

2012 Environmental Report





A new project: air quality

In 2012 environmental concerns continued to be the focus of activity for the players in the aviation sector, and the work undertaken for the benefit of the sustainable development of civil aviation have quite naturally found their place within the Government's ecological transition policy.

2012 was marked by the progress made in terms of noise and CO₂ emissions. It will also have been marked by international awareness of the necessity of making progress on the market measures dossier. In large part, this awareness has been caused by the desire of Europe to put the ETS system in place, and that a European hardening of position should not now hold it up by paradoxical stubbornness.

2012 has also been a year for new technological developments in terms of air navigation, which makes it possible to increase air transport efficiency in terms of both energy consumption and noise suffered.

Finally, in the field the revision of the Noise Nuisance Plans (PGS) for Orly and Paris Charles-de-Gaulle airports bears witness to the continued accounting for the expectations of local residents in the large open spaces surrounding our large airports.

So once again 2012 confirms the commitment of an entire economic sector to its environment. Air transport must be even more irreproachable in this as it is irreplaceable for all medium and long-haul connections, which society could no longer do without as serious damage would result.

The distinctive environmental element for me in 2012 is, however, not part of these actions. It is the practical, visible emergence of the third aspect of the aviation environment, namely local pollution. Although civil aviation has always been aware of its emissions of pollutants, taking them into account has, up till now, been somewhat less of a priority than the socially sensitive questions of noise and global warming.

2012 will stand out for the first concrete actions taken on this aspect which, even if still modest, show the importance attached to controlling these emissions by the players in the aviation sector.

2013 has been designated the year for air quality by the European Union. In conjunction with the other ministerial departments and the French Independent Monitoring Authority for Airport Pollution (ACNUSA), the competences of which have been widened to include air quality since 2010, the French Civil Aviation Authority (DGAC) will continue to explore the means of reducing the emission of pollutants linked to civil aviation.

Patrick Gandil,
Director, French Civil Aviation Authority



table

Environmental Report for 2012



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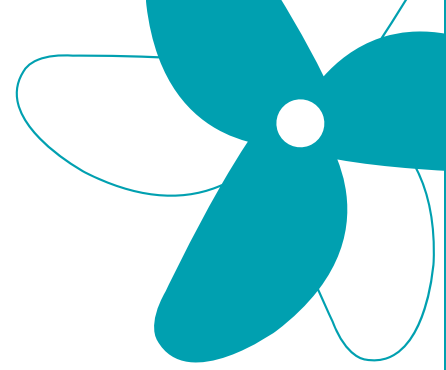
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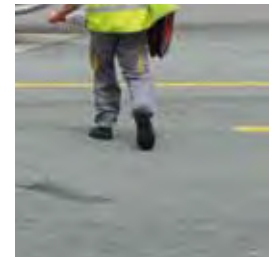
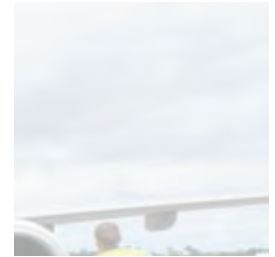
PREVENTING NUISANCES

The work conducted at international level to adopt stricter standards and the integration of aviation into the European ETS system are among the significant happenings in 2012. As far as airports are concerned, the revision of noise exposure plans has continued and, in particular, has resulted in the adoption of a new PEB for Paris-Orly airport.





International actions



THE CAEP ON THE ROAD TO STRICTER STANDARDS

The CAEP (Committee on Aviation Environmental Protection) of the ICAO (International Civil Aviation Organisation) is responsible for drawing up measures designed to reduce the environmental impact of aviation. In particular, this technical organisation, made up of several groups of experts, is working on putting in place new standards in terms of noise and atmospheric emissions (pollutants and CO₂).

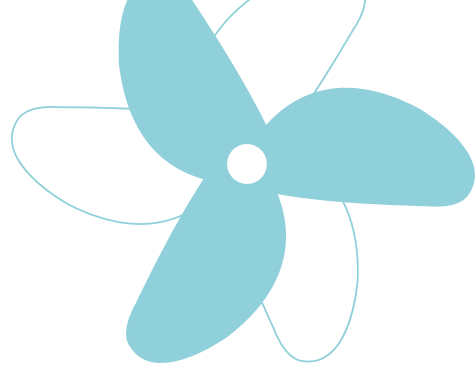
In 2012 French experts continued the work conducted within the different groups of the CAEP. In July 2012 the meeting of the CAEP Steering Committee made it possible to validate an international indicator (a “metric”) for the energy efficiency of aircraft, which will serve as a base for a restrictive standard for CO₂ emissions, which remains to be finalised.

In February 2013 the CAEP validated the work

undertaken over the last three years on noise pollution by adopting a new noise standard – namely Chapter 14. **From 2017 the noise from jet and propeller aircraft of more than 8.6 tons must be less than 7 decibels** (see Spotlight) in comparison with the current Chapter 4 standard which came into force in 2006.

The experts also continued their work on establishing a standard for fine, non-volatile particle emissions. For this purpose, a measuring device was started at the end of the year within the scope of the MERMOSE project. This project was launched in 2011 mainly by ONERA (The French Aerospace Lab) and SNECMA, with the support of the DGAC (French Civil Aviation Authority).

Over and above technological progress and the improvement in air traffic management, it is also necessary to use economic measures to reduce emissions.



THE ENVIRONMENT A STRONG FRENCH PRESENCE INTERNATIONALLY



Within the ICAO the CAEP is responsible for working on all questions concerning environmental protection. There are now 23 members from all the regions of the world and 16 observers from Governments and governmental and non-governmental organisations. Work is carried out mainly within 5 groups (acoustic certification, atmospheric emissions, operational procedures, analyses of environmental and economic impacts) in which a dozen DGAC experts participate.

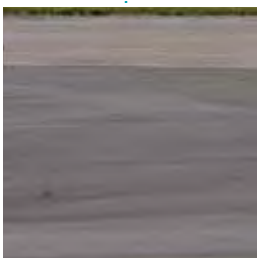
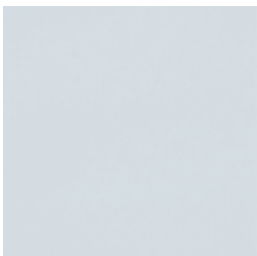
Within the framework of the ICAO, France also participates in the High-level Group on Climate Change (HGCC). This high-level group was created in 2012 to establish a general framework for putting in place instruments to control CO₂ emissions from aviation, which will be examined during the next general meeting of the ICAO in September 2013.

SPOTLIGHT

LESS NOISE PLEASE

The work conducted in 2012 by CAEP experts has enabled a new, stricter noise standard, in comparison with the current Chapter 4 noise standard, to be adopted at the start of 2013.

The noise standard takes into account three certification points: take-off, approach and overflight. It is established depending upon the take-off weight of the aircraft and the number of engines. It is expressed in EPNdB (Effective Perceived Noise decibel), a noise unit taking into account the specific characteristics linked to aeronautics and enabling the effective level of perceived noise to be expressed. In 30 years jet aircraft noise has seen an average reduction of a little more than 20 decibels.



Tools for the prevention of gaseous emissions

ETS: A EUROPEAN INITIATIVE WHICH MOBILISES THE ICAO

At the beginning of 2012 aviation was incorporated into ETS (Emission Trading Scheme), the European system for the exchange of CO₂ emissions quotas. Over and above the technological progress and improvements provided by management of air traffic, these economic measures should make it possible to limit CO₂ emissions for all flights affecting the European Union. Within the context of ETS the airlines concerned must compensate for their emissions by a quota restitution. In addition to the quota quantity distributed free at the start of the year (corresponding to about 72% of emissions in 2012), operators may buy quotas on the market, project credits or quotas put up for auction by Member States.

At the end of March 2012 the DGAC received and checked the emissions declarations of nearly 200 operators for 2011. The free quotas for 2012 were distributed to operators by the Caisse des Dépôts et Consignations (Deposit and Consignment Office) which is the national administrator for the European Register of greenhouse gas emission quotas.



