

# *Environmental Report*

## *For 2011*





# 2011 ENVIRONMENTAL REPORT

## WELL REWARDED EFFORTS



For the fifth consecutive year, French Civil Aviation Authority (DGAC) presents its environmental report. The time has come to assess the performance of five years of action. In this respect, it seems enlightening to stress three pieces of good news which prepare the future for sustainable development in civil aviation.

The first piece of good news is technical with the spectacular development of alternative fuels, which are likely to partly replace fossil fuels. Scarcely three years ago, the perspective of using biofuels for aircraft on a large scale seemed very far away and unrealistic. The aeronautical community seemed to have made little progress since the middle of the 20<sup>th</sup> century on the questions of biofuels freezing point at high altitudes and its miscibility with traditional fuels. Today the experiments conducted by the aircraft manufacturers and the airlines show that the technology is ready. Now the aeronautical players are calling on the authorities to carry out their regulatory work. It is up to us to meet the challenge so that yesterday's dream and today's possibility of biofuels becomes tomorrow's reality.

The second piece of good news is international with the international community and International Civil Aviation Organisation (ICAO) returning to the front stage. Europe's willingness to act on climate change control by introducing a directive on CO<sub>2</sub> emission quotas in the aviation industry, has woken the international community and given sense to collective action in developing air transport. Above and beyond the obvious necessity of avoiding a commercial war, which would not benefit any nation, our responsibility is not to re-invent the rules of the game for the aviation industry. The task is undoubtedly of the same immense size as it was in 1944 when the bases for the Chicago Convention were laid down.

Finally the third piece of good news is national. Today the French aviation industry, whether manufacturers, airports, airlines, air traffic control or the administration, has achieved its efforts concerning the environment and quality of life and continues to do so. After five years of uninterrupted effort, we can legitimately demand that everyone recognises this and highlight what is unique about the aviation industry: its irreplaceable character for long- and medium-haul, its energy efficiency in terms of consumption per passenger-kilometre transported and the limitation of noise pollution. The aviation industry can no longer be reviled on principle.

**Patrick Gandil, Director General of French Civil Aviation Authority**

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1.

ACTING UPSTREAM  
TO PREVENT  
ENVIRONMENTAL  
NUISANCES

*Preparing the integration of aviation into the ETS system, contributing to drawing up more rigorous noise standards, experimenting with new approaches to reduce CO<sub>2</sub> emissions, and managing town planning to protect the local residents. In 2011, DGAC (French Civil Aviation Authority) continued to work on limiting noise pollution and polluting emissions linked to air transport.*

## ACTIONS AT INTERNATIONAL LEVEL



### The work of CAEP for stricter standards on noise and polluting emissions

ICAO plays a major role in drawing up and keeping up-to-date the standards relating to noise and polluting emissions that are internationally accepted. This work is carried out by CAEP (Committee on Aviation Environmental Protection). In 2011 the DGAC experts in acoustic certification took part in the work of the triennial programme adopted by CAEP in 2010 in order to study the various scenarios favouring more rigorous noise standards. The study concerns the possibilities for increased severity in the standards for "Chapter 4" which could go as far as a reduction of 11 dB compared with the current standards. Five options have already undergone economic and environmental analysis. All these proposals, which aim to encourage the development of new noise reduction technologies, will be submitted to CAEP in February 2013. The DGAC experts have also taken part in updating the document establishing the new standards and practices

of Appendix 16 of the ICAO relating to aircraft noise, in force since 18 July 2011.

Moreover, in 2011 the DGAC aircraft noise specialists contributed to the drawing up of the new international IEC (International Electrotechnical Commission) standard concerning the measuring systems used for acoustic aircraft certification. It was entrusted by EASA (European Aviation Safety Agency) with the validation of trials systems and the control of software devoted to the acoustic certification of the Airbus. Furthermore, the work of CAEP is continuing both in the definition of a metric for the CO<sub>2</sub> standard and the development of a certification method for the measurement of emitted particles.

### The contribution of ENAC (French National School of Civil Aviation) to the European studies

In 2011 ENAC participated in various international research studies into the sustainable development of air transport. University lecturers and researchers are taking part in the CARING (Contribution of Airlines for the Reduction of Industry Nuisances and Gases) project. This project was launched in 2010 within the scope of the European Clean Sky programme. It brings together nine partners and aims to analyse the economic impact of environmental regulations on airlines and to study the effects on the environment of innovations in terms of flight path management.

With the framework of CAEP, lecturers and students from ENAC took part in the discussions on the categorisation of aircraft, the long-term fleet forecasts and the production of economic models incorporating environmental standards. ENAC also participated in the European TEAM Play (Tool suite for Environmental and Economic Aviation Modelling for Policy Analysis) project which aims to provide the European Commission with decision-making tools in the fields of air transport, energy and the environment.

### Environmental procedures in the AIRE project

The AIRE (Atlantic Interoperability Initiative to Reduce Emissions) project, led by SESAR (Single European Sky ATM Research) joint enterprise, aims to evaluate and validate procedures and techniques that make reduction in aviation CO<sub>2</sub> emissions possible. DSNA (French department of air navigation services) was allocated four contracts concerning the organisation of demonstration flights in real situations, transoceanic flights, procedure optimisation flights on the approach to Paris-CDG, and gate to gate flights between Paris-Orly and Toulouse-Blagnac. Thus more than 500 demonstration flights have been operated by Air France with the assistance of the four air navigation services (SNA) and the three regional air navigation centres (CRNA). On 13 October 2011 the first French commercial flight using biofuel took place between Toulouse-Blagnac and Paris-Orly. The use of biofuel (half of which came from recycled vegetable oil) combined with optimisation of all the flight phases for the aircraft has made it possible to reduce the CO<sub>2</sub> emissions by half compared with a conventional flight.

### AIRE: EXEMPLARY COOPERATION

The AIRE programme, launched in 2007 by the European Commission and American Federal Aviation Administration (FAA) and entered into application in 2009, aims to develop flights that use less aviation fuel, therefore being less polluting, by associating all the partners concerned. Air navigation services, airlines, airports and manufacturers are developing cooperation in order to implement more environmentally-friendly procedures for the various flight types. For the first "optimised" transatlantic flight operated by Air France between Paris-CDG and Miami in April 2012,

Aéroports de Paris, FAA, DSNA and the various air traffic control centres concerned worked together to put in place a set of optimised procedures: reduction in taxiing time, continuous climb, choice of cruising altitude and optimum speed, and continuous descent.



### A KEY FIGURE

● 54 g. This is the quantity of CO<sub>2</sub> emissions per passenger per kilometre during the first "bio" flight by Air France on 13 October 2011. This is 50% less than a conventional flight (source Air France).

### SPOTLIGHT

#### A COMMUNAL ENVIRONMENTAL STRATEGY FOR ICAO

● In 2010 the member Nations of ICAO (which represents more than 93% of the commercial traffic worldwide) set themselves a series of communal environmental objectives, in particular a 2% improvement per year in energy efficiency for air transport (ratio between fuel consumption and traffic) until 2050, carbon-neutral growth from 2020 and the drawing up of worldwide standards concerning CO<sub>2</sub> for aircraft (source ICAO).

