities for these processes and how can they be coordinated most effectively? How will conflicting views be handled?

What should be the main content of the report? – The report should be viewed as a quick “business plan” for delivering real environmental, improvements in the short, medium and long-term and as a support for operational and capacity developments. Typically, it should present the significant environmental improvements that can be achieved at relatively low cost together with financial savings, operational cost reductions, workload reductions, etc. It should also explain the external drivers for CEM and should raise the risks of not implementing CEM. Where effective collaboration on environmental matters is already achieved, it should highlight what additional benefits can be achieved. In a sense, the report proposes a CEM management structure and says to decision makers “this is what we should do and here are the reasons...”

³ The key aircraft related processes and activities that give rise to environmental impacts.

⁴ At this stage whilst potential solutions may be uncovered and should be documented for future reference it is not a requirement of a preliminary review to propose new solutions.

CEM Process

Pre-Implementation Step 2: Top Management Commitment

Gaining commitment from the top management of the core stakeholders is the critical milestone (go-no-go) of the pre-implementation phase. Without this commitment it may not be possible to develop a “robust” and “sustainable” CEM process at the airport. This decision does not merely grant the permission to proceed, but must be seen as a long-term commitment to the development of CEM at the Airport. This commitment should be made clear in the preliminary report.

Thought Provoker

What messages will offer the most likely chance of support? – Have all the options been considered? Are there any low-cost opportunities? Is there any corporate image risk from inaction? Are there opportunities to improve the quality of life of local people? Can CEM support the airport’s development plans? Are there PR or recognition opportunities or risks? Are there potential cost savings? Is there a risk of abortive, ineffective or duplicated effort without effective collaboration? And of course if there are no potential improvements available - how can we sell the fact that we meet or exceed good environmental practice? Can you start with small steps? Or is there a bigger opportunity available? What go-no-go opportunities will be available to decision makers? How will they be reported to? What kind of performance monitoring will be provided?

What kind of top management support is needed? – What costs are involved? What resources will be needed? How can the top management support be made visible? What doors can they unlock?

Pre-implementation Step 3: Collaborative Arrangements

Once top management commitment to CEM has been achieved the next step will be to set up and organise the working arrangements of the CEM implementation group on:

- Terms of Reference;
- Membership (expertise);
- Roles and responsibilities;
- Communications channels and reporting arrangements.

Continuous communication among CEM stakeholders are essential for successful CEM implementation. At this initial stage it is important to agree an outline implementation plan – which will act as the main working document for the future. This will mature and be developed as CEM progresses.

CEM Process

The achievement of objectives can be measured against the plan using performance indicators. Two types of indicators would need to be considered:

- Generic performance indicators, applicable collectively to all partners. These indicators would measure the achievement of global target objectives such as Minutes of taxi time reduction, % of CDA flights achieved, dB reduction in average maximum noise levels measured;
- Performance indicators collaboratively defined for each partner. These indicators would measure the achievement of specific improvement objectives (individual stakeholder objectives).

CEM working arrangements would typically involve a range from the following:

Airport Operator

- Environmental team
- Planning team
- Airfield Ops team

Aircraft Operators (lead carrier as a minimum)

- Experienced pilots
- Training Captains
- Station Managers

Air Navigation Service Provider

- Procedure designers
- ATCOs
- Operations Managers

Thought Provoker

- Are Objectives 'SMART' (specific, measurable, achievable, relevant and time-bound?)
- Have you identified and specified the means by which information is to be exchanged between the CEM working group members? – Between CEM and the public communications processes? E.g. new letters? Jojunt complaint responses support? Internet, public meetings, open days etc).
- Are there existing monitoring equipments, modelling tools, data processing systems, etc., available to use?
- What information collection, storage and communications gaps need to be filled and how – by whom?
- What training is required by CEM members? By operational people?