The European initiative concerning the setting up of ETS has incited the opposition of some partner countries of the European Union and contributed to the mobilisation of the ICAO on market-based measures to control greenhouse gas emissions. **In 2012 the DGAC monitored the work of the ICAO on these market measures designed to lay the foundations for a worldwide mechanism to regulate CO₂ emissions by 2020.**

The purpose of this work is also to draft a framework enabling regional systems to be put in place, similar to the European ETS.

Given the progress obtained by the ICAO in this area, in November 2012 the European Union announced the suspension of the application of ETS to extra-community flights for a year.

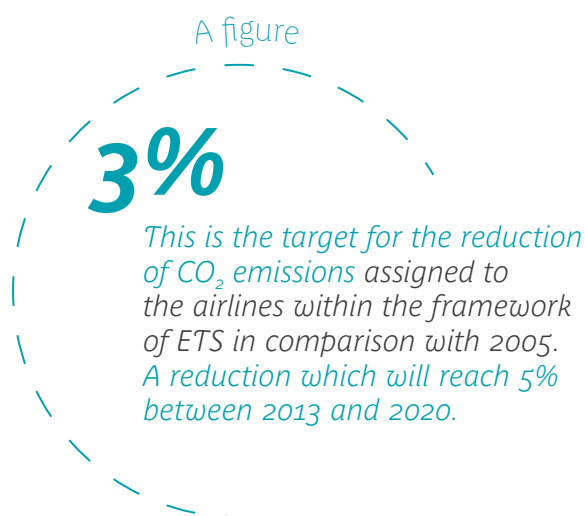
SPOTLIGHT

A GROWING ENVIRONMENTAL IMPACT

In terms of CO₂ emissions the impact of aviation is now much less significant than that of other sectors. It represents 2 to 3% of worldwide CO₂ emissions. However, with an average annual growth rate in air traffic of 4 to 5% since the middle of the 1980s, the share of the aviation sector in greenhouse gas emissions could double between now and 2025.

BY 2020 Europe has set itself a target of reducing CO₂ emissions per passenger by 50% (in comparison with 2000).

(Source: Institut français du pétrole-énergie nouvelle - IFP)



Actions for the prevention of noise pollution

CONTROL OF URBAN DEVELOPMENT AROUND AIRPORTS

The noise exposure plan (PEB), designed to limit the establishment of new populations in areas exposed to noise pollution, is a town planning document which incorporates air traffic and the conditions of use of airport infrastructures in the short term, but which also takes into account development for the next 15 to 20 years. For each of the 215 airports with a PEB, a map shows the various noise exposure area (high noise level areas A and B, moderate noise level area C and an area D, compulsory information for the 12 largest airports). Following the adoption in 2002 of a new noise indicator (Lden: Level day evening night), more representative of the nuisance suffered by those living nearby, **all the PEBs are being revised.**

In 2012 the procedure for revising the PEB for Paris-Orly airport started in 2009 was finished. This new PEB, approved by Interprefectorial Decree on 21 December 2012, takes into account the change in noise indicator, the developments of the platform and its operation as well as the improvements in aircraft fleets which have taken place since 1975 when the previous PEB for this Paris airport was established.

The work of finalising the PEB project for Paris-Le Bourget airport continued in 2012. On 6 September 2012, the Minister Delegate responsible for Transport,

the Sea and Fishing gave express agreement for the establishment of a PEB for the leading European airport for business aviation.

The noise exposure plan for Beauvais-Tillé airport was approved on 26 June 2012.

In New Caledonia the Engineering Department of the DAC (Civil Aviation Authority) worked on producing PEBs for the airports of Tontouta and Magenta with the aim of proposing that these be set up within a regulatory framework, which up to now has not existed.

In 2012 the DGAC also worked towards encouraging the drafting of PEBs suitable for airports where traffic is irregular and low volume (also including military airfields). Decree No. 2012-1470 concerning the methods for drafting noise exposure plans for certain airports was signed on 26 December 2012. For small airports where traffic is irregular the calculation method is adapted so as to consider only days when airport activity is significant, in order to obtain noise curves more consistent with reality. The range of choices of index for Area C is also enlarged to make it possible to take better account of the local context of each airport. For military airfields receiving fighter aircraft (the case of a mixed use airfield – civil and military – with fighter traffic such as Lorient-Lann Bihoué) the range of choices of index for Areas B and C is also modified to adapt to local characteristics and those of fighter aircraft



Nouméa-Magenta airport

NOISE EXPOSURE PLAN - BEAUVAIS-TILLÉ AIRPORT





SPOTLIGHT

A PEB FOR THE EUROPEAN LEADER IN BUSINESS AVIATION

Le Bourget airport, dedicated solely to business aviation since 1980, did not have a PEB. Given its high traffic volume the law, however, requires that it has one. So in 2010 it was decided to start the procedure for drafting the PEB. In 2012 Le Bourget airport recorded more than 53,000 movements.

A figure

3,862,562

The number of passengers welcomed at Beauvais-Tillé airport in 2012, i.e. an increase of 5% compared with 2011.

(Source, UAF)



Paris-Le Bourget airport



ACOUSTIC CERTIFICATION OF AIRCRAFT

The main purpose of acoustic certification is to encourage incorporation of advanced techniques in terms of noise reduction from the aircraft design onwards. In 2012, on behalf of the European Aviation Safety Agency (EASA) the DGAC certified the European military transport aircraft, the A400 M.

In the field of business aviation the DGAC has started acoustic certification work for the Falcon 2000S and for light aircraft has undertaken certification procedures for aircraft equipped with sound suppressors.

The certified noise levels for public transport aircraft are listed in the NoisedB database. NoisedB was put on-line in 2006 and has become the international reference for studying the development in the acoustic performance of aircraft. The DGAC, under the aegis of ICAO, is responsible for providing its maintenance and regular updating. In 2012, NoisedB added new data concerning 200 aircraft.

A figure

More than 10,000

The number of public transport aircraft for which the certified noise levels are listed in the NoisedB database.

ENVIRONMENTAL CONTROL OF AIRCRAFT

In 2012 the DGAC undertook a procedure aimed at strengthening the environmental control of public transport aircraft. During a future experimental phase it should be possible to check the presence of noise attenuation equipment between the arrival and departure of the aircraft.



SPOTLIGHT

TRACKING THE SLIGHTEST NOISE

In 2012 the DGAC performed acoustic readings to find the origin of a particular noise emitted by the Airbus A320. Notified by local inhabitants this noise is audible over a distance of between 12 and 50 km from the runway threshold. The origin of this noise nuisance was four cavities located under the aircraft's wings. The technical solution provided by Airbus should soon be certified and installed on aircraft in production by the end of the 2013. The equipment of aircraft already in service (retrofit) is also being studied, even though it is a more complex operation to be dealt with on a case by case basis.



Airbus A 320



THE ORIGINS OF NOISE FROM JET AIRCRAFT

The noise from an aircraft mainly has two sources: the engines and the aerodynamics.

Engine noise has been greatly reduced with the appearance of modern double-flow jet engines, in which a fan is driven by a turbine. However, the engines are not alone in being responsible for aircraft noise. Aerodynamic noise is the noise of friction between the aircraft and the air. The strength of these two noise sources varies depending on the flight phase. Aerodynamic noise is linked to the wing span of the aircraft. When the aircraft descends the aerodynamic noise and that of the engines are more or less at the same level. When the aircraft climbs, the engine noise is greater than that of the aerodynamics.



DR 400

CALIPSO

CALIPSO (*Classification des avions légers selon leur indice de performance sonore* – Classification of light aircraft according to their noise performance index), developed by the DGAC, is a new tool which can be used over time to manage noise exposure in the vicinity of airfields for light aircraft while looking after the interests of those who enjoy the pursuit of light aviation. CALIPSO classifies aircraft into different categories depending on the noise level produced in a real flight situation.

In 2012 the development phase of CALIPSO was finished and the stakeholders consulted on the subject issued a favourable opinion. CALIPSO should be available in the second quarter of 2013. Its field of application will initially be limited to aircraft fitted with fixed pitch propellers.