# TOOLS FOR THE PREVENTION OF POLLUTANT EMISSIONS

## ETS in the approach phase

DGAC has continued its work in preparation for the integration of aviation in the CO<sub>2</sub> emissions trading system, which will be applicable from 1<sup>st</sup> January 2012 for all flights to and from the European Union. After having passed the ETS directive into French law, DGAC has controlled the declarations of emissions and tons-kilometres of nearly 200 operators before sending them on to the European Commission. The Commission has established the applicable references for the allocation of free quotas to operators for 2012 and for the period 2013-2020. On 24 December DGAC published a decree setting the allocation of these free quotas to operators which had requested them. These quotas will be given to operators each year.

DGAC has also monitored the foreign opposition of some third-party Nations (e.g. Canada, China, Russia, India and the United States), for which companies operating in Europe will be subject to the ETS system. In particular it has monitored the discussions which, in November 2011, led ICAO to adopt a non-binding resolution recommending the exemption from ETS of companies from outside Europe. It has also monitored the questions raised by the European Court of Justice which delivered a decree declaring ETS legal on 21 December.

## Acting to adapt to climate change

As well as implementing actions to reduce greenhouse gas emissions, the battle against climate change involves adapting our society to the major changes already in progress due to climate system inertia. This is the *raison d'être* of the first French National Plan for Adapting to Climate Change (PNACC) presented on 20 July 2011. The PNACC has 230 actions which will cost nearly a billion Euros to implement. In the civil aviation field, four actions have been identified. Firstly, the listing and adaptation of the technical references for the building and maintenance of airports. Then the study of the impact of climate change on transport demands. Finally the PNACC recommends defining a methodology that will make it possible to carry out an infrastructure diagnosis and undertake a study of the vulnerability of all airports. These two latter actions have been entrusted to the Service technique de l'Aviation civile (STAC – French Civil Aviation Technical Department). Initially STAC drew up an exhaustive, descriptive inventory of the potential impacts of climate

change on airports (such as the increase in extreme weather events). The study of the possible vulnerability of some 550 airports will then be performed using the methodology defined.

## A KEY FIGURE

● **215 million tons** of CO<sub>2</sub>. This is the ceiling for emissions in 2012 for all flights affecting Europe within the scope of ETS.



Nice-Côte d'Azur airport

## ETS TO MINIMISE THE IMPACT OF AVIATION ON CLIMATE

Although aviation CO<sub>2</sub> emissions throughout the world only represent about 2.5% of total CO<sub>2</sub> emissions, the rapid growth of the air sector justifies putting in place economic measures to eliminate its greenhouse gas emissions. With the initiation of the ETS system CO<sub>2</sub> emissions should be balanced by quotas, one share of these being distributed free to operators at the beginning of the year. This share of free quotas will represent about 72% of emissions in 2012. Above this threshold operators may buy quotas corresponding to reductions in CO<sub>2</sub> emissions in other sectors, or quotas which will be auctioned by the Nations.

### Air quality studied by CORAC

In 2011 DGAC and, more particularly, STAC participated in the new "air quality" work group of the themed, environmental network of the Conseil pour la recherche aéronautique civile (CORAC- Council for Civil Aeronautical Research). The first studies have made it possible to identify the scientific approaches which should enable more advanced knowledge of engine emissions and their impacts to be acquired.

### THE IMPACTS OF CLIMATE CHANGE IN FRANCE

The report from the Intergovernmental Panel on Climate Change (IPCC), which was made public in September 2009, highlights the negative consequences but also the opportunities of climate change for France between 2050 and 2100. Amongst the expected difficulties the IPCC experts spotlighted losses in the agricultural sector linked to more numerous periods of heatwaves and droughts, reduction in water resources in areas where the situation is already difficult, or even a heritage of national roads affected by an elevation in sea level of one metre (estimated at two billion euros). On the other hand climate change would produce gains in terms of energy consumption (source PNACC).

### A KEY FIGURE

● Between 5% and 20% of the world's annual GDP. This is the estimated cost of inaction on climate change according to the report on the economic consequences of climate change by the previous Chief Economist of the World Bank, Nicholas Stern. He stated that the cost of action would be between 1% and 2% (source PNACC).

### An action plan for pollution peaks

In 2011 DGAC proposed an action plan for prolonged pollution peaks for aviation to the Ministry responsible for civil aviation. The action plan, drawn up in consultation with the sector professionals, will be triggered by the Ministry. The latter will decide on the implementation of the measures considered to be most relevant when the alert threshold for a primary pollutant<sup>(1)</sup> is crossed on three consecutive days and if the prefect is forced to take the most restrictive measures planned if there is a pollution peak (e.g. alternation of traffic).

(1) Exceeding the regulatory limit value expressed in micrograms/m<sup>3</sup> for pollutants emitted directly from sources.



### SPOTLIGHT

● The DSNA policy concerning environmental nuisance control involves favouring the control of noise pollution below 2000 m and the reduction of gaseous emissions above this altitude. This policy is consistent with an initial study performed by the DSNA Environment Mission which showed that more than 80% of the CO<sub>2</sub> is emitted above 2000 m for mainland France. DSNA is continuing its studies on this subject.

# PROTECTING AGAINST NOISE POLLUTION

## Control of town planning around airports

The noise exposure plan (PEB) is a town planning document that makes it possible to limit the establishment of new populations in areas exposed to noise pollution caused by air traffic. It anticipates the development of air activity in 10 to 15 years. The PEB mark out four areas depending on the level of noise nuisance, two loud noise areas (areas A and B), one moderate noise area (area C) and one compulsory information area (area D) for the twelve largest airports. The PEB concern 215 airports in France. With the move to the Lden (Level day evening night) noise indicator, which better represents the nuisance suffered by those living nearby, the revision of the PEB is continuing.

In 2011, the procedure for revising the PEB for the Paris-Orly airport (which dates back to 1975) has moved forward slightly. After the decision to revise taken by the decree in May 2011 and consultation with all the communes and public institutions for intercommunal cooperation concerned, the CCE (Environmental Consultative Committee) gave a favourable opinion for this project in November, followed by ACNUSA (French Independent Monitoring Authority for Airport Pollution). Several PEB were approved in 2011, notably those for the airports of Albi-Le Séquestre, Cahors-Lalbenque and Castelnaudary-Villeneuve.

In 2011, DGAC also relaunched the procedure for drawing up the PEB for Paris-Le Bourget airport. This is the leading European airport for business air travel with more than

56,000 movements per year<sup>[1]</sup>, but to date has no approved PEB. In June a draft project was therefore presented to the members of the CCE who pronounced in favour of the most protective NEP.

DGAC has continued its action aimed at encouraging the realisation of PEB appropriate for airports where traffic is low and irregular.