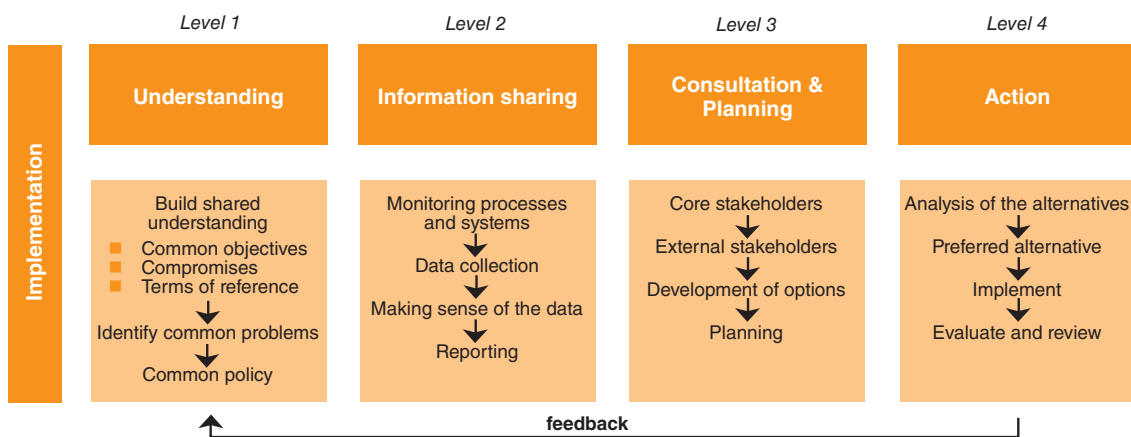
Note: *It is not recommended to involve external stakeholders (e.g. the community) into CEM working group meetings. In fact, a CEM team should meet in "private" in order to foster an open dialogue where "tentative" proposals can be tackled and agreed or dismissed without creating public expectations. Such a group should however feed into and be fed by community relations programmes.*

CEM Process

Implementation Phase

Overview

The CEM process goes through 4 stages of implementation – understanding, information, consulta- tion and action (this is the most mature level).



Level 1: Understanding

This level is where the stakeholders use the outcomes of the pre-implementation phase to build a shared understanding of priorities to be addressed. This should result in a common policy statement and high level vision or strategy to set out the priority action for CEM to work on.

This will require a common understanding of the importance of the different environmental challenges facing the airport, the potential difficulty or costs of potential solutions and the risks of selecting or overlooking each option. Information to help select priorities can come from existing environmental documentation, regulations, complaints data, impact footprint and inventory data etc. Developing this common vision will require a full and open discussion on operational stakeholder interests and constraints together with a mutual view of the drivers for operational change.

CEM Process

Thought Provoker

The process of identifying interests and constraints and the subsequent prioritisation will result in clearly defined objectives based on a balance between:

- the most significant business opportunities and risks;
- the most significant environmental impacts;
- interests and constraints identified during stakeholder analysis;
- interdependencies with other performance areas (capacity, efficiency and so on).

Note: *Any policy should clearly state all key effects in its objectives and be as unambiguous and clearly defined as possible e.g. to reduce noise may give a blank cheque to increase emissions, but it may reduce insulation costs that would otherwise be passed on to other stakeholders.*

Benefits

- satisfying multi-stakeholder priorities, interests and constraints makes it more likely for proposals to succeed;
- involvement in this early stage helps to ensure that options are not overlooked, that buy-in is more likely, that priority issues are addressed first and that risks to individual stakeholders interests are minimised;
- trade offs, limitations and constraints will be fully explored before policies reach the public domain thus loss of credibility is avoided.

Level 2 - Information sharing

The main purpose of this level is to establish an information sharing system through which each partner, provide and have access to the necessary and accurate information that is required.

This step will offer a larger base of information than available to any one of the parties acting alone to allow the development of integrated information streams.

Note: *Some supporting information specific to many airports will be available from EUROCONTROL. It is recommended to contact EUROCONTROL at an early stage to save unnecessary expenditure on gathering information that may already be available.*

CEM Process

A useful starting point will be to simply list available relevant data, its source, availability/coverage, costs, reliability and granularity and how it has changed over time (older data is usually less comprehensive than recent data).

Information relevant to CEM will vary depending on the CEM vision but could include for example (not exhaustive):

- environmental regulations (local, national and International);
- complaints and social survey results;
- plans to modify airport related equipment;
- plans for airfield maintenance;
- points of contact information;
- good practice at other airports;
- flight data recorder data on fuel flow;
- simulator output;
- emissions quantifications;
- environmental models and algorithms;
- CDA achievement.

