Aviation and the environment

Sir Richard Branson
Virgin Group Chairman
The environment is everyone’s responsibility

Ulrich Stockmann (MEP)
Emissions trading: a significant step towards addressing the impact of aviation on the environment

Airbus tackles the environmental challenge

Interview with
David McMillan
ECAC Focal Point for Environmental Matters
3 Editorial

Focus

4 The environment in ATM or ATM in the environment: the heart of the matter
8 EUROCONTROL: a partnership for sustainability
12 Assessing the impact of aviation on the environment

Interview

16 David McMillan, ECAC Focal Point for Environmental Matters and Director General of Civil Aviation in the UK

Stakeholder Forum

18 Virgin Group Chairman Richard Branson: the environment is everyone’s responsibility
21 DFS: balancing operational and environmental needs
24 ICAO’s work on the environment
   The CAEP/7 results
28 ENAC: addressing environmental issues globally
31 Airbus tackles the environmental challenge

Independent Platform

34 Ulrich Stockmann (MEP)
   Emissions trading: a significant contribution towards addressing the impact of aviation on the environment
36 European Federation for Transport and Environment
   Emissions trading for aviation: only a first step
38 Air transport and the environment
   The need for a political will

Review

40 EUROCONTROL’s Software Team celebrates 30 years of operational service in Karlsruhe

Datelines

42 Maastricht ATC Exhibition and Conference
44 The Workshop on Functional Airspace Blocks
46 Environment in ATM Consultation Workshop

44 Industry News

46 Visits & Agreements
Dear readers,

Over the past few years, environmental concerns have assumed increasing importance.

With the number of flights expected to reach 16 million by 2020, the capacity of the entire European air traffic management (ATM) network will be increasingly constrained by environmental factors. That is why EUROCONTROL is doing everything it can to minimise aviation’s environmental impact.

In this respect, increased efficiency in the European route network plays a key role. The introduction of six new flight levels in January 2002 reduced annual carbon dioxide emissions by 1 million tonnes, which is the equivalent of removing three days’ worth of emissions from the system every year. The implementation of the flexible use of airspace in Europe currently saves a further 400,000 tonnes of CO₂ annually. EUROCONTROL’s Central Flow Management Unit also helps reduce emissions on a daily basis. It does so by proposing more direct routings whenever possible and by keeping aircraft on the ground with the engines switched off until there is a slot available, rather than have them circle in the air.

However, more work is needed to ensure that air traffic management can contribute to a 10% reduction in fuel burn by 2020. Central to achieving this progress in the short and medium term is the Dynamic Management of the European Airspace Network (DMEAN) Programme, and in the long term there is SESAR.

Together with our stakeholders we are determined to accelerate air traffic management’s contribution to the sustainable development of air transport.

Key to enhancing aviation’s environmental performance is improved communication. It is essential for all of us in the aviation industry to be able to improve our understanding of environmental issues and to be able to learn from each other’s experience and move towards determining and adopting best practice. This is why we at EUROCONTROL have launched a debate with stakeholders in order to identify key issues and areas for change, with a view to ensuring that we can add value and help our partners to do business.

This Skyway issue is a very good example of this. In this edition, we aim to shed light on the main environmental challenges facing the aviation industry as a whole. We address the main issues and propose solutions. By working in partnership, we believe that ATM can contribute to minimising aviation’s environmental impact, while meeting safety, capacity, security and economic requirements.

Victor M. Aguado
Director General

Chers lecteurs,

Les préoccupations environnementales ont pris, au cours des dernières années, une importance grandissante.

La croissance escomptée du nombre annuel de vols, qui devrait atteindre les 16 millions en 2020, soumettra la capacité de l’ensemble du réseau européen de gestion du trafic aérien (ATM) à des contraintes environnementales sans cesse plus fortes. C’est la raison pour laquelle EUROCONTROL met tout en œuvre pour limiter au minimum les incidences de l’aviation sur l’environnement.

L’efficacité accrue du réseau de routes européen joue, sur ce plan, un rôle déterminant. L’introduction de six niveaux de vol supplémentaires en janvier 2002 a permis de réduire d’un million de tonnes les émissions annuelles de dioxyde de carbone, ce qui revient à supprimer chaque année l’équivalent de trois jours d’émissions. La mise en œuvre du concept d’utilisation flexible de l’espace aérien en Europe permet à l’heure actuelle de diminuer annuellement les émissions de CO₂ de 400 000 tonnes supplémentaires. L’Organisme central de gestion des courents de trafic aérien d’EUROCONTROL contribue lui aussi quotidiennement à la réduction des émissions, en proposant systématiquement des itinéraires plus directs à chaque occasion possible et en maintenant les aéronefs au sol, moteurs coupés, jusqu’à ce qu’un créneau se libère, plutôt que de les faire évoluer dans des piles d’attente.

Des efforts supplémentaires sont toutefois requis afin que la gestion du trafic aérien puisse contribuer à une diminution de 10% de la consommation de carburant d’ici 2020. À court et moyen termes, le Programme DMEAN (Programme de gestion dynamique du réseau aérien européen) jouera un rôle essentiel dans la réalisation de cet objectif, suivi, pour le long terme, par le Programme SESAR.

Nous sommes déterminés, avec nos partenaires, à accélérer la contribution de l’ATM au développement durable du transport aérien.

L’amélioration des performances environnementales de l’aviation passe impérativement par une meilleure communication. Il est en effet essentiel que chacun des acteurs du secteur aéronautique puisse mieux cerner la problématique environnementale et tirer parti des expériences des autres en vue de définir et adopter des pratiques exemplaires. C’est dans cet esprit qu’EUROCONTROL a engagé un débat avec ses partenaires, qui a pour objet de recenser les questions et domaines clés où un changement s’impose et, partant, de faire en sorte que l’Organisation puisse apporter une valeur ajoutée et aider ces mêmes partenaires dans la conduite de leurs activités.

La présente édition du magazine Skyway est une très bonne illustration de cette démarche. Dans ce numéro, nous nous attachons à mettre en lumière les principaux défis environnementaux auxquels le secteur aéronautique dans son ensemble est confronté. Nous abordons les grands problèmes et proposons des solutions. Nous croyons fermement qu’en œuvrant en partenariat, le secteur ATM peut contribuer à réduire les incidences de l’aviation sur l’environnement, tout en répondant aux exigences posées en termes de sécurité, de capacité, de sûreté et d’efficacité économique.

Victor M. Aguado
Directeur général
The environment in ATM or ATM in the environment?

by Guido Kerkhofs, Director Air Traffic Management Programmes, EUROCONTROL

Andrew Watt, Environment Domain Manager, EUROCONTROL

There is growing environmental pressure on the air traffic management (ATM) sector, both from the general public and at political level. Many stakeholder articles in this edition of Skyway explain the underlying factors. They are most apparent at the increasing number of airports which have severe environmental restrictions on their operations, principally due to noise but increasingly linked to local air quality. However, the impact of aviation emissions on climate change is very quickly becoming a major concern. This has the potential to influence the use of en-route capacity as a result of measures or regulations designed to minimise environmental impact, and possibly also to affect the demand side as a result of economic measures.

The vast majority of European airports now experience environmental restrictions, yet only six flow management positions currently report environmental delay. In 2006, this amounted to 33,915 minutes out of a total of 18.4 million minutes of air traffic flow management (ATFM) delay reported. The fact that environmental restrictions and non-optimal operations are built into flight plans probably masks the real extent of the problem. Moreover, noise abatement operational procedures may lead to longer flight times, which in turn increase fuel burn and engine emissions.

At airports, ATM has to cope with noise abatement procedures, noise routes, noise-related airfield configuration restrictions, noise preferential runways, noise dispersion regimes, movement restrictions and curfews, impact limits, onerous planning and consultation processes and other environmental management measures. It must do so while maintaining high levels of safety and ensuring adequate capacity to meet demand. As traffic increases and with it the pressures to further constrain airport operations for environmental reasons, ATM finds itself at the heart of the matter, namely how to ensure the least possible environmental impact for the maximum possible airport throughput.

A particular concern is the lack of harmonised guidelines and operational techniques that can be applied across the European region. This leaves airports and ATM open to attack from
local, well-informed communities, which cherry-pick what they consider to be the most advantageous procedures (for themselves) from other European regions or even from other global regions. While this applies primarily to operations at airports, it may also apply to a lesser extent to en-route operations.

Air traffic operations in the en-route phases of flights do not yet suffer from the environmental constraints that airports are experiencing. The significant investments and cooperative action to increase en-route capacity over the last 15 years have also improved the efficiency of the en-route network, with direct benefits in the proportionate reduction of both fuel burn and greenhouse gas emissions per flight. ATM has in general neither assessed nor claimed these benefits, which in practice are unlikely to offset the absolute increase in aviation emissions over time as movements increase.

For example, the introduction of reduced vertical separation minima is estimated to save over 310,000 tonnes of fuel annually, which is equivalent to almost 1 million tonnes of carbon dioxide ($CO_2$). The Flexible Use of Airspace Concept is being increasingly applied and already saves about 120,000 tonnes of fuel every year. Air traffic flow management measures require aircraft to wait at airports with their engines switched off prior to their slot time becoming available. This avoids the unnecessary consumption of a further 300,000 tonnes of fuel every year. ATM therefore effectively delivers fuel savings of over 700,000 tonnes a year, equivalent to approximately 2,300,000 tonnes of $CO_2$.

Firstly, airspace users are pressing for network inefficiencies to be squeezed out of the system. The EUROCONTROL Performance Review Commission’s (PRC) 2005 Report identified annual savings to users of up to €1.2 billion if such inefficiencies could be eliminated. A significant proportion of these savings comes from reduced fuel burn, which also reduces greenhouse gas emissions. In response to the confirmation of these findings in its 2006 Report, the PRC is therefore proposing as a flight efficiency target a reduction in the European average en-route extension per flight of two kilometres per annum until 2010, which would reduce carbon dioxide emissions per flight as a consequence.

Secondly, the attitude of the general public and politicians towards climate change has hardened in recent years as the research evidence linking global warming to the activities of mankind has accumulated. Politicians feel an increasing need to act as public disquiet grows. The pressure to invoke the precautionary principle is building. The European Summit of 8-9 March 2007 committed the European Union by
The environment in ATM or ATM in the environment?

The heart of the matter

2020 to reducing CO₂ emissions by 20% against 1990 levels.

Like all forms of transport, aviation is a rapidly-rowing generator of greenhouse gases. Although aviation is starting at a low base of approximately 3% of total man-made emissions, it has to be seen to be responding to this challenge, and must communicate more effectively the environmental improvements being achieved. The European Commission considers, for example, that at current growth rates, “there is a risk that growth in the Community’s share of international aviation emissions could by 2012 offset more than a quarter of the environmental benefits of the reductions required by the Community’s target under the Kyoto Protocol.”

Despite the best efforts of ICAO to reach agreement on emissions reduction measures, the European Commission is actively pursuing the incorporation of aviation emissions in the European Union’s Emissions Trading Scheme (EU ETS). On 20 December 2006, the Commission proposed new legislation to that effect which, if adopted, would apply to all intra-EU flights from 2011, and other departing and arriving flights from 2012. The pressure from airspace users on ATM to further improve network efficiency can therefore be expected to grow.

It is important not to forget, however, that the European Community’s Single European Sky legislation specifically identifies, in Article 6.1 of the Airspace Regulation, the need for route and sector design to ensure the safe, economically efficient and environmentally-friendly use of airspace. It can therefore be anticipated that, as environmental awareness spreads among ATM stakeholders, air navigation service providers and regulators will increasingly incorporate environmental mitigation in their activities, such as the design of functional airspace blocks. This would reinforce the rapidly evolving approach of the ATM industry towards sustainability issues in general, which the SESAR initiative is strongly driving. Indeed, the European Commission considers the SESAR initiative to be a complementary instrument to the ETS in combating the climate-change effects of aviation.

ATM therefore finds itself once more at the heart of the matter. It has to facilitate society’s demand for safe and expeditious air transport on the one hand, while also respecting society’s competing demand to minimise or reduce the environmental impact that is the inevitable consequence of such mobility. While these issues may never be completely resolved, the European aviation industry, including ATM, must demonstrate that it is doing all it can to resolve this paradox and thereby convince decision-makers of its sustainability over the long term.

The Agency's various airport operations initiatives now systematically take fuel burn and environmental impact into account

EUROCONTROL at the heart of the matter

What, therefore, is EUROCONTROL doing to help our industry meet this challenge? Firstly, it is doing everything it can to improve network efficiency. This reduces flight times and fuel burn, directly benefiting the airspace users’ bottom lines, while minimising the environmental impact per flight. The DMEAN Programme is central to achieving this progress in the short term and is developing a “DMEAN Environmental Case” that will demonstrate the positive impact the programme will have. Much can also be done at airports where every initiative to improve airside efficiency should save fuel and emissions. The Agency’s various airport operations initiatives now systematically take fuel burn and environmental impact into account. Also, of course, there is SESAR, in which the Agency is working closely with stakeholders within the Environment Work Package (1.1.4) to ensure that SESAR identifies those actions which will deliver the 10% emissions reduction sought by decision-makers.

The Agency has gradually built up its expertise on environmental issues, firstly through research activities at the EUROCONTROL Experimental Centre (EEC), and more recently in EATM, where the Environment Domain was established four years ago. Together, these two units provide a small but highly motivated group of staff with the skills and resources to deal with environmental issues in the ATM context.

There is, for example, an increasing requirement to be able to model the environmental impact of ATM, whether from the service-provider side assessing new operational procedures, or from the regulatory perspective to identify performance trends and what, if any, further standards should be devel-
The suite of “dual-use” assessment tools that the EEC has developed is being used to support these two key stakeholder groups.

Indeed, the EEC’s Advanced Emissions Model (AEM – as explained in a related article) is being used to support ICAO standardisation activities on the one hand, and airspace scenario design assessments on the other. It also supports assessments of operational improvement proposals such as continuous descent approach, where both the fuel and emissions savings contribute to an increasingly persuasive business case for its implementation. Operational flight trials managed by the Environment Domain have demonstrated fuel savings of between 50 and 150 kg per approach, while reducing noise levels 10-25 nautical miles from touchdown. A related article in this edition of Skyway further explains EUROCONTROL’s plans for CDA implementation.

We also have to look at how the ATM sector can better communicate its increasingly good environmental performance. Airspace users and manufacturers can call upon decades of performance data to support their claims of 70% reductions in fuel consumption and noise per flight, but what story has ATM to tell? Do we have such information? Who is achieving best practice in managing environmental pressure as a business issue? What basic information can be provided to move air navigation service providers and their regulators along that road? Operational stakeholders have recently made it clear that they expect strong support from the Agency on such communication and awareness issues.

