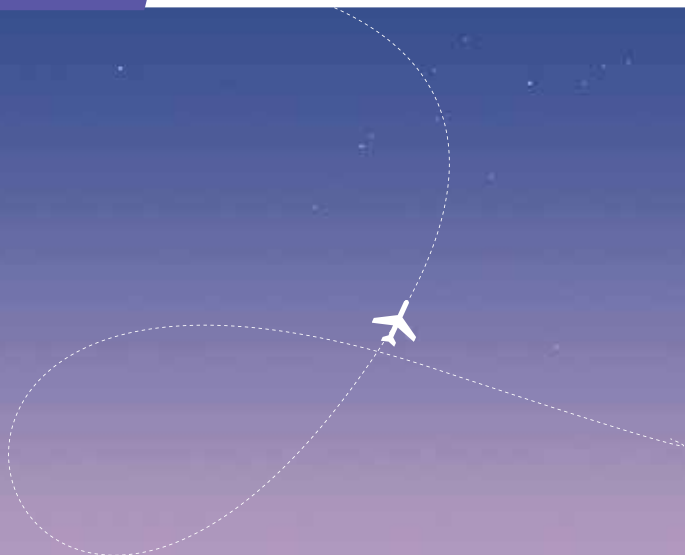


French Civil Aviation Authority

Environmental Report for 2008



Resources, regions and habitats
Energy and climate
Sustainable development
Risk prevention
Infrastructure, transport and the sea

**Present
for
the future**



An Unprecedented Mobilisation



Prior to 2008 never had there been such a high level of mobilisation on such a wide range of issues relating to sustainable development and the air transport industry. The end of 2007 saw projects getting under way, and commitments being made. 2008 was the year that saw the first practical results of what had been decided. The air transport industry is at the heart of the main issues involved in sustainable development: noise, climate change and local pollution. Although its global impact in quantitative terms remains limited, and is no doubt less than some members of the general public perceive it to be, it is nevertheless true that at the present stage in the history of aviation, catering for environmental concerns has become one of the driving forces of the industry. And in a period of major crisis, sensitivity to environmental issues remains in the news. Cutting fuel consumption, curbing noise and maintaining an ongoing dialogue with society at all levels are the required responses to these concerns.

As regards curbing noise inconvenience, the implementation of measures brought in over the past several years is going ahead, with particular attention to night-time pollution.

On the climate change front, the DGAC has taken on board the strategy of the French Ministry of Ecology, Energy, Sustainable Development and Town and Country Planning, which is to make the country a benchmark for environmental progress. This includes pushing ahead with the policy of modal complementarity between planes and high-speed trains (TGV), which relocates the air transport industry within a new area of relevancy, on the basis of flight times. The plane is thereby seen as corresponding to the requirements of travellers for all trips taking over three hours.

Research is more than ever an indispensable lever to help prepare the air transport industry of tomorrow to reconcile economic performance with the need to curb environmental impacts while also ensuring maximum safety.

Last but not least, the reorganisation of the DGAC in 2008, as part of the creation of the new Ministry of Ecology, Energy, Sustainable Development and Town and Country Planning, made it possible to place sustainable development at the heart of its activities. An indispensable move if we are to meet the challenges of a greener aviation industry.

Patrick Gandil,
Director, French Civil Aviation Authority

ENVIRONMENTAL REPORT FOR 2008

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Curbing Aviation's Sound Footprint

France's Environmental Round Table process, also known as the «Grenelle de l'Environnement», has speeded up implementation of a number of projects aimed at reducing noise pollution. Increases in flight path altitudes and the provision of soundproofing for homes are just two examples of the practical measures taken as part of what has been an unprecedented process of dialogue. In addition, the DGAC has boosted its own initiatives aimed at further curbing the sound footprint of aircraft.

The Round Table Commitments on SOUND POLLUTION



Initial Measures

As regards flight paths, an increase of 300 metres (1,000 feet) in the ILS interception altitude for eastward-facing night flights coming in to Le Bourget from the southeast came into force on May 8, 2008. Studies have shown that increasing the altitude of approach flight paths can cut maximum perceived noise levels on the ground by up to 50%. In October 2008 air traffic controllers at Orly Airport carried out a simulation to see what the effect would be if the altitude of aircraft coming in facing



east were raised to 1,200 metres (4,000 feet). The overall increase in interception altitudes in the greater Paris region is a major task which involves flight paths coming from all points of the compass and serving the capital's three main airports. Implementation is taking place between 2008 and 2011. Also at Orly, assessment of a continuous descent approach (CDA) procedure for east-facing flights has been under way since August 2008.

On the home soundproofing front, thanks to an increase in the funds raised by the tax on aviation noise pollution (known as the TNSA from its French initials) at Orly and Nantes, it was possible to cater for 1,500 pending requests for home sound insulation from people living in the vicinity of Orly. As regards Nantes, the backlog of applications is progressively being processed and should have been completely eliminated in line with projections by the end of 2009. Separately, a new daily time slot, from 6:00 to 10:00 pm, was defined under the TNSA schedule in 2008; it gives rise to a levy three times as high as that during daytime.

Meanwhile the noise pollution problem in and around Nantes in western France is set to be considerably alleviated by the opening of the new Notre-Dame-des-Landes airport, which will be the first facility to fully integrate the conclusions of the environmental round table. The resulting closure of the Nantes-Atlantique airport to commercial traffic will eliminate low-altitude overflights of the city. The decree authorising construction of the new facility, which will serve much of western France, was published in February 2008.

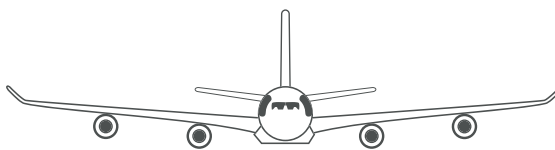
Tougher Operating Restrictions

At Charles-de-Gaulle Airport the operating restrictions on noisy aircraft that have been progressively introduced since 2004 have been fully in effect since October 1, 2008, with a total ban on the noisiest craft not only at night but also during daytime. The aircraft affected are those defined as having a cumulative margin* of less than five effective perceived noise decibels (EPNdB) in relation to the limits set by Chapter III.

*The cumulative margin is the sum of the individual margins obtained on the three parameters of acoustic certification: lateral, overflight and approach.

*The individual margin is the difference in decibels between the certified noise level and the noise threshold laid down in the regulations.

SOME EXAMPLES OF NOISE TAX RATES FOR VARIOUS AIRPORTS AND AIRCRAFT



The sums levied under the TNSA vary according to the acoustic classification of each type of craft. The lower the aircraft's acoustic performance, the higher the tax. The following are a few examples since the introduction of a new six-to-ten pm time slot:

- Levy for an **Airbus A380** operating at Charles de Gaulle
Daytime takeoff: 52€
Evening takeoff: 157€
Night takeoff: 312€
- Levy for an **Airbus A320-200** at Nantes-Atlantique
Daytime takeoff: 82€
Evening takeoff: 246€
Night takeoff: 493€
- Levy for an **Airbus A340** at Paris-Orly
Daytime takeoff: 115€
Evening takeoff: 345€
Night takeoff: 688€
- Levy for a **Boeing 747-400** at Paris-Orly
Daytime takeoff: 1,464€
Evening takeoff: 4,392€
Night takeoff: 14,640€

International ACTION AND CERTIFICATION

Certification

By measuring the acoustic performance of different aircraft, certification makes it possible to make reliable distinctions between them.