Additionally, subject to commercial confidentiality limitations, relevant business information should be shared between the core stakeholders. This is particularly important where future plans (e.g. fleet changes, new routes, airspace changes, airport development plans) can influence the environmental performance at the airport.

The objectives and targets identified in CEM Level 1 will require common agreement on a minimal set of KPIs to allow progress to be tracked. These should now be defined in the light of available data.

Level 3 – Consultation and Planning

In CEM level 3 each stakeholder, in recognising the interests and needs of the others, will proactively inform others of proposed changes and engage them in dialogue in good time before decisions are taken. CEM core stakeholders should seriously consider preparing commonly agreed positions to the external world and supporting each other in dealing with environmental pressure groupgroups and community representatives.

1. **Core stakeholder consultation** - estimation of the size of the cost impacts for the airport stakeholders involved. Stakeholders should be more tolerant to support development of environmental management strategies and policies that reflect their issues and concerns.

The CEM Consultation level will minimise the risk of an environmental constraints or non optimal procedure being published or agreed without the pre-agreed support of the player required for its delivery. CEM comprises two principal components:

- A. **Common Impact Assessment** – Individual plans that can affect the aircraft related environmental performance of an airport should be assessed (even if at only high level) using commonly agreed output metrics. These should be consistent with the KPIs agreed in CEM Level 2.

CEM Process

B. CEM Core Stakeholder consultation – This is where CEM stakeholders inform each other and accommodate each others interests in their individual actions, including for example:

- informing each other of relevant plans and proposals in good time;
- seeking the input of other CEM stakeholders before key and relevant decisions are taken;
- proactively supporting each other in achieving their plans where these support CEM;
- modifying individual management processes (e.g. Environmental Management Systems) to support CEM.

2. Support stakeholders' consultation - survey (in the neighbours) about their experience, attitudes, reactions, and finally the benefits that are expected from environmental management strategies.

Level 4 – CEM Action

This mature level is where stakeholders work together to:

- implement environmental improvements;
- optimise the environmental benefits from operational improvements;
- ensure that the environmental benefits from operational improvements are understood and recognition gained (community relations);
- implement mitigation where adverse impacts are predicted.

This requires a shared confidence that *'we have enough agreement to allow us to move forward'*. CEM level four is where collaborative processes become mature and jointly agreed CEM initiatives become integrated into each stakeholder's internal business processes.

Step 1: Make sure you have thought of all the alternatives, in the light of the common understanding of the situation. This stage mainly consists in reviewing recommended practice.

Step 2: Analyse the alternatives from the perspectives of supporting the agreed CEM Vision, safety, key operational performance areas (KPA), practicalities, risks, benefits, costs, trade-offs; and compliance with rules and regulations.

Step 3: Agree detailed plan for each proposal and get formal approval from the top management.

Step 4: Assign responsibilities.

Step 5: Implement⁵. This stage is a sequential process along the lined of: simulation and validation, training, publication, development, promulgation, and launch.

Each CEM member will develop internal actions by which the environmental objectives and/or strategies selected are to be achieved. Sufficient time should be allowed for CEM stakeholder to seek internal agreement to proposals and to secure the resources to progress these. This action step is designed to agree specific actions, each of which having a responsibility and resource assigned.

⁵ Each CEM member will develop internal actions by which the environmental objectives and/or strategies selected are to be achieved. Sufficient time should be allowed for CEM stakeholder to seek internal agreement to proposals and to secure the resources to progress these. This action step is designed to agree specific actions, each of which having a responsibility and resource assigned.

CEM Process

Considerations

Examples of stakeholder actions are:

- Each pilot to use thrust reduction procedure (take off) whenever it can be applied;
- The ANSP to ensure track keeping on departure and arrival procedures so as to affect the least number of people on the ground;
- The airport to apply charging differentials between quieter and noisier aircraft type.