In order to successfully communicate ATM’s improved environmental performance, we need to have the tools and processes in place to deliver the facts and figures that will underpin our claims. As part of its internal improvement programme to achieve EFQM² Award status, the Agency adopted a Corporate Social Responsibility Policy in 2006. Minimising aviation’s environmental impact through ATM measures is at its heart and is driving a systematic approach to assessing the contribution that each ATM performance improvement measure can bring. Essentially, the principles of an environmental management system are being introduced, with the Environment Domain and Experimental Centre providing the methodologies and tools for ATM project managers to evaluate their contribution to environmental performance, as they do already for safety and capacity, for example.

Both SESAR and ICAO are in fact thinking along similar lines. We anticipate that the Agency can contribute to both the “Environmental Case” methodology initiative within ICAO (as explained in a related article) while developing through SESAR a more systematic approach to managing environmental issues within ATM.

That is one reason why we have put in place an “Environment in ATM” training strategy that was explained in the most recent edition (Winter 2006) of Skyway. It provides ATM organisations with the means to kick-start the development of environmental awareness in their organisations. The “Environment in ATM” training suite combines the e-learning product released in April 2006, a one-hour awareness module embedded within other training courses at our Institute of Air Navigation Services (IANS) and, from early next year, a dedicated instructor-led course at IANS aimed at those ATM managers who have to consider environmental impact in their work.

Finally, the Agency is the custodian of a vast amount of ATM-related data, and both operational and regulatory stakeholders are increasingly appreciative of the information that the Agency can provide when analysing these data from an environmental perspective. Thus, the Environment Domain, working closely with the PRISME data warehouse team, has established the PAGODA facility to deliver pan-European ATM network indicators covering flight efficiency, fuel burn and greenhouse gas emissions. PAGODA has been used extensively to support the policy-making discussions surrounding the proposal from the European Commission to include aviation in the EU’s Emissions Trading Scheme. Indeed, the Agency continues to receive requests from Member States, the EC and airspace user organisations for support as the debate on the draft legislation develops.

Whether dealing with local or global aviation environmental issues, EUROCONTROL, working with its partners, has a unique role and competence in cost-effectively facilitating, harmonising and communicating ATM’s success.
Society demands have increased access to all forms of public transport, including aviation, whose annual growth remains consistently above that of national economies. Most economic and social benefits that come from aviation activities are well known, yet public acceptance of our industry is weakened by community perceptions of its environmental impact thereby threatening its sustainable growth over the long term. Other societal benefits such as health improvements from aviation-driven poverty reduction are less widely understood. Since it is around airports where these impacts are most directly felt by society, airports have remained the focus of the regulatory response and are the source of the most significant environmental constraints in Europe’s air traffic management (ATM) system.

In en-route airspace, climate change and fuel stock depletion are the most significant ATM-related adverse impacts. Around airports, however, these are strongly exacerbated by noise, air quality and third party risk issues. In fact, since landside operations make use of “environmental capacity” that would otherwise be available to aircraft operations, there are interrelationships between many landside and airside operations at an airport as far as the environment is concerned. Indeed, these interdependencies go beyond airport boundaries since overall environmental impact often depends on factors external to aviation such as land-use planning (or an absence thereof) and the proximity of other pollution sources such as motorways. Furthermore, changes to the noise footprint and certain related decisions external to ATM, such as those regarding residential development close to airports, will benefit some communities and disadvantage others. Thus, ATM-related environmental management at an airport is a very complex issue from technical, societal and political perspectives.

The policy response to these adverse impacts imposes major costs and constraints on the ATM system, including:

- mitigation costs (e.g. bunds, barriers, insulation and management overheads), which form part of operational costs;
- operational costs (e.g. extra fuel used to avoid overflying population centres);
For decades there have been environmental programmes at many European airports. These tend, however, to respond to local circumstances and, where not coordinated either nationally or regionally, will lead to the proliferation of local rules. Moreover, despite the fact that most environmental problems can be resolved only through collaboration among airport operational stakeholders (air navigation service providers, aircraft operators and airport operators), such collective action is often not optimised and sometimes is not present at all. There is also considerable room for pan-European improvement regarding the avoidance of poor practice, the sharing of good practice, training and awareness, assessment capabilities (including trade-offs) and avoiding duplication of effort.

This situation is compounded by instances where ineffective environmental solutions are imposed by external (i.e. non-ATM) decision-makers – often with significant adverse environmental or socio-economic trade-offs. Such poor performance often arises because poor practice at one airport is being blindly replicated at another without consideration of its suitability to local conditions. These problems are typically (though not always) found at airports where community relations and consultation are not effective, or where community trust has been lost.

This does not mean that all airports exhibit poor practice or that some airports are not achieving best practice. In fact, if environmental performance at all airports matched the existing best in class, there would be very little for rule-makers to criticise or impose. Few airport stakeholders, however, are world class in all aspects of environmental management and yet this is the standard that is required if aviation is to retain its licence to operate.

Furthermore, ATM stakeholders must collaborate more effectively in highlighting the environmental benefits from the operational improvements they introduce. ATM organisations have achieved major efficiencies and improvements over many years but are only now beginning to appreciate how much their value in environmental terms can strengthen their business cases and reputations among both financial and political decision-makers. Unfortunately, ATM is still not very good at making these known to the public or to policy shapers. This is one of our sector’s critical weaknesses.

For environmental performance at all airports to match the existing best in class, there would be very little for rule-makers to criticise or impose. Few airport stakeholders, however, are world class in all aspects of environmental management and yet this is the standard that is required if aviation is to retain its licence to operate.

It is also vital that environmental issues are not seen in isolation, but are addressed within the context of sustainability. This will also ensure that where the many and substantial positive contributions of aviation are also taken into account, are not sacrificed and indeed are seen to be maximised where possible. This will avoid situations where small gains in environmental performance are made at the cost of major impacts on, for example, jobs and economic development. Thus, ATM must become more informed about the sustainability impacts of its decisions. This will require better environmental impact assessment tools, trade-off assessment methodologies and high-quality information. It is also
EUROCONTROL: a partnership for sustainability

essential to avoid the imposition of environmentally-driven constraints and non-optimum operations that are ineffective or counterproductive from an environmental standpoint. This will require transparent decision-making not only by ATM but also by the external rule-makers themselves. It will also mean avoiding the blind replication of environmental practice and application of ‘one-size-fits-all’ solutions.

Meeting the challenge

Working closely with ATM stakeholders, EUROCONTROL is developing a suite of airport-related environmental initiatives. These have been selected on the basis of stakeholder requirements following, firstly, extensive research and consultation and, secondly, agreement on where EUROCONTROL’s competence and ability will add significant value.

The first key activity is to facilitate the implementation of Continuous Descent Approach (CDA) in a harmonised manner across Europe. This work was triggered by operational stakeholders – principally airlines – who recognised both the safety implications of an uncoordinated development of CDA across Europe, as well as the benefits to be gained from CDA’s potential to reduce noise, fuel burn and emissions. CDA is therefore the subject of a European Convergence and Implementation Plan Objective – in this case ECIP ENV01. EUROCONTROL has established a cross-Agency team of airspace, navigation, airport, environmental and ATC systems experts to work with stakeholders in developing pan-European CDA guidance material. This will be available from June 2007.

Operational CDA flight trials have been undertaken at Manchester International, Stockholm Arlanda and Bucharest Henri Coanda International Airports and have successfully demonstrated that CDA can be implemented. Results from the trials typically indicate that, along the CDA approach segment, noise reductions of 10-40% and fuel savings of 50-150kgs per flight can be achieved, with associated reductions in greenhouse gas emissions (principally, carbon dioxide and oxides of nitrogen). The CDA activity is being progressed with stakeholders under the auspices of the Airport Operations Team, which originated the initiative, and the Airspace and Navigation Team, which has been developing the operational aspects through a dedicated CDA Focus Group.

In parallel, a study is currently under way to demonstrate the feasibility of implementing a group of activities centred around Collaborative Environmental Management. If accepted by stakeholders, they will be developed as part of SALIENT, the first EUROCONTROL environmental implementation programme, with an objective to secure current and future airport capacity through environmental improvements. SALIENT includes:

- A methodology for Collaborative Environmental Management (CEM) at airports. CEM provides practical guidance and support resources to help airport operational stakeholders collaborate effectively in dealing with airport environmental problems, such that they prioritise their shared responsibilities efficiently, effectively and economically. This is at the very heart of EUROCONTROL’s airport environmental activities and is critical to successfully selecting, designing and implementing any operational environmental solutions. An effective CEM mechanism is essential to introducing CDA, for example. CEM is the subject of a European Convergence and Implementation Plan Objective (ECIP ENV02), for which pan-European guidance will be available in June 2007.

- A web-based portal, SOPHOS. This will provide CEM practitioners with a ‘one-stop shop’ offering guidance and practical support to airport operational stakeholders when undertaking environmental initiatives and when responding to environmental pressures and proposed local regulations including harmonised CDA definition. It offers resources in three key and interrelated areas: quantification, evaluation and management. In addition to recommended practice pages and case studies, SOPHOS will also include:
  - a confidential benchmarking facility;
  - a significance assessment tool;
  - an outline environmental impact assessment tool to apply to operational proposals; and,
  - an environmental information repository including a legislative database and extracts from relevant reports and standards.

SOPHOS is presently being beta-tested by airport operators and, if proven to be feasible and of value, will be developed over 2008 to 2011.

- An initial scoping study into the overall cumulative capacity and efficiency effects of environmental constraints and environmentally-driven non-optimal operations on the European ATM system. This study will also compare constraints with reported delay to identify whether the subject is being adequately monitored. If viable, this will be the first time that a European perspective on these environmental
aspects will have been compiled and should lead to improvements in the monitoring of environmental issues and their management.

- The development of advanced noise abatement techniques. These will make use of recent improvements in navigation and aircraft technologies to enable more optimised profiles to be flown, including more accurate adherence to noise routes. A critical element here is to ensure that there is no impact on airport throughput.

- Trade-off assessment methods and tools, plus provision of operational information. These will inform decision-making and help to develop more sustainable thinking.

This portfolio of airport-related environmental activities addresses the most urgent needs of stakeholders to deal with airport environmental challenges. The overall aim of our work is to facilitate and enhance local decision-making through the provision of a harmonising framework that allows local stakeholders to select optimum solutions and implement good practice. Moreover, if local stakeholders do work within such a pan-European approach, their credibility, both nationally and locally, will be enhanced when they demonstrate that they are adopting European best practice.

EUROCONTROL is also developing an action plan to ensure that all parts of the Agency and all levels of management consider environmental sustainability in their decision making. Indeed, the Agency’s airport operations project leaders are taking the lead to ensure that the environmental dimension is fully captured in their work. Examples include a specific environmental module in the Airside Capacity Enhancement training course, and the assessment of the fuel burn, emissions and noise reductions to be gained from the introduction of departure manager support tools.

**Conclusion**

Airports have become the main bottleneck in the European ATM system, in large part due to increasingly stringent environmental constraints. ATM operational stakeholders, including EUROCONTROL, must collectively demonstrate that all avenues for environmental improvements are being explored, that the best options are effectively implemented and that maximum socio-economic benefits are delivered if aviation is to retain its licence to grow.

Aviation however, is not separate from society. The extent of the beneficial and adverse impact of aviation is largely driven by societal demand for mobility. Society also has a responsibility to help to minimise adverse impacts by not imposing unnecessary or counterproductive environmental rules and by seeking to mitigate impacts where possible, for example through fully enforced and integrated land-use planning; for its part, ATM must remain responsive to the often conflicting demands from society. ATM will only effectively meet the environmental challenge, and hence its own business needs, through leadership and collaboration, through improved two-way communications and by effectively prioritising investments for improved environmental performance without delay.
Focus

Assessing the impact of aviation on the environment

Despite the obvious societal and economic benefits of aviation, there are clearly some negative impacts that need to be managed if the industry wishes to advocate and promote itself as being sustainable.

Traditionally, the focus has been on the impact of aviation on noise, local air quality and global climate change.

Monitoring the situation, by analysing background conditions and individual events, is essential. However, this cannot by itself isolate the contribution of aviation to ambient conditions. Furthermore, because of uncontrollable influences such as weather and other contributing factors, monitoring alone cannot easily quantify the average or typical impacts that aviation activity might have.

That is why modelling is also used to explain observed “facts” by representing a system with all its complexities and interactions. A model will attempt to describe a system based on existing knowledge and available data. In many cases, the data and knowledge are incomplete, massive or complex and some assumptions and simplifications are needed. A model has a further advantage - it can be used to simulate the future and predict the results, based on particular conditions and assumptions.

The reason for explaining these generalities about modelling is to stress that successful modelling depends on developing and supporting international methodologies and guidance material, which have been peer-reviewed by a wide cross-section of domain experts. Only by developing transparent and endorsed methodologies as a community and applying these in validated modelling tools, can an analyst expect the results presented will be credible and acceptable.

EUROCONTROL first started developing environmental models more than eight years ago and has in parallel participated in European and International working groups, contributing to new guidance material being developed for modelling the impact of aviation on the environment.

International guidance material

Contributions have been made within ICAO’s Committee on Aviation Environmental Protection (CAEP) working groups to the development of guidance material on local air quality and greenhouse gas emissions. The example offered here, however, covers EUROCONTROL’s contribution to aircraft noise modelling, including the updating of ECAC’s Doc 29 “Report on Standard Method of Computing Noise Contours around Civil Airports”.

Update of the ECAC Doc 29

In 2001, the ECAC’s Group of Experts on the Abatement of Nuisances Caused by Air Transport (or ANCAT for short) set up a task group to update the ECAC Document 29 2nd Edition in 1997, which introduced a number of additional features, without changing the foundations of the methodology.

Apart from the fact that it has been overtaken by modelling improvements that have already been incorporated into some state-of-the-art noise models, this international guidance had two major limitations, diminishing significantly its practical value. Firstly, this guidance focused mainly on the algorithms and equations that have to be incorporated into computer programs, with little advice on the practical application of the methodology. Secondly, the guidance did not provide any of the aircraft-specific noise and performance data that are required to implement the modelling methodology in a real – practical – modelling system.
intended principally for aviation policymakers and planners who need noise contour maps to make informed decisions. Volume 2, which replaces the Second Edition of ECAC Doc 29, describes a recommended modelling methodology (i.e. a full description of the equations and algorithms) that incorporates the latest internationally agreed advances in modelling techniques.