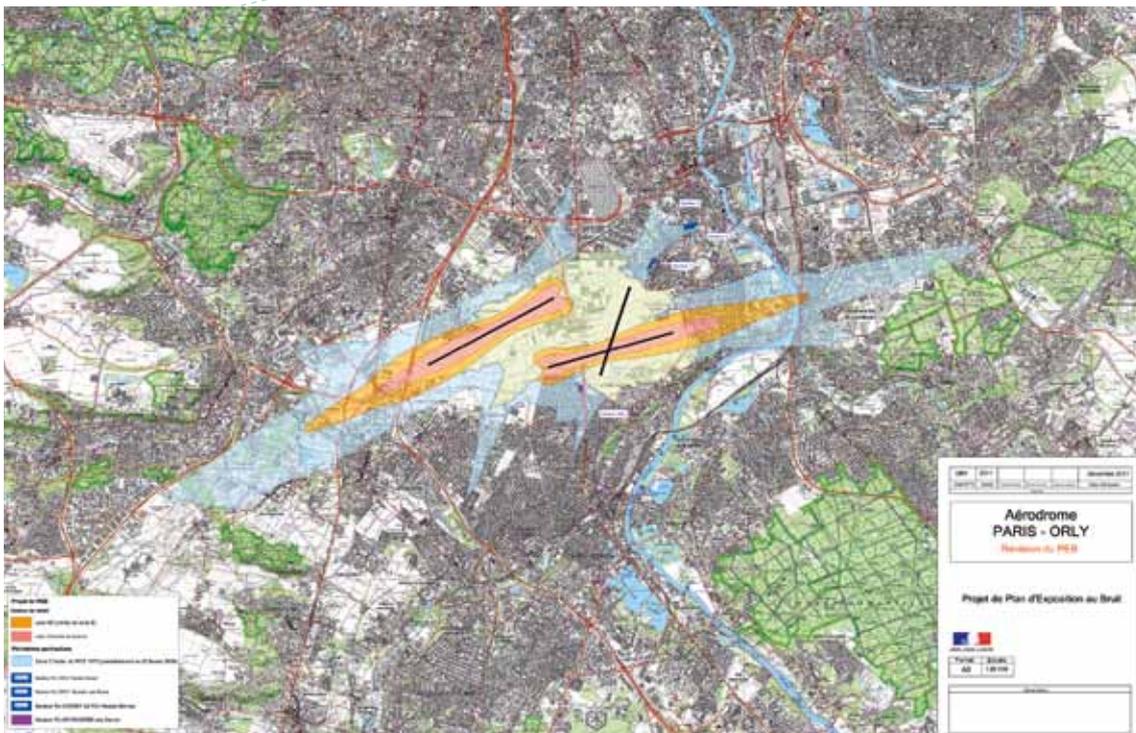
DR 400-160 in flight

## Acoustic certification of aircraft

In the field of light aviation, DGAC has gone ahead with the certification of the APM 40 Simba from Isoire aviation, a 4-seater aircraft built entirely in composite.

[1] Source ADP 2011.

## NOISE EXPOSURE PLAN PROJECT - PARIS-ORLY AIRPORT





The certification of aircraft fitted with sound suppressors continues, particularly for the DR 400-180 R, the DR 400-160 and the DR 400-140.

### The CALIPSO project

Developed by DGAC, CALIPSO (Classification des avions légers selon leur indice de performance sonore – Classification of light aircraft according to their noise performance index) is a new tool designed to reconcile the expectations of local residents and the interests of users by guaranteeing appropriate noise management around 500 airports used by light aircraft. It makes it possible to evaluate the noise produced during flight phases, especially for runway traffic and taxiing which is now the main source of nuisance encountered by those living nearby. The aircraft are then classified according to their acoustic performance level. Using this objective data, the local consultation authorities can determine the aircraft categories that may fly and the possible times for airport traffic circulation.

In 2011 the project entered a second development phase with the measurement of a sample of more than fifty aircraft, i.e. 75% of fleet models, in order to determine the number of appropriate acoustic classes and their limits. When additional measurements have been carried out, CALIPSO should be operational at the end of 2012.

The objective of CALIPSO is to quantify and manage the nuisance from light aircraft circling using objective data on the noise of aircraft in real flight situations.



### NOISE MEASURED AND NOISE PERCEIVED

A logarithmic scale is used to measure noise. Consequently the sum of two noise sources, each of 50 dB, does not correspond to 100 dB but to 53 dB, the 3 dB corresponding to a doubling of power.

As for noise perception, this varies depending on certain factors. At equal power, a shrill noise is felt to be more bothersome than a dull noise, for example. Similarly the noise of an aircraft flying more slowly is perceived as more disturbing than the noise of a faster aircraft, even though the noise is greater (source APAME).

### Pilots trained to respect the environment

In 2011, DGAC conducted control actions in the field of pilot training on respect for the environment. Controls in flight and in the simulator have made it possible to check that training on the environment is implemented: observance of curfews and least noise procedures, minimal use of APUs, or implementation by operators of computation systems for minimum take-off thrust, etc. In 2011 no deviation was noted during the controls performed within the scope of the surveillance plan for companies holding an air transport certificate issued by DGAC.



Adherence to "lower noise" procedures, curfews or even minimum use of APUs are now part of the training programme of every pilots.

### Regulating ULM noise

In 2011 DGAC drew up a decree aimed at limiting the noise of helicopter-type ULMs. This decree defines an appropriate noise measurement procedure and sets the noise limit that must not be exceeded.



## EFFECTIVE AIRPORT INFRASTRUCTURES

### Notre-Dame-des-Landes airport

On 1<sup>st</sup> January 2011 the concession for building the new Notre-Dame-des-Landes airport was granted. The concessionaire has selected a multi-disciplinary team of experts in order to set up an observatory on the environment which will monitor water quality, the respect for natural environments and monitoring of road traffic noise and air quality. For monitoring airborne noise the observatory on

the environment will rely on the CCE for Nantes-Atlantique airport and the informal CCE for Notre-Dame-des-Landes airport, which will be created before it opens.

DGAC is heavily involved in the work of the supervisory authority responsible for monitoring the execution of the concessionaire's commitments towards the environment.

# 2.

## TREATING NUISANCES TO REDUCE THEIR IMPACT



*In 2011 new operational restrictions for aircraft operating at night at Paris-CDG were agreed and the raising of arrival altitudes for aircraft in Ile-de-France became a reality. Assistance for local residents underwent major advances: Paris-Le Bourget and Beauvais-Tillé airports now have noise nuisance plans and the measures for assistance with soundproofing have been improved.*

## LIMITING NOISE SOURCES



### Operating restrictions

Several operating restriction measures designed to reduce nuisance at night were agreed upon or implemented in 2011. Within the framework of proposals from Jacques Dermagne in his report on sustainable development conditions for Paris-CDG, operating restriction measures for the noisiest aircraft operating at night at Paris-CDG were taken. From March 2012, some aircraft defined by their noise level (those where the margin relating to maximum level admissible after international acoustic certification is less than 8 EPNdB) will be prohibited between 10 pm and 6 am. In 2014 new restriction measures will apply for the same time period to aircraft for which the margin is between 8 and 10 EPNdB. This second measure will concern more than 3000 movements, i.e. 6% of night time traffic. The flights concerned may be operated using less noisy aircraft.

More generally in 2011 several restriction decrees have been issued and will be implemented over several years. This principle of programming the coming into force of restrictions

over several years both enables local inhabitants to have a positive perspective and the airlines to anticipate the organisation of their operation.

At Marseille Provence airport, the time period, during which the noisiest Chapter 3 aircraft (for which the margin is less than 5 EPNdB) are prohibited, has been widened. It now extends from 10 pm to 6 am (as opposed to 11 pm and 6 am beforehand). The new decree also prohibits flights using propeller aircraft, for which the cumulative margin is less than 8 EPNdB, between 10 pm and 6 am.

### A KEY FIGURE

● **30,000.** This is the minimum number of people exposed to an average night time noise level greater than 50 dB(A), as a result of the operating restrictions for the noisiest aircraft planned at night at Paris-CDG (source DGAC).

At Toulouse-Blagnac the decree providing for progressive prohibition of the noisiest Chapter 3 aircraft (-8, -10, the -13 EPNdB) between 10 pm and 6 am came into force on 30 October 2011.

At Nice Côte d'Azur airport the prohibition of Chapter 3 aircraft with a cumulative margin of 13 EPNdB came into force on 30 October 2011.