Actions have clear responsibilities assigned such as:

- Airport Operator: Providing information on existing and emerging issues of environmental significance (e.g. constraints);
- ANSP: Facilitating environmentally responsible operational procedures;
- Aircraft Operators: Ensure adequate pilot awareness of new procedures e.g. modifying support information and providing training accordingly.

Benefits

- Turns commitment into action;
- Allows to clearly identify what level of success the CEM team is aiming at - based on what level of success is possible/practical.

Risks

- Competing priorities: environmental actions may sometimes be pitched against urgent needs. In that case, it may be difficult for some stakeholders to comply with their responsibilities.

How do I know that I am compliant with this guidance?

For CEM compliance, your airport should exhibit the following characteristics:

- a regular (minimum twice per annum) CEM group meeting takes place that has the full backing of top management;
- the CEM group is always attended by representatives of:
 - the Airport Operator;
 - the Aircraft Operators (a minimum of the lead carrier or sufficient carriers to cover 50%+ of movements);
 - the ANSP.
- a shared environmental vision for the airport has been agreed by all core Stakeholders and plans for its delivery have been agreed;
- regular joint progress reports against SMART objectives/targets are made through appropriate channels.

Future Development

This brochure should be regarded as a living document that will be adapted as experience is gained on implementation of this guidance. Additional complementary material and support resources will be produced in the near future and these may include:

- a commonly agreed lexicon;
- a web based communications portal for CEM airports to help share good practice;
- conflict resolution tools and techniques to help maintain progress when differing requirements are identified;
- simple (non expert) environmental assessment tools to help with basic option selection;
- case studies to offer practical good practice examples to speed progress; and,
- model terms of references, checklists and risk management documents to harmonise to good practice.

For most airports however, CEM can be fully implemented on the basis of this overall CEM guidance document alone. The four CEM implementation levels proposed in this guidance document are not expected to change substantially. It is important to recognise that structures and cultures differ across Europe and there will be a need to adapt these guidelines to local needs. The initial CEM approach however, should be followed in it entirely.

Next steps

It is important that before implementation of CEM, each stakeholder involved in CEM processes at an airport fully understands the CEM implementation guidance. EUROCONTROL is able to support and offer further guidance in that respect.

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Annex A: Roles and responsibilities

Stakeholders have been categorised into two different groups:

CEM **'core'** stakeholders that will actually carry out CEM at an airport:

- Airport Operator - typically the lead in CEM (but not always);
- Aircraft Operators;
- ANSP.

CEM **'support'** stakeholders who will respond to specific needs communicated by the core stakeholders:

- aviation regulator (may be a core stakeholder);
- community representatives;
- local authorities;
- aviation organisations;
- industry stakeholders.

CEM Core stakeholders

Airport Operator

Usually the Airport Operator is accountable for the overall environmental impact of the airport and has responsibility to ensure adequate support of environmental information. It is often the case that the airport operator also has responsibility for community relations and for future airport capacity development and delivery. In regard to CEM the typical airport operator's roles and responsibilities (local aspects should be taken into account as well) would include:

- Gaining top commitment from airport senior management;
- Coordinating CEM implementation at the airport including facilitating and chairing the Airport CEM Group;
- Providing information on general airport policy, strategy and development plans (e.g. strategic master planning);
- Providing information on airport tactical situations that may affect CEM implementation (e.g. work on runways, aprons and taxiways);
- Providing information on existing and emerging issues of environmental significance (e.g. constraints);
- Identifying and providing information on best practice at other airports;
- Undertaking and reporting on environmental (noise and emissions) and social (complaints) surveys, monitoring and modelling including specific studies in support of CEM;
- Where agreed, and as accountable client for CEM, funding studies and simulations.
- Collating and providing CEM performance information;
- Integrating the potential outputs of CEM with local planning authorities and ensuring that local land-use planning issues are sufficiently taken into account in implementing CEM;
- Ensuring CEM performance is reported internally and in particular to top management;

- Providing the main liaison conduit with:
 - The local community;
 - Locally elected representatives;
 - Local NGOs and amenity groups;
 - Local and regional government;
 - Local authorities including planning bodies;
 - Airport specific state agencies and international/national trade associations;
 - Environmental regulators;
 - Airport related research bodies and consultants;