**The Aircraft Noise and Performance database website**

In order to enable its full implementation in practical modelling systems, and promote commonality within the community of aircraft noise modellers, the Third Edition of ECAC Doc 29 is supported by an on-line, industry-backed, international Aircraft Noise and Performance (ANP) database.

This ANP database is accessed through a website (http://www.aircraft-noise-model.org) that has been developed and is maintained by EUROCONTROL, with logistical and financial support from the United States Federal Aviation Administration (FAA) in obtaining the relevant data from airframe manufacturers.

**From European to international guidance**

Now that the Third Edition of ECAC Doc 29 and the ANP database are available, ICAO guidance material is being updated and brought into line. There are now around 200 registered users of the ANP database worldwide. EUROCONTROL has recently agreed to a request from ICAO to guarantee the availability of the ANP database for a minimum period of five years, thereby facilitating the release of ICAO’s own revised noise modelling guidance material.

**TESA – A European Toolset for Environmental Sustainability Assessment**

TESA provides a framework for in-depth analyses of changes to the ATM system such as new runways, new ATC procedures, new air-route structures, new aircraft types, increased demand, etc., and for arriving at solutions that minimise their environmental impact. TESA evaluates the impact of changes in terms of local air quality, noise, fuel burn and global emissions.

TESA is driven by four-dimensional flight profiles (sources may be from Central Flow Management Unit, radar, fast- and real-time simulations, and actual flight data). The tools are closely coupled to international databases (for example: the Aircraft Noise and Performance database, ICAO engine emissions databank, weather information, GIS data).

TESA provides an efficient support tool for decision-makers on a European and international level and can help evaluate the achievement of targets. TESA is a unique set of tools for providing answers to key questions, both for the EUROCONTROL Agency’s projects and for the wider international community.

It provides a platform for conducting trade-off studies between noise and emissions as it allows simultaneous analysis from the same data sources using the same assumptions.

**Modelling local air quality**

Local Air Quality (LAQ) is an increasingly important issue for airports. Faced with demands on capacity and pressure from local communities, airport operators need to understand and plan their environmental impact to help mitigate the impact of noise and pollution whilst improving safety and airport capacity.

To meet these needs airport operators require accurate emissions inventories and emissions concentration maps, correlated with data such as land-use, population density, non-airport sources of pollution, and pollution-sensitive zones.

Air quality modelling is particularly complicated, as it is not only a question of modelling the amount of emissions each source produces, but also of estimating pollution concentration levels resulting from physical mixing and chemical reactions in the atmosphere. Regulations on air quality are usually defined in terms of concentration levels.
Focus

Assessing the impact of aviation on the environment

The EUROCONTROL Airport Local Air Quality (ALAQS) project was initiated in 2002 to address these issues by providing good-practice methods, a database of default values, and a test-bench toolset aimed at European airport local air quality modellers.

ALAQS is currently managed in partnership with experts from universities and industry, and airport air quality specialists. EEC ALAQS staff also closely cooperate with European thematic networks (AERONET) and international bodies (ICAO-CAEP) working towards guidance on airport air quality issues and trade-off analyses between noise and emissions.

The ALAQS-AV toolset is a GIS (Geographical Information System) based research tool. It is a test bed that can be used to investigate the sensitivity of different inventory and dispersion methodologies. The choice of a GIS as a test bench simplifies the process of defining the various airport elements (runways, taxiways, buildings, etc.) and allows the spatial distribution of emissions to be visualized and integrated with other data sources such as population, land use and local geography.

Modelling global emissions

The impact of aviation on Climate Change is more and more in the public eye these days, particularly in Europe.

As a result, the Toolset for Emission Analysis (TEA) is being developed to allow an analysis of the effectiveness of planned ATM and aviation measures in minimising the impact of aviation on the environment.

TEA is a set of inter-connected models, namely:

- AEM3 – a system for estimating aviation fuel burn and emissions (CO₂, H₂O, SOx, NOx, HC, CO, Benzene, VOC, TOG & PM);
- MET Server / MM5 - a meteorological model for providing realistic 4D meteorological forecasts and/or (re)analysis data;
- CONTRAIL - a tool for determining the probability and amount of contrail formation from aircraft.

The individual models are described in more detail below:

**AEM3**

The Advanced Emission Model (AEM3) estimates aviation fuel burn and emissions. It is able to analyse flight profile data, on a flight-by-flight basis, for air traffic scenarios of almost any scope (from local studies around airports to global emissions from air traffic).

It uses several underlying system databases (aircraft, aircraft engines, fuel burn rates and emission indices) provided by external data agencies in order to assure the quality of the information provided.

Optionally, if required, the fuel burn calculation can be based on the Landing and Take-Off Cycle (LTO) below 3,000 ft defined by the ICAO Engine Certification specifications instead of the input flight profile.

The ICAO Engine Exhaust Emissions Data Bank provides AEM3 with emission indices and fuel flow for a very large number of aircraft engines.

Above 3,000 ft, fuel burn calculation is based on the EUROCONTROL Base of Aircraft Data (BADA). This provides altitude and attitude dependent performance and fuel burn data for more than 150 aircraft types. Incidentally, BADA is recognised now within emerging international guidance material, as a unique source of aircraft performance and fuel burn data and is increasingly used in other environmental models such as the FAA’s Aviation Environmental Design space Tool – AEDT.

Emission factors are adapted to the atmospheric conditions at altitude using an EEC-corrected version of the ICAO-CAEP-recommended Boeing Method 2 (EEC-BM2). The estimation of VOCs and TOGs is based on a method developed by the U.S. Environmental Protection Agency.
A validation campaign based on more than 10,000 FDR flight profiles has demonstrated the realism of the AEM3 model. Overall, it underestimates fuel burn by between -8 and -1%; these errors are mostly attributable to not knowing an aircraft’s actual take-off weight and not calculating the change in weight as fuel is burnt along the flight profile.

As well as being used within EUROCONTROL to assess the impact of introducing new CNS/ATM concepts, AEM is also used by ANSPs to assess the impact of airspace changes.

A “batch” version of AEM has been integrated into the Agency’s PAGODA facility for deriving ATM-related environmental performance indicators. Running in an Oracle environment, it is used to calculate the daily emissions from all European flights based on the CFMU flight plans archived in the data warehouse at EUROCONTROL headquarters.

In fact, AEM will be at the core of future developments within EUROCONTROL to incorporate fuel burn considerations into both airspace and route design planning tools and the flight planning processes in the CFMU.

**MET-SERVER**

The Meteorological model and database (MET SERVER – MM5) is a ‘state of the art’ system based upon the MM5 (Mesoscale Model version 5) model developed by the National Centre for Atmospheric Research (NCAR) and Pennsylvania State University in the United States. MET SERVER will provide the surface and upper air meteorological data needed for local and global emission studies and contrail estimations. These include pressure, geopotential height, temperature, horizontal and vertical winds speed and humidity.

MET-SERVER can supply comprehensive meteorological data for global, regional and local air studies since it is based on proven technology (MM5) and worldwide data have been collected regularly since 2004.

**CONTRAIL**

The purpose of the CONTRAIL model is to calculate the probability of condensation trail formation from actual aircraft flight tracks.

The formation of contrails is an emerging issue within the aviation community and the science is still not mature enough to fully understand their impact on climate change. However, it seems plausible that contrail-generated cirrus clouds could have a significant global warming potential impact – and if this is indeed the case, ATM may be required to mitigate for this problem, by trying to predict where contrails may form, and then planning routes to avoid them. This, of course, may have unfortunate consequences for airspace capacity and flight efficiency. Such trade-offs illustrate the need for ATM organisations to have access to tools that can analyse such interdependencies.

The CONTRAIL model combines the output from AEM3 with meteorological data from MET SERVER - MM5, to generate a gridded output showing those flight tracks that produce contrails that would be visible to a satellite passing overhead at specific times during the day. This is to facilitate actual comparison with earth observation data.

**Conclusion**

The emerging suite of models, datasets and assessment tools being developed at the EUROCONTROL Experimental Centre provides a basic toolset that can be used to assess aviation’s impact on the environment.

EUROCONTROL is this year initiating a rigorous process of industrialisation of these tools which will assure their long term availability and support for users throughout the EUROCONTROL Member States.

Since the tools have been designed to share data with other ATM simulation and monitoring tools, the task of estimating the environmental impact of changes to the ATM system is made much easier. It is expected that they will form the foundation of the assessment suite that will be used to validate the SESAR concept and which can be used together with other ATM modelling tools such as fast and real time simulators and capacity analysis tools.

Further harmonisation of European tools for assessing the impact of aviation on the environment will continue under the stewardship of an ECAC-ANCAT working group, together with European CAEP members, who will in turn feed a new ICAO-CAEP task group established with a similar remit. In the end this will ensure that both European and global developments remain harmonised, ensuring that new models and methodologies follow internationally-recognised best practice, which can only be of benefit to stakeholders assessing the environmental impacts of our industry.
In your capacity as ECAC Focal Point for Environmental Matters, could you please highlight the priority issues on ECAC’s agenda when it comes to addressing environmental challenges?

The European Civil Aviation Conference (ECAC) has long recognised that civil aviation must respond to the increasing scientific, public and political pressure in relation to aviation environmental issues, and therefore includes the environment as one of its key priorities alongside safety and security. ECAC believes that, if the civil aviation community does not act both decisively and quickly to address such pressures, there is a real danger that environmental issues may come to dominate the whole aviation agenda.

Noise was the first of aviation’s environmental impacts to be recognised. Reducing it remains a major focus of effort, through the various elements of the “balanced approach” agreed on by the International Civil Aviation Organisation (ICAO). The effects of aircraft emissions on air quality and health have also become an increasing source of concern in recent years. These local impacts of noise and emissions have already affected national decisions relating to the expansion of airport capacity. It is, however, the effect of aircraft emissions on the atmosphere and aviation’s contribution to climate change which would appear to be the major sources of concern. Dealing with this major challenge is therefore a key priority for ECAC.

In your own country, the UK, aviation environment issues have been very prominent in the media in recent months. Could you explain why?

Environmental issues – of all types – have become a matter of intense political debate in the United Kingdom in recent years. They are also a frequent subject of conversation between ordinary people on a daily basis. There are a number of reasons for this, but perhaps two stand out. First, the UK is a relatively small and, in places, a very densely populated island. With that comes congestion and pollution which are very apparent to everybody. Secondly, as in many other parts of the world, we have been experiencing unusual and extreme weather events which also raise environmental concern.

Amidst all this, aviation is an iconic and fast-growing sector of the economy, which seems to have caught the public imagination as a major source of environmental concern.

Do you see this interest as a one-off issue in the UK or part of a wider trend?

There is growing public and political interest in environmental issues across Europe, particularly with respect to climate change. In part this can be explained by the increasing coverage of this issue in the media and the increasing attention being paid to it by political parties of various complexities. While the particular emphasis will differ between countries, I certainly see this increased interest as a regional trend and one that is set to continue as scientific knowledge improves, as air traffic continues to grow and as the pressures mount to balance capacity expansion against environmental impact.

Europe is apparently taking a more aggressive approach to dealing with aviation’s contribution to climate change. Is that really the case?

It is worth recalling that Europe, and in particular the European Union, has generally adopted a more ambitious approach to environmental issues than other regions, for instance through its commitments under the Kyoto Protocol. There are probably a number of reasons for this, including the particularly strong European environmental lobby, growing public awareness and a responsive attitude on the part of many governments. There is genuine concern at the growth of civil aviation both in Europe and globally, and at the increasing
contribution it will make to harmful emissions and climate change, particularly when viewed against the reductions being achieved in other sectors. Therefore ECAC quite rightly believes that effective action should be taken, and quickly. It is true that other regions and States view the environmental challenge differently, depending on their geographical situation, their state of economic development and other factors. However, as I said earlier, we need to act soon if the environment is not to dominate the aviation agenda and so constrain the health of the sector, which would of course also do damage to our economies.

If Europe is indeed taking a more aggressive approach, is there a danger that this in fact leaves Europe isolated with respect to other ICAO regions?

ECAC is committed to the principle that measures to address aviation’s environmental impacts would be best agreed on and implemented at global level through ICAO. ECAC States and observer organisations therefore make a major contribution to the work of ICAO’s Committee on Aviation Environmental Protection (CAEP). The fact that ICAO has not moved quickly on this agenda, however, has been of particular concern to European ministers and governments. ECAC will of course continue to take a leading role in seeking international action and will make every effort to pursue the dialogue with individual States and with its sister associations; this dialogue is necessary in order to secure agreement at ICAO level. However, we will continue to observe the need to meet the challenge posed by the particular environmental pressures within Europe itself.

What do you expect to be the outcome of the forthcoming ICAO Assembly, from the environmental perspective?

We hope to see the Assembly endorse guidance material on both the implementation of emissions trading schemes and emissions charges related to local air quality. We also expect it to endorse the next three-year work programme for CAEP, including the development of modelling tools to support the analysis of aviation’s environmental impacts. These achievements will not be easily won, however – I fully expect a good number of late nights and hard negotiations to get there.

Until recently, the focus of aviation environmental protection was very much on reducing impact at source, i.e. the airframe and engines. Air traffic management was not really an issue. Is that still the case?

Improvements to aircraft and engines remain a key part of the effort to reduce aviation’s environmental impact. However, they alone cannot compensate for the forecast growth in traffic and it is becoming more and more difficult for them to achieve major improvements. What is required is a combination of measures, including different operating procedures and the use of economic instruments to address emissions.

What do you think air traffic management can contribute to ensuring the long-term sustainability of the air transport industry?

ATM can contribute to reducing the environmental impacts of aviation at both local and global levels. It can influence operations at and around airports, an example being the continuous descent approach, which reduces noise levels, fuel burn and emissions. It can also provide network efficiencies, allowing the more direct routing of aircraft, less “holding” and the avoidance of unnecessary fuel burn and emissions. These sorts of improvements should of course be an inherent part of the SESAR programme. Whilst we should not make extravagant claims about the degree of savings which can be achieved through ATM, there is undoubtedly more that can be done, not least by putting environmental goals right up there with safety and effectiveness as key priorities for us.

What would your environmental vision be for our industry in, say, 2025, when traffic may have doubled?