(Source, ONERA)



Effective airport infrastructures



Landing fees can be modulated by airport operators depending on the acoustic performance of aircraft and periods of the day. Airlines are thus encouraged to modernise their fleets and use less noisy aircraft in the evening and at night. Many airports, including Paris-CDG, Orly, Le Bourget, Nice, Lyons, Marseilles and Toulouse, have inserted such modulations into their tariff schemes.

The large airports are also starting to use renewable energy. So centralised geothermal energy on a deep water table was put into service at the start of 2011 at Paris-Orly airport and a biomass power station at Paris-Charles de Gaulle airport at the end of 2012. Aéroports de Paris is targeting a national objective of 23% renewable energy in 2020.

As for the Grand Ouest airport, it will be the first French airport to bear the label, High Environmental Quality (HEQ). The energy consumption per passenger (energy consumption necessary for the operation of the airport related to the number of passengers) will be three times less than for the Nantes-Atlantique airport, with low consumption buildings incorporating positive energy installations. The carbon balance sheet will be in the black throughout the project. Service vehicles will be fitted with clean engines.

Controlling aircraft taxiing time at large airports is one of the levers for the reduction of gaseous emissions.

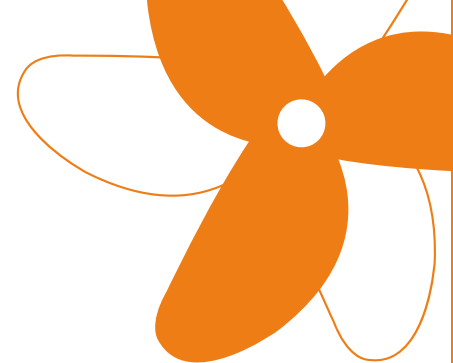
SUSTAINABLE DEVELOPMENT

Sustainable development figures in the number of good practices of the contracting authority: in the context of calls for tender concerning the delegation of the operation of the Toulouse-Francazal and Toulon-Hyères airports, the environmental performance of the operator is one of the selection criteria for candidates.

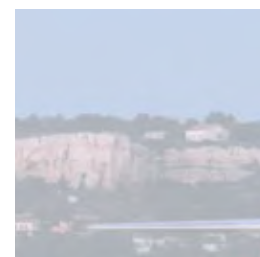


REDUCING THE IMPACT OF NUISANCES

Numerous measures for reducing noise and pollutant emissions linked to aviation were taken in 2012 such as the operating restrictions on night flights at Paris Charles-de-Gaulle airport and optimised air navigation procedures. The entry into force of the decree making the level of aid at 100% widespread also enabled a greater number of people living around airports to carry out soundproofing work.



Limiting noise sources



NEW OPERATING RESTRICTIONS

Operating restriction measures were put in place in 2012 to reduce noise pollution in several airports. Following the Grand Roissy meetings organised in 2011, **the prohibition of landing and take-off for the noisiest aircraft between 2200 and 0600 at Paris Charles-de-Gaulle came into force on 25 March 2012**. It applies to aircraft for which the acoustic margin¹ is less than 8 EPNdB. **This initial measure, which concerns a thousand flights, will be followed in 2014 by a second restriction measure** which will concern aircraft with a margin of between 8 EPNdB and 10 EPNdB for the same time period, i.e. about 3000 flights.

At Marseille-Provence airport the Decree of 2 May 2012 extended the existing operating restriction measures. Since 28 October 2012 aircraft with an acoustic margin of less than 8 EPNdB are prohibited between 2200 and midnight and those with a margin lower than 10 EPNdB from midnight to 0600. Aircraft with a margin between 8 and 10 EPNdB will only be authorised

between 2200 and midnight until October 2013. After this date aircraft with a margin lower than 10 EPNdB, with a very few exceptions², will be prohibited between 2200 and 0600.

(1) cumulative margin of certified noise levels for the aircraft under consideration in comparison with the acceptable limits defined in Chapter 3.

(2) transitory period for the 2200-midnight period for certain aircraft.

SPOTLIGHT

In France the large majority of aircraft making night flights are Chapter 4 aircraft for which the requirements in terms of acoustic standards are the severest.

For the first time an accurate diagnosis of the situation of night flights at large French airports was published in 2012 following the work carried out by a working group under the aegis of ACNUSA and in which the DGAC participated.



THE NECESSITY OF A BALANCED APPROACH

The “balanced approach” concept was developed by the ICAO in 2001. The balanced approach, translated into Directive 2002-30 of the European Parliament and Council of 26 March 2002 legislates that operating restrictions are only put in place as a last resort, after having examined measures of noise reduction at source, the tools for limiting urban development around airports and the improvement of air navigation procedures. The Directive is currently being revised. France, following the example of almost all the other Member States, defends the principle of the right of each State to define its own policy in terms of operating restrictions. In fact, only the States are able to decide whether they wish to favour economic development linked to air traffic or, conversely, to favour limiting pollution depending on local characteristics. In France Directive 2002-30 applies to the seven largest airports.



PREVENTION OF NOISE IN THE ENVIRONMENT

A figure

Between 4 and 11%

Depending on the airports, this is the proportion of flights taking place between 2200 and 0600. The share of these night flights has remained stable between 2000 and 2009.

(Source, Night flight working group 2012).

The European Directive 2002/49/EC dated 25 June 2002 transposed into French Law has made the production of noise maps and Noise Prevention Plans in the Environment (PPBE) compulsory, particularly for large airports (more than 50,000 movements/year). **The respective objectives of the noise maps and the PPBEs are to assess noise exposure globally and to prevent the effects of noise linked to air traffic by reducing noise levels if necessary.**

The PPBE for Orly airport has been incorporated into the noise exposure plan (PEB) which was submitted to a public enquiry in the first quarter of 2012.

The PPBE for Paris-CDG airport will be submitted for consultation at the beginning of 2013 and the PPBE for Le Bourget airport is being drawn up.

LIGHTER AVIATION

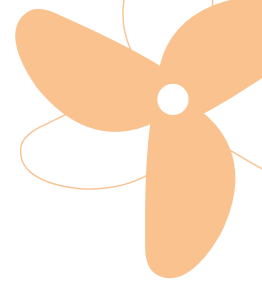
Leisure aviation also contributes to noise reduction. Within the context of aid to light aviation, promotion allowances are paid to flying clubs which undertake actions to reduce the noise from the aircraft they operate. Falling within this context are the installation of exhaust sound proofers or three-blade propellers for flying school aircraft or, for gliding, the installation of take-off winches which enable the number of towing aircraft movements to be reduced. **So in 2012 about €95,000 were paid to authorised flying clubs which have made efforts to install this equipment and which try to encourage the incorporation of light aviation activities within their environment.**

The pilots themselves are made aware of environmental questions. So the DSAC/IRs encourage communication between users and local residents when complaints arise, with the aim of identifying the most suitable solutions (modification of circuits either in height or laterally, identification of sensitive areas, etc.). This communication may be made formal by an environmental charter. In the last few years the trend has been towards creating flash cards (A0 format for example) which are made available in flight preparation rooms in flying clubs and presented to instructors so that their pupils are made aware of the subject. Using clearly identified ground markers and simple, accurate instructions it is possible to influence behaviour.



SPOTLIGHT

Nearly a quarter of the 500 airfields that can accommodate light aviation encounter noise pollution problems. These are pollution due mainly to the noise emitted by aircraft during circuits of the airfield.



Optimising air navigation procedures



THE DEVELOPMENT OF CONTINUOUS DESCENT APPROACHES

Experiments on and development of continuous descent approaches is one of the major strategies in the DGAC policy in terms of reducing noise pollution and gaseous emissions from aviation.

These procedures make it possible to avoid variations in engine speed by removing the level flight phases from the start of the descent until the runway is reached.

In 2012 the DSNA continued its work for the definition and publication of continuous descent approaches. A permanent briefing circular has been published in order to facilitate the implementation of the new continuous descent approach procedures.

After procedures of this type were implemented at some airports, such as Strasbourg-Entzheim and Paris-Orly, several other continuous descent approaches underwent experimentation and evaluation in 2012, particularly at the airports of Bordeaux-Mérignac, Marseille-Provence, Paris Charles-de-Gaulle, Toulouse-Bagnac and Lyon Saint-Exupéry.