Air Navigation Service Provider

The ANSP is responsible for ensuring the safe and expeditious use of existing operational infrastructure and provides a facilitation role to help aircraft operators to implement optimum procedures. ANSP typical responsibilities include (local aspects should be taken into account as well):

- Ensuring safe operation;
- Gaining internal top commitment from senior management;
- Ensuring that the staff is aware and trained in new procedures etc;
- Leading on the design of environmentally responsible aircraft procedures;
- Reviewing and optimising airspace design (with adequate consultation);
- Facilitating procedure trials;
- Arranging the publication of new procedures;
- Facilitating environmentally responsible operational procedures;
- Providing radar data and other inputs to maximise environmental monitoring capabilities;
- Minimising the use of non-standard procedures consistent with capacity requirements;
- Advising on emerging ATM related advances, technologies, policies, standards and methodologies that may have a bearing on the environmental impact at an airport;
- Providing timely information on operational tactical situations that may affect CEM implementation (e.g. relevant changes to airspace);
- Identifying and providing information on the best practice of other ANSPs;
- Providing the main liaison conduit with:
 - Aviation regulators;
 - ANSP specific state agencies and international/national associations;
 - EUROCONTROL (focal point);
 - ANSP software and equipment manufacturers.

Aircraft Operator

The Aircraft Operators will implement the environmentally responsible operational procedures and provide simulator support for new proposals. Their CEM typical responsibilities include (local aspects should be taken into account as well):

- Ensuring safe operation;
- Gaining internal top commitment from their senior management;
- Modifying their policy, strategy and plans in the light of the needs for the airport;
- Supporting the design of environmentally new responsible aircraft procedures with simulations and aircraft performance information etc;

Annexes

- Performing procedural trials;
- Ensure adequate pilot awareness of new procedures modifying support information and providing training accordingly;
- Promoting CEM to other operators and assisting them to adopt agreed measures;
- Performing agreed environmentally responsible operational procedures;
- Logging the issuance and adherence to agreed procedures other relevant agreed performance data;
- Providing Flight Data Recorder and other inputs to maximise environmental monitoring and modelling capabilities;
- Advising on emerging aircraft related advances, technologies, policies, standards and methodologies that may have a bearing on the environmental impact at an airport;
- Identifying and providing information on the best practice of other airlines;
- Providing the main liaison conduit with:
 - aircraft operator specific state agencies and international/national associations;
 - aircraft software and equipment manufacturers;
 - other aircraft operators;
 - airport operator specific committees at the airport.

CEM Support stakeholders

The Aviation Regulator

The aviation regulator may be actively involved in CEM at an airport as a core stakeholder, or may act as a proactive support stakeholder. In either case its roles and responsibilities include:

- Ensuring safety by supporting or conducting safety assessments for new concepts and procedures, etc, arising from CEM at an airport;
- Ensuring that any best practice arising from CEM at the airport is spread amongst other state airports as appropriate;
- Publishing any new procedures or AIP information;
- Ensuring that the broader regulatory framework is taken into account.

Relevant State Departments

The State may be a core stakeholder, may rely on the aviation regulator for representation or may be content to have a support role. The State will have an interest in ensuring that a country's airports support economic development by responsible operation and development. Where the State has adopted the EUROCONTROL European Convergence and Implementation Plan Objective for CEM, the State will actively support CEM development. A State's responsibilities include:

- Providing the international context;
- Encouraging the participation of CEM stakeholders;
- Promoting successful applications;
- Support funding where appropriate;
- Spreading best practice to/from other CEM exemplar airports.

Industry's role as a CEM stakeholder

The industry roles will include:

- Providing relevant information on the capability and limitations of their products;
- Support the development of new procedures etc;
- Providing support expertise and evaluation capabilities (e.g. models and simulators);
- Modifying existing and developing new products;
- Providing support funding.

The “community” role as a CEM stakeholder

In addition to potential CEM core stakeholders, other stakeholders will be involved in the implementation of CEM, with varying roles and responsibilities. These include residents, elected representatives, planning authorities, local regulators, amenity groups, chambers of commerce, etc. It is not the purpose of this document to set down this range of possibilities here.