My vision for the industry is one that delivers the objectives contained in initiatives such as the Strategic Research Agenda, which was formulated within the EU by all government and industry stakeholders, and in ATM’s own SESAR programme. In this vision, there would be continued reductions in source noise and emissions, together with an air transport system combining novel approaches to the design of air vehicles, the full capabilities of a seamless European ATM system and better integration of aviation with other modes of transport. The industry would be implementing recognisable and significant measures to reduce its contribution to climate change and would have stabilised or reduced its local noise and emissions impacts. It would be achieving these environmental objectives whilst meeting ever-more stringent requirements in terms of safety, security, reliability and affordability. The achievement of this vision represents an enormous challenge, requiring a major and sustained effort on the part of all involved. The aviation industry has encountered and overcome many challenges in its short life – this is perhaps the most important of all.
Virgin Atlantic’s sustainability ethos is very straightforward. Our aim is to reduce our environmental impacts over which we have direct control, to use our influence to drive other industry stakeholders to play their part in reducing emissions and other environmental impacts, and to engage our customers and staff and empower them to help us meet this challenge.

I am very confident that the ambitious targets set out in the UK industry-wide Sustainable Aviation Strategy (50% greater fuel efficiency of new aircraft in 2020 compared with 2000 equivalents, 80% less NOx) are on track to be met. With the advances in fuel efficiency already achieved by the aircraft manufacturers – 70% in the last 40 years, even before climate change became an industry focus – together with the airlines, airports, air navigation service
providers and other sustainable aviation partners, new aircraft entering airline fleets around the world should be substantially more environmentally sustainable than those in operation today.

However, until these technological developments allow aviation to reduce its carbon footprint as much as other industry sectors have been able to do, we are going to have to ensure that we operate the aircraft fleet we have in the most efficient way we can. This is not just up to the airlines themselves, but will need collaboration between all the various stakeholders, some of whom may not have previously considered the potential environmental impact of their role in the operation of a flight.

You may have seen the quite extensive media coverage of the “starting grid” proposal Virgin Atlantic put forward in 2006. This very simple idea means that, instead of starting their engines whilst still at the stand, aircraft are towed away from the airport terminal to a neutral “starting grid” area. They then wait, until they are given a take-off slot, before starting their engines. This means that considerable amounts of fuel can be saved per departing aircraft and scarce capacity at aircraft stands can be freed up for arriving flights. In the first trials we undertook at London Gatwick and Heathrow airports in December 2006, we saved up to 1.5 tonnes of CO₂ for just one departing flight. Imagine what this could mean if implemented at all busy airports for all departing flights.

This sort of operational efficiency, which was the result of extensive collaboration between the airport operator BAA, the air navigation service provider NATS and ground handling companies, makes absolute business sense as well as environmental sense. Good business can be green business. For some airports, such as New York’s JFK for example, where departing flights are routinely held in taxi queues of more than an hour, the cumulative fuel saving could be considerable. This means saving money and reducing emissions.

We are planning on conducting longer and more in-depth trials of the towing and starting grid procedures in 2007 and will again be working closely with BAA and NATS, as well as our ground handling provider Groundstar. There has already been a lot of interest from around the world in the potential for starting grids to become standard operating procedure at new and existing airports, which I am very excited about.

Virgin Atlantic’s plans for driving efficiency in our operations does not stop there, however. We are working with NATS and academic institutions on other models of best practice which should further reduce the emissions generated and fuel consumed by our business activities. We are also making sure that we put our own house in order. Although by far the majority of the environmental impact of our business is caused by the aircraft themselves, we should not neglect what happens on the ground. We are undertaking detailed audits of all aspects of our business, and looking at ways to reduce our carbon footprint, minimise waste streams and generally operate more efficiently. This doesn’t have to mean huge capital outlay either. Many of the initiatives we have identified will actually save the company money very quickly – making the business case for their implementation even more persuasive.

I do not need to tell you all how the Single European Sky proposal could help the aviation industry to operate more fuel-efficiently and thereby save millions of tonnes of carbon emissions every year. Estimates suggest that European carriers could save 12% of fuel on the basis of their current route networks and fleets if they were able to operate the more direct routings envisaged through the Single European Sky concept. Together with allowing aviation to participate in the
EU Emissions Trading “carbon cap and trade” System proposed by the European Commission, the Single European Sky could make a huge difference to the future sustainability of the industry. I am sure that national governments recognise the crucial social and economic benefits associated with international air travel and will make every effort to play their part in ensuring its long-term environmental viability.

However, it is not just the arguments for cost-efficiency that should drive us in trying to make our industry more environmentally sustainable. Our customers – be they families going on holiday once a year, business travellers flying once a month, or big corporate clients buying millions of pounds' worth of flights a year – are asking us to make it possible for them to travel in a more environmentally sustainable way. They do not want to lose out on the experience of learning about new cultures and visiting new places, or having that face-to-face meeting with a key client. Nor, however, do they want to feel guilty about it, and airlines, as customers of manufacturers, air navigation service providers and airports, are also asking their key suppliers to enable them to operate in a more sustainable manner. None of us operates in a vacuum.

Other air traffic control initiatives such as RVSM and SESAR have had (or could have) a substantial influence on reducing carbon emissions. I understand that EUROCONTROL’s RVSM initiative alone saves the airline industry some 300,000 tonnes of fuel or 1 million tonnes of CO₂ each year, and there is much scope for key environmental criteria to be built into the SESAR initiative through its project definition phase. I would urge you to ensure that these and other opportunities for air navigation service providers to play their part in guaranteeing the future sustainability of the industry are explored to their full potential.

We should not underestimate the human capacity for innovation. This is why I have recently announced, together with Al Gore and other eminent environmentalists and scientists, a $25 million “Virgin Earth Challenge” prize for an idea with the potential to significantly reduce carbon dioxide in the world’s atmosphere over a sustained period of time. There is a lot of evidence that prizes such as this can provide impetus for inventors and innovators to develop ground-breaking solutions to challenging problems. It is only fitting that this, the largest science and technology prize ever offered, should be for a solution to possibly the greatest problem ever faced by humanity.

I have also committed, at former US President Bill Clinton’s Global Initiative event in the US in September 2006, my profits from all my Virgin Group transport interests – estimated to be around $3 billion over ten years – to be invested in renewable energy research, development and production. Substantial sums have already been spent on bio-fuels and, although we have not yet found a practical alternative to traditional jet fuel, this cannot be too far away. In the meantime, by developing renewable fuel sources which can be used by other transport modes, we can help contribute to global energy security for the future whilst reducing emissions from surface transportation.

One of the priorities facing Virgin Atlantic’s new Business Sustainability Team will be to embed sustainability thinking into all aspects of our business. I am very keen that all of our staff are empowered to take responsibility for reducing the environmental impact of their own area of the business. By engaging staff in our sustainability challenge, and empowering them to take forward initiatives which will have a direct impact on the airline’s carbon footprint, we will be able to make a difference. It also makes good business sense. We should all think about our own jobs, home lives and day-to-day choices and make sure that we are doing everything possible to ensure that future generations can continue to enjoy the freedom to travel from which we have all benefited.
Main task: service provision

In Germany, the responsibility of DFS Deutsche Flugsicherung GmbH is described in the German Aviation Act as the "safe, orderly and expeditious handling of air traffic". Environmental issues, especially noise abatement, are mentioned but cannot overrule this primary task. However, this does not justify performing air traffic control services without taking environment impact into account. The Aviation Act leaves room for interpretation. This gap has been filled by judicial decisions in such a way that today we have a clear and sound basis for handling environmental issues.

Noise versus safety

As far as those working in aviation are concerned, safety cannot under any circumstances be jeopardised. Safety is not visible and cannot be felt – until something goes wrong. As long as an air navigation provider delivers safe air traffic control services, the public will take safety for granted, instead of viewing it as the result of hard work.

With noise, the situation is completely different. Noise can be heard and felt. It may be disturbing, sometimes even painful. It can cause physical and psychological distress. More importantly: it can be measured.

Balancing these two phenomena is a difficult task – it is like comparing apples and oranges. Making this balancing act transparent to the public has become a demanding and important task, which comes on top of the primary task of service provision.

The legal task of publishing routes lies with the Federal Office of Civil Aviation (Luftfahrt-Bundesamt, LBA). However, through its route planning office DFS provides a major input into the decision-making process. In this way, DFS has considerable influence on the distribution of noise, and that noise affects the quality of life for hundreds of thousands of people. It is fair that these people should expect their needs to be
met to the greatest extent possible without affecting safety.

**Balancing noise and operational needs**

Because of Germany’s central geographical location, traffic flows in Europe strongly affect route planning within German airspace. It is therefore obvious that a planning process at European level is required to meet the increasing traffic demands. In return, this has an impact on regional and local planning, as airports have to be connected to the route network through arrival and departure procedures. Finally, international commitments result in local procedures, which have noise impact around airports. DFS has promoted the need to consider the environmental impact of planning activities even at an early stage, when this impact first becomes visible. Due to the fact that such a planning process may be very abstract and not self-explanatory, the consideration of environmental issues has to be made transparent not only to the public but also before the courts. DFS has therefore made considerable efforts to “translate” internal considerations into non-expert language.

The ICAO balanced-approach concept was developed some years ago to deal with noise around airports. Although the concept and the respective European regulation were not developed for the challenges we are currently facing, they can be taken as a baseline of a methodology for balancing operational needs (capacity and economy) and environmental issues.

Balancing in this case does not mean that noise abatement has priority over capacity or economic demands. Indeed, the balancing methodology may even be used to identify increased capacity needs with negative consequences for the noise footprint. The difference between that and the “just-do-it” methodology is that the former has a sound and transparent decision-making process. DFS has always carefully investigated the noise impact of route planning but has now greatly intensified the related documentation and publications. Using safety as an argument for noise exposure, however, can be counterproductive when the communities or courts believe that this argument is just an excuse for not making the effort to look for alternatives. The immediate result will be a loss of credibility and a damaged reputation. Experience shows that a clear and transparent description of safety issues is welcomed and supported.

To ensure a transparent route development process, the procedure design office and the environmental office should work closely together, without any competition. This is important because every decision is unique and the justification for the final result of a balancing process has to be understood by everybody involved. Stakeholders such as airports, airlines, and communities should have a possibility to contribute to this process.

*Before complaints, either written or verbal, are made, an objective picture of the situation can be obtained using STANLY Track*
The result of this balancing process is sometimes criticised by the communities around airports once the final result is made available to stakeholders. This is not surprising: the air navigation service provider has to regard capacity demand as a major item in the balancing process (not to mention safety, as already referred to above).

However, since the introduction of the formalised balancing process, no claim against the Federal Office of Civil Aviation regarding departure routes has as yet been successful.

Communication

We are already well aware that transparency in balancing operational and environmental issues and in the final decision-making process is the key element for public acceptance and credibility. The better communication is between stakeholders, the easier it is to understand each other. It is therefore in the interest of DFS to support the communication process.

The Internet can be used as an excellent medium for publishing internal data for stakeholders, and DFS makes extensive use of this possibility. In addition to formalising the balancing process, DFS has therefore simplified access to information on flight tracks. DFS publishes radar data on its website, partly in real time for an increasing number of German airports (http://www.dfs.de/dfs/internet/deutsch/index.html). This service has brought about remarkable benefits: the number of complaints has significantly decreased. Thus, providing information on aviation is the way forward if we wish to ensure the acceptance of aviation.

Components

The benefits of a transparent balancing process for an air navigation service provider have already been discussed. Especially as regards noise abatement, it has to be ensured that trust is built up between service providers and stakeholders. Building up this level of trust means that the service provider has to:

- document the balancing of environmental issues and ATC issues;
- make the decision-making process transparent and public;
- actively inform communities and residents about planning (well in advance) and decisions (as soon as available);
- take every complaint seriously and take it into consideration for the planning process;
- make use of electronic media to make environmental information available without restrictions;
- actively participate in new developments and support research on the environment;
- be proactive in information delivery, i.e. provide information on environmental issues even before it is requested.

New environmental challenges

Although noise is currently the most challenging environmental impact around airports, other environmental issues were being addressed by air navigation service providers long before they came into public view. In fact, DFS puts in considerable effort to minimise the time aircraft are sitting on the ground with their engines running as well as the time aircraft remain airborne through the optimisation of the route network and using demand-oriented day-to-day air traffic control. This is a major input towards the reduction of CO₂ emissions caused by aviation and can be seen as the service provider’s contribution to environmental protection.

Today, the discussion on global warming brings aviation more into the environmental spotlight than has been the case in the past. This can be seen both as a risk and as an opportunity for an air navigation service provider. To neglect the need to include aviation in environmental protection is to run the considerable risk that legislation will in the end restrict ATC operations far more than if early action to mitigate the negative environmental impact of aviation had been taken. For this reason, DFS does not oppose but rather supports research activities on condensation trails (“contrails”) and possible operational scenarios to avoid the generation of contrails. It is our responsibility as a service provider to use our operational knowledge to give guidance on environmental research.
ICAO’s work on the environment
The CAEP/7 results

In February, international experts on aviation and the environment gathered at ICAO Headquarters in Montreal for the seventh meeting of the Organisation’s Committee on Aviation Environmental Protection (CAEP/7). They reported on their work over the past three years and formulated recommendations to the ICAO Council. Seven new ICAO documents for addressing aircraft noise and emissions, as well as amendments to existing ICAO publications, were proposed and subsequently approved by the Council on 15 March. The main outcomes of CAEP/7 are described here.

Aircraft noise: “a balanced approach”

“Balanced approach” guidance developed in 2001 provide ICAO Members States with an internationally-agreed approach to address aircraft noise problems in a holistic, and environmentally and economically responsive way, based on four elements: noise at source, land use planning and management, operational measures, and operating restrictions. States endorsed this policy at the 35th ICAO Assembly, considering it a valuable tool for noise mitigation. CAEP/7 proposed that the guidance include socio-acoustic factors (“people issues”) and airport case studies.

Noise at source

Procedures for noise certification were revised and amendments to Annex 16, Volume I - Aircraft Noise were proposed. Provisions are related to atmospheric conditions in noise certification testing and measurement conditions (e.g. clarification of definitions relating to wind speeds), the measurement of aircraft noise received on the ground, the evaluation method for noise certification of helicopters, and an update to the guidelines for obtaining helicopter noise data for land-use planning purposes.

Amendments were also made to the Environmental Technical Manual (ETM) on the use of procedures in the noise certification of aircraft. They focused on procedures for noise certification guidance in flight test procedures for helicopters, and evaluation of noise measurement to establish non-acoustical change following engine modifications. Guidance material on differential global positioning was developed for inclusion in the ETM.