MORE DIRECT AIR ROUTES

Within the context of its gaseous emissions reduction policy, the DSNA is taking part in projects aimed at optimising FABEC (Functional Airspace Block European Central) airspace. In particular in 2012 the DSNA continued its work within the “City Pairs” working group, the aim of which is to enable airlines to plan direct routes between certain European cities. This work is now being continued by Eurocontrol, the European organisation for air navigation safety.

The DSNA is also taking part in the “Free Route” project, the aim of which is to enable airlines to use direct flight paths between two defined points in the upper airspace and over time to move away from the network of predefined routes. At this stage the DSNA has created 15 direct routes.

The policy of controlling environmental nuisances involves favouring the reduction of noise pollution below 6,000 feet and encouraging the reduction of gaseous emissions above this altitude.

SPOTLIGHT

The evaluations conducted at Paris-Orly airport have shown that continuous descent approach procedures enabled a Boeing B-747 to save 370 kg of kerosene and reduce its CO₂ emissions by 1100 kg.



NIGHT TIME ROUTES TO REDUCE CO₂ EMISSIONS

The DGAC is committed to the project for developing a network of night time routes within FABEC. These night time routes are used from 2200 to 0500 and at weekends. Due to the low density of air traffic during night hours, the airlines are freed from certain restrictions, particularly bypassing military areas, and are able to plan direct routes. In this way airlines can reduce the amount of fuel planned for their flight.

Work on the night time route network will now continue within the “Free Route” working group.

IMPROVING FLIGHT PROFILES

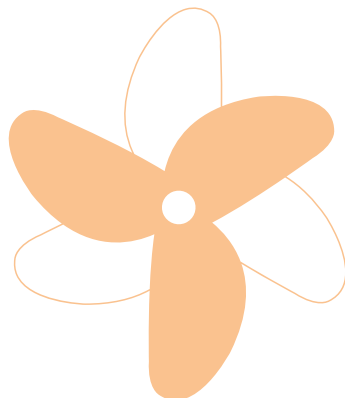
The Interface Brest Bordeaux Paris 2012 (IBBP 2012) project is the extension into the upper airspace of the progress made in the Paris region in mid-November 2011 for the platforms of Paris Charles-de-Gaulle and Le Bourget. The first phase of the IBBP 2012 project is aimed at improving the profile of flights from the South-West to Paris Charles-de-Gaulle leading especially to a reduction in CO₂ emissions. This first phase of the project was successfully implemented in December 2012. The second phase of the project, concerning the improvement in the profiles of flights from the South-West to Paris-Orly and the Beauvais platform are being studied.

A figure

36,000 tons

This is the annual potential gain in terms of CO₂ provided by the night time route network, estimated at the end of 2012. This represents more than 10,000 tons of fuel saved.

According to an initial study by DSNA, on the scale of Metropolitan France, more than 80% of the CO₂ is emitted above 6,000 feet.



South-West regional air traffic control centre



Aiding local resident

NOISE NUISANCE PLANS

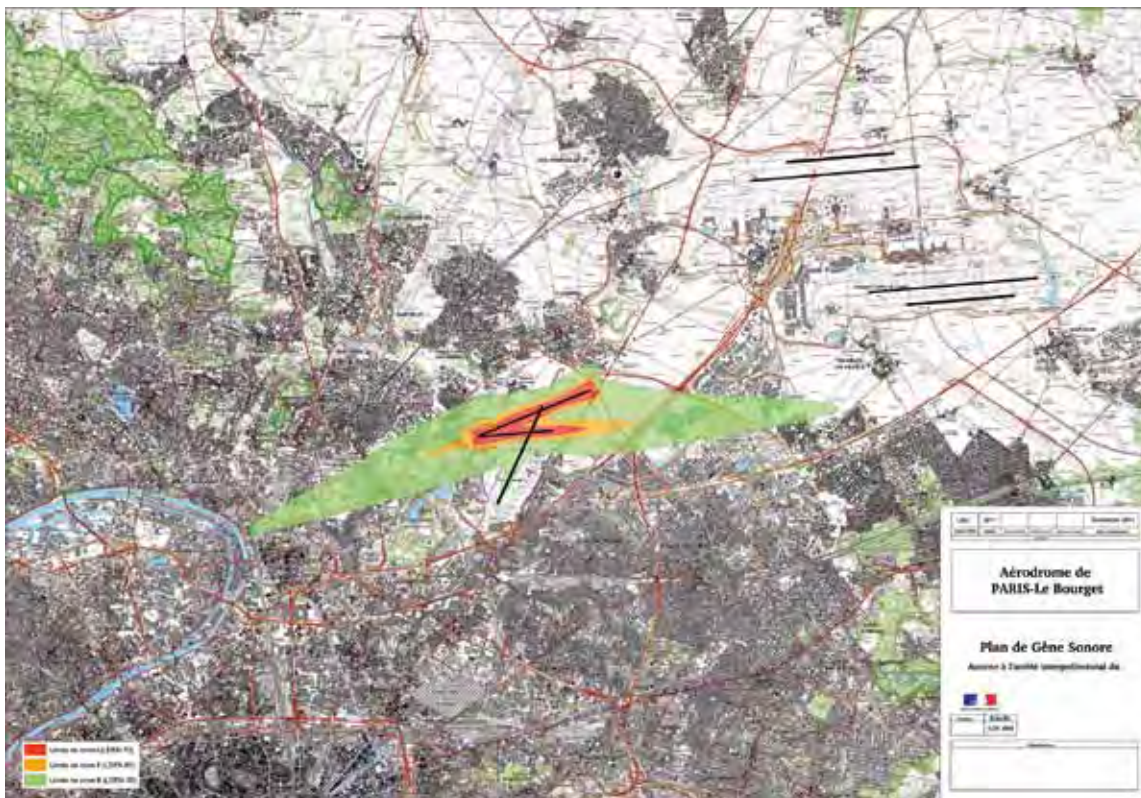
Noise nuisance plans (PGS) determine the areas eligible for financial assistance with soundproofing. Currently 12 French airports have a plan. Those for Paris Charles-de-Gaulle and Paris Orly airports are being updated by DGAC. For each of these two airports the DGAC is preparing a draft PGS. The new PGS is expected to be adopted at the end of 2013 after consultation with the communes concerned and presentation to the competent consultative commissions for the assistance of local inhabitants and ACNUSA (French Independent Monitoring Authority for Airport Pollution).

ASSISTANCE WITH SOUNDPROOFING

The number of housing units benefitting from a favourable opinion on the part of the Consultative Commissions for Subsidies to nearby Residents to carry out soundproofing work stands at 6 709 with an overall sum of 66,85 M€. **So the amount for this assistance has increased very markedly in 2012, largely due to the incentive effect of the Decree of 23 December coming into force, which made assistance at 100% widespread.**

Furthermore, at the end of 2012 5069 premises benefitted from the additional budget of €1000 per dwelling for ventilation work in apartment blocks, and 34 premises benefitted from additional assistance of €5000 for roof treatments from the exterior.

NOISE NUISANCE PLAN - PARIS-LE BOURGET AIRPORT



SPOTLIGHT

In 2012 the French Aviation Noise Inconvenience Tax (TNSA), instituted to finance assistance with soundproofing the dwellings of local inhabitants brought in €55 million.

This revenue reduced slightly compared with 2011, mainly due to the improvement in fleet acoustic performances and the reduction in the number of movements due to a better filling rate for aircraft.

These two developments play their part in fighting aviation noise pollution.

THE APU, A SOURCE OF NUISANCE

Auxiliary power units (APU) are a significant source of noise and atmospheric pollution. The measures taken in 2004, within the framework of the Protection Plan for the Atmosphere in Ile-de-France, evaluated the emissions of nitrogen oxide linked to these systems at nearly 0.5% of the total NO_x emissions in Ile-de-France. As for the noise levels attributable to APUs, they can reach up to 85 dB around the aircraft.