Annex B: CEM in Practice – a Case Study

Noise-driven airspace change at Manchester International Airport (UK)

What was the problem?

Manchester Airport operated a policy of concentrating departures on noise preferred routes until they reach the noise abatement altitude of 3,000ft. At the same time the single runway throughput was reaching its max capacity of 42 movements per hour. Additionally because the runway capacity was exceeded non-standard departure instructions⁶ were occasionally given. This took aircraft away from the noise routes. A proposal for a second runway had been initiated.

How was the problem identified?

The Airport Operator, as part of its environmental policy, which had been agreed with local planning authorities demanded accurate track keeping for land-use planning purposes. Most noise complaints were generated by people claiming to be over-flown away from the nominal centrelines of the SIDs. The airport Noise and Track Monitoring System had identified an average of 90% compliance with the noise routes at +/- 1.5km tolerance either side of the centrelines.

Why was CEM seen as the solution?

Following an initial attempt to enforce the noise routes, it soon became clear that only by operational collaboration could these problems be addressed. Additionally each stakeholder had opportunities to gain benefits and each stakeholder had clear contributions to make. No single stakeholder could achieve the objective on its own. The stakeholders realised this was a shared problem. The top management of each stakeholder fully supported this, which proved to be essential for the success.

⁶ *i.e* An occasional instruction for a flight not to follow a SID but rather to fly to an altitude before turning to clear traffic on the SIDs and to ensure safe and expeditious flow. Only to be used when traffic demand required it.

What initial CEM arrangements were made?

A Technical Working Group was established, led by the Airport Operator Environment Department support by the Operations Division. The Aircraft Operators, including the lead carrier were invited to send station managers and senior pilots (e.g. Training Captains). The Air Navigation Service Provider sent a senior manager supported by technical expertise. The group met every six weeks and typically six to ten Aircraft Operators attended. Track keeping was recognised as a flying techniques issue that was enabled by ATC procedures and technologies.

Thus whilst the Group was chaired by the Airport Operator, the drivers for change were the requirements of the pilots and the sharing of good practice between airlines. This was underpinned by track plots provided by the Airport Operator's noise and track monitoring system.

Which solution was selected to resolve the issue?

It soon became clear that other than the sharing of good practice between aircraft operators, track-adherence had been optimised as far as possible and that further improvement would require that more flyable SIDS more suited to modern aircraft had to be developed. The policy was to follow the existing noise routes as far as possible whilst at the same time the opportunity would be taken to alleviate noise over some population centres. Capacity related improvements were also to be considered.

The following suite of measures were jointly developed and adopted:

- All SIDS were re-designed using PANsOPs criteria to be as flyable as possible within the constraints of noise sensitive populations - these included speed control requirements;
- Certain SIDs were radically altered to avoid major population centres, and these were designed to also be capable of being used given approval for a second runway - to avoid a subsequent change with the associated community concerns;
- The noise abatement altitude⁷ was individually set for each SID depending on populations locations and in consultation with the affected communities (between 3,000ft and 5,000ft);
- Tactical early turn procedures for turboprops were introduced in part to prevent non standard departures being given to noisier Jet Aircraft;
- The SIDs were designed to terminate an air route where possible and the terminate as close as possible to the airport;
- A new Holding Stack (race-track) was introduced;
- A system to log and review non-standard departures was facilitated by giving Air Traffic Controllers the ability to input a one letter code to explain why an NSD had been given – into the airport noise and track monitoring system.

What roles and responsibilities were adopted?

The Airport Operator:

- chaired, sponsored and facilitated the CEM process;
- undertook local liaison and formal public consultation;
- provide track monitoring performance data to support continual improvement.

⁷ Including Airport Operator, ANSP and Aircraft Operator

The Aircraft Operators:

- Improved Flight Management System capabilities and techniques;
- Shared good practice;
- Raised pilot awareness on the track-keeping issue;
- Offered flight simulator support.

The ANSP:

- Liaised with the regulator and EUROCONTROL to incorporate policy and requirements into the SID design;
- Undertook the airspace design and implemented the change;
- Raised controller awareness.
- Managed of non-standard departure procedures.
- Provided ATC simulator support.

What benefits were achieved?