The various versions of the A380 have all been certified as Chapter IV under the ICAO's Annex 16 classification. This new stricter standard, which came into effect on January 11, 2006, provided for a 10dB reduction in the maximum admissible noise level compared to the previous norm, Chapter III. Recertification of the various Airbus models from Chapter III to Chapter IV went ahead in 2008, as was also the case for business craft produced by Dassault, which were all recertified as Chapter IV.

In 2008, the Spanish laboratory in charge of flight testing the A330 MRTT - the military in-flight refuelling craft based on the A330 - asked the DGAC to carry out an expert study of that aircraft with a view to its acoustic certification.

International Action

The DGAC's experts are involved in proceedings of the ICAO's acoustic certification working groups which draw up and adopt technical standards for aircraft. They have participated in a preparatory study for a meeting of the Committee on Aviation Environmental Protection (CAEP) which is due, in 2010, to draw up a new standard that will be even stricter than the current Chapter IV.

THE ACOUSTIC CERTIFICATION PROCEDURE

Civil aviation authorities carry out acoustic certifications under procedures drawn up by the ICAO. The tests consist of measuring the noise emitted by an aircraft from three locations: an approach point 2,000 metres from the runway threshold, a lateral point 450 metres from the runway axis and a flyover point located 6,500 metres from the start of roll at takeoff. The certified noise levels for standard flight procedures provide a good way of quantifying the nuisance levels for people living in the vicinity of airports.

ZOOM

CLASSIFYING AIRCRAFT BY NOISE LEVELS: THE ICAO CHAPTER RANKING

The acoustic classification of each type of aircraft is determined via three measurements, corresponding to noise on approach for landing, at take-off under full throttle, and during overflights. These levels have to correspond to ceilings set by the ICAO (Annex 16). Currently there are three generations of aircraft, classified as Chapter II - the noisiest - Chapter III and Chapter IV, the quietest. All new aircraft now have to comply with the restrictions defined under Chapter IV, which was brought in in 2001.



KEEPING TABS ON NOISE around Airports

Monitoring Campaigns

Several noise monitoring campaigns were carried out around Orly Airport in 2008 as part of tests to assess continuous descent approach (CDA) procedures. The gains in noise exposure vary depending on the regions overflowed and the type of aircraft being monitored.

Another monitoring campaign was carried out in Nice, on the acoustic impact of thrust reversers. It will make it possible to test an audio recognition software program.

With the Paris-region noise agency BruitParif, the DGAC took part in the acquisition of three permanent monitoring stations to complete the networks on and around the Issy-les-Moulineaux heliport on the southern outskirts of the capital. The network will make it possible to better monitor the noise caused by helicopters at the facility and on various flight paths, in line with a commitment made in the heliport's October 2007 environmental charter.

At the Basel-Mulhouse Airport, tests of a new noise and flight-path monitoring system began in 2008. The Civil Aviation Technical Service (STAC) was given the go-ahead by the French independent airport noise monitoring agency ACNUSA to act as the certified expert on the new system.

Impact Studies

Thanks to air traffic impact studies, the environmental effects of a given change in procedures can be assessed before it comes into force. In 2008 the DGAC carried out five such studies, concerning the airports of Marseille, Rennes, Nice, Caen and Toussus-le-Noble. In Nice, a new northbound takeoff procedure for runway 13 implied flights passing over the town of Vitrolles. A study was carried out to try and reduce as much as possible the resulting inconvenience to residents. After a broad consultation process a solution was drawn up and approved by an Environmental Consultative Committee. It allowed more than 3,000 out of a total of 24,000 residents to escape the side-effects of the new procedure.



MILLIONS OF SOUND RECORDINGS

The monitoring equipment used for the DGAC's measurement campaigns consist of microphones linked to computers. The recordings are compared to radar data to determine which sounds are caused by aircraft. Thanks to these monitoring stations millions of recordings have been made of the sound associated with a given aircraft and a given flight path. One of the uses of the data is to inform local populations of the noise levels to which they are most often exposed.



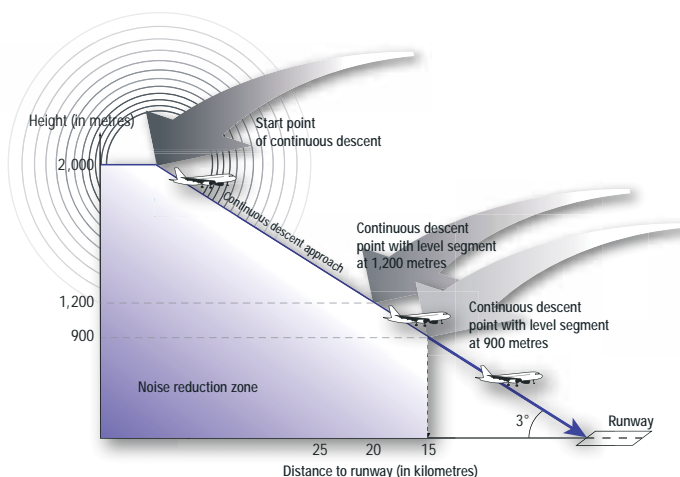
New Avenues for CURBING THE IMPACT of OVERFLIGHTS

Continuous Descent

Work on assessing this quieter technique of coming in to land, the potential of which was stressed by all participants in the environmental round table, continued in 2008. In addition to the tests on eastward-facing descents into Paris-Orly, work continued on evaluating a continuous descent approach procedure for north-west-facing craft at the Marseille-Provence airport. By eliminating the long flight phase carried out 2,000 feet above the city's northern neighbourhoods the procedure helps to provide a substantial cut, of between two and three dB, in the noise levels for residents in overflight zones to the west of the conurbation.

The continuous descent procedure was also submitted to the Environmental Consultative Committee for the Strasbourg-Entzheim Airport, where an evaluation process started in December 2008. The mayors of towns located away from the airport were contacted with a view to setting up a monitoring unit to assess the effectiveness of continuous descent.

Diagram Showing Continuous Descent Approaches





Quieter Procedures

A new northwards take-off procedure for Toulouse-Blagnac Airport is under study. It curbs noise pollution by using precision radio navigation, and will benefit the neighbourhoods of Merville and Grenade, located directly beneath the current runway axis. The test procedure, which was applied to night-time operations from December 2008, is to be extended to daytime takeoffs during weekends and public holidays in the summer of 2009.

Today, 100% of Air France-KLM's fleet complies with the ICAO's Chapter IV noise specifications.

(source: Air France's sustainable development report for 2007-2008)

CLOSE-UP

NICE: SWIFT CORRECTIVE ACTION

At the Nice-Côte d'Azur Airport, new takeoff procedures that had been implemented in April 2008 were rectified. The new rules, aimed at better separating the paths of fixed-wing aircraft from those of helicopters, had the effect of causing troublesome flights over the Baie des Anges coastal region, bringing sharp complaints from residents. As a result, the DGAC immediately brought in new measures. Initially these have consisted of raising the altitude above which craft are allowed to fly on full throttle, and making planes turn out to sea earlier. Further ahead there are also plans to create an environmental protection space which would ban aircraft from flying near to the coast.