Since August 2011, the operating restrictions have been strengthened at the Toussus-le-Noble airport which receives general aviation. In particular a silent period was instituted for 1<sup>st</sup> April to 30 September, on Sundays and public holidays from 12 pm to 3 pm.

### Prevention of noise in the environment

The production of noise maps and noise prevention plans in the environment (PPBE), made compulsory by the European Directive dated 25 June 2002, particularly concerns large airports (more than 50,000 movements per year). Its objective is to guarantee information for the public in terms of noise in the environment and to enable action plans to be set up using communal evaluation methods.

The establishment of PPBE based on this mapping continued in 2011. The PPBE for the airports of Nice Côte d'Azur and Bâle-Mulhouse were approved in May 2011 and the one for Lyon-Saint Exupéry airport in October 2011. The PPBE for Marseille Provence airport was made available to the public and submitted for the approval of the prefect.

### SPOTLIGHT

● In 2010 Beauvais-Tillé airport breached the barrier of 20,000 annual movements of aircraft weighing at least 20 tons. It must therefore have a PGS. Forecasts are for 28,000 movements in 2012 and 32,000 over the longer term (source DGAC).

### Drawing up of Noise Nuisance Plans

The DGAC is collaborating with all the players concerned (i.e. the decentralised government departments, especially the prefectures because it is under the aegis of the coordinating prefect that the Noise Nuisance Plans (PGS) are produced, the communes concerned the consultative commissions for the assistance of local inhabitants and ACNUSA to draw up the PGS. This document marks out the areas in which the local residents can take advantage of assistance in soundproofing their premises. All airports which each year receive more the 20,000 movements of aircraft weighing less than 20 tons, as well as those airports annually receiving more than 50,000 movements of aircraft of less than 2 tons and for which the noise exposure or noise nuisance plans have a cross-over with the plans of one of the previously mentioned airports, have a PGS.

In December 2011, the PGS for Beauvais-Tillé and Paris-Le Bourget airports were approved after a favourable opinion from their consultative commission for the assistance of local residents and ACNUSA.

With the approval of the Noise Nuisance Plan (PGS) for Paris-Le Bourget Airport, there are now 12 airports that fulfil the competence field of ACNUSA (French Independent Monitoring Authority for Airport Pollution).

### Aid for light aviation

Exhaust sound proofers, three- or five-blade propellers, electric winches for towing gliders, etc. Every year the inter-regional departments of the DGAC (DSAC-IR) grant financial aid to authorised flying clubs, which want to be equipped with noise reduction devices but have limited means so that they are not able to do this without assistance. In 2011 an exceptional budget of €120,000 was allocated for these operations with an especial effort for the flying clubs in the Ile-de-France region to support their actions in favour of the environment, such as the fitting of exhaust silencers on flying school aircraft. Substantial aid has also been allocated to several flying clubs in the west and south-west regions.



### A KEY FIGURE

● 8 000. This is the number of light aircraft in France, 3000 of which are in flying clubs (source DGAC).

# OPTIMISING AIR NAVIGATION PROCEDURES



## SPOTLIGHT

- When the ILS intercept altitude is raised by 300 m, the sound energy experienced by the overflown populations reduces by 50%. So for an Airbus 320, the noise level drops from 71 dB to 68 dB and from nearly 75 dB to 71 dB for a Boeing 747, one of the noisiest aircraft.

## Raising altitudes of flights on approach to Paris airports

Since 17 November 2011 the approach altitudes for aircraft going to the airports of Paris-CDG, Paris-Orly and Paris-Le Bourget have been raised by 300 m. The ILS intercept altitude therefore moves up to 1200 m and 1500 m for aircraft going to Paris-CDG, from 900 m to 1200 m for aircraft arriving at Paris-Orly in the facing east configuration and to 900 m for arrivals at Paris-Le Bourget airport.

For several years this complex project has called upon the services of the DGAC and has received favourable opinions from the CCEs of the three Parisian airports and ACNUSA. As a result of this device the number of people exposed to noise greater than 65 dB will be reduced from 217,000 to 86,000 over the whole Parisian region, i.e. a reduction of 60%.

## ZOOM

- Acoustic measurements of continuous descent approaches performed in the axis of Runway 6 at Paris-Orly demonstrated a noise reduction of 4 to 5 dB at 25 km from the runway threshold and 6 to 7 dB at 33 km, compared with approaches with standard interception at 900 m.

## Continuous descent approach procedures

Experiments on and the development of continuous descent approach procedures are part of the broad guidelines of DSNA (French department of air navigation services) in terms of the sustainable development of air transport. By removing the level flight phases from the start of the descent until the runway is reached, this approach in clean configuration makes it possible to avoid variations in engine speed and, at the same time, limit noise pollution and gaseous emissions. DSNA is continuing its work for the definition and publication of continuous descent approaches.

Following Strasbourg Entzheim in 2010, a continuous descent approach was implemented at Paris-Orly airport in 2011 and several others are undergoing evaluation at the airports of Paris-CDG, Lyon-Saint Exupéry, Marseille Provence and Toulouse-Blagnac.

There are projects for other continuous descent approaches for the airports of Nice Côte d'Azur, Bordeaux-Mérignac, Nantes-Atlantique and Bâle-Mulhouse.

## NOISE IS THE LEADING SOURCE OF NUISANCE

The survey carried out by DGAC on the "image of civil aviation in 2011" shows that for people in France noise is the leading factor in nuisance attributable to air transport (for 38% of those questioned), followed by CO<sub>2</sub> emissions and the greenhouse effect (32%) and local air pollutions (30%). These results are a radical change in comparison with the 2010 survey in which those questioned put CO<sub>2</sub> and greenhouse gases on top for nuisance attributable to air transport, before local air pollution and noise. In this respect during the study of air traffic projects on the outskirts of airports, if the choice is between reducing noise or gaseous emissions, the policy adopted favours the reduction of noise pollution. On the other hand, for changes in air traffic above 2000 m reduction of gaseous emissions take priority (source DGAC).

### Optimising air routes

DGAC is taking part in projects enabling the reduction of gaseous emissions from air transport by optimising air routes. In 2011 DGAC continued its work within the group dedicated to the “City Pairs” project, the aim of which is to provide improvements to the current route network.

DSNA also continued the work undertaken with its partners on the setting up of “Free Route” air space within the Functional Airspace Block European Central (FABEC). By offering aircraft the potential to choose the route they wish inside an air space, between defined entry and exit points, the “Free Route” makes it possible to follow shorter flight paths, which therefore saves fuel and gaseous emissions.

### Night time routes to limit CO<sub>2</sub> emissions

Within the framework of FABEC, DSNA is participating in setting up a night time air route network. Low traffic density during the night allows some restrictions, such as by-passing military areas, to be lifted. So aircraft reduce their fuel consumption and CO<sub>2</sub> emissions by following more direct routes and because the amount of fuel planned for these flights is reduced.



#### A FIGURE

● **16,000 tons** a year. This is the quantity of CO<sub>2</sub> saved due to the 115 night time routes put in place within FABEC, which have made it possible to shorten total flight distances by 1.5 million kilometres (source DGAC).

## AIDING LOCAL RESIDENTS

### New provisions for assistance with soundproofing

Two major advances took place in 2011 in the measure providing aid for soundproofing the houses of local residents around main airports, starting with reassessment of the ceiling for grants for major work. From now on ventilation work in cooperative housing and external treatment of the roof will benefit from an additional allowance of €1,000 per dwelling and €5,000 per roof.