Acting for the local environment



At Toulouse-Blagnac airport the use of APUs is limited in compliance with the Code de Bonne Conduite Environnementale (Good Environmental Conduct Code) adopted in 2009. **At the end of 2012 out of 17 gates connected to airline terminals, 13 were equipped with 400 Hz electricity distribution systems.** All gates will be equipped by the end of 2013.

ENVIRONMENTAL MEASURES IN ECONOMIC REGULATION CONTRACTS

The large French airports have taken measures, particularly in the form of price incentives, aimed at reducing the impact of their activity on the environment. Some of these measures have been made contractual with the Government within the framework of economic regulation contracts. As such, for the period 2011-2015 Aéroports de Paris is developing an environmental policy mainly directed at the control of energy consumption, increased use of renewable energy and better management of rainwater. A budget of €39 million is devoted to strengthening this environmental policy.

In 2012 Toulouse-Blagnac airport continued the environmental actions written into its 2009-2013 economic regulation contract. In particular the airport set up a rainwater treatment plant and electrical supply systems for gates connected to airline terminals, and developed renewable energy.

LIMITING THE USE OF APUS

When aircraft are parked the APUs (auxiliary power units) are used to provide electrical power for onboard equipment, air conditioning and starting the engines.

To reduce noise nuisance and polluting emissions from APUs, measures are currently taken to limit their use or to replace them with more environmentally friendly means such as 400 Hz electricity distribution systems.

Since 28 October 2012 the use of APUs has been regulated at Charles de Gaulle, Orly and Le Bourget airports. **The use of fixed or mobile substitution equipment, when it exists, is now compulsory.**

Otherwise the periods of use of APUs are limited on arrival at and departure from the gate. The use of APUs is also regulated at Nice-Côte d'Azur airport on Parking Kilo bordering the Promenade des Anglais.

A figure

31%

This is the reduction in greenhouse gas emissions in 2011 compared with 2010 at Paris Charles-de-Gaulle, Orly and Le Bourget airports.

(Source, ADP)

SPOTLIGHT

The average consumption of de-icing and anti-icing products is constantly increasing.

It went from 184 litres in 2003-2004 to 266 litres in 2005-2006. As an example, an A320 requires between 160 and 650 litres of products during a de-icing operation. The wide variability is linked to the human and technical resources put in place locally and the weather conditions.



THE IMPACT OF ICE CLEARING AND DE-ICING PRODUCTS

The DGAC has continued its programme of studies and measurements aimed at making the operational procedures for clearing snow and ice. With this aim STAC (French Civil Aviation Technical Department) and ENAC (French National School of Civil Aviation) have cooperated with Aéroports de Paris concerning training in de-icing and ice clearing operations. This training aims to provide better understanding of the environmental and safety problems linked to winter viability operations.

DISPERSION OF ATMOSPHERIC POLLUTANTS

In 2012 STAC continued the study of software for modelling the dispersion of local pollutants at airports. Two tools were accepted for this study which is expected to continue with a comparison of the modelled results with the measured data.

The reduction of local pollutants such as nitrogen oxides and particulates is undoubtedly the major challenge for the coming years.

A figure

10%

This is the reduction in taxiing time for aircraft leaving Paris-Charles de Gaulle in 2011 compared with 2007.

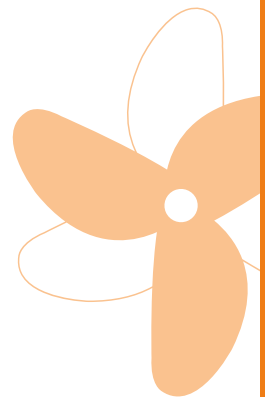
(Source, ADP)



SPOTLIGHT

AN ECOLOGICAL AIRCRAFT TRACTOR

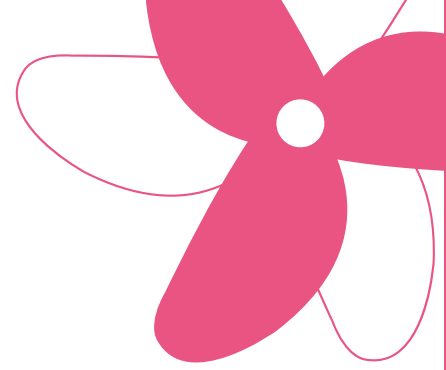
In 2012 a new type of aircraft tractor was tested at Châteauroux-Centre airport. The originality of this new type of haulage system, christened TaxiBot, is based on the potential to manoeuvre it from the cockpit without using the jet engines. The company which designed this aircraft tractor report 30 kg of CO₂ produced by the TaxiBot as opposed to 3.2 tons of CO₂ emitted during the towing phase for a B747.



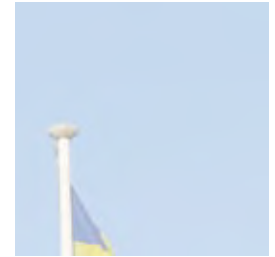
COMMUNICATING AND FULFILLING COMMITMENTS

In addition to measures taken to prevent and treat air transport nuisances, the DGAC is encouraging consultation with and giving information to the public and all players in air transport. This desire for transparency came to fruition in 2012 in many fields, such as impact studies, noise measurements or even the calculation and publication of air traffic gaseous emissions from the main French platforms.





Sustainable commitment



FABEC, A MORE ECOLOGICAL EUROPEAN SKY

Within the context of setting up FABEC (Functional Airspace Block European Central) and the objectives of the communal performance plan set for the 2012-2014 period, the DGAC and its 5 European partners calculated the average difference between the most direct route and that actually followed, and are committed to reducing this difference by 5% compared with 2011. The 2012 results show that this objective should be largely exceeded. **This measure represents a 0.2%**

reduction in aircraft flight distance, i.e. nearly 6 million kilometres travelled and 30,000 tons of kerosene less. The various FABEC air navigation service providers are also committed to bringing to at least 21 (instead of 10) the number of main airports where continuous descent approach procedures are published.

MORE HOMOGENEOUS AIRSPACE

FABEC is a functional airspace block, the purpose of which is to manage European airspace more homogeneously in order to improve air navigational performance in an area of 1.7 million km² typified by extremely dense air traffic. FABEC represents more than 5.5 million flights per year, i.e. 55% of the air traffic controlled in Europe, about 240 airports, 370 control sectors and 400 zones managed by Defence. FABEC, which brings together Germany, Belgium, France, Luxembourg, the Netherlands and Switzerland, is a major step in setting up a Single European Sky. It should make it possible to create more direct routes and reduce flight times, fuel consumption and greenhouse gas emissions.



PARIS CHARLES-DE-GAULLE SOUND ENERGY UNDER CONTROL

The Weighted Global Measured Indicator (IGMP), instituted by the Decree dated 28 January 2003, is an indicator designed to control the sound energy level emitted by air traffic at Paris Charles-de-Gaulle airport. The value of this index, calculated from data supplied in real time by a network of eight stations placed at the end of each of the four runways of the airport, should not exceed for each year the average level for 1999, 2000 and 2001.

In June 2012 the DGAC, which provides the monitoring for this indicator, presented ACNUSA with the 2011 index value. **Despite a 2.8% increase in the number of movements, the IGMP had continued to decrease compared with the previous year, reaching its lowest ever observed level: 81.4 as opposed to 82.3 in 2010 and 85.6 in 2009, compared with the value of 100 for the reference period.** This reduction is principally explained by continuous renewal of fleets.

A figure

66,000

This is the number of tons of CO₂ which could be saved each year in the context of the 2012-2014 FABEC performance plan.

Encouraging dialogue

Biarritz airport



ACTIVE MODE CONSULTATION

The Environmental Consultative Committees (CCE) were set up by the Law dated 11 July 1985 concerning town planning in the neighbourhood of airports to encourage dialogue between local residents, professionals in the aviation sector and representatives of local government. They must be consulted on all important questions relating to development or the impact of airport operation on the environment. The members of the CCE for Paris-Orly airport, renewed in 2012, were informed about the new PEB

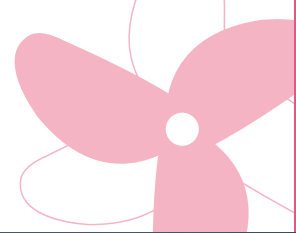
adopted in December 2012 and also about the procedure for revising the PGS then being launched.