Enhanced PREVENTION and PROCESSING Capabilities

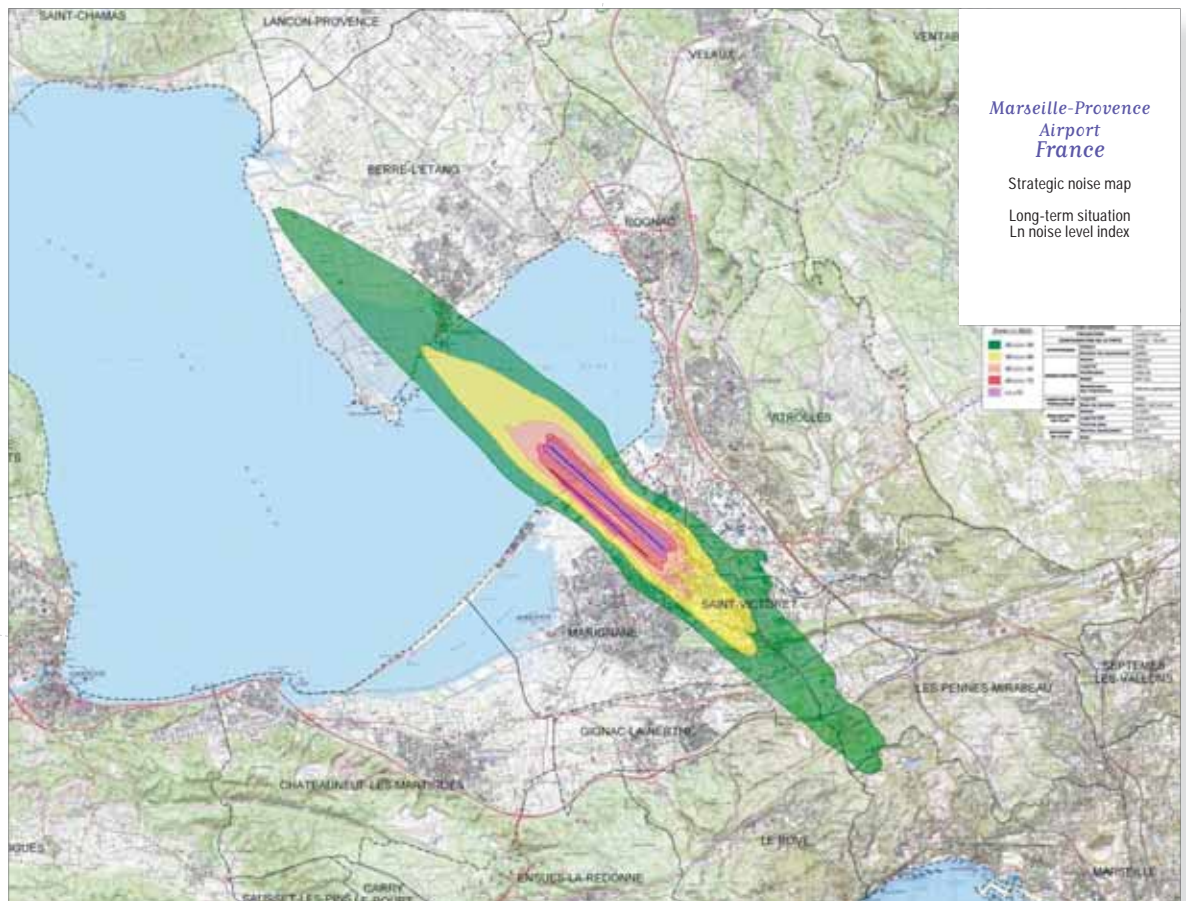
Strategic Noise Mapping

To provide for standardised measurement of noise exposure in the vicinity of major facilities (notably airports handling more than 50,000 movements per year) and in conurbations of more than 250,000 inhabitants, a European Union directive dated June 25, 2002 obliges member states to draw up strategic noise maps. These are to be used in turn to draw up environmental noise action plans.

The DGAC has produced noise maps for eight French airports: Basel-Mulhouse, Bordeaux-Mérignac, Lyon-Saint Exupéry, Marseille-Provence, Nice-Côte d'Azur, Paris-Charles de Gaulle,

Paris-Orly and Toulouse-Blagnac. The resulting maps are available via the web sites of the prefectural authorities in the corresponding French départements, and also on the DGAC's site.

Work on drawing up action plans based on the noise maps began in 2008. Bordeaux-Mérignac Airport, in liaison with all the members of the Environmental Consultative Committee, has completed the process, and the result has been presented to the public via the DGAC web site. All the action plans are due to be completed in 2009.



Town Planning Constraints

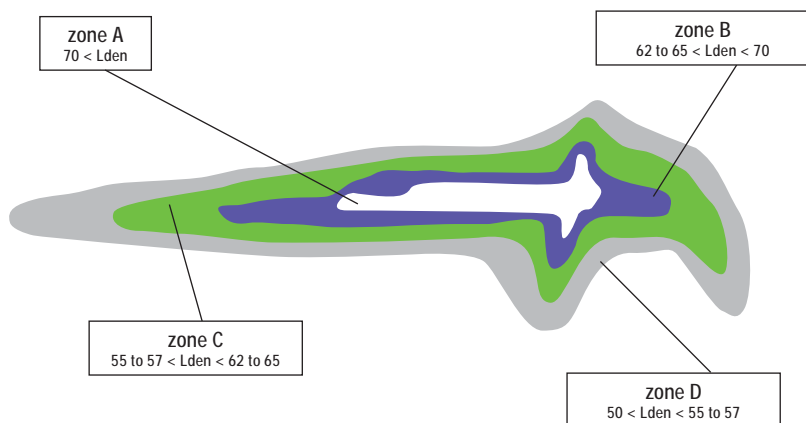
A total of ten noise exposure maps were approved in 2008, and five were declared subject to revision. The DGAC also started work on a preliminary exposure map for Paris-Orly, in partnership with Aéroports de Paris. The airport is located in a region of high population density and its existing plan dates from 1975, which means it is ripe for revision. The process of consultation and revision needed to carry through such a project to final approval is expected to take at least 18 months.

Two noise inconvenience maps, for the airports of Basel-Mulhouse and Lyon-Saint Exupéry, were also declared subject to revision in 2008.

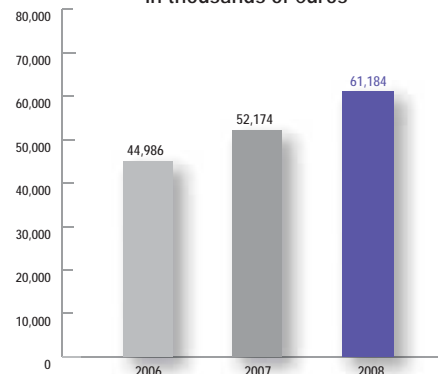
Home Soundproofing

In 2008 the tax on aviation noise pollution brought in almost 61 million €, as against 52 million in 2007 and 45 million in 2006. For Orly, the yield increased from 10 to 20 million €, making it possible to satisfy 1,500 pending applications. In all, the Consultative Committees for Subsidies to Nearby Residents (CCAR) approved a total of 5,049 applications in 2008. And all the airports had sufficient funds to cater for soundproofing applications from residents.