Furthermore, Decree No. 2011-1948 dated 23 December 2011 raised the rate of financial aid to 100% for all dwellings, whether the request for aid was presented individually or within the scope of group operations. Until then the aid rate was 80% for individual requests and 95% for group operations, the remaining costs often leading some residents to forego all the aid as they were unable to finance the 5% to 20% that remained. This general bearing of costs is planned for a two year period (until 31 December 2013) so as to encourage

the residents concerned to undertake the soundproofing work quickly.

### Slight increase in receipts

The Tax on Air Noise Pollution (TNSA), which is paid by airlines for each take-off by an aircraft of at least 2 tons, finances the aid for the soundproofing of residents' premises around an airport where they are paid (polluter pays principle). In 2011 the TNSA concerned the largest eleven airports and brought in €54 million for the services for aid to residents. Given the reimbursements of overpayments recorded for some years, the sum effectively paid was, in fact, €56.8 million in 2011 as opposed to €56.5 million in 2010.

#### SPOTLIGHT

#### SOUNDPROOFING OF DWELLINGS HALF-WAY COMPLETED

● The study conducted by s, the General Directorate for Risk Prevention and the DGAC in 2011, showed that 76,000 dwelling remain to be soundproofed out of a total of 143,000 dwellings in the noise nuisance plans (source DGAC).

### Soundproofing aid for two new airports

Beauvais-Tillé and Paris-Le Bourget, the two airports newly concerned by the soundproofing aid measure, will, with the adoption of their noise nuisance plans, be able to put in place financial aid for local residents in 2012.



Paris-Le Bourget airport

## ACTING FOR THE LOCAL ENVIRONMENT

### Studying the impact of ice clearing and de-icing products

DGAC has continued its studies and research into the optimisation of operations for de-icing aircraft and clearing ice from runways. Within the scope of its international cooperation, STAC began several studies in this field in 2011, particularly on the question of the performance of ice clearing products. It has also initiated a study programme to optimise operational procedures for snow and ice clearing, particularly in terms of the application rate for ice clearing products.

### Training for ice clearing and de-icing operations

For the third consecutive year, STAC and ENAC have provided training for airport ice clearing and de-icing operations. Mainly designed for airport operators, civil aviation staff, airport assistants and airlines, this training has made it possible to widen technical knowledge relating to the organisation of airport ice clearing and de-icing services, as well as of environmental and safety problems linked to winter sustainability operations.

In October 2011, STAC also organised the first training course on ice clearing operations for operating agents at Paris-CDG.

### PLANTS FOR REDUCING LOCAL POLLUTION

From 2008 to 2010 STAC, together with Aéroports de Paris and the Regional Interdepartmental Directorate for Equipment and Planning, has experimented with the use of planted filters on Paris-Orly airport with a view to reducing the environmental impact of ice clearing and de-icing products. This experimental measure has made it possible to show that planted filters (made up either of iris and Scirpus or of rushes and reeds) make it possible to reduce by more than 89% the organic pollutant load in surface water in less than six days (source STAC).



# 3.

## CONSULTING, COMMUNICATING AND FULLFILLING COMMITMENTS



*The actions of informing, consulting and monitoring the agreements made by the stakeholders in the sector in favour of sustainable development for air transport were continued in 2011. The positive balance from the measures taken in the framework of the January 2008 convention, the important consultation work at Paris-CDG and the development of the health and environmental information concerning local residents illustrates the progress made in terms of dialogue, transparency and monitoring.*

## SUSTAINABLE AGREEMENTS



### Monitoring of the 28 January 2008 convention

In January 2011, DGAC published the fourth statement concerning actions undertaken by all the stakeholders in the air sector relating to the convention signed on 28 January 2008 following the Grenelle de l'environnement (French multi-party debate on the environment). Despite the difficulties due to the financial and economic crisis, all the objectives were fulfilled or are in the process of being fulfilled. 2011 was marked by several major advances, such as the general raising of the arrival altitudes by 300 m for aircraft destined for airports in the Ile-de-France region or the continued setting up of the ETS system. In 2011 French civil aeronautical research benefitted from a Government budget of €60 million and DGAC devoted €5 million to research programmes and €4 million to a study programme for alternative fuels. CORAC, which was created within the

framework of the 28 January 2008 convention, has launched one of the research programmes on condensation trails (contrails) and aeronautical biofuels. Finally the progress made in 2011 by Paris-CDG airport in reducing taxiing times for aircraft and the good results recorded in terms of inter-modality with rail transport should be noted.

#### SPOTLIGHT

● The objective of reducing taxiing time by 10% in comparison with 2007, set in the 28 January 2008 convention, has been achieved. Since 2010, an accurate monitoring device for taxiing time has been operational at Paris-CDG.

### The weighted global measured indicator (IGMP)

The decree of 28 January 2003 defined the weighted global measured indicator (IGMP) which quantifies the total noise energy emitted by all the aircraft that have frequented Paris-CDG airport. In June 2011, DGAC presented ACNUSA with the IGMP value for 2010. The indicator value recorded a new reduction compared with the previous year and at 82.3 reached the lowest level since 2003 as compared with the reference value of 100 (corresponding to the average of the years 1999 to 2001). This reduction is explained by the reduction in traffic linked to the crisis and also by the airlines continuing to modernise their fleets.

### Revision of the protection plan for the atmosphere in Ile-de-France

The protection plans for the atmosphere (PPA) are measures for the management of air quality governed by the code for

In the new PPA (Protection Plan for the Atmosphere) for Ile-de-France (metropolitan area surrounding Paris) the aviation industry has undertaken measures and objectives aimed at improving air quality in the region.

the environment. Drawn up in agglomerations where there are more than 250,000 inhabitants, their aim is to bring atmospheric pollution levels below the limit values set by the regulations.

In 2011 DGAC participated in drawing up a new PPA for the Ile-de-France region together with all the players in the air transport sector. The sector collectively agreed to a series of measures designed to reduce polluting emissions on airport platforms. These measures especially concern emissions due to aircraft taxiing, the use of means for the substitution of APUs and the use of electric vehicles on platforms. The PPA for the Ile-de-France region should be adopted at the end of 2012 and will concern the period 2012-2017.

#### A KEY FIGURE

● **30 %**. This is the reduction in overall noise energy in comparison with 2005 by Air France at the end of 2011 (source Air France).

#### TGV-AIR: A WINNING COMBINATION

The survey carried out by DGAC in May and the summer of 2011 on 5100 passengers at the Paris-CDG and Lyon-Saint Exupéry airports confirmed the development of TGV-Air inter-modality in France. In 2011, nearly 3 million passengers used a TGV to go and take a flight from airports linked to a high speed rail network, i.e. Paris-CDG and Lyon-Saint Exupéry. They were three times as many as in 1999 and 90% of them have said they were satisfied with this transport formula. The results of the survey are available on the website <http://www.developpement-durable.gouv.fr/Enquetes-sur-la-complementarite.html>



# SUSTAINED DIALOGUE

## The action of Consultative Commissions for the Environment in 2011

The Consultative Commissions for the Environment (CCEs), the special authorities for communication and consultation between local residents, professionals in the aeronautical sector and representatives of local government, were instituted by the Law of 11 July 1985. They must be consulted on all important questions relating to development or the impacts of airport operation on the environment.