The CCE for Paris Charles-de-Gaulle airport met twice in 2012 and gave an opinion on various air navigation devices. It was also informed about the 2011 IGMP value and the ongoing revision of the PGS.

The CCE for Paris-Le Bourget airport convened in 2012 finally met in January 2013 to issue an opinion on various air navigation procedures. It was also informed about the ongoing procedure for drawing up the PEB and the implementation of assistance for soundproofing.

DSAC (French Civil Aviation Safety Department) for the Northern region took part in eleven CCE meetings. In September 2012 the CCE for Toussus-le-Noble adopted the specifications for the performance of a study on the environmental impact of the airfield and its future. Five CCEs met in 2012 in the South-West region. These were the CCEs for Poitiers-Biard, Biarritz-Anglet-Bayonne, Bordeaux-Mérignac, La Rochelle-Ile de Ré and Arcachon-La Teste-de-Buch.

SPOTLIGHT



To monitor the development of night time traffic an observatory for "dead of night" flights has been put in place at Toulouse-Blagnac airport.

This observatory, made up of CCE members and run by the DSAC South, is responsible for drawing up the indicators and monitoring the development of traffic between midnight and 0600. This information can be accessed by CCE members on the Internet. In the context of growth in the number of movements the dead of night activity has been controlled, as shown by the 1.4% reduction in the number of movements during this period in 2012. (Source, Toulouse-Blagnac airport)



Toulouse-Blagnac airport

For the Western region the CCEs for Brest, Caen, Laval, Nantes, Rennes and Saumur met in 2012.

In the Rhône-Alpes and Auvergne regions the CCEs for eleven of the thirteen airports which have one met at least once in 2012. At Lyon-Saint-Exupéry the airport projects and other important subjects, such as traffic in the night time period, were debated during the two meetings of the CCE held during the year.

The CCE for La Réunion-Roland Garros met in May 2012 for an update on the refurbishment of the runways and the setting up of the GNSS procedure in the context of this future work. **In 2012 in total there were about fifty Environmental Consultative Committee meetings.**

DEBATE ON NIGHT FLIGHTS IN FRANCE

In the wake of work conducted in 2010 and 2011 on night flights at Paris Charles-de-Gaulle airport a working group has been set up by ACNUSA to extend this debate to national level. This working group, made up of representatives from the aeronautical professions, politicians and associations for local residents and environmental protection and with the secretarial services provided by the DGAC, met several times between September 2011 and March 2012 and held a number of hearings. The working group examined the economic, health, technical and environmental problems and drew up a report, which was published in May 2012. The diagnosis made for each of the large French platforms is a basis for future initiatives.

Contributing to transparency



NOISE MEASUREMENTS

In 2012 the DGAC conducted four campaigns for measuring noise emitted by aircraft, One campaign took place between February and April 2012 with twelve measuring stations around Paris to produce an acoustic analysis of the "altitude reading" project.

In September 2012 a measurement campaign was conducted at Merville, in Haute-Garonne, to validate the new DGAC measuring stations. At the end of 2012 two measurement campaigns were performed in Martigues, then in Miramas and Saint-Chamas, to

Work on data collection and the production of maps making it possible to see the traffic concerned is the most accurate possible response to the appeals of politicians, local residents' associations and individuals.

Strasbourg-Entzheim airport



assess the acoustic impact of the new air traffic procedure ("Vent Arrière 13" – Tail Wind13) implemented at Marseille Provence airport.

IMPACT STUDIES

Before any changes are made to air traffic procedures the DGAC performs a study to assess the consequences of the new procedure on the environment (EICA – Air Traffic Impact Study).

In 2012 the DGAC performed several impact studies, particularly for Paris Charles-de-Gaulle and Le Bourget airports following new satellite procedures.

Two impact studies were performed for Strasbourg Entzheim airport before two continuous descent approach procedures were implemented.

Impact studies were also conducted at Nevers-Fourchambault and Brive Souillac airports for new satellite procedures.

A figure

20 dB

This is the reduction in noise from aircraft over 40 years due to research and technological progress made for the engines. An aircraft with jet engines designed in the 1960s produced a noise equivalent to that of 125 Airbus A320s.

ANTICIPATION COMES FROM BETTER UNDERSTANDING

The purpose of Air Traffic Impact Studies (EICA) is to anticipate the development of a situation at an airport by gathering all the information that will make it possible to measure and understand the environmental impact of a change in procedure. The comparisons made in these impact studies concern firstly the population being overflown before and after the new procedures have been put in place, and secondly the population concerned by a given noise level (measurement of the acoustic situation, aircraft noise levels, estimation of sound levels, etc.).

INFORMATION ON FLIGHT PATHS AND AIRCRAFT NOISE

Within the scope of its actions aimed at making public access to information on the environmental impact of air traffic easier, the DGAC is participating in the deployment of the Vitrail flight path display system in the Ile-de-France communes which request it. This software, designed in 2005 by Aéroports de Paris, enables the public to have detailed information on overflight conditions (aircraft type, altitude, noise level) in almost real time for aircraft arriving and departing from Paris Charles-de-Gaulle, Orly and Le Bourget airports.

In 2012 two new regional authorities were equipped with the **Vitrail system**. **In total twenty-four communes in Ile-de-France, and the Maisons de l'Environnement et du Développement Durable (Environment and Sustainable Development Offices) for Paris Charles-de-Gaulle and Orly, currently have this tool.**

Since 2011 an interactive tool for the display of typical days has been available for consultation on the Internet⁽¹⁾. It gives accurate information on traffic flows for these days with heavy traffic during which normal air traffic procedures are used.

(1) <http://www.developpement-durable.gouv.fr>, Headings "Local Residents near Paris Airports"

LEARNING ABOUT AIRCRAFT NOISE

VisioBruit, developed by the DGAC, is educational computer software which enables the general public to gain a basic idea about acoustics and to find out how the various indices used to represent air traffic are measured and calculated. This tool, which is installed





MAISONS DE L'ENVIRONNEMENT FOR PARIS AIRPORTS

The Maisons de l'Environnement et du Développement Durable (MEDD - Environment and Sustainable Development Offices) are offices for exhibitions, documentation and information. Those at Paris Charles-de-Gaulle and Paris-Orly were created in the middle of the 1990s by Aéroports de Paris to develop dialogue and understanding between local residents and players in air transport. In the middle of the 1990s by As Charles-de-Gaulle and Paris-Orly were created technological progress tool. air traffic easier, the Twice a week the DGAC invites former air traffic controllers to explain to visitors how air traffic operates in Ile-de-France and what the DGAC is doing to reduce the environmental impact of aviation.

in the Maison de l'Environnement at Paris Charles-de-Gaulle airport, also enables the noise produced by an aircraft to be compared with other noises with the same intensity.

In 2012 VisioBruit was adapted so that its use is more independent and interactive.

CO₂ EMISSIONS UNDER OBSERVATION

For several years the DGAC has calculated the CO₂ emissions attributable to commercial aviation in France. **The 2012 version of the study shows that internal French air transport produces 1.3% of CO₂ emissions in France, a figure which rises to 6% if the emissions due to international traffic are included.** Between 1990 and 2011 the number of passenger-kilometres increased by 154%. At the same time CO₂ emissions only increased by 65%.

As a result of regular improvements in the energy efficiency of air transport CO₂ emissions per passenger-freight-kilometre have decreased by 29% since 1990.

The work carried out by the DGAC to quantify CO₂ emissions has made it possible to develop a tool which enables the passenger to know about the emissions linked to his/her flight. This CO₂ calculator is available on the DGAC website⁽¹⁾.