The various zones of a noise exposure map



Level of the aviation noise tax in thousands of euros



NOISE MAPS: WHAT ARE THEY FOR?

A noise exposure map, known in France by its initials as a PEB, is a town planning document aimed at curbing urban sprawl in the vicinity of airports. The DGAC is in overall charge of drafting the maps, for which it uses a software system known as the Integrated Noise Model. The maps designate zones as A, B, C and in some cases D, depending on the noise levels they are exposed to. There is a specific procedure involving a public enquiry based on consultation with the relevant local authorities plus the Environmental Consultative Committee, the Independent Monitoring Authority for Airport Noise Pollution (ACNUSA) and the government. Once approved, the maps are officialised by a decree issued by the prefectural authorities in each region.

A noise inconvenience map is a cartographic document which shows noise levels in the vicinity of an airport, and thereby defines those regions within which residents are entitled to apply for soundproofing grants. It is drawn up by the same process as the noise exposure maps.





CLOSE-UP

LIGHT AVIATION DOES ITS BIT TO FIGHT NOISE POLLUTION

In 2008 France's regional Civil Aviation Directorates (DAC) channelled a total of 98,000 € to general aviation clubs to help them reduce noise pollution caused by light aircraft. Some clubs, such as those in the Sarladais or Béarn regions of southwest France, or at Saint-Cyr-l'Ecole and Pontoise in the north, have invested in exhaust silencers and quieter three- or four-bladed propellers. Several others, such as those of Marmande and Mantes Chérence, have acquired glider launch winches to curb the noise from towing aircraft. Least noise procedures have also been drawn up. The Civil Aviation Directorate for the southern region has set up

an experimental plan for scheduling alternating airspace zones for aerobatics, with four different orientations being suggested. At the Toussus-le-Noble and Saint-Cyr-l'Ecole airfields, new runway taxiing layouts have been drawn up to cut noise affecting local residents. Under the terms of the environmental charter for the Chavenay-Villepreux airfield in the Yvelines département near Paris, users have committed themselves to respecting certain time periods when runway activities will be banned to reduce inconvenience for people living nearby. Last but not least, environmental and best-practice charters have been adopted at clubs such as La Baule or Aix les Milles.





CUTTING POLLUTION FROM AIRCRAFT EMISSIONS

In 2008 the DGAC pushed ahead with efforts to curb greenhouse gas emissions. This included preparatory work on integrating the aviation industry into the emission trading scheme (ETS), working within international bodies responsible for protecting the environment and prospective studies on ways that technology can help cut pollution. The agency also boosted its efforts to monitor local air quality, as well as water and ground pollution.

Fighting CLIMATE CHANGE



Adopting ETS

2008 was a crucial year as regards the participation of the aviation industry in efforts to fight climate change. After two years of debate in which the DGAC played an active role and thanks to progress made during the French presidency of the European Union, the directive calling for the aviation industry to be brought into the CO₂ Emission Trading Scheme was adopted by the European Parliament on July 8, 2008 and by the European Council on October 24, 2008. The DGAC will also play a key role in providing information for operators, and for implementing the directive at the national level.

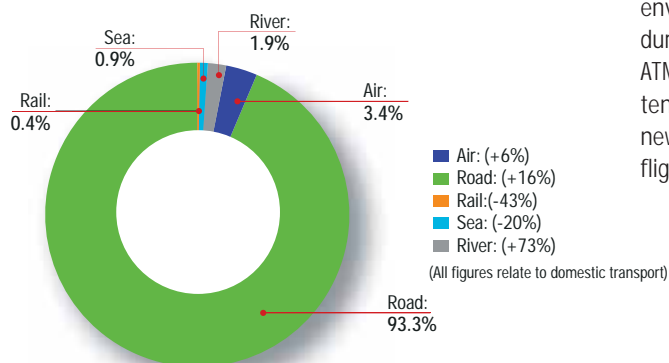
Taking part in the Group on International Aviation and Climate Change (GIACC)

Although the adoption of the ETS on the European level is a partial solution, the ultimate aim should be to agree on a

THE EMISSION TRADING AND AVIATION DIRECTIVE: BASIC PRINCIPLES

ETS is a "cap and trade" system which consists of setting a global ceiling for aviation-induced emissions and then making it possible for companies to buy and sell the right to generate those emissions. The system is due to come into force from 2012 for all flights originating and/or terminating in European Union countries. The ceiling is to be based on the emissions generated historically by the industry, using the average 2004-2006 figures as a benchmark. For 2012 it will be set at 97% of that figure, falling to 95% from 2013. Each year, airlines will have to keep to quotas corresponding to the amounts of CO₂ emitted during the year. They will acquire emission rights either via a contingent handed out free of charge to existing operators, or by buying them from an operator in another industrial sector.

BREAKDOWN OF GREENHOUSE GAS EMISSIONS
BY MODE OF TRANSPORT (2006, LATEST AVAILABLE FIGURES)
1990-2006 CHANGE (%)



In 2006, the air transport sector's contribution to overall emissions stabilised at 4.8 million CO₂ equivalent tonnes, or 3.4% of all emissions generated by domestic transport.

worldwide system. The DGAC is working towards that end, as can be seen from the work it has done in the GIACC, which was set up by the International Civil Aviation Organisation (ICAO) in 2007. At the two meetings held in 2008, France recommended the introduction of compulsory measures including economic mechanisms such as emission trading, while respecting the principle of non-discrimination.

Studies by the ICAO's Committee on Aviation Environmental Protection (CAEP)

In 2008 the DGAC pushed ahead with its work in the framework of the CAEP. The committee is analysing research prospects for the medium and long terms, for work on cutting fuel consumption and reducing the environmental impact of air traffic management, noise and nitrogen oxide emissions. On the latter issue, proposals to cut the existing limits by between five and 20% are due to be submitted in February 2010. The DGAC is funding the participation of two independent experts who are responsible for the prospective study.

The Atlantic interoperability Initiative to Reduce Emissions (AIRE)

A joint effort with the European Commission and the US Federal Aviation Administration (FAA), AIRE aims to develop environmentally beneficial air traffic management procedures. Within that framework the joint Single European Sky ATM Research (SESAR) company launched an invitation to tender for a study into possible environmental gains from new technologies and procedures applied to all stages of a flight ("gate to gate").





The DGAC won two contracts. One, in partnership with Air France and Aéroports de Paris, relates to ground operations at Charles-de-Gaulle Airport; cutting taxiing times, new tools for local management of departures, etc. The other concerns operations in terminal zones: better handling of flights during the departure and arrival phases, continuous descent approaches, etc.

In line with the aims of the AIRE project the regional air navigation centres of Brest and Paris (in partnership with Air France) launched initiatives in 2008 to assess possible reductions in gaseous emissions resulting from optimised arrival procedures. "Custom" procedures were thereby drawn up to cut the number of descent segments, a cause of extra fuel consumption, during arrivals at Charles de Gaulle.

Plane-high-speed-train intermodality

A growing number of airline passengers use the high-speed train system to connect with airports, as shown by the success of the airport-TGV rail connection set up several years ago at Charles de Gaulle. Such rail-plane interconnections are also increasingly popular for domestic travel, and yield cuts in CO₂ emissions. The DGAC keeps tabs on these developments via regular surveys, the latest of which showed that multimode travel connections saved a million tonnes of CO₂ equivalent in 2007.