In 2011 about 50 CCEs met. The Civil Aviation Safety Services (DSAC) for northern France took part in 13 CCE meetings, particularly for the preparation of the noise nuisance plan for Beauvais-Tillé airport and during consultations on the operational restrictions recommended for Toussus-le-Noble airport. For the North-Eastern region, the CCEs for the airports of Mulhouse-Habsheim, Colmar-Houssen and Strasbourg-Entzheim met to validate their environmental charter. The DSAC for southern France took part in 5 CCE meetings



including one for the Pamiers-Les-Pujols airport, which enabled the platform to acquire a code for environmental good practice in May 2011. For the Western region, the DSAC took part in CCE meetings for the airports of Brest Bretagne, Caen Carpiquet, Châteauroux-Centre, Le Mans-Arnage, Nantes Atlantique, Saumur-Saint-Hilaire-Saint-Florent and Tour Val-de-Loire. The DSAC for South-Western France took part in four CCE meetings in 2011. Several meetings were organised to draw up the new environmental charters, as for Bordeaux-Mérignac airport where a sustainable development charter was signed in February 2011. In the Rhône-Alpes and Auvergne region the CCEs of nine out of the 12 airports which have them met at least once in 2011. The CCE for Lyon-Saint Exupéry airport met twice, especially to assess the progress of the "Environmental Agreements" over the period 2009-2013. For the South-Eastern region the DSAC continued its consultation process within the twelve airports with a CCE, following the example of the work conducted at Marseille Provence airport when new operational restriction measures were put in place in October 2011. Finally the CCEs of the three Parisian airports met six times to examine, in particular, the measures announced at the Grand Roissy

meetings, the raising of aircraft arrival altitudes, the noise exposure plan (PEB) project for Paris-Orly airport and the draft PEB project for Paris-Le Bourget airport. 100% of the dossiers presented in 2011, which were all air traffic dossiers, received a favourable opinion from the CCEs.

## The consultation approach at Paris-CDG

After publication of the report by Jacques Dermagne on conditions for sustainable development of the Paris-CDG platform in December 2008, unprecedented consultation measures were conducted with all the players concerned, elected officials, local residents' and air transport professionals' associations, on the subject of noise pollution reduction. In particular DGAC led several commissions on this subject and that of soundproofing aid. After two years of work and consultation, a global set of measures for the reduction of noise pollution was presented on 25 January 2011 by the French Ministry of Ecology, Sustainable Development, Transport and Housing at the Grand Roissy meetings.

During 2011, DGAC worked on putting these measures in place as soon as possible. Since 17 November 2011 the raising of flight altitudes on the approach to the Paris region has, in particular, made it possible to reduce noise pollution day and night. On 20 September, the decree relating to the prohibition of the noisiest aircraft (for which the margin is less than 8 EPNdB from March 2012, then those for which the margin is between 8 and 10 EPNdB from 2014) between 10 pm and 6 am at Paris-CDG was signed. A balanced approach study designed to draw up the environmental and economic balance sheet for these operational restriction measures was performed by DGAC and presented at the CCE in July 2011. A new take-off path facing west at night, avoiding the highly urbanised areas to the west of Roissy, was brought into service in March 2012. Other measures, such as take-off at the runway threshold or the preferential configuration facing west, have also been implemented. After a long consultation process all these measures fall within a global approach designed to guarantee their environmental benefits to as many people as possible.

## AN APPROACH TO TRANSPARENCY



### Noise measurements

DGAC conducted two noise measurement campaigns in 2011. The first was performed around Paris and has been used to enrich the “long distance aircraft noise” database, which is now available on the Internet<sup>[1]</sup>. The second was conducted around Saint-Chamas and Miramas, in the axis of Marseille Provence airport. This measurement campaign was carried out within the scope of the changes to arrivals of aircraft coming from the south on Runway 13. This project should make it possible to limit noise pollution by favouring the overflying of expanses of sea and by raising the approach paths.

### Impact studies

DSNA is carrying out a study of the impact of air traffic (EICA) before making any changes to an air traffic procedure at one of the eleven main French airports. As well as the studies performed within the scope of changes to procedures put in place in the Paris region (such as the general raising by 300 m of arrival altitudes or the new night time take-off path for Paris-CDG among others), several impact studies were conducted on provincial airports in 2011. So studies have been performed for the implementation of new arrival procedures at Marseille Provence airport, for environmental improvement of departures from Bordeaux-Mérignac and for northern arrivals at Lyon-Saint Exupéry airport.

### SPOTLIGHT

● The website on aircraft noise at long distances from airports, which is accessible to all, makes it possible to find out the noise level for an aircraft depending on its height and distance in relation to the airport runway. At 10 km from the runway and an altitude of 1300 m the noise level for an Airbus A320 on departure is 69 dB for example.



Bordeaux-Mérignac airport

[1] <http://www.developpement-durable.gouv.fr/IMG/flash/BruitLongueDistance.swf>

### A KEY FIGURE

● **1 ton.** This is the quantity of CO<sub>2</sub> emitted for a return flight for one person between Paris and New York, i.e. 12,000 km. By way of comparison, a car with a small engine emits the same quantity of CO<sub>2</sub> travelling 6,200 km (source DGAC eco-calculator).

## AIR TRANSPORT: A DEVELOPMENT TO BE MANAGED

According to the survey on the "image of civil aviation" carried out in 2011 by DGAC, a growing proportion of French people consider that air activity must continue to develop but by managing it so that it is less pollutant (70% of people questioned in 2011 as opposed to 68% in 2010).

Amongst the points requiring vigilance was noise, which was placed first in the nuisance factors, after which came CO<sub>2</sub> emissions and local air pollution.

(\*) Telephone survey performed between 7 and 21 November 2011 on a sample of 1115 people.

## Public health and environmental information

DGAC is contributing to the DEBATS (Discussion sur les effets du bruit des aéronefs touchant la santé - Discussion on the effects of aircraft noise affecting health) which continued in 2011 with the finalisation of the scientific protocol and financing plan.

This first large epidemiological study conducted in France is aimed at better knowledge of the consequences of aircraft noise on the health of local residents. The study, carried out at three large French airports (Paris-CDG, Lyon-Saint Exupéry and Toulouse-Blagnac), will analyse the individual states of health of 1200 people over four years, and the quantity of sleep a hundred people get in one week.

The SURVOL study also continued in 2011. It was launched in 2008 with co-financing to the tune of €300,000 from DGAC, and is a monitoring tool for noise and air quality around the airports of Paris-CDG, Paris-Orly and Paris-Le Bourget. It should allow the populations concerned to be aware of the health impact of air traffic in Ile-de-France. Mapping data from monitoring of noise and air quality induced by air traffic should soon be available on the Internet.

## Improving knowledge of flight paths and aircraft noise

In 2011 the commune of Moussy-le-Neuf was equipped with the Vitrail noise monitoring and flight path display system. DGAC took part in the deployment of this tool enabling the local residents of the three large airports in Ile-de-France to monitor, with a minor delay, the flight path of an aircraft by associating it with a noise level. In 2011, 22 communes as well the Maisons de l'environnement et du développement durable (Environment and Sustainable Development Offices) for Paris-CDG and Orly airports have the Vitrail system. Since April 2011 an interactive tool has made it possible to visualise the air traffic on typical days above communes in Ile-de-France on the Internet<sup>(1)</sup>.

## SPOTLIGHT

● The development of air traffic has been accompanied by continuous improvement in energy efficiency. The CO<sub>2</sub> emissions per passenger/cargo ton/kilometre transported have therefore been reduced by 34% on average since 1990 (source CITEPA-DGAC).