Operational measures

An important outcome of CAEP/7 was the development of a new ICAO manual proposing methods for computing noise contours around airports. It replaces ICAO Circular 205. The new guidelines represent a major advance in three important areas. First, it provides much-needed guidance on the implementation of aircraft noise contour modelling, especially with respect to the critical importance of correctly representing aircraft types and their operating configurations and procedures. Second, it fully describes up-to-date algorithms that incorporate the latest internationally agreed advances in segmentation modelling. Third, the methodology is supported by an online database from EUROCONTROL (International Aircraft Noise and Performance (ANP) database) allowing for a timely update of the data.

A new ICAO circular on noise abatement departure procedure (NADP) noise and emissions effects was developed, which provides information for airports and operators on noise and emissions (NOx and CO2/fuel) effects of departure procedures designed in accordance with PANS-OPS provisions.

Building on Circular 303 – Operational Opportunities to Minimize Fuel Use and Reduce Emissions – further work on the estimated benefits to the environment of CNS/ATM system implementation (e.g. fuel savings and emission reductions) was undertaken and practical guidelines developed. This information was incorporated into the Global Air Navigation Plan for CNS/ATM Systems (Doc 9750).
Continuous Descent Approach (CDA) implementation and its associated benefits were revised through the CAEP/7 cycle. Until now, a global assessment has been difficult mainly because of inconsistent definitions of CDAs, the nature of CDA operations and the lack of an internationally-agreed methodology for the assessment of emissions or noise. It was agreed that CAEP would coordinate the operational aspects with other expert panels.

Aircraft engine emissions

ICAO’s Annex 16, Volume II, was revised and updates proposed on the provisions for modernising current emissions certification methods, measurement and sampling requirements, and procedures for regulated emissions and aviation fuel supply composition.

CAEP/7 also proposed guidance material related to engine emissions certification that will become an Environmental Technical Manual dedicated to emissions in support of Annex 16 Volume II. Until the manual is issued, this guidance material will be available on the ICAO website.

Airport local air quality guidance

CAEP/7 proposed guidance to States in implementing best practices with respect to local air quality at airports, and in assessing and quantifying airport source emissions. This guidance manual should consist of three parts. The first part will help users create inventories of aircraft and airport source emissions. It will contain background information on the regulatory context, drivers for addressing local air quality at airports, and details of how aircraft source emissions contribute to total emissions measured and modelled around airports. This material is available on the ICAO website.

Nitrogen oxides (NOx) goals

For CAEP/7, a panel of independent experts was tasked with reviewing technologies to control nitrogen oxides (NOx). The group considered information on the relationship between goal-setting and standard-setting, on atmospheric science and on current and developmental technology. They assessed the industry’s ability to reduce NOx emissions at source, provided information on possible trends in future emissions reduction over the long term, and considered possibilities for improvement. To define technological feasibility, the experts used a Technology Readiness Level (TRL) scale. This scale is a general tool characterising the level of development of new technologies. Based on this work, they developed medium- and long-term technology goals for NOx. Medium-term goal refers to the level of emissions produced by a specific engine thrust category in service in ten years’ time (or a TRL of 6). Long-term goal refers to an improvement of engine emissions performance in about twenty years (or TRL 2).

In relation to mid-term goals (2016), the group estimated a 45% reduction on the current standards. As for the long-term goal (2026), it estimated that a reduction of some 60% would be attainable.

CAEP/7 agreed that the use of the
Stakeholder Forum

ICAO’s work on the environment
The CAEP/7 results

The TRL scale would be an integral part of the goal-setting process and that TRLB (flight qualified through test and demonstration) should be accepted as defining feasibility in the context of standard-setting.

Market-based measures

Voluntary measures
At present, it is not easy for States and the aviation community to share information on voluntary activities aimed at reducing the impact of greenhouse gases from aviation on the climate. In order to facilitate dialogue on this issue, CAEP has collected information on voluntary actions by States and aviation stakeholders.

This information will be updated on an annual basis and posted on the ICAO website. Sharing the information will help entities initiate environmental protection measures or improve their current activities.

Local air quality charges
Guidance on emissions levies related to local air quality was developed by CAEP, consistent with ICAO policy.

Emissions trading
One of the highlights of the meeting was proposed guidance for incorporating international aviation emissions into States’ emissions trading schemes, consistent with the United Nations Framework Convention on Climate Change process. The draft guidance focuses on aviation-specific issues, identifies options and offers potential solutions:

- Aircraft operators should be the accountable international aviation entity for purposes of emissions trading.
- Obligations should be based on total aggregated emissions from all covered flights performed by each aircraft operator included in the scheme.
- States, in applying an inclusion threshold, should consider aggregate air transport activity (e.g. CO₂ emissions) and/or aircraft weight as the basis for inclusion.
- States should start with an emissions trading scheme that includes CO₂ alone.
- States should apply the Intergovernmental Panel on Climate Change definition of international and domestic emissions for the purpose of accounting for greenhouse gas emissions as applied to civil aviation.
- States will need to put in place an accounting arrangement that ensures that emissions from international aviation are counted separately and not against the specific reduction targets that States may have under the Kyoto Protocol.
- As regards trading units, States will need to consider economic efficiency, environmental integrity, and equity and competitiveness when making a choice.

On the question of geographic scope, the draft guidance recommends that States take into account an ICAO Council request that CAEP include the various options with regard to geographic scope, describing their advantages and disadvantages, start to address the integration of foreign aircraft operators on a mutually agreed basis, and continue to analyse further options. The draft guidance will include an introduction emphasising that the majority of ICAO Council members do not currently favour a non-mutually agreed approach. The ICAO Assembly will further consider this issue.

Next steps
The Committee will continue to address the impacts of aircraft noise and emissions and study policy options on the use of technical and operational solutions, while continuing to consider market-based measures.

One of the future items CAEP/7 will consider is the further development of a methodology to carry out environmental assessments of ATM projects. The goal is to quantify the impact on the environment in terms of the cost of fuel burned, greenhouse gas emissions, air quality impacts and noise. This method will facilitate the development of trade-off considerations and hopefully lead to improvements in efficiency and capacity of ATM systems.

Emphasis will also be given to the work on modelling and databases to better estimate aviation’s impact on the environment, and cooperation with EUROCONTROL will continue in this area.

Forthcoming events
The ICAO Colloquium on Aviation Emissions will be held in Montreal on 14-16 May 2007. It will enhance the level of environmental information available to States and provide a forum on aviation emissions so as to facilitate discussion and decision-making.

Another milestone this year will be the publication of ICAO’s first Environmental Report, which is to be issued every Assembly year.

We look forward to the 36th Session of the ICAO Assembly in September of this year, as the Organisation’s Member States and aviation stakeholders review achievements and agree on the policy of the Organisation in this field.
Main topics covered:

- A more dynamic European airspace network for 2010+
- Current initiatives (with the participation of external speakers)
- Interactive session: areas of improvement in the short term
- Contribution to next steps
- Interactive session: mapping the way forward

Essential for:

- Aircraft operators, flight planning service providers, air navigation service providers and military authorities

Online registration: www.eurocontrol.int/dmean
Most of the environment-related work in ICAO is undertaken through its Council’s Committee on Aviation Environmental Protection (CAEP), which consists of members and observers from States, international organisations and non-governmental organisations representing the aviation industry and environmental interests. CAEP is key to achieving ICAO’s strategic objective of minimising the adverse environmental effects of global civil aviation and meeting its three related goals: to limit or reduce the number of people affected by significant aircraft noise, to limit or reduce the impact of aircraft engine emissions on local air quality and to limit or reduce the impact of aviation greenhouse gas emissions on the global climate.

Over the years, CAEP has developed and promoted realistic, comprehensive and forward-looking environmental solutions that have been endorsed by the world community. During the latest CAEP/7 cycle, which culminated in the CAEP 7 meeting held recently in Montreal (5-16 February 2007), the foundations were laid for decisions and actions in a number of critical areas.

CAEP took a first step towards the establishment of the interdependencies modelling framework that will provide analytical capability to comprehensively assess synergies and trade-offs. Proposed changes to technology and operations often result in trade-offs between different impacts. For example, noise abatement can sometimes lead to increased emissions. The ability to assess these trade-offs in a commonly agreed way is essential for sound and effective decision-making.

With reference to the specific aspect of CNS/ATM, CAEP has made significant progress in quantifying the environmental benefits of efficiency improvements in global CNS/ATM practices. Experts have produced an updated proposal on issues concerning the environmental benefits of CNS/ATM systems, setting out the possible development of simplified methodologies and tools for estimating the environmental benefits of CNS/ATM systems.

In February 2007, CAEP/7 accepted a proposal by the Italian Member to...
adopt another approach to the problem, bearing in mind the global framework of ATM operations.

Within the international aeronautical community, a great deal of work has been done on improving the performance of the air traffic management (ATM) system. Efforts are underway to develop and ensure commonality of new technologies and worldwide interoperability with the aim of improving the efficiency of the system and achieving operational benefits more quickly.

Air traffic growth is facing environmental constraints which limit airport operations and hence capacity. Moreover there is a risk that the implementation of strategic ATM development plans linked to ever-increasing traffic demand may erode the improvements in the environmental climate that have already been achieved. Air traffic management may affect noise pollution by influencing when, how and where aircraft fly, for example by facilitating noise-abatement techniques such as CDA. The noise cost associated with each flight, however, is mitigated by the flight efficiency factor. If these measures are not fully assessed, however, they may lead to high levels of fuel use (a scarce natural resource) and increased atmospheric emissions.

Growth in demand for air travel causes an expansion of aircraft operations and, consequently, an increase in greenhouse gas emissions, which are expected to outpace improvements in emissions-abatement technologies for the foreseeable future. Improving the efficiency and capacity of the ATM system may have both negative and positive effects on the environment. For instance, improving flight path efficiencies reduces the amount of fuel and emissions per flight, while the noise problem could prevent increased operational airport capacity, limiting aircraft operations.

The importance of trade-off considerations between noise and emissions has already been stated within CAEP activity and consideration has been given to the inherent complex and evolving interdependencies between environmental factors.

It is therefore appropriate, in this framework, to consider that a cost/benefit assessment applied to ATM projects could quantify the net impact on the environment in terms of the key impacts of the cost of fuel use, greenhouse gas emissions, air quality impacts and noise.

Many major infrastructure developments which are likely to have significant effects on the environment are commonly the subject of a systematic environmental assessment. The evaluation is carried out for all major developments in the energy, industry, transport, telecommunications, and land development sectors. Further, newly proposed regulations and laws now need to be assessed from a social, environmental and economic perspective. The strength of this transparent assessment is that it proves that the entity proposing a change has fully considered alternatives and associated impacts and demonstrates that the preferred option most effectively solves the problem, without creating unacceptable new problems.

Environmental impact assessment is, in its simplest form, a planning tool generally regarded as an integral component of decision-making. It may be defined as a formal process used to identify, predict and assess the likely environmental consequences of any development project. Thus it ensures that potential problems are foreseen and addressed at an early stage in the project’s planning and design.

In the operational ATM field, notwithstanding various initiatives at local level, we are still far from a common definition or at least understanding amongst the various stakeholders of a methodology to be adopted when assessing the environmental impact of CNS/ATM initiatives.

Methodology, transparent process and tools to address the environmental assessment of the implementation of CNS/ATM plans are still at a formative stage. This systematic environmental assessment should, however, also be performed in the case of plans and programmes regarding the CNS/ATM system. It has already been emphasised...
that improving the efficiency and capacity of the ATM system may have effects on the environment and generally any significant change in the air traffic scenario at each airport has an influence on its environmental climate. It is therefore appropriate to introduce the concept of environmental assessment for application to CNS/ATM plans and programmes, leading to improved efficiency and capacity of the ATM system, in order to:

a) quantify and weigh the effective benefits resulting from their implementation with a view to achieving maximum environmental benefit;

b) better evaluate the appropriateness of technical and operational solutions; and

c) protect environmental improvements already achieved to prevent them from being eroded by incompatible ATM plans.

The first step is to define the concept of environmental assessment for ATM purposes with a view to identifying a common understanding. The second step is to develop the necessary methodologies/tools to carry out the transparent, harmonised process of environmental assessment.

The CAEP 7 meeting endorsed this basic objective, the outline of the work to be done and the setting-up of a Task Group (TG) dedicated to CNS/ATM environmental benefits.

The TG has been tasked inter alia with:

a) examining the concept of environmental assessment applied to CNS/ATM and defining the appropriate methodologies in order to quantify the benefits resulting from the implementation of CNS/ATM plans/programmes and identify appropriate ATM improvements;

b) reporting on CNS/ATM initiatives including navigational technologies and associated benefits for goals and policy analysis.

The CAEP 7 meeting also approved the promotion in the States of the use of an environmental management system approach, proposed by USA, as a means of managing the environmental impacts of international aviation in a more systematic and cost-effective manner.

In my view the Environmental Management System (EMS) is a systematic method for ensuring the environmental performance of an organisation. The application of this method to the air operators, the airport operators and to the ATM service providers will ensure that the conditions are in place to safeguard the environmental benefits achieved.

The environmental case is thus to be considered a critical and crucial element of an EMS within the air navigation service provider organisations.

Without any doubt, there is a need for sustained and prioritised effort in the ATM field in order to evaluate all possible environmental benefits, and more than ever, ICAO is determined to provide the world with guidance in moving towards a sustainable global air transport system.

Of course, the impact of CAEP depends ultimately on the States and the measures they adopt and enforce to mitigate the environmental effects. To achieve the full benefits of EMS and the environmental case, a harmonised application of this type of approach across aviation organisations is required. In the light of this, EUROCONTROL’s contribution will be key to managing the environmental aspects of aviation efficiently and in a focussed manner.
Airbus tackles the environmental challenge

Airbus became the first and only aerospace company to receive corporate certification to ISO 14001 environmental standards in early 2007, which covers all the company’s production sites and products throughout the life cycle.

ISO 14001 corporate certification is a testament to Airbus’ commitment to the environment – a commitment to keep pace with the world’s accelerating demand for air transport and greener skies.

It also gives full credit to Airbus’ robust Environmental Management System (EMS), which aims to constantly identify, monitor and minimise the side effects associated with designing, manufacturing, flying and dismantling an aircraft.

Integrating environmental responsibility into all aspects of the activities, at each stage of the life cycle, is key to keeping our environmental footprint minimal.

Design

With 27,307 passenger aircraft expected to fly in 2025\(^1\), reducing aircraft noise and aircraft engine emissions to a minimum is a necessity. It is also business imperative to be part of the solution and adequately address the complex challenges of a sustainable air transport industry.