Carbon footprint studies

As part of the French environment round table, the DGAC also carried out a study of the carbon footprint of its headquarters in 2008, revealing several avenues for improvement. Commuting and other forms of people-moving account for no less than 56.9% of emissions due to the HQ, and a number of initiatives are proposed for promoting public transport, optimising other modes of transport and air connections, and using videoconferencing whenever possible. Other actions are due to be developed to rationalise the use of equipment, consumables and energy, with the overall aim of cutting greenhouse gas emissions from the HQ building by 20% in the next three years. Several regional offices also undertook carbon footprint studies in 2008.

CUTTING CO₂ OUTPUT THANKS TO THE HIGH-SPEED RAIL NETWORK

With the growth of the French high-speed rail (TGV) network, some 13 million travellers have chosen trains rather than planes, which is a tribute to the service quality of the former. This shift in travel patterns allows the air transport industry to cut its total CO₂ emissions by almost 5% per year. The multi-mode system at Charles de Gaulle has also helped cut emissions: thanks to the 2.5 million passengers who used the TGV-plane interconnection at CDG in 2007 - three times as many as in 1999 - savings of some 300,000 tonnes of CO₂ were made.

A FEW FIGURES

- The air transport industry's energy efficiency has improved by **33%** in 14 years (DAST Notes, May 2008)
- According to AIRE studies, the use of "custom" approach procedures would make it possible to economise between **200 and 400 kilograms** of aviation fuel per flight.
- The inclusion of the aviation industry in the European emissions trading system will make it possible to cut overall CO₂ emissions by **183 million tonnes in 2020** (European Commission Impact Studies, 2006).

CLOSE-UP

CO₂: THE NUMBER-ONE ENVIRONMENTAL ISSUE

For 78% of French people questioned in a DGAC survey, the air transport industry is a source of pollution and other negative side-effects. For 39%, the main subject of concern is CO₂ emissions. Noise, considered the worst factor by 36%, is in second place, with local air pollution in third place at 25%.

(Source: "2008 Inquiry into the Image of the Civil Aviation Industry". DGAC, March 2009)

Preserving LOCAL AIR QUALITY

Keeping tabs on air quality in the Paris region

In 2008 the DGAC played an active part in the Ile de France (Greater Paris) region's Air Quality Plan (PRQA). During the drafting of the document, which lays down guidelines aimed at preventing or cutting atmospheric pollution in order to attain air quality targets, the DGAC notably insisted on the need to step up efforts to renew aviation fleets and to cut emissions caused by airport ground activities.

Measuring air pollution

An atmospheric pollution monitoring study was carried out at the Nantes-Atlantique Airport by the Civil Aviation Technical Service (STAC) in 2008. Focusing on restricted pollutants (CO₂, NO and NO₂, CO, benzene, ozone, etc), it should open the way to multi-year air quality monitoring on and around the airport.



Analytic and measuring tools

Thanks to its OCEAN system for the calculation of annual emissions from aircraft, the DGAC pushed ahead with its work on measuring annual emissions of hydrocarbons (HC), carbon monoxide (CO) and nitrogen oxides (NOx) due to air transport at the 50 main French airports. The results of its study into the amounts of nitrogen oxides (NOx) emitted in each phase of the landing-takeoff (LTO) cycle were submitted to the CAEP in May 2008. They showed an unvarying breakdown of these emissions for each flight phase whatever the airport. One eighth of NOx emissions occur during landing approaches, another eighth during roll, a quarter during takeoff and half during the climb phase. The calculations were carried out for ten French airports of varying size: Charles de Gaulle, Orly, Nice, Lyon, Toulouse, Bordeaux, Nantes, Strasbourg, Rennes and Toulon. Also in 2008, the DGAC completed the development of a guidance application, drawn up by the multi-disciplinary technical centre for studies of atmospheric pollution (CITEPA). The resulting computer program should be easy for airport operators to use.

AN ENVIRONMENTAL SURVEY PILOT PROGRAMME

The conclusions of an environmental and health survey carried out in Champlan, a town in the Essonne region which is surrounded by a very dense network of superhighways and subject to low altitude flights by aircraft landing at and taking off from Orly Airport, were published in 2008. The results showed that the intensity of emissions was due mainly to road transport and only secondarily to air traffic. The multi-criteria study, the first of its kind, identified and mapped a variety of pollution levels and other nuisances, leading to the creation of a computer model.

Fighting WATER and GROUND POLLUTION

Work went ahead on the drawing-up of a reference dataset on airport ground pollution. New monitoring campaigns on the impact of airport activities on earth quality were carried out in 2008 at the airport of Montpellier-Méditerranée and the Hyères naval aviation base. The resulting data complements studies carried out in 2006 and 2007, and will help produce the complete methodological dataset in 2009.

Pollution caused by de-icing and other airport chemicals

In 2008 the DGAC pushed ahead with its research into the environmental impact of de-icing chemicals used at airports

during winter weather (notably acetates and glycols). An experiment was carried out at Orly Airport into the usefulness of filtering via plants and other organic material (rhizospheres) to eliminate such substances.

Also during the year, work started on the construction of a rainwater run-off treatment plant at Toulouse-Blagnac Airport. It will make it possible to treat rainwater before it runs off into the surrounding environment, and to ensure that it is retained in the event of accidental pollution. All stages of both construction and subsequent operation of the plant will be subject to ISO 14001-certified environmental impact studies.





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CONSULTING, COMMUNICATING,
FULFILLING COMMITMENTS

The ability to listen and engage in dialogue, essential if we are to ensure sustainability in the air transport industry, was a notable feature of France's environment round table. To boost exchanges of views and ensure transparency, the DGAC has for several years now been working to meet the increased demand for information from the general public.

Keeping PROMISES



The convention dated January 28, 2008

This expressed the determination of an entire professional sector to achieve sustainable development in the field of air transport. All the industry's players have set targets and mobilised to achieve them. The release in July 2008, by the DGAC, of the first intermediate progress report arising from the January 28 agreement shows that we are well on the way to achieving the aims laid down in that document.

Working together

The year also saw a joint effort between the DGAC and ADEME, France's national Agency for the Environment and Energy Management, on the drafting of airport carbon footprint



reports. The civil aviation technical service (STAC) started work, with the ADEME, on adapting the notion of a carbon footprint report to the specific circumstances of an airport, aiming to draw up a technical guide on how to apply the relevant methods. This will make it possible to draft standardised reports for each airport.

220 kilograms of CO₂: The maximum cut in emissions per flight expected by 2018 as a result of the FABEC, according to the feasibility study completed in June 2008.