Since the beginning of 2011 the Visiobruit tool has been installed in the Paris-CDG Environment Office. This interactive, educational tool, developed by the DGAC, has enabled the general public to acquire the basic concepts of acoustics and information on the methods for measuring aircraft noise.

## Passenger information on CO<sub>2</sub>

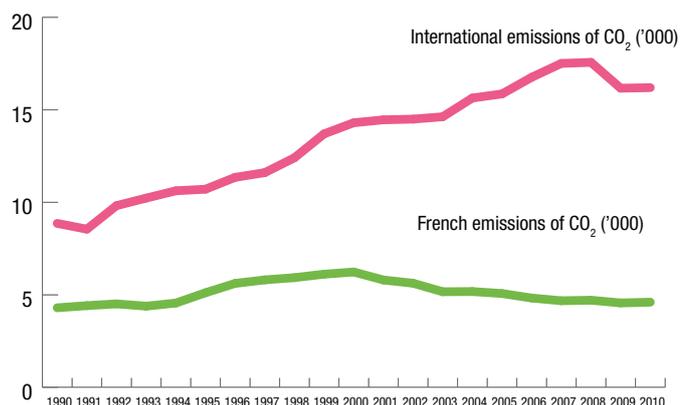
DGAC contributed to the publication of the decree of 25 October 2011 relating to the obligation of information for beneficiaries of a transport service on the quantity of CO<sub>2</sub> emitted, as planned in the "Grenelle 2" law. The decree defines exactly how to quantify the carbon emissions of different modes of transport, by including, amongst other things, the production of energy (fuel or electricity) required for movement ("upstream phase").

For air transport the CO<sub>2</sub> emissions calculator that can be consulted on the Internet (<http://www.developpement-durable.gouv.fr/aviation/eco-calculateur>) gives the traveller the average quantity of CO<sub>2</sub> estimated in compliance with this regulation.

(1) <http://www.developpement-durable.gouv.fr/Les-journees-caracteristiques-du.html>

## CO<sub>2</sub> EMISSIONS FROM FRENCH AIR TRANSPORT

The emissions from internal traffic have continued to reduce regular since 2000. The emissions from international air traffic remained stable in 2010 although traffic increased by 2.1%: a good illustration of the efforts made by air transport in terms of gains in energy efficiency.



# 4.

## PREPARING THE FUTURE



*In 2011 DGAC continued its work in supporting research and started implementing the aeronautical action for the Programme d'Investissements d'Avenir (Future Investments Programme). It also contributed to the advances made in the fields of composite materials, future alternative fuels and the concept of all-electric aviation.*

## FRENCH RESEARCH INTO THE INTERACTION BETWEEN AVIATION AND THE ATMOSPHERE



Created following the agreements made by all the French air transport players within the context of the Grenelle de l'environnement, CORAC is meeting the environmental objectives of Advisory Council for Aeronautics Research in Europe (ACARE). In 2011, DGAC decided to give its support to a series of studies identified by CORAC, with the aim of improving scientific knowledge concerning the impact of aviation on the atmosphere. In particular it involves studying the physical and chemical properties of the particles emitted by aircraft engines, the formation of ice crystals, the detection of areas of the atmosphere supersaturated in ice favouring the formation of condensations trails in the wake of aircraft, as well as the mechanisms leading to the formation of these trails.

### SPOTLIGHT

● In 50 years, the technological progress made by the aeronautical industry, due to the efforts in research and innovation, have made it possible to reduce fuel consumption by more than 70% (and similarly in CO<sub>2</sub> emissions) and emissions of nitrogen oxide by 70%. The aeronautical sector has also reduced noise by more than 6 dB (source, summary report of CORAC steering committee - 15 May 2009).

## THE POLICY OF SUPPORT FOR INDUSTRIAL PARTNERS



Colomban MC Cricri, 100% electric aircraft developed by EADS Innovation Works (IW), Aero Composites Saintonge and the Green Cri-cri Association

In 2011 the research programmes supported by DGAC covered all aeronautical fields and disciplines. In particular the research work concerned the use of composite materials designed to reduce aircraft weight, the powering of wheels using auxiliary power systems, new blades and better integration of helicopter engines making it possible to improve their environmental performance.

In 2011 DGAC also continued its support for research work concerning the concept of more electric aviation (embarked electric generators, fuel cells, etc.) and intelligent management of assignments which make it possible to optimise traffic management in real time.



The two DGAC action points are aimed at **assisting** the French aeronautical sector and **strengthening competitiveness** while **preparing** to meet the environmental challenges of future years.

### THE EFFECT OF CONDENSATION TRAILS ON CLIMATE

In certain atmospheric conditions, condensation trails form in the wake of aircraft, particularly due to the emission of particles (sulphur compounds, soot, etc.) and water vapour by the engines. These trails can then develop into induced cirrus cloud, altitude cloud which causes climate warming as do CO<sub>2</sub> emissions. This induced cirrus cloud could cover 0.2% of the surface of the Earth (source summary report of CORAC steering committee - 15 May 2009).

# PREPARING FOR THE EMERGENCE OF ALTERNATIVE FUELS

In 2011 DGAC continued its work to encourage the emergence of new, sustainable aviation fuels. Bringing together the main French players concerned by this subject, the initiative on future aviation fuels (Ini FCA) launched by DGAC in 2007 explores research themes such as the compatibility of alternative fuels with the materials of engines or the composition of alternative fuels. Ini FCA also considers questions such as the sustainability of the production and availability of biomass resources in order to encourage the emergence of biofuel production for air transport.

Today new networks for obtaining biofuels, such as advanced biofuels, are being explored. These biofuels have physical and chemical properties suitable for air transport, unlike first generation biofuels such as bioethanol or methyl esters of vegetable oils.

Furthermore, in 2011 DGAC took the decision to support the CAER (Carburants Alternatifs pour l'Aéronautique - Alternative Fuels for the Aeronautics Sector) research programme, the work of which will extend over a period of four years. This programme run by IFP Energies Nouvelles should make it possible to select the most suitable fuels for aviation from among known networks and others that are more prospective, particularly with regard to the impact of the fuels on materials and their CO<sub>2</sub> emissions throughout their entire lifecycle.

DGAC also took part in the observatory on biofuels set up in the autumn of 2011 by the General Directorate for Energy and Climate of the French Ministry for Ecology, Sustainable Development, Transport and Housing.

In October 2011 with the assistance of DGAC an Air France flight by an Airbus A320 between Toulouse-Blagnac and Paris-Orly showed that it was possible to reduce CO<sub>2</sub> emissions by half by combining a mixture of biofuel, optimised air traffic management and the implementation of the continuous descent approach.

## SPOTLIGHT

● Given the forecasted growth in worldwide air traffic in the medium term, fuel consumption should increase by 1.5% to 3% per year while the production of crude oil should only increase by 1% per year (source Observatoire de l'Aviation Civile 2009-2010).



## NEW GENERATIONS OF BIOFUELS

The use of biofuels could help to reduce CO<sub>2</sub> emissions and, in the long-term, provide an alternative to the growing consumption of oil products for air transport. In the aeronautics field, biofuels must meet many requirements such as significant temperature changes, pressure or compatibility with the materials with which they are in contact. First generation biofuels used in the automobile sector, such as ethanol or methyl esters of vegetable oil, do not meet the requirements of aviation and have harmful consequences for biodiversity and food production. New generations of sustainable biofuels obtained from plant residues and waste or robust plants for example are now being studied. Hydro-treated vegetable oils from resources such as cameline, jatropha or algae also seem to be a promising avenue. In July 2011, the first aeronautical fuel containing synthetic hydrocarbons from hydro-treated vegetable oils was certified by the American Society for Testing and Materials (ASTM) (source DGAC and IFP Energies Nouvelles).