Airbus’ innovative approach reflects those key environmental performance drivers that are part of the primary requirements for any new product designed today. One major strand of the Research & Technology efforts is to investigate, test, validate and optimise the most advanced technologies, design features, configurations and architectures that will lead to aircraft generating less noise and fewer emissions, while carrying the maximum payload over the optimum range.

Reducing noise at source is a priority for Airbus. The company is working on low-noise nacelle designs, acoustic treatment, optimised propulsion systems and overall aerodynamic efficiency, but also on low engine noise technologies, hand-in-hand with engine manufacturers.

One such innovative project is the 0-splice inlet technology for engine nacelles to reduce fan noise. An Airbus-patented technology, it was awarded the 2006 “Décibel d’Or” by the French Ministry of Ecology and Sustainable Development. It also contributes to the remarkable noise performance of the A380 that shows unprecedented certified noise levels with a 17-EPNdB cumulative margin\(^2\), and thus satisfies the noise requirements of the most stringent international airports.

Reducing engine emissions is a similar priority for the company. One major strand is the continuous and progressive introduction of advanced materials and new processes to reduce the basic weight of an aircraft to minimise fuel consumption and, subsequently, the level of engine emissions.

The A380 is the first commercial aircraft to incorporate as much as 25% composites. With a carbon-fibre-reinforced plastic composite centre wing box, a weight saving of up to 1.5 tonnes versus the most advanced aluminium alloys has been achieved. With less than 3 litres per passenger per 100 kilometres – the figure for a small diesel-engine car – the A380 has a very low fuel burn.

\(^{1}\) Source: Airbus Global Market Forecast

\(^{2}\) ICAO Chapter 4 noise limits
Supply chain

Aircraft are one of the most complex products, integrating hundreds of thousands of components. Therefore, managing the entire supply chain is key to ensuring reliability at each subcomponent level, and delivering products on time and within budget that satisfy the highest standards of quality.

Efficient processes plus a shared commitment to responsible business practices and to environmental performance are a must. Suppliers and industrial partners are also assessed on the basis of environmental criteria, which are part of contractual agreements. They are expected to comply with Airbus’ environmental policy, provide reliable environmental data on the products delivered and, wherever possible, deploy an Environmental Management System. Tracking and managing hazardous materials is also crucial and Airbus is working towards a systematic inventory of such materials. The company will uphold these standards and will continue to evaluate its suppliers accordingly.

Manufacturing

Airbus has committed to continuously work on limiting the environmental impact of the production processes specific to the aeronautical industry, on all sites.

Considerable efforts are made to contain, reduce and, if possible, eradicate the local industrial effects of working metals and composites, polishing and treating surfaces, assembling components and parts, and then assembling the entire aircraft.

Cleaner technologies are being continuously introduced. Manufacturing inputs and outputs are reduced to the greatest extent. Regular inspections are run. Material quantities, toxicity and usage are evaluated and related to how waste, water discharge and air emissions are impacted.

Airbus will cut down energy consumption, water consumption and the amount of waste produced by 2% by year-end. Emissions of volatile organic compounds will be reduced by a further 5%, following a 13% reduction over 2004 and 2005.

Direct carbon dioxide emissions from fossil fuel consumption per seat delivered fell by 9% over the same period.

A number of projects to preserve renewable and non-renewable resources should be given credit for such achievements – such as the additional 725 m² of solar energy panels installed at Airbus’ facilities in Spain to generate 130,000 kWh and reduce carbon dioxide emissions by 109 tonnes per year.

Transport

Airbus has developed an innovative inter-site routing system to transport aircraft sections, specifically designed to increase efficiency in the air as well as on the ground while limiting the impact of transport on the environment.

Large and heavy aircraft sections are transferred in roughly two days from any of Airbus’ manufacturing facilities in Europe – adjoining the airport – to the final assembly lines in Toulouse and Hamburg, thanks to five A300-600 super transporters specifically built for that purpose. Known as Belugas, these aircraft
generate very low noise levels, with a margin of 14 EPNdB over their certification limit. This low noise disturbance is ensured in the immediate vicinity of the airports.

A380 components are shipped via a multimode transport network that combines marine, river and road transport, as they are far too large for the Belugas. First conveyed by sea to Bordeaux, the aircraft sections go down the Garonne river and then continue the journey by road convoys at night.

The double-hulled barges were designed to preserve the riversides and fishing, thanks to minimum bow wave and an engine noise minimised at 55dB(A) at 30 metres for normal thrust – that of any fishing boat.

The low-speed road convoys use exceptionally large trucks equipped with special noise reduction and guidance systems for constant speed and no additional nuisance. Road segments were slightly adapted for loads up to 14m high, 8m wide and 50m long.

**Aircraft operations**

There is today a persistent demand for our industry to further improve the overall environmental performance of aircraft operations and further reduce noise, emissions and fuel burn.

Much remains to be done, but a lot has already been done.

Aircraft entering into service now are typically 20 decibels quieter than comparable products 30 years ago. An A320 taking off or landing has a noise footprint of less than 1/10th the area of that created by a similar sized 1970s trijet. An A330 taking off has a noise footprint that is contained within the airport’s perimeter. The A380 is the quietest long-range aircraft on the market, with slightly lower noise levels than the A340 (one of the quietest aircraft of its kind) for possibly twice as many passengers. It also meets the most stringent night noise rules at London Airport - QC/2 for departures and QC/0.5 for arrivals.

Fuel consumption has been more than halved since 1960 and CO₂ emissions from aviation in 2000 remain stable at 2.2% of total man-made carbon dioxide emissions despite air traffic growth. Today, Airbus aircraft are amongst the most fuel-efficient means of transport in the world, with just three litres of fuel needed to transport a passenger 100 kilometres. The A380 generates CO₂ emissions as low as 80g per passenger per kilometre, far below the 160g per kilometre for an average European car.

Airbus has endorsed the 2020 vision of the Advisory Council for Aeronautics Research in Europe (ACARS) that targets a 50% reduction in noise, fuel consumption and carbon dioxide emissions.

It has joined the Aeronautics Joint Technology Initiative for a “Clean Sky”, which aims to introduce the technologies that will lead to progressive changes. The company also works with the airlines, airports, air navigation service providers and engine manufacturers. In particular, Airbus contributes to SESAR – the European Commission and EUROCONTROL project to optimise air traffic management and flight efficiency in Europe for a 5 to 12% reduction in fuel consumption and CO₂ emissions by 2020.

**End-of-life**

There are some 4,000 aircraft due to reach end-of-life by 2023; hence the need for decommissioning, dismantling and recycling aircraft in an environmentally-responsible manner.

Airbus’ response is PAMELA, an experimental project for end-of-life aircraft to test state-of-the-art procedures and establish best practices through the entire process. The purpose is to show that between 85 and 95% of the aircraft components can be recycled, re-used or recovered.

Selected as part of the European Commission’s LIFE programme, PAMELA will be used to disseminate environmental knowledge and practices to other industrial sectors.

**To conclude**

Airbus’ environmental performance is highlighted in a biennial report. The 2006 issue is a clear sign of Airbus’ commitment to shape a greener industry for greener skies and ensure that air transport continues to be an environmentally efficient means of transport.

**For more information, go to www.airbus.com**

---

4- Noise annoyance reduced by 75%
5- Process for Advanced Management of End-of-Life of Aircraft
6- L’Instrument Financier de l’Environnement

© Airbus S.A.S.
Independent Platform

**Emissions trading**: a significant contribution towards addressing the impact of aviation on the environment

**Ulrich Stockmann** has been a Member of the European Parliament since 1994. As a Member of the Transport Committee, he is actively involved in European aviation policy.

The publication by Ulrich Stockmann "Aviation and Emissions Trading" can be downloaded at: http://www.ulrich-stockmann.de/upload/aviation_emissions_trading.pdf

In December 2006, the European Commission published its proposal to amend the current Directive 2003/87/EC to include aviation activities in the European Emissions Trading Scheme (EU-ETS). This proposal has now been transmitted to the European Parliament for its first reading, which will take place in the coming months.

This legislation is of crucial importance in addressing, on a common European basis, the environmental impacts of the CO₂ emissions of air traffic. Although aviation is presently responsible for only 3.5% of human-induced climate impacts, the current and predicted growth in the number of flights departing from EU airports (7.4% increase in 2004 alone) clearly shows the need for action. Nevertheless, the European Commission’s proposal raises a couple of questions which have to be tackled in the course of the legislative process.

Firstly, there are various areas for concern within the proposal. The most striking is the fact that the Commission wants to include the emissions of all intra-EU flights in the EU-ETS as soon as 2011, whereas emissions from all flights arriving at and departing from EU airports (i.e. intercontinental flights) are to be included only from 2012. I cannot see any convincing argument for supporting such a differentiation. On the contrary, such an arrangement would only lead temporarily to a Europe-only application of the emissions trading mechanism in the aviation sector. This concern is even more justified if we consider the possible legal disputes with third Countries and non-European States which in the worst case might delay the inclusion of intercontinental flights for many years. Such a scenario would have serious consequences for the European aviation industry without bringing major positive effects for the environment. No doubt the Commission’s approach of excluding from the scope of the Directive all flights arriving from third Countries adopting equivalent measures to those of the Directive is very constructive. I fear, however, that this is not enough of an incentive to avoid legal conflicts with non-EU States and negative economic side-effects for European airlines.

Hence, I welcome the initiative to address the issue of emissions trading during the ICAO Conference in

---

**by Ulrich Stockmann, Member of the European Parliament**
Secondly, the Commission proposal raises the question of whether it is really the most effective instrument for dealing with the problem of the CO₂ emissions of air traffic. To avoid any misunderstandings, this is by no means an attempt to argue against the inclusion of aviation in the EU-ETS. However, unlike other Members of the European Parliament, I do not expect emissions trading to be the "super weapon" in the fight against climate change. Instead, I believe that emissions trading is only one (albeit essential) element of a more comprehensive set of measures for reducing the aviation industry's impact on climate. An emissions trading mechanism alone does not result in the reduction of CO₂ emissions. It makes flying more costly and might slow down the growth of aviation and, therefore, is an incentive to reduce the consumption of kerosene – but it is not a means of increasing energy efficiency. The fight against climate change therefore requires complementary measures and instruments.

The completion of the Single European Sky (SES) Programme, with its Functional Airspace Blocks, offers great potential for reducing fuel consumption by some 15%. The Commission is expected to release a report on the state of implementation of the SES Programme in April. Unfortunately, this report will most probably not be very positive. The creation of Functional Airspace Blocks requires the bundling of national sovereignty over European airspace. The refusal of Germany’s President, Mr Horst Köhler, to sign a law for the privatisation of the German air traffic control service provider (DFS), is just one example of the difficulties of implementing the SES. Moreover, in many Member States cooperation between military and civil aviation authorities and air traffic control service providers is still lagging behind. This is another factor making it difficult to ensure the necessary flexibility of European airspace.

As outlined in the European Commission Communication in January 2007 ("An action plan for airport capacity, efficiency and safety in Europe"), improving the slots system can contribute significantly to the reduction of fuel consumption and CO₂ emissions. The mandate given to EUROCONTROL in 2005 to develop implementing rules on air traffic flow management in close cooperation with the Commission is an important step towards achieving an optimal use of airport slots, thus avoiding unnecessary holding patterns.

As a Member of the European Parliament and the Transport Committee, it is my obligation to work towards well-balanced legislation governing the inclusion of aviation in the EU-ETS. However, it is equally important to make full use of the great potential of all other measures designed to increase technological standards and fuel efficiency. Otherwise, I see a realistic threat that emissions trading will not have the expected positive effects on our environment.

For further information, please contact:

Robert Wiener
European Parliament
T +32 2 284-7687
F +32 2 284-9687
ulrich.stockmann@europarl.europa.eu
www.ulrich-stockmann.de
The aviation industry is an important and fast-growing contributor to human-induced global warming. In recent years climate change has been on top of the policy agenda, as knowledge about aviation’s atmospheric impacts and mitigation costs has improved with the new Intergovernmental Panel on Climate Change and Stern reports respectively. There is now a broad consensus in the European Union that aviation should not be excluded from the global effort to tackle climate change.

When the Kyoto Protocol was signed, almost ten years ago, the need to reduce emissions from aviation was addressed. However, given the international character of the aviation industry, the parties decided to tackle aviation’s impact on climate through the UN body that regulates the sector. In Article 2, the protocol asks parties to “pursue limitation or reduction of emissions of greenhouse gases not controlled by the Montreal Protocol from aviation (…), working through the International Civil Aviation Organization (ICAO).”

Yet, in October 2007, the ICAO General Assembly will not be evaluating the progress made in the implementation of measures. The Assembly will not vote on the implementation of any policy instrument to reduce the impact of aviation on climate in the near future. According to the European Commission: “action taken so far through ICAO has mainly contributed to improving the understanding of the global climate impacts of aviation, and ICAO’s 188 member countries have not been able to agree on regulatory standards or emissions charges applicable to CO₂ emissions, and an attempt to identify and agree a suitable efficiency indicator for aircraft has failed.”

However, ICAO is not only failing to meet the requirements of the parties to the Kyoto Protocol, it is also blocking Member States from limiting emissions from aviation unilaterally.

In 1996 ICAO was firmly against the introduction of kerosene taxes. In 2004 a resolution was adopted, recognising that: “ICAO guidance is not sufficient to implement greenhouse gas emissions charges internationally”, and asked States “to refrain from unilateral implementation of such charges prior to 2007 Assembly.” The only window of opportunity kept open in 2004 was the Assembly resolution supporting the development of voluntary emissions trading, even though the possibility of setting up a scheme at ICAO level was considered unattractive and should not be pursued further.

Given ICAO’s slow progress, in 2005 the European Commission identified policy options to be pursued at EU level to reduce emissions from aviation. The Commission stressed the need to go “further and beyond traditional technical standards and voluntary action”, and focus has been placed on emissions trading and emissions charges as more promising ways to address the climate impact of aviation. Emissions trading was considered the best way forward in line with the ICAO recommendation. Following this Communication, which received broad support from the European Parliament and Council, the Commission proposed in December 2006 the inclusion of aviation in the EU Emissions Trading Scheme (EU ETS).

This proposal is the first step towards addressing emissions from international aviation, but there is little doubt that further steps will be necessary to guarantee the necessary reductions. According to the impact assessment that was presented with the proposal,
the reduction of aviation emissions will be around 3%, equivalent to less than one year’s growth.