- The number of off-track departure was reduced by around 50%;
- There was a noticeable tightening of overall track-adherence accuracy;
- The number of non-standard departures offered was reduced by over 50%;
- Runway capacity was increased by over two movements per hour;
- The close liaison between operational partners added a lot of weight in the public consultation process to getting the operational improvements secured;
- Everyone was fully aware and engaged in the decision-making process – no surprises.

What problems or risks were encountered?

- The intention to use RNAV procedures for departures was deferred via an intervention by the Regulator;
- Any change to where the occurrence of noise impact sets communities against communities;
- The public consultation requirement was onerous – but essential.

What happened afterwards?

- Over ten years have passed since this initial task was completed and the Technical Working Group still meets;
- Continual improvement in track-keeping accuracy continued under this group;
- New noise and emissions abatement issues were handled by the same working arrangements;
- The same arrangement (using a split agenda) was used for developing runway capacity enhancement initiatives and for informing aircraft operators of airfield maintenance plans, etc;
- The good practice displayed supported the bid for the second runway and gave confidence to decision makers that working arrangements were in place to effectively address the shared environmental challenge.

Annex C: Benefits of applying this guidance

Using this guidance as a basis for strategic process whereby the stakeholders work collaboratively, will maximise the environmental potential of airports. Environmental efficiency can help to minimise the impact of ATM and achieve the following:

- avoiding abortive work;
- adjusting operational costs;
- developing good practice;
- appropriate environmental trade-off;
- optimising operational practice;
- unlocking capacity and helping secure new capacity;
- ensuring that the focus is on priorities.

Community Relations

Effective and two-way relations with surrounding communities, including individuals, amenity groups, local regulators, elected representatives and public authorities is essential to the effective and efficient implementation of Collaborative Environmental Management (CEM). Such open two-way communications are also essential to establish a track record and in gaining recognition for environmental commitment. Operational stakeholders must present a united partnership in order to develop credibility with local communities.

How CEM relates to Collaborative Decision Making (CDM)

CEM is mainly strategic in nature, while CDM⁸ at airports is a mainly tactical initiative. There are however, some potential synergies and overlaps between CEM and CDM at airports. Correctly managed, CEM should be complementary to CDM and vice versa.

Relations with the Environmental Management System (EMSs)

CEM is not an alternative to individual stakeholder Environmental Management Systems (EMS) but it is augmented by these and complements them.

An Environmental Management System (EMS) provides companies with a method to systematically manage their environmental activities, products and services. EMSs have been deployed for decades and are covered by international standards such as ISO14001 and the European Commission's EMASII standards. ISO, the International Standards Organization, defines an EMS as *“the part of the overall management system that includes organizational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining the environmental policy.”*

⁸ Collaborative Decision Making can be summarised as operational stakeholders sharing information and working closely together to optimise an airport's operational capacity and minimise delay. CDM is therefore primarily a tactical and relatively immediate process.

CEM is a process via which individual stakeholders can collaborate on shared environmental challenges at airports that cannot be covered by any individual EMS.

The SESAR ATM Master Plan recommends that CEM is implemented and supported by individual stakeholder Environmental Management Systems. CEM is more effective where stakeholders also operate their own EMS.

Annex D: Support resources

Pre-implementation checklist

Before progressing to CEM implementation it is recommended that the following checklist is used to assess the completeness and robustness of the pre-implementation phase:

- Has an environmental review been undertaken that confirms that CEM is necessary, and what priorities are to form the initial scope for CEM activities?
- Have the key stakeholders been identified and support gained from their top management including the approval for the release of adequate resources and the nomination of points of contact?
- Has a CEM initial framework plan been collaboratively prepared in conjunction with the core stakeholders? Have the following items been approved for adoption:
 - Accountability and responsibilities for the development of a CEM plan;
 - Adequate communication links;
 - A process to assess and measure the implementation of CEM phases.
- Have the other stakeholders been informed of the adoption of CEM and have their roles been agreed with them (especially state, local planning authorities and regulators)?
- Has EUROCONTROL been informed of the intention to implement CEM (we may be able to help you set things up)?

If all is satisfactory then proceed to the implementation phases.