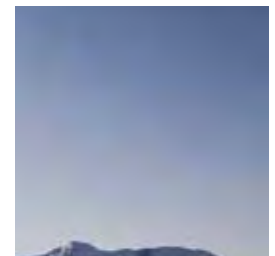
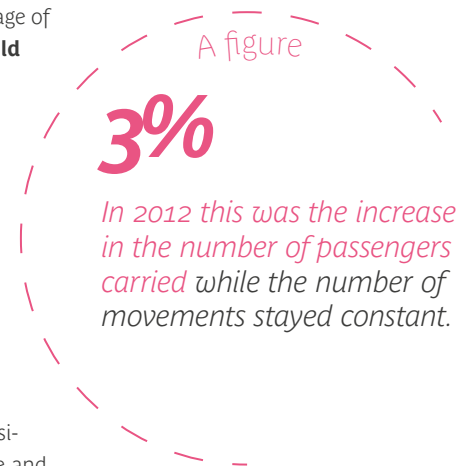
(1) <http://eco-calculateur.aviation-civile.gouv.fr/>

A NECESSARY, BUT MANAGED UPSWING

Just as it has every year since 2006, in 2012 the DGAC commissioned a survey on the image of civil aviation⁽¹⁾. **In the environmental field people questioned considered that the release of CO₂, which contributes to the greenhouse effect, is the most important nuisance factor.** 43% considered CO₂ emissions to be the principal nuisance attributable to air transport as opposed to 32% in 2011. A distinct change compared with previous surveys which placed noise as the principal nuisance factor attributable to aviation.

Seven out of ten people questioned considered that air transport caused nuisance and pollution. However, this figure has decreased in the last three years. At the same time, 85% of people questioned considered air transport should continue to develop but be managed at the same time. 70% were of this opinion in 2011.

(1) Survey carried out from 15 to 27 November 2012 with a sample of 1046 people. The complete results may be consulted on the Internet: <http://www.developpement-durable.gouv.fr/Enquete-sur-l-image-de-l-Aviation>



PREPARING THE FUTURE

One of DGAC's concerns is participating in work aimed at building the aircraft of the future, which will be cleaner, quieter, with greater fuel economy or even operating on alternative energy sources. So in 2012 the DGAC participated in the work of CORAC, supported by industrialists who offer future technological breakthroughs and have acted to encourage the emergence of new fuels. Generally it is heavily involved in European research.

Participation in the work of CORAC



In 2012, alongside the aeronautical industry and all the players in air transport, the DGAC participated in the work of French Council for Civil Aeronautical Research (CORAC). CORAC, created in 2008, has taken on the European objectives of a 50% reduction in CO₂ emissions for air transport, 80% of nitrogen oxide emissions and 50% of perceived noise by 2020 in comparison with 2000.

In 2010 CORAC drew up a technological demonstrator programme. A technological demonstrator is an experimental device which enables new technologies to be validated in real conditions of use. The DGAC financed four technological demonstrators developed by CORAC, particularly the EPICE (propulsion system integrated with composites for the environment) demonstrator for the advanced propulsion system and the system for the future composite aircraft. Work on these two demonstrators is the most advanced. The two other demonstrators concern the more electric aircraft (an aircraft which uses more electrical energy by replacing hydraulic and pneumatic energy) and modular avionics, the purpose of which is to validate the principle of a new generation of onboard IT.

In 2012 the DGAC also financed and participated in the varied work of the Réseau thématique aéronautique et environnement (Aeronautical and Environmental Concept Network) launched

in 2010 within the framework of CORAC. After the series of three initial projects on the impact of condensation trails on climate, the DGAC allowed the IMPACT project to be launched in 2012. The purpose of this project is to model the impact of the emissions of different aircraft on climate change. At the same time the DGAC took part in the work of the Aeronautical and Environmental Concept Network on air quality. This work made it possible to provide a report on the scientific studies necessary in this field and to suggest the main guidelines for a future research policy. Work also started in the field of the acoustic impact of aviation.

France, faced with the challenges of competitiveness for the industry and the sustainable development of air transport, has increased its support for aeronautical research to unparalleled levels.

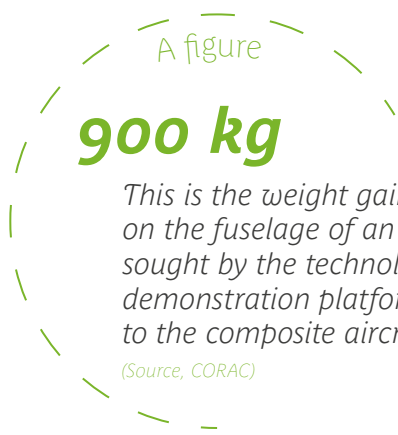
EXAMINING THE IMPACT OF AVIATION ON LOCAL AIR

The first work carried out by the group from the Réseau thématique aéronautique et environnement on local air quality has highlighted the necessity of directing efforts to pollutants, the concentrations of which verge on the regulatory thresholds or which are likely to exceed them, as a matter of priority. These are essentially nitrogen dioxide (NO₂), volatile organic compounds (VOC) and fine particles (PM₁₀ and PM_{2.5}). The group proposed three projects to make progress in this field: setting up measurement campaigns, the application of simulation models to measure the impact of these emissions and the evaluation of the influence of technologies and operational procedures on the local and regional air quality.



Condensation trails form when an aircraft finds itself in a sufficiently cold, damp atmosphere. They can progressively take on the appearance of cirrus cloud.

According to some studies the altitudes most used by aviation (30,000 to 36,000 feet) are also the most conducive to the formation of these condensation trails, and their consequences on the climate could, in some conditions, be as significant as that of the CO₂ emissions due to aviation. (Source: CORAC)



The policy of support for industrial partners

SPOT LIGHT

In the aeronautical sector, it is estimated that a new generation of aircraft is developed every 10 years and that a breakthrough technology appears every 20 years.

(Source: CORAC)

The research programmes supported by the DGAC in 2012 covered all fields, with particular stress placed on future generations of cockpits. In particular, the technologies studied in this field should make it possible to adapt cockpits to future air traffic systems and reduce the environmental impacts of aviation over time. This work completes the research devoted to new aircraft architecture, innovative structures and materials. In the propulsion field, the purpose of the research is to prepare technological breakthroughs designed to reduce engine weight in particular, or propulsion formulas such as the open rotor, a concept of a propfan which could provide fuel consumption savings in the order of 25%.



SOLAR IMPULSE THE AIRCRAFT WITHOUT FUEL

On 24 July 2012 the aircraft, Solar Impulse, took off from Toulouse-Francazal airport for Switzerland on the final leg of a 6000 km journey over four countries and two continents. The particular characteristic of this aircraft, the size of which is equivalent to that of an Airbus A340 with a weight approximately that of a large saloon car, is its solar energy propulsion system. The 12,000 monocrystalline silicone solar cells powering four 10 HP electric motors have, in fact, made it possible to cover this distance at an average speed of 70 km/hour without any pollution.

If the technologies used as an experiment in Solar Impulse were adapted to general aviation, they could, nonetheless, result in inventions that can be applied to commercial aviation.

(Source, solarimpulse.com)



In 2012 the DGAC also provided support for energy optimisation projects as in the case of the more electric aircraft. Ongoing projects concern, in particular, the development of new battery techniques, such as engines powered by fuel cells.

In 2012 the DGAC supported research into electric propulsion within the framework of the project of an aircraft with an E-Fan electrical drive.



AVIATION BIOFUELS CONSIDERABLE CONSTRAINTS

Biofuels for aviation must meet numerous requirements. In fact, adherence to environmental and socio-economic criteria of sustainable development means turning towards sectors that are not in competition with food resources. **These fuels must be able to withstand significant temperature and pressure variations without degradation, have an energy density as high as that of kerosene, be compatible with all drive mechanisms and have a satisfactory environmental balance sheet.** So as not to disrupt agri-food industry equilibria, the future of aviation biofuels will rely on multiple local businesses for biomass production.

(Source: <http://www.developpement-durable.gouv.fr/Les-carburants-alternatifs.html> + IFP-EN)

Preparing for the emergence of alternative fuels

In 2012 the DGAC continued to support the emergence of alternative fuels making it possible to reduce CO₂ emissions. In particular it provides the management of the initiative for future aviation fuels (Ini-FCA) which brings together the French players in air transport, the aeronautical industry, energy and agriculture. The main aim of this cycle of meetings, started in 2007, is to identify and programme research requirements in this field for the coming years. The FCA initiative works on the technological, economic and environmental aspects necessary for the launch of significant production of sustainable biofuels for aviation. It involves determining the most interesting and most suitable sectors for France, which could be biofuels from the processing of sugar or oilseed plants. This work falls within the framework of the European road map, "Biofuel Flight Path 2020", the aim of which is to produce two million tons of aviation biofuel by 2020.