The global weighted measured noise index

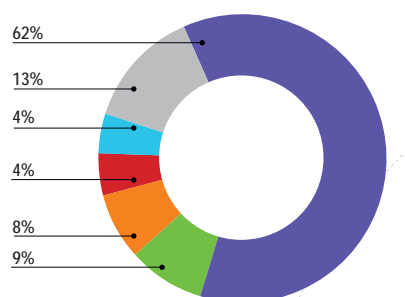
This is an indicator based on noise monitoring that takes account of the type of terrain. Tracking this index year after year makes it possible to check that the sound energy emitted by traffic at Charles de Gaulle Airport does not go above a certain agreed ceiling. To ensure that this commitment is respected, the DGAC has designed, developed and implemented a software tool which tracks the index. That made it possible to determine the 2007 figure, which was approved by the Independent Monitoring Authority for Airport Noise Pollution (ACNUSA) in July 2008.

reflected the efforts being made by airlines to comply with the regulations. At Charles de Gaulle in particular, changes made to the flight schedules made it easier to respect the ban on unscheduled take-offs between midnight and five am. Even if such take-offs amounted to 60% of all violations, their number fell by 20% between 2007 and 2008.

One-stop reception facility

To receive complaints from local residents, a single reception facility has been set up in each airport. Complaints are processed in partnership with the civil aviation services. At Bordeaux-Mérignac Airport, for example, 184 complaints and 110 requests for information had been received at the single reception facility as of October 31, 2008 - twice the number received in 2007.

Breakdown, by type of violation, of the number of fines recommended in 2008 by the French National Commission for the Prevention of Nuisances (CNPN)



- Failure to respect general ban on night-time flights*
- Deviation from flight path
- Night-time take-off without authorised slot
- Going over Chapter III quota
- Failure to respect ban on night-time Chapter III flights
- Exceeding noise thresholds

* Including violations of the ban on night-time flights by turbojet aircraft at Paris-Le Bourget

Ever lower numbers of noise violations

In 2008 the Independent Monitoring Authority for Airport Noise Pollution (ACNUSA), acting on proposals from the National Committee for the Prevention of Nuisances (CNPN), imposed 454 fines for a total of 4,026,600 euros, as against 676 fines totalling 5,745,000 euros in 2007. The total number of fines continued to fall in 2008, while the average sum levied in each case increased, to 8,869 euros in 2008 as against 8,499 euros the previous year. The drop in the total number of fines

Aviation summit

The European aviation summit held in Bordeaux from November 17 to 19 within the framework of the French presidency of the EU resulted in the signing of several major European environmental agreements. The first ones concerned the Functional Airspace Block Europe Central (FABEC). The integrated management of a zone which includes the densest

air traffic spaces in Europe will yield significant drops in CO₂ emissions. The second series of agreements related to the joint "Clean Sky" initiative, aimed at coordinating and optimising research and development into the path-breaking technologies needed to usher in an "ultra-green" aviation industry in Europe. The agreements also concern funding for the related R&D work.

FABEC: ELIMINATING THE FRONTIERS OF AIR TRAFFIC CONTROL

Functional Airspace Blocks are a key stage in the creation of a Single European Sky; the aim being to organise air traffic control in relation to aircraft flows rather than national borders. This makes it possible both to boost capacity and shorten routes, with significant environmental and economic gains. The European Central block, or FABEC, includes six states⁽¹⁾ with a total area of 1.7 million square kilometres. The zone accounts for 5.3 million flights a year, which is no less than 55% of all European air traffic. The new functional block should make it possible to reduce CO₂ emissions per flight.

⁽¹⁾ France, Germany, the Netherlands, Luxembourg, Belgium and Switzerland.

An Ongoing Process of CONSULTATION

Dialogue with local residents and their elected officials continued in 2008 via the Consultative Committees on the Environment (CCE). A total of 47 CCE meetings were held during the year to examine the environmental impact of various operational or development issues. The Civil Aviation Directorates for the northern and southwestern regions of France each took part in 10 CCE meetings during the year. During the CCE meeting held for Paris-CDG Airport in July 2008, information was notably provided on the results of sound-proofing grants, the value of the global weighted measured noise index for 2007 and plans for a sustainable development



charter for the airport. The President of the Republic asked the President of the Economic and Social Council to draw up the said charter.

Wider feedback

In 2008 the DGAC extended the structure of local "environment" committees, bringing together representatives of air traffic controllers with local managers to analyse environmental incidents, draw conclusions and suggest improve-

ments. Six new committees were set up, for Basel-Mulhouse, Bordeaux, Lyon, Nantes, Strasbourg and Toulouse. Similar structures were already in place for Marseille, Nice, Orly, Paris-CDG and Montpellier.

To coordinate efforts to curb noise, five best-practice codes were drawn up in 2008, for Bordeaux, Nantes, Toulouse, Lyon and Montpellier. They commit industry professionals to taking practical steps to improve the sound environment in the vicinity of airports.

TOWARDS A SUSTAINABLE DEVELOPMENT CHARTER FOR PARIS-CDG

During his speech to mark the inauguration of the S3 satellite structure at Charles de Gaulle on June 26, 2007, the President of the Republic called for the conditions of sustainable development for airports to be better defined. As a result he asked Jacques Dermagne, president of the national Economic and Social Council, to draw up a charter which will usher in a real strategy for sustainable development at the airport, reaffirming the social contract between the facility and its surrounding residents. A total of 35 measures and 12 objectives were defined to ensure sustainable development at the airport, reconciling traffic growth, economic development and the quality of life for residents. Some 150 auditions have taken place, most of them to compare best practices in other countries, with several trips organised to foreign facilities, including Frankfurt, London, Amsterdam and Atlanta.





TRAINING on Environmental Issues

Both air traffic controllers and pilots are given specific training on environmental issues. In addition to the complementary courses provided to the engineers of the air navigation control service (ICNA), a cooperation project was set up in 2008 with the ACNUSA noise pollution authority to provide pilots with training on curbing aircraft noise. This involves the inclusion of "environment modules" in both the basic pilots' training curriculum and in refresher courses.

On the international level DGAC experts took part in 2008 in the training of foreign operatives (from administrations, airports, industrial companies...) in the fields of noise abatement and gaseous pollution.



Boosting Communication and **TRANSPARENCY**

Almost 25,000: the number of people who have used the carbon footprint calculator since it was installed on the DGAC's web site in October 2007 to provide estimates of the amount of CO₂ emitted for any given flight.

Over and above purely regulatory obligations as regards dialogue and information, transparency and communication are part of the DGAC's stock in trade, helping us to achieve our aims.

On May 29, 2008 an information meeting of elected officials and local residents from the Essonne and Yvelines regions to the west and southwest of Paris took place at the French parliament on the subject of air pollution. Under the chairmanship of Jean-Frédéric Poisson, MP for the Yvelines region, and

Guy Malherbe (Essonne), representatives of the DGAC and Aéroports de Paris outlined their respective activities in the field: regulations, assessment and monitoring and support for research projects.

In 2008 the DGAC also carried out a "survey on the image of civil aviation". It notably highlights French people's environmental concerns (on CO₂ emissions, noise, etc.) as regards air transport. Further to the commitment made in June 2008



to provide information about night flights at Paris-CDG, the DGAC provided the information for 2007 in September. The data show a slight overall increase in night traffic (1,385 more movements), but a decrease in the period between midnight and 5:00 am. The increase in the overall number was nevertheless offset by the ongoing replacement of older aircraft, with the disappearance of the noisiest ones.

In 2008 the DGAC pushed ahead with the creation of information tools for local residents and the general public as a whole. Two new multimedia CD-ROM's illustrating aircraft trajectories in three dimensions at the airports of Nantes and Bordeaux on typical days were made available to the public. The series already included seven discs, on Toulouse, Nice, Marseille, Lyon, Paris-CDG, Paris-Orly and Strasbourg.