Annex E: Potential Operational Topics for CEM

NB: *The following are only indicative of the guidance on these operational elements and will be expanded as necessary including limitations and risk-management advice.*

Make sure you have considered the following options while identifying solutions with the potential to improve your particular situation regarding any of the following themes. The following list is not exhaustive and each item should be considered locally.

- **Land use planning and management policies**
- **Noise abatement operational procedures**

Departure-track keeping - This is fundamental to noise management programmes. It is appropriate to use it where significant populations are living along side flight tracks.

Noise preferred runway - Within the constraints of safety, future capacity needs and the need for efficient operations, consider how the utilisation of runway configurations with the least noise impact can be maximised.

Non-standard procedure - Used to minimise noise in conditions where operational constraints require their application. They may also be required in emergencies when noise minimisation is not an operational priority. The distinction between standard and non-standard procedures is not defined. For example, it is possible to vary the standard ICAO Noise Abatement Departure Procedures 1 and 2 within guidelines established by ICAO.

Arrival management - This is important for airports where significant numbers of people live, or where sensitive activities such as schools and hospitals are located under the approach path(s). This comes within the general area of the 'Balanced Approach' to noise management on which guidance was issued at CAEP/6 in 2004 (CAEP/6 WP/16 "Guidance Document on the Balanced Approach to Aircraft Noise Management"). It also relates to CDA.

Continuous descent approach (CDA) - an aircraft operating technique in which an arriving aircraft descends from an optimal position with minimum thrust and avoids level flight to the extent permitted by the safe operation of the aircraft and compliance with published procedure and ATC instructions. By flying higher for longer on approach, the noise impact on communities around airports is reduced.

Departure noise abatement - by adjusting procedures such as rate of climb (within limits that do not compromise safety), the impact of noise can be managed so as to minimise the overall impact on communities below the departure routes. Departure noise abatement will give greatest benefit when applied to for-engined aircraft which are unable to climb out from airports as rapidly as their two- or three-engined counterparts, since they are also often the largest and heaviest aircraft using an airport and generally have more noise impact.

Annexes

Fleet management - managing the composition of the aircraft fleet using an airport in order to reduce noise and disturbance. Most airlines have a fleet purchasing/leasing and maintenance programme. Fleet purchasing decisions may have long-term implications, since purchased or leased aircraft may be expected to be in service for many years in order to achieve financial targets. Perhaps the most important contribution to noise impact and management from airlines will be the choice of fleet mix, and its concomitant noise performance. Increasingly, certain aircraft types performing poorly on noise are discouraged or banned from airports where noise performance is critical. Airlines will wish to have a fleet that best meets the needs of the schedule operated. (Freight capacity is key criteria, alongside environmental performance)

Operational restrictions - used to limit the access of particular aircraft to airports, or aircraft to airports at particular times of the day. The restriction can be applied at individual airport level, or through national or regional regulations. Voluntary restrictions have also been implemented to reduce noise impact.

Market-based measures - measures such as charges, penalties and incentives are used to encourage airlines to invest in or route less noisy aircraft, or to operate fleet to reduce noise impact.

Airspace design - the environmental noise impact of aviation can often be mitigated by taking appropriate factors into account at the airspace design stage. In the design of airspace the primary objective is to secure the most effective use of the airspace consistent with the safe operation of aircraft and the expeditious flow of air traffic.

Mitigation measures - use of cost-effective approaches to mitigate the effects of noise on local communities, as part of the overall Balanced Approach to airport noise management.

Dispersion vs. Concentration - if the departures are concentrated on a small number of tracks then these can be designed to impact fewer people, but these people will be exposed to a higher level of noise than if the tracks were dispersed. Dispersion essentially means that the noise exposure is shared across the population living around an airport.

Abbreviations

ANSP	Air Navigation Service Provider
ATM	Air Traffic Management
CDA	Continuous Descent Approach
CDM	Collaborative Decision Making
CEM	Collaborative Environmental Management
EMS	Environmental Management System
EU	European Union
ICAO	International Civil Aviation Organisation
NGO	Non-Governmental Organisation
SID	Standard Instrument Departure
STAR	Standard Arrival Route





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