In 2012 the DGAC also financed the CAER (Alternative Fuels for the Aeronautics Sector) research programme sponsored by IFP-Energies Nouvelles. This 4-year programme should make it possible to select the fuels most suitable for aviation and perform an overall analysis of the impacts from production to use.

A figure
260 millions

In tons this is the worldwide consumption of Jet Fuel in 2012, i.e. about 6% of fuels.

(Source, IFP-EN)

Heavy implication in European research

In 2012, with the French aviation players the DGAC played a large part in drawing up a new strategic research and innovation agenda (SRIA) for European aviation, made public in September 2012 by ACARE (Advisory Council for Aeronautics Research in Europe). The new ACARE agenda set the objectives for European aviation for 2050: a 75% reduction⁽¹⁾ in CO₂ emissions, 90% for nitrogen oxides and 65% for aircraft noise, in comparison with 2000.

The DGAC is taking part in the preparation and implementation of research activities through the deployment of the 7th Programme cadre européen de recherche et développement technologique (PCRDT – European Framework Programme for Research and Technological Development) for the period 2007-2013. In 2012 the 5th call for proposals for this PCRDT made it possible to launch significant research projects, particularly in the field of engine performance, such as HAIC (High Altitude Ice Crystals) and E-BREAK (Engine Breakthrough Components and Sub-Systems). These objectives are part of the ACARE environmental objectives.

The DGAC and French aviation players have supported

the Clean Sky technological initiative from the start. The objectives of this programme, started in 2008 within the framework of the 7th PCRDT, are the demonstration and validation of breakthrough technologies necessary for making progress in the environmental field. With a budget of €1.6 billion over seven years, the Clean Sky initiative now brings together nearly 500 partners.

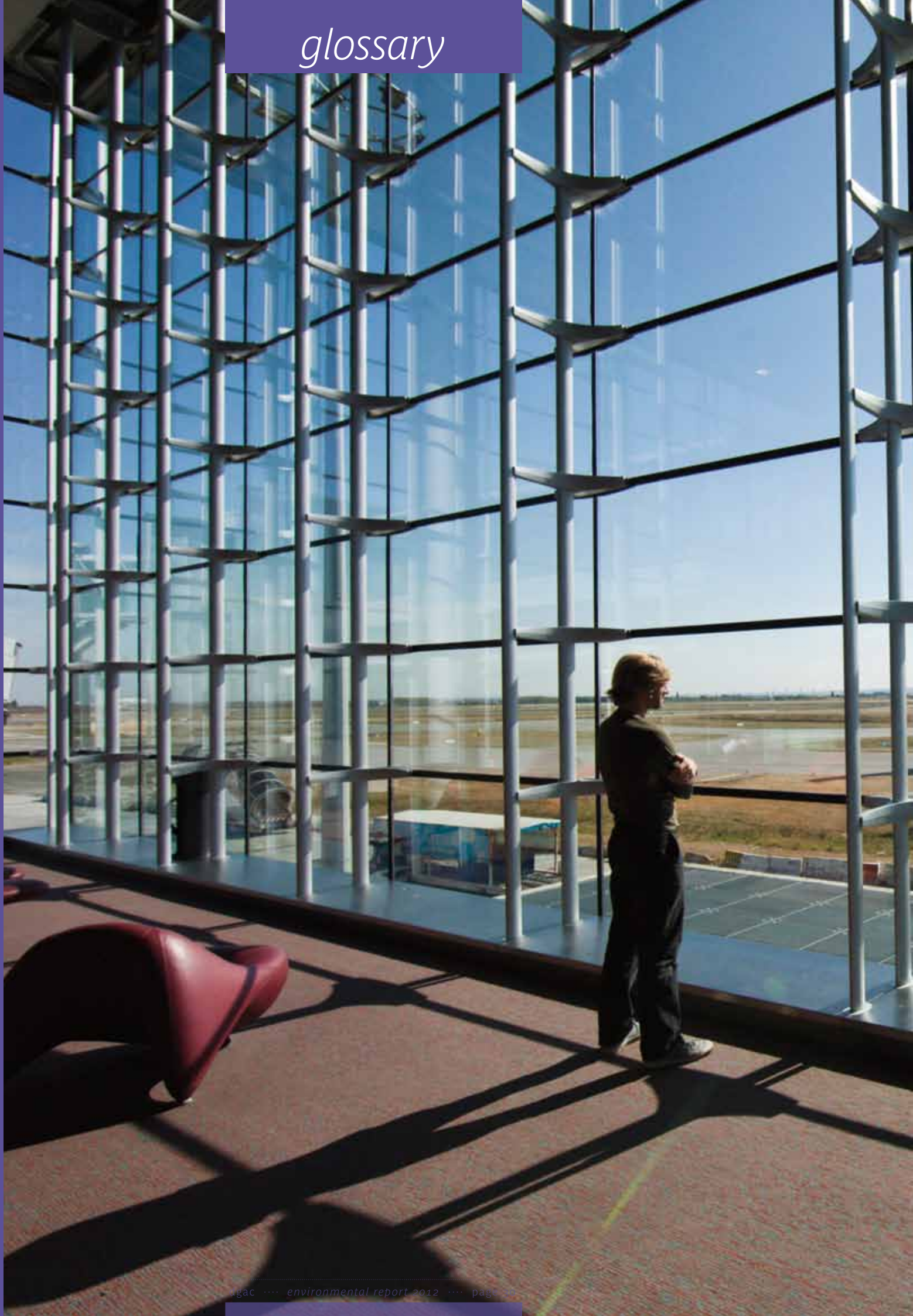
(1) Unit reductions per passenger/kilometre.

SPOTLIGHT

The helicopter turbine engine demonstrator, "SAGE 5 – Turboshaft Engine", is one of the first large-scale Clean Sky technological demonstrators produced in 2012. The tests programmed for 2013 should show a CO₂ saving in the order of 15% for future helicopter engines.



glossary



A

ACARE: Advisory Council for Aeronautics Research in Europe

ACNUSA: French Independent Monitoring Authority for Airport Pollution

AESA: European Aviation Safety Agency

APU: Auxiliary Power Unit

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

CCE: Environmental Consultative Committee

CO₂: carbon dioxide

CORAC: Council for Civil Aeronautical Research

D

DGAC: French Civil Aviation Authority

DSAC/IR: French Civil Inter-regional Aviation Safety Department

DSNA: French department of air navigation services

E

E-BREAK: Engine Breakthrough components and subsystems - Research project in the field of engine performance

E-FAN: Aircraft electrical propulsion project

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

FABEC: Functional Airspace Block European Central

G

GNSS: Global Navigation Satellite System

H

HAIC: High Altitude Ice Crystals - Research project in the field of engine performance

HGCC: High-level Group on Climate Change

I

IBBP: Interface Brest Bordeaux Paris Projects

ICAO: International Civil Aviation Organisation

IGMP: Weighted Global Measured Indicator

Ini-FCFA: Initiative on future aviation fuels

L

Lden: Level day evening night

M

MEDD: Environment and Sustainable Development Offices

N

NO₂: Nitrogen dioxide

NoisedB: International reference for the study of the development of aircraft acoustic performance

NO_x: Nitrogen oxide

P

PCRDT: European Framework Project for Technological Research and Development

PEB: French abbreviation for Noise Exposure Plan

PGS: French abbreviation for Noise Nuisance Plan

PPBE: French abbreviation for Noise Prevention Plan in the Environment

S

SRIA: European Strategic Research and Innovation Agenda for Aviation

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


TaxiBot: A new ecological aircraft tractor

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

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A large, stylized graphic of two overlapping leaves. The leaf in the foreground is a light purple color with white veins, while the one behind it is a light green color with white veins. The leaves are positioned in the lower-left quadrant of the page.

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