The Vitrail noise monitoring and flight-path display system was deployed in three new towns (Bonnelles and Villebon-sur-Yvette to the south-west of Paris and l'Orée de la Brie to the south-east). The system, which provides people living near airports with information on overflights with just a 30-minute time lag, can now be consulted in 14 Paris-region towns, as well as in the Environment and Sustainable Development Centres of the CDG and Orly airports.

Also in 2008, the DGAC produced a presentational film on the information mission carried out by air traffic controllers in the airport Environment and Sustainable Development Centres. The film can be viewed on the DGAC's Internet site.

On December 31, 2008 the DGAC published its fifth information bulletin on air traffic in the greater Paris region. Based on questions asked by local residents, it provides information

on the activity and operating conditions of the airports of Paris-CDG, Orly and Le Bourget. It is available by subscription and can be downloaded from the DGAC web site.

Thanks to the carbon footprint calculator designed by the DGAC and available on our site (www.aviation-civile.gouv.fr), members of the public can find out how much CO₂ is emitted, and aviation fuel used, per passenger for any given flight between France and 800 airports. The calculator also gives lots of information on how to compensate for one's CO₂ footprint, on the role of air transport in greenhouse gas emissions and on the carbon trading scheme.

CLOSE-UP

Ever More Questions about Overflights

In 2008, as part of its informational mission for elected officials, non-profit groups and people living near airports, the DGAC provided, via the Air Navigation Services Department (DNSA), over 800 replies to questions that were asked on overflights. Such questions are more and more often being submitted via e-mail (write to environnement-dnsa@aviation-civile.gouv.fr) and by phone (01 58 09 49 49).



LOOKING TO THE FUTURE

To better prepare for the challenges of sustainable development, the DGAC has honed its internal structure by creating a single large Air Transport Department. In 2008 the DGAC also pushed ahead with its environmental research effort and was involved in projects of major importance for the future of air transport. It notably took part in the setting-up of a Council for Civil Aviation Research and in the ongoing Single European Sky ATM Research (SESAR) programme.



A New Body to Help Optimise Aeronautical RESEARCH

The decision to create a Council for Civil Aviation Research (CORAC) was taken at the French environment round table and included in the agreement of January 28, 2008 which outlined the resulting commitments of the air transport industry. The council, which takes as its model the EU's Advisory Council for Aeronautical Research in Europe (ACARE), was set up on July 23, 2008. Bringing together the DGAC with all the other industry bodies (companies, airlines, airports, air navigation institutions, research centres), it is charged with drawing up and implementing the research projects and technological innovations needed to attain the environmental targets set by the ACARE for 2020. These involve cutting CO₂ emissions

by 50%, slashing perceived noise levels by the same amount and reducing NO_x emissions by 80%. The DGAC is active in the CORAC working group responsible for drawing up a balance sheet of scientific knowledge as regards the environment and determining environmental impact indicators for the air transport industry. It is also tasked with establishing recommendations for research and innovation in order to coordinate and share the results achieved by the various players involved. A steering committee was set up in September 2008 for the purpose of drafting a roadmap for the next ten years.

CORAC: A ROADMAP FOR RESEARCH

The technological roadmap drawn up by the CORAC for the next ten years breaks new ground because it brings together not only all the different players of the air transport industry - engine and equipment manufacturers, aircraft builders, airlines, airports and institutions - but also competitiveness-builders and research institutes such as the French National Research Agency (ANR). The CORAC's work will play a crucial role in assigning funds to those research projects which are most in line with its strategy. Sustainable development is at the heart of the approach, which takes in fields as diverse as fuel consumption and the effects of the aircraft-atmosphere interaction on climate.

SESAR: Building Europe's Future Air NAVIGATION System



In October 2008 the Single European Sky Air Traffic Management Research project, or SESAR, entered its development stage. This ambitious programme aims to completely modernise Europe's air traffic control system by 2020. Changes will include increased automation of control functions, the generalisation of satellite navigation systems, and flight path optimisation. The project also calls for the creation of an air traffic control intranet that will make it possible for all the links in the chain to access the same level of information at the same time. Further ahead it should also reduce the environmental impact of each flight, notably by optimising flight paths and cutting aircraft waiting times. The challenge facing SESAR is indeed a major one: by 2020 almost 16 million flights should

SESAR: A TEAM EFFORT

The European SESAR programme, which has just entered its development stage, aims to modernise air traffic control by bringing all the relevant players on board. Those involved in SESAR include air traffic control bodies, industrial companies, airlines and also airports. In October 2008 a company, the SESAR Joint Undertaking (JU), was set up to manage the research and development effort. It brings together the European Commission, Eurocontrol and industrial firms. Following an invitation to tender, 15 companies were chosen to take part in the SESAR JU. Thanks to the presence of companies in the structure, the solutions decided on will receive operational confirmation.

be criss-crossing Europe's skies every year. With a contribution of 150 million euros out of a total of 2.1 billion, the DGAC is providing significant support for the project's development stage, which is due to conclude in 2016.



An Enhanced Role for the DGAC in Environmental RESEARCH

In 2008 the DGAC reaffirmed the essential importance of sustainable development for air transport by devoting a major part of its budget to research on environmental issues. The DGAC's research effort during the year touched on all aspects and activities of the aeronautical sector, beginning with work on aircraft configurations and structures as well as new materials. The search is on for major technological breakthroughs in overall aircraft architecture, propulsion techniques and systems which in the medium term could lead to totally new, environmentally friendly aircraft. There is the prospect of revolutionary wing, tail-unit and propulsion configurations that would make tomorrow's planes look completely different from those flying today. Support is being provided for research projects aimed at improving wind tunnel testing, so as to protect the environment by optimising aerodynamics. Other research avenues being explored by the DGAC include a study into new high-speed propellers which could yield technological breakthroughs on the environmental front. Major progress is also expected from the development of "greener" aircraft engines by increasing the dilution rate, improving combustion and using composite materials. 2008 also saw real progress in reducing noise from light aircraft via the quiet

ANIBAL propeller. Trials carried out in October by the ONERA aerospace lab, as part of an applied research project supported by the DGAC, found that a five-bladed propeller could achieve and even exceed the initial aim of cutting noise pollution by eight decibels. The DGAC also continued its support for research and development aimed at improving flight systems, with the design of more "electric" aircraft, and creating alternative fuels.

Over the past 50 years fuel consumption per passenger and per 100 kilometres, as well as emissions of related greenhouse gases, have been cut by around 70%, falling from between 10 and 12 litres for Douglas DC8-type aircraft in 1955 to less than three for planes like today's A380.

MULTI-DISCIPLINARY RESEARCH

Reducing the environmental impact of air transport requires a multi-disciplinary approach to research. Up until now the field that has made the greatest contribution to cutting the environmental impact of the sector has been propulsion. Over the past half-century advances in engine design have accounted for almost 50% of the overall progress made. For example the appearance in the 1970's of double-flow jet engines was a real technological breakthrough, yielding a cut of around 8dB in noise levels and 24% in fuel consumption. Today several avenues are being explored in the search to build less thirsty engines. They include open-rotor designs, in which the blades are located outside the engine casing. Open-rotor engines could provide gains of 25% in fuel consumption, on condition that the acoustic impact can be kept low. Other research possibilities include lightening the structure of planes, intelligent wing designs, in which the shape of the wing changes depending on the stage of flight, and increased use of onboard electronics.