Improvements to the current proposal are still possible, and should be expected if the opinion of European Parliament is kept in line with its 2006 resolution on “Reducing the climate change impact of aviation”.

There are several issues addressed by the Parliament resolution of June 2006 that were not fully integrated in the Commission proposal, presenting opportunities to improve the environmental effectiveness and cost-effectiveness of the scheme:

- To ensure that non-CO₂ gases are addressed through NOx emissions reduction measures and air traffic management, but not to rule out the use of a ‘multiplier’ in case such measures fail to be implemented.
- Revise the current “stabilisation cap at 2004-2006 levels” in line with the Kyoto agreement and EU climate targets.
- Increase the amount of emission allowances to be auctioned, since it is the most fair and efficient way of distributing allowances, avoid ‘windfall profits’ and ensure the polluter pays principle applies to aviation.
- Keep the geographical scope as broad as possible (all flights arriving and departing EU airports).

If these steps are taken by Ministers and the Parliament, integration of aviation in the EU-ETS could be a significant step forward.

But it is increasingly clear that a much broader overall strategy to reduce emissions from aviation is necessary and will require action from all players.

**Air traffic management**

Although reforms to air traffic management could optimise routes and reduce emissions (SESAR aims to reduce CO₂ by 10% per flight) an equally important challenge is to use air traffic management (ATM) as an instrument to avoid the formation of cirrus clouds and contrails. Although there is still some scientific uncertainty as to the extent of the contribution of these clouds to global warming, there is a certain consensus that there is a contribution. Applying the precautionary principle would mean that early action should be taken. Given this, it is essential that ATM systems address the need to adapt their mechanisms to make aircraft avoid areas where the probability of the formation of such clouds is high, and the work to develop policies, processes and technologies to allow this should start as soon as possible, perhaps through SESAR.

A third important issue regarding the development of ATM activity in the near future is the potential contribution of organisations such as EUROCONTROL in supporting the implementation of economic policy instruments for aviation. Indeed, ATM organisations have access to information that could determine the amount of pollutant emissions of each flight, being a natural candidate to become ‘charges collector’ if any charges related to that pollution are to be implemented.

With this in mind, ATM organisations should plan for such a development and improve the methods of calculation of the various impacts of aircraft on environment. Amazingly, considering the lack of progress on aviation emissions at international level, even emissions trading, the last remaining policy under discussion, is under attack.

Some ICAO delegations, led by the United States, are pushing to limit implementation of emissions trading only to carriers registered in States where the system operates, or whose States ‘mutually agree’ to be part of the scheme. If this approach is successful it would of course kill the system instantly. To discriminate against air carriers on the basis of their ‘nationality’ would not only go against the Chicago Convention, but also be harmful to the competitive position of the airlines inside the system. The absurdity of the ‘mutual agreement’ strategy is obvious when one considers what the response of the United States would be if European airlines refused to apply American security regulations when landing at US airports.

Given this, and since emissions trading is considered by policy-makers to be the best way to begin addressing the contribution of aviation to climate change, any move from ICAO to block this first step in the EU should be considered to be unacceptable and counterproductive by the industry as a whole. Counter-productive because the remaining options would involve directly managing demand for aviation, instead of incentivising the improvement of its environmental performance through more flexible economic instruments.
Air transport and the environment

The need for a political will

The environment has already made the headlines in the early weeks of this year, notably with the publication in February of a new report by the United Nations-sponsored Intergovernmental Panel on Climate Change (IPCC). Its main conclusion was that human activity was almost certainly a key factor in “global warming”, although – like most studies – it was unable to put a precise figure on the long-term consequences.

Creating the necessary political will

There is no doubt that a growing body of public opinion supports concerted action – after all, climate change is rightly perceived to be a global problem. Chinese CO₂ emissions impact other regions and are increasing at such a rate that they are expected to rival those of the USA – currently the worst offender – within a generation. However, without widespread political support and commitment to making progress, the outlook is unclear. Any successor to the Kyoto Protocol, the intergovernmental environmental pact, must include not only the recalcitrant developed nations, such as Australia (all those cattle, sheep and wild animals passing wind!) and the USA, but also the newly emerging industrial forces, notably Brazil, China and India.

The air transport industry is one area in the global economy where there is a strong desire to make progress. A major voice is the Air Transport Action Group (ATAG), an industry-wide coalition launched by the International Air Transport Association (IATA), Airbus and Boeing at the beginning of the 1990s. Philippe Rochat is ATAG’s Executive Director. His career in aviation includes two three-year terms as Secretary General of ICAO. ATAG is working with its industry partners to provide clear information and facts about the aviation industry’s environmental impact and its commitment to environmental responsibility.

Air transport is often unjustly targeted as a major atmospheric polluter. “This is not very fair”, Rochat observes. “Politicians and the media do not recognise what we have achieved in the past and plan to achieve in the future.” The recent IPCC report noted that aviation contributes a global total of 2% to worldwide emissions of carbon dioxide (CO₂) – about the same as a single medium-sized industrialised nation such as the United Kingdom. This figure is unchanged from the last IPCC review seven years ago, although the report noted that this proportion could rise to 3% by 2050.
The current emphasis on global warming and climate change has altered the airline industry’s environmental focus. When jet airliners entered service, the emphasis was on aircraft noise. “This is still important in the context of airports”, Rochat noted, pointing out that in the USA “according to the Federal Aviation Administration, noise and local air quality have a higher priority than climate change.”

The airlines have worked hard on environmental issues within their control and will continue to do so. Nevertheless, one fundamental problem is that air transport is the industry that will have the most difficulty in moving away from its traditional fuel, Rochat noted. In addition, airlines are criticised for not paying taxes on fuel used for international services but, he pointed out, in the transport sector, aviation is the only industry that fully covers its infrastructure costs through airport and ATC charges. Road and rail transport infrastructures are all subsidised, sometimes to a considerable degree.

Government support is the key

The IPCC reported that, if air transport infrastructure can be made more efficient by the authorities, overall fuel consumption could be reduced by up to 12%. This is surely a worthwhile target for governments to aim for.

Europe should be the region where the most progress can be made in the short term, given the Single European Sky (SES) Programme. Rochat stressed that the obstacles to successful implementation of the SES are not technical but political. “The issue of military airspace and the resulting negative impact on the efficiency of commercial traffic flows should be addressed more vigorously.”

The problem of parking and departure slots affects a large number of hubs around the world. For instance, it is not uncommon for aircraft to queue for more than an hour at New York’s Kennedy International Airport, wasting numerous tonnes of fuel before getting airborne. Europe has proved to be more efficient than other regions at addressing airport congestion during peak hours, thanks to EUROCONTROL’s Central Flow Management Unit (CFMU), Rochat pointed out. He is encouraged by initial results from trials in the United Kingdom where aircraft are towed to the vicinity of the take-off runway before starting their engines.

Emissions trading

Another European initiative that will impact the air transport industry is emissions trading, which is scheduled to be introduced in 2011 for flights within the European Union (EU), with extension to cover flights to and from the EU the following year. However, IATA Director General and CEO, Giovanni Bisignani, said that: “An emissions trading scheme is preferable to taxes and charges, provided that it is well designed and that there is efficient infrastructure.” Above all, from the airlines’ standpoint, competitive distortions must be minimised.

The US Government has opposed extending the plan to non-EU carriers, saying that it is “unlawful” and that a global solution is preferable, rather than a regional or national approach. A cynic would say that the USA knows full well that getting agreement on a global level could take many years. The current US Administration is unlikely to consider the application of mandatory emissions trading to aviation.

Outside Europe, some progress has been made, notably in Asia, where IATA has been able to persuade governments to shorten some long-haul routes by “straightening” them in geographic terms. However, given the technology offered by satellite navigation, global positioning systems and the like, there is room for much more improvement, particularly on trans-oceanic and transpolar routes. One highly inefficient procedure, given the availability of technology, is that aircraft flying trans-oceanic services cannot alter their assigned flight paths at any stage during the actual over-water sector, except in cases of real emergency.
EUROCONTROL’s Software Team celebrates 30 years of operational service in Karlsruhe

The EUROCONTROL Karlsruhe Team has been at the sharp end of air traffic control (ATC) for over 30 years, and ‘systems’ is their key-word. They have worked with those who plan systems, those who pay for systems, those who produce systems, and those who operate and use systems. Jürgen Hein, Head of the EUROCONTROL Software Team in Karlsruhe, is “very pleased to be celebrating the 30th anniversary”. He and his team are “proud to have driven the development, maintenance and formulation of requirements to support the provision of air traffic control services in one of the most important ATC centres in the core area of Europe”.

In 2006 the Karlsruhe Centre handled approximately 1,400,000 movements, with a peak day of over 4,700 flights and a peak hour of over 300 flights.

Original concept

In the late 1960s, civil aircraft movements increased to such an extent that by 1970 traffic was approximately double the forecast made in 1965 (when plans for the creation of Maastricht Upper Area Control Centre (UAC) were being proposed). This traffic density, combined with airspace limitations and a complex route structure, specifically in the upper airspace of the Federal Republic of Germany, made it necessary to redefine the operational concept. In order to deal with the increase in traffic and to achieve an optimum degree of safety, it was considered necessary to integrate the civil and military air traffic control functions in the Federal Republic of Germany. Consequently, Belgium, Luxembourg, the Netherlands and the Federal Republic of Germany decided that an ATC centre needed to be built to control the upper airspace in south-west Germany. Their intention was described in a “Declaration of Intent” which was officially approved by the EUROCONTROL Permanent Commission in 1970 – and so the Karlsruhe concept was born.

EUROCONTROL took advantage of the work that had already been done in the building and setting-up of its first UAC in Maastricht and used that Centre as a blueprint for Karlsruhe. In 1971, EUROCONTROL staff were recruited, and the building was inaugurated in 1972. ATC operations with Bundesanstalt für Flugsicherung (BFS) controllers started with a Karlsruhe Automatic Data Processing and Display System (KARLDAP A). This system was used for the provision of air traffic control in the upper airspace above 24,500 feet within a geographical area roughly corresponding to central and south-west Germany. KARLDAP 1 was modelled on the MADAP system used at Maastricht UAC and provided integrated radar data and flight plan processing. Since both systems used the same standards, an automatic exchange of flight data could be ensured, with the aim of reducing telephone coordination to a minimum.

However, just before the Centre was due to become operational, the basic political framework changed, and in 1976 the Permanent Commission approved the German request for the BFS to take over responsibility for the Karlsruhe UAC infrastructure by 1983. A special contract between the BFS and EUROCONTROL was agreed, under which software development and maintenance for the KARLDAP system was to continue to be carried out by a team of EUROCONTROL staff. The Software Team Karlsruhe is now part of the EUROCONTROL Directorate of Air Traffic Management Strategies, Stakeholder Implementation Service.

In 1993, German ATC was “privatised”, and the air traffic control body Deutsche Flugsicherung GmbH (DFS)
became the national service provider. The Software Team continued to perform ATC tasks in Karlsruhe until 1995 when the agreement between EUROCONTROL and DFS changed. Although the DFS took over responsibility for the system, EUROCONTROL was still required to supply staff to maintain KARLDAP. After 1995, DFS staff and contractors joined the team in order to replace EUROCONTROL staff who were retiring.

On 26 February 2007, the Karlsruhe Software Team celebrated 30 years of successful software development and maintenance for the KARLDAP system. It has been an impressive partnership that has worked well over the decades. The DFS has given notice of termination of the contract, which comes to an end on 30.6.07. The contract has been replaced with a special agreement that will permit between five and eight EUROCONTROL staff members to stay in Karlsruhe. The KARLDAP system is scheduled to be replaced with a new system in late 2008 or early 2009.

For the last thirty years a EUROCONTROL Team has been providing an excellent service to the Karlsruhe ATC Centre,” said Víctor M. Aguado, EUROCONTROL Director General. “Continually adapting to the challenging aviation environment and changing information technology needs, the Team has successfully met the Centre’s operational and growing traffic requirements."

<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>26.2.77</td>
<td>Karlsruhe UAC begins operations with the KARLDAP-A system (separated radar and flight plan processing). The system consists of IBM mainframes (360/158) and peripheral computers (Telefunken TR86). Radar data processing is performed by a hardware plot processor.</td>
</tr>
<tr>
<td>7.12.80</td>
<td>The KARLDAP-1 system (derived from the MADAP system in the Maastricht UAC) is introduced, with integrated radar and flight plan processing. The hardware plot processor is used as back-up. Interface with ODS and radar data input is performed by a peripheral computer complex (TR86). AFTN communication and input of MET messages is performed by DCTS, a system based on mini-computers (Mitra15).</td>
</tr>
<tr>
<td>1983</td>
<td>One of the first activation message (ACT) exchanges is implemented between Maastricht and Karlsruhe UAC. Connections with ZKSD Frankfurt follow.</td>
</tr>
<tr>
<td>1985</td>
<td>The hardware replacement of the KARLDAP main computer complex (mainframes and peripherals) begins.</td>
</tr>
<tr>
<td>1988</td>
<td>Transition to a UNIX-based software development system. A hardware replacement study begins for the KARLDAP Peripheral Computer Complex (KPCC) and Operational Display System (ODS) incorporating local area networks and 2k x 2k raster displays.</td>
</tr>
<tr>
<td>1989</td>
<td>The communication system KIDS (based on personal computers) replaces DCTS. OLDI connections using the OLDI Short-Term ICD with Zurich, Reims and Prague is implemented.</td>
</tr>
<tr>
<td>1993</td>
<td>The new KARLDAP PCC (Concurrent Computer) and ODS (Hughes) come into operation. KUAC is one of the first centres to be equipped with colour raster-scan displays.</td>
</tr>
<tr>
<td>1994</td>
<td>The DFS decides on a common procurement with Maastricht to use COPS-compliant displays. The KADS (Karlsruhe Advanced Display System) software contract is awarded to Siemens. Short Term Conflict Alert (STCA) is implemented</td>
</tr>
<tr>
<td>1995</td>
<td>The communication system is re-hosted (KDCS replaces KIDS).</td>
</tr>
<tr>
<td>1996</td>
<td>KADS is integrated into the KARLDAP system and the new operations room becomes operational.</td>
</tr>
<tr>
<td>1999</td>
<td>New mainframes and peripherals (s/390) come into operation.</td>
</tr>
<tr>
<td>2001</td>
<td>Traffic throughput increases via horizontal splitting of sectors (level-split concept).</td>
</tr>
<tr>
<td>2003</td>
<td>New message-logging system (AMLS) is implemented to replace ageing IBM printers.</td>
</tr>
<tr>
<td>2004</td>
<td>Basic Mode-S radar data processing is implemented. Migration of the batch system from OS/390 to z/OS.</td>
</tr>
<tr>
<td>2005</td>
<td>KARLDAP is extended to include the Berlin upper airspace.</td>
</tr>
<tr>
<td>2006</td>
<td>Conspicuity Codes concept and Mode-S evaluation are implemented.</td>
</tr>
</tbody>
</table>

For the last thirty years a EUROCONTROL Team has been providing an excellent service to the Karlsruhe ATC Centre,” said Víctor M. Aguado, EUROCONTROL Director General. “Continually adapting to the challenging aviation environment and changing information technology needs, the Team has successfully met the Centre’s operational and growing traffic requirements."