## THE LAUNCH OF TECHNOLOGICAL DEMONSTRATORS

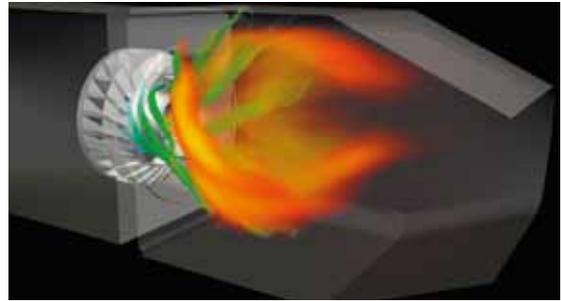
In 2011, DGAC started to implement the research processes for the air section of the Programme d'Investissements d'Avenir, launched by the President of the Republic on 14 December 2009. Within this framework, the two first technical demonstration platforms were launched in 2011. Their aim is to accelerate the incorporation of innovation into future aeronautical programmes.

The future composite aircraft aims to reduce the mass, and therefore the environmental footprint, of aircraft due to the increased use of composite materials onboard aircraft. It will make it possible to evaluate gains in empty weight that can be obtained in certain parts of the aircraft such as the main or forward landing gear housings, the keelson or even the wing box.

The objective of EPICE (Ensemble propulsif intégré avec composites pour l'environnement - Propulsion system integrated with composites for the environment) platform is to lighten the engines and reduce their consumption and CO<sub>2</sub> emissions by the introduction of new concepts and new materials on the engine systems, nacelles, attachment systems and struts. The expected gains in terms of CO<sub>2</sub> emissions are in the order of 15% by 2016 and 19% by 2020.

### A KEY FIGURE

● Although research into future composite aircraft seem conclusive, gains in the order of **900 kg** of empty weight for an airliner could be obtained. For comparison, a reduction of 1000 kg in the empty weight of an airliner enables its annual fuel consumption to be reduced by about 175 tons and its CO<sub>2</sub> emissions by about 500 tons.



Research work into the temperature of engine combustion chambers, which has a very significant effect on nitrogen oxide emissions (NO<sub>x</sub>)

In 2011, the DGAC devoted a large part of its budget to aeronautical research and technology to support projects to reduce the environmental impact of air transport.



# ADVANCES IN EUROPEAN RESEARCH



Airbus A 300 B2-1C with fixed wing aircraft developed by CNES (French Space Agency)

In 2011, Clean Sky continued its technological development work in the fields of commuter aircraft and green helicopters, fixed wing aircraft, green air operations and engines, and eco-design. The European programme, launched in 2008 and based on a public-private partnership, takes on the environmental aims of the Advisory Committee for Aeronautics Research in Europe.

Three new requests for proposals benefitting from maximum financing of €64.1 million and covering 123 subjects for all technological demonstrators were launched in 2011.

In 2011, the European Commission presented the European vision of aviation for the coming decades in a document drawn up by experts in aeronautical research and entitled "Flight Path 2050 – Europe's Vision for Aviation". As well as the objectives of competitiveness, safety, and quality of service in the European aeronautics industry, protection of the environment appears as a basic challenge for the development of aircraft and aviation infrastructures.

In July, the European Commission launched the drawing up of a new strategic schedule for research and innovation, in which DGAC is participating. This schedule is designed to guide the

The Clean Sky initiative has made it possible for European research to design future ecological aviation by working in an integrated manner on all technological aspects.

determination of future European research programmes with the aim of reaching the objectives of Vision 2050, particularly in the field of the environment.

## A KEY FIGURE

● The European environmental objectives for 2050 are to reduce CO<sub>2</sub> emissions by **75%**, NO<sub>x</sub> emissions by **90%** and perceived noise by **65%** in comparison with the new aircraft of 2000. The aircraft will be recyclable. Europe will be a centre of excellence in terms of sustainable alternative fuels and state-of-the-art research into the atmosphere.

# GLOSSARY



## A

ACARE: Advisory Council for Aeronautics Research in Europe  
ACNUSA: French Independent Monitoring Authority for Airport Pollution  
ADP: Aéroports de Paris (Paris Airports Group)  
AIRE: Atlantic interoperability Initiative to Reduce Emission  
APAME: Association for the Promotion of Electrical Engine Aircrafts  
APU: Auxiliary Power Unit  
ASTM: American Society for Testing and Materials

## C

CAEP: Committee on Aviation Environmental Protection  
CAER: French abbreviation for Alternative Fuels for the Aeronautics Sector  
CALIPSO: Classification of light aircraft according to their performance index  
CARING: Contribution of Airlines for the Reduction of Industry Nuisances and Gases  
CCE: Environmental Consultative Committee  
Clean Sky: A European Union programme to coordinate and optimise research into a more environmentally friendly aviation industry  
CNES: French Space Agency  
CO<sub>2</sub>: Carbon dioxide  
CORAC: Council for Civil Aeronautical Research  
CRNA: Regional air navigation centre

## D

DEBATS: Discussion on the effects of aircrafts noise affecting health  
DGAC: French Civil Aviation Authority  
DSAC-IR: French Civil Inter-regional Aviation Safety Department  
DSNA: French department of air navigation services

## E

EASA: European Aviation Safety Agency  
EICA: Air Traffic Impact Study  
ENAC: French National School of Civil Aviation  
EPICE: Propulsion system integrated with composites for the environment  
EPNdB: Effective Perceived Noise in Decibels  
ETS: Emission Trading Scheme

## F

FAA: US Federal Aviation Administration  
FABEC: Functional Airspace Block European Central

## I

ICAO: International Civil Aviation Organisation  
IEC: International Electrotechnical Commission  
IFP Energies Nouvelles: French public research, innovation and formation organization working on energy, transport and environment domains  
IGMP: Weighted Global Measured Indicator  
ILS: Instrument Landing System  
Ini FCA: Initiative on future aviation fuels  
IPCC: Intergovernmental Panel on Climate Change

## L

Lden: Level day evening night

## N

NO<sub>x</sub>: Nitrogen oxide

## P

PEB: French abbreviation for Noise Exposure Plan  
PGS: French abbreviation for Noise Nuisance Plan  
PIA: French abbreviation for Investing in the Future Programme  
PNACC: French National Plan for Adapting to Climate Change  
PPA: Protection Plan for the Atmosphere  
PPBE: French abbreviation for Noise Prevention Plan in the Environment

## S

SESAR: Single European Sky ATM Research  
SNA: Air navigation services  
STAC: French Civil Aviation Technical Department  
SURVOL: (literally "overflight") a four-year study carried out on communities living near Paris-CDG, Paris-Orly and Paris-Le Bourget airports, as part of a regional health and environment plan

## T

TEAM Play: Tool suite for Environnemental and Economic Aviation Modelling for Policy Analysis  
TNSA: French aviation noise inconvenience tax

## V

Vitrail: System for monitoring aircraft noise and displaying flight paths  
Visiobruit: An educational tool enabling the general public to acquire basic notions of acoustics and to listen to the real noise made by the most common aircraft

[www.developpement-durable.gouv.fr](http://www.developpement-durable.gouv.fr)

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