A Plan for Introducing CONTINUOUS DESCENT Techniques in France



The DGAC will push ahead with the introduction of continuous descent landing procedures to French airports. Work to assess such approach and arrival procedures will continue at the airports of Marseille, Paris-Orly and Strasbourg-Entzheim. The tests already carried out have confirmed that the procedure can yield potential noise-reduction benefits of around 3dB during the intermediate phase (the start of ILS descent). Tools have been set up to analyse real traffic and automatically monitor continuous descent flight paths while assessing the resulting gaseous emissions.



SUSTAINABLE DEVELOPMENT at the Heart of the DGAC's New Structure

In 2008 the DGAC brought in a new organisational structure which boosts the agency's core prerogatives. The main Air Transport Department (DTA) brings together the former Departments of Economic Regulation (DRE), Aeronautical Programmes and Cooperation (DPAC) and Strategic and Technical Affairs (DAST). The DGAC also has two operational services with domestic functions (the Air Navigation Services Department, or DSNA, and the Civil Aviation Flight Safety Group, or

DSAC), plus a general secretariat. Environmental issues are one of the DTA's top priorities, as is shown by the creation within the department of a service for sustainable development. Meanwhile the Environment Mission within the DSNA works on monitoring and analysing flight paths and providing information for and dialogue with the general public, while the DSAC has appointed an "environment coordinator".

GREEN AVIATION TAKES THE STAGE AT LE BOURGET



In a sign of the importance that sustainable development has taken on in the air transport industry, the Le Bourget airport hosted the first "Green Air Show" in June 2008. The event, intended to showcase innovations in environmentally friendly flying, is to be held every two years, in between each main Paris Air Show. At the 2008 event exhibitors showed off new products aimed at promoting environmental progress, such as electrically-powered craft and the Hy-Bird, the first plane designed to fly round the world on renewable energy. Flight demonstrations, conferences and other events illustrated the various aspects of sustainable development as regards the aviation industry.

A

ACARE: Advisory Council for Aeronautics Research in Europe.
ACNUSA: The French Independent Monitoring Authority for Airport Noise Pollution.
ADEME: Agency for the Environment and Energy Management.
AIRE: Atlantic Interoperability initiative to Reduce Emissions.
ANIBAL: French acronym for curbing noise levels of light aircraft.
ANR: France's National Research Agency.

C

CAEP: The ICAO's Committee on Aviation Environmental Protection.
CCAR: Consultative Committee for Subsidies to Nearby Residents.
CCE: Environmental Consultative Committee.
CDA: Continuous Descent Approach.
CITEPA: Interprofessional Technical Centre for the Study of Atmospheric Pollution.
CLEAN SKY: A European Union programme to coordinate and optimise research into more an environmentally-friendly aviation industry.
CO: Carbon monoxide.
CO₂: Carbon dioxide.
CORAC: Council for Aeronautical Research.
CNPN: French National Commission for the Prevention of Nuisances.

D

DSAC: The French Civil Aviation Flight Safety Group.
DSNA: Air Navigation Services Department.

E

EICA: Air Traffic Impact Study.
EPNdb: Effective Perceived Noise in Decibels.
ETS: Emission Trading Scheme.
EUROCONTROL: European body for air navigation safety.

F

FAA: The US Federal Aviation Administration.
FABEC: Functional Airspace Block Europe Central.

G

GIACC: Group on International Aviation and Climate Change.

H

HC: Hydrocarbons.

I

ICAO: International Civil Aviation Organisation.
ICNA: Air Navigation Control Engineer (France).
IGMP: French abbreviation for Global Weighted Measured Noise Index.
ILS: Instrument Landing System.

L

LDEN: Level Day Evening Night.
LTO: Landing-Take-Off (cycle).

N

NOx: Nitrogen oxide emissions.

O

OCEAN: French acronym for Tool to Measure Annual Aircraft Emissions.
ONERA: French National Aerospace Laboratory.

P

PEB: French abbreviation for Noise Exposure Map.
PGS: Noise Inconvenience Map.
PPBE: French Plan to Curb Environmental Noise.
PRQA: Regional Air Quality Plan.

S

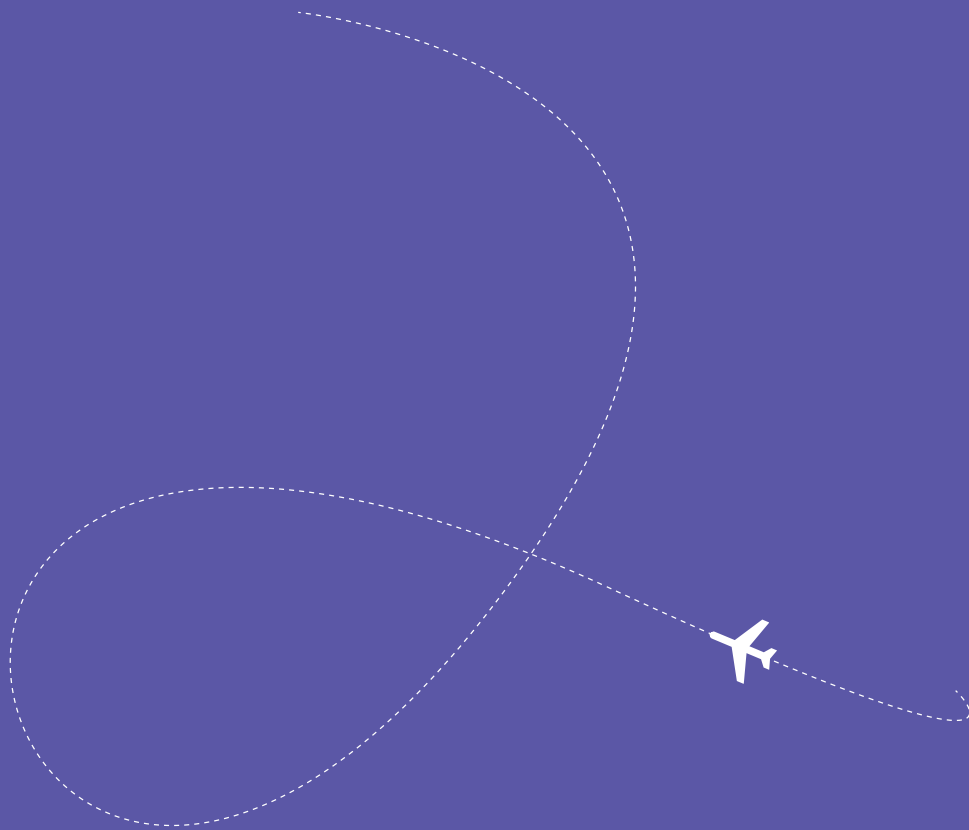
SESAR: Single European Sky ATM Research.
SO₂: Sulphur dioxide.
STAC: Civil Aviation Technical Service.

T

TNSA: Aviation Noise Inconvenience Tax.

V

Vitrail: System for monitoring aircraft noise and displaying flight paths.



www.developpement-durable.gouv.fr
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