On 26 February 2007, the Karlsruhe Software Team celebrated 30 years of successful software development and maintenance for the KARLDAP system. It has been an impressive partnership that has worked well over the decades. The DFS has given notice of termination of the contract, which comes to an end on 30.6.07. The contract has been replaced with a special agreement that will permit between five and eight EUROCONTROL staff members to stay in Karlsruhe. The KARLDAP system is scheduled to be replaced with a new system in late 2008 or early 2009.

Karlsruhe UAC begins operations with the KARLDAP-A system (separated radar and flight plan processing). The system consists of IBM mainframes (360/158) and peripheral computers (Telefunken TR86). Radar data processing is performed by a hardware plot processor.

The KARLDAP-1 system (derived from the MADAP system in the Maastricht UAC) is introduced, with integrated radar and flight plan processing. The hardware plot processor is used as back-up. Interface with ODS and radar data input is performed by a peripheral computer complex (TR86). AFTN communication and input of MET messages is performed by DCTS, a system based on mini-computers (Mitra15).

One of the first activation message (ACT) exchanges is implemented between Maastricht and Karlsruhe UAC. Connections with ZKSD Frankfurt follow.

The hardware replacement of the KARLDAP main computer complex (mainframes and peripherals) begins.

Transition to a UNIX-based software development system. A hardware replacement study begins for the KARLDAP Peripheral Computer Complex (KPCC) and Operational Display System (ODS) incorporating local area networks and 2k x 2k raster displays.

The communication system KIDS (based on personal computers) replaces DCTS. OLDI connections using the OLDI Short-Term ICD with Zurich, Reims and Prague is implemented.

The new KARLDAP PCC (Concurrent Computer) and ODS (Hughes) come into operation. KUAC is one of the first centres to be equipped with colour raster-scan displays.

The DFS decides on a common procurement with Maastricht to use COPS-compliant displays. The KADS (Karlsruhe Advanced Display System) software contract is awarded to Siemens. Short Term Conflict Alert (STCA) is implemented.

The communication system is re-hosted (KDCS replaces KIDS).

KADS is integrated into the KARLDAP system and the new operations room becomes operational.

New mainframes and peripherals (s/390) come into operation.

Traffic throughput increases via horizontal splitting of sectors (level-split concept).

New message-logging system (AMLS) is implemented to replace ageing IBM printers.

Basic Mode-S radar data processing is implemented. Migration of the batch system from OS/390 to z/OS.

KARLDAP is extended to include the Berlin upper airspace.

Conspicuity Codes concept and Mode-S evaluation are implemented.
13-15 February was that time of year again when the long-awaited annual Maastricht ATC Exhibition and Conference took place. Attracting a record 4,300 attendees from 82 countries this year, Maastricht ATC has definitely become the premier event of the industry, a must for the world’s leading suppliers of ATC and ATM equipment and services, as well as the key specifiers and buyers in the market.

This year’s programme was entitled “The future of air traffic management” and focused on how the industry should progress, how it should be regulated and organised, and how its technology base should be defined and developed in order to meet the challenges of the next-generation ATM systems.

EUROCONTROL stand

In line with this, EUROCONTROL’s stand had a running theme divided into two parts: “Delivering today”, which described the short- and medium-term programmes it was currently working on, namely the Dynamic Management of the European Airspace Network (DMEAN); and “Shaping the future”, which detailed its long-term goals, namely the Single European Sky ATM Research Programme (SESAR).

DMEAN, which looks to meet the capacity demand and flight efficiency requirements up to 2010, featured five main projects:
- capacity network planning (unlocking capacity);
- airspace design (increasing flexibility and efficiency);
- pre-tactical phase (meeting civil and military requirements);
- day of operations (meeting civil and military requirements);
- airports and network (collaborative decision-making).

SESAR, which will combine operational, technological and economic solutions to allow the development of air traffic up to and beyond 2020, displayed three main projects:
- SESAR;
- OATA;
- TMA 2010+.

EUROCONTROL experts from the relevant divisions were on hand to provide visitors with further information about these projects and explain how EUROCONTROL’s collaboration with the aviation industry in general looks to accommodate the vast growth expected in the number of flights (16 million by 2020) in a safe, efficient and sustainable manner with a minimum delay.

Conference

The Conference brought together important figures from all sections of the aviation market to see how the institutional, political and technical elements of the next-generation ATM system could be successfully merged. Once again it was designed to provide delegates with new opportunities to engage with industry leaders to better understand the implications of developing advanced technologies and the challenges that remain. The speaker
line-up included representatives from the fastest-growing aviation areas of the world and key decision-makers from Europe and North America, with new voices from State transport departments, aviation environmental groups and technology providers. The new interactive panels to encourage debate and audience participation proved particularly popular.

EUROCONTROL’s Director General, Mr Victor Aguado, co-chaired the event and opened the Conference with a keynote address touching on safety, capacity, costs, the technical and regulatory front, FABs and the future. Other presentations on behalf of the Agency were given by Jean-Robert Cazarré, Director Civil-Military ATM Coordination, on developing next-generation ATM systems with specific reference to civil-military interoperability; Joe Sultana, Head Airspace Network Planning and Navigation, who used EUROCONTROL’s slogan ‘Delivering today and shaping the future’ as a basis for his speech, during which he referred to DMEAN and SESAR; and Bo Redeborn, Director ATM Strategies, who focused on EUROCONTROL’s perspectives on the Single European Sky and SESAR. Mr Redeborn also chaired the session on ‘The challenges of developing next-generation ATM systems’ and ‘The solutions for developing next-generation ATM Systems’.

EUROCONTROL wins award

As the one of the biggest days in the calendar for the air traffic control industry, and the annual meeting place for ATC professionals worldwide, it was a prestigious moment for EUROCONTROL’s ATM Safety Project, when it was awarded the prize for “Contribution to European ATM”.

Between 2004 and 2006, EUROCONTROL implemented and delivered more than 90% of its Strategic Safety Action Plan. In 2006 it launched a new programme called the European Safety Programme for ATM (ESP) with specific actions for navigation service providers, regulators, airlines and airports. Over 16 countries have received EUROCONTROL support, including on-the-job training in safety management under the project ‘Support to air navigation service providers on safety management system implementation’ (SASi).

The award was accepted by Dr Erik Merckx, Deputy Director ATM Programmes, and Peter Stastny, Head of the Safety Regulation Unit, who gave a joint statement saying “We are delighted with the recognition that this award brings to both the EUROCONTROL Safety Project and the dedicated team of safety professionals who have been providing tremendous support to air navigation service providers and regulators. We have trained over 500 safety experts in more than 20 countries and are starting to see the benefits in terms of increased levels of safety maturity across Europe. The considerable results achieved through the Project represent a significant step forward for EUROCONTROL in advancing European aviation safety, and were only possible through the concerted effort of everyone involved.”

Over the last six years at Maastricht ATC, Jane’s Awards have been recognising excellence within the air traffic management industry and raising awareness of significant contributions to air traffic safety, capacity and efficiency. This year they presented a total of six awards.

“EUROCONTROL organises ADS-B Workshop

"It is clear that ADS-B will be a hot subject in the coming year and will continue to be one of our key priorities", said Alex Wandels, CASCADE Programme Manager at EUROCONTROL. This was very much the feeling on 15 February, the last day of the event. The External and Public Relations Unit and CASCADE Programme organised an ADS-B Workshop, which exceeded all expectations by attracting more than 120 attendees. Several presentations were made on a range of topics, including “The path to CASCADE implementation”, “An international solution for the FAA's ADS-B Programme”, “First ADS-B ground stations and planned developments”, “The ADS-B market in Europe”, and “Breaking into the professional ADS-B ground station market”. There was also plenty of opportunity for interaction through the questions and answers sessions.

Dr Erik Merckx, Deputy Director ATM Programmes, EUROCONTROL (left), and Peter Stastny, Head of the Safety Regulation Unit, EUROCONTROL (right)
On 6 March the EUROCONTROL Agency held jointly with the European Commission a Workshop on Functional Airspace Blocks (FABs). The workshop attracted approximately 200 participants from 35 different European States and the USA, representing some 20 international organisations and companies.

The workshop shed light on the whole spectrum of ongoing FAB initiatives, their complexity levels and the applied methodologies. It covered not only the status of the most relevant FAB initiatives in Europe but also EUROCONTROL and European Commission’s ideas of pan-European harmonisation of FAB activities.

“It is clear that the implementation of functional airspace blocks is more than just an airspace issue. Their implementation must also address security, social, legal, economic and technical aspects.” Mr Alex Hendriks, EUROCONTROL Deputy Director ATM Strategies and Chairman of the FAB Workshop, stated in his closing remarks.

“FABs are the motor for defragmentation and, while reflecting the air traffic demands, FABs must provide economic and operational benefits,” reinforced Mr Chris North, representative of the European Commission at the FAB Workshop.

---

**FRApport traffic figures – February 2007**

**Frankfurt airport begins the spring with new record figures**

3.8% more passengers
and 4.4% more airfreight in February

13 March 2007 – In the reporting month of February 2007, Frankfurt Airport (FRA) again achieved new record traffic figures. Airfreight tonnage reached its highest level ever, and FRA also registered new February records for aircraft movements and maximum takeoff weights, which are important for calculating airport charges.

(source: FRAPORT press release)

---

**NATS pioneers biggest ATC advance since radar**

7 March 2007 – A set of computer-based predictive tools developed by NATS will trigger the biggest change in air traffic control since the introduction of radar.

iFACTS – Interim Future Area Control Tools Support – will further improve safety and provide controllers with a set of advanced support tools, which will enable them to increase the amount of traffic they can comfortably handle. In trials, the system has delivered significant capacity increases.(…)

(source: NATS news release)
7 March 2007 - The FAA will hire and train more than 15,000 controllers over the next decade under a comprehensive plan that matches staffing to air traffic.

The updated controller staffing plan, released today, takes into account anticipated retirements and changes in traffic. It ensures that there are the “the right number of people in the right facilities at the right time,” said FAA Administrator Marion Blakey.

The “good news” in the report, according to Blakey, is that the FAA hired 1,116 new controllers in fiscal 2006, increasing the total number of controllers employed to 14,618.

Even more – nearly 1,400 new controllers – will be hired this fiscal year. (…)
(Source: FAA press release)

On 20 December 2006, ROMATSA successfully completed ISO 9001:2000 Certification for all its activities. The Quality Management System Certificate was handed over by Bureau Veritas Certifications to the ROMATSA General Manager.

The prime objective of the certification was to implement and certify a quality management system based on EN ISO 9001:2000 family standards by the end of 2006, in accordance with the European Commission Regulation nr.2096/2005.
**Datelines**

**Environment in ATM Consultation Workshop**

*18 January 2007*

EUROCONTROL Director ATM Programmes, Mr Guido Kerkhofs, addressed delegates at the Environment in ATM Consultation Workshop held at the Organisation’s Headquarters, Brussels on 18 January.

Representing over 30 different organisations covering all sectors of the European ATM system, delegates discussed the EUROCONTROL Environment Domain Action Plan, covering the Agency’s action on ATM environmental issues for the coming three years. Mr Kerkhofs concluded the meeting with the following observation: “Environmental challenges to ATM are already here and are growing rapidly. Doing nothing is not an option. The stakeholders recognise this; they have asked us to set up more permanent working arrangements so that we can steer this important programme of work in partnership together”.

---

**On 22 March,** the Director General welcomed Mr Alessandro Bianchi, Minister of Transport of Italy (left). The Minister was briefed on the EUROCONTROL Agency’s role in air traffic management, Functional Airspace Blocks and the SESAR Programme.

**On the same day,** the Director General received Mr Peter Vassilev Mutafchiev, Minister of Transport of Bulgaria. The Minister was given an overview of EUROCONTROL, the Agency’s relations with the European Community and its role in the Functional Airspace Blocks.

**On 28 February,** various EUROCONTROL’s officials attended the Prime Minister of Turkey’s visit of the Senior Audit Board. Representatives from Turkey included Mr Hakan Aydin, Mr Sami Iskender, Mr Isik Eyugbglu, Mr Karpuzcu and Mrs Berrin Berke. The visit was spread over two days, the first of which took place at EUROCONTROL’s Headquarters. Following a courtesy meeting with the Director General and an overview of the Agency, the visitors were informed about the role of the Central Route Charges Office. Information was also provided on the financing of the Agency and the Audit Board’s mission and activities, as well as the Internal Audit. The day finished with a tour of the CFMU operations room. On 1 March the group visited the Maastricht operations room.
On 23 January EUROCONTROL officials welcomed a delegation from the Civil Aviation University of China. The programme of the visit included a general overview of EUROCONTROL, presentations on European air traffic management and European airspace, as well as a tour of the CFMU operations room.

The Director General met Mr Binali Yıldırım (Turkey’s Minister for Transport and Communications), Mr Ali Ariduru (Director General Civil Aviation), and his Deputy, Mr Haydar Yalçın in Ankara on 10 January to discuss matters of common interest, in particular the ratification of the revised Convention and bilateral cooperation with and support for EUROCONTROL in technical, operational and organisational fields.

The Summer 2007 issue of Skyway will focus on ATM performance

EUROCONTROL website: www.eurocontrol.int

Next events

16-20 April 2007
46th Annual Conference of International Air Traffic Controllers Associations
İstanbul, Turkey

19-22 April 2007
‘AERO 2007’ 16th International Trade Exhibition
Friedrichschafen, Germany

19-20 September 2007
CFMU User Forum
EUROCONTROL Brussels’ Headquarters, Belgium

26-28 October 2007
IFATCA European Regional Meeting
Prague, Czech Republic

28-31 October 2007
52nd Annual Conference and Exposition
Marriott Wardman Park Hotel, Washington DC

VLJ Workshop
4 May 2007
Brussels Headquarters

Registration closing date: 25 April 2007