



# 2013

Environmental Report







## ***International mobilisation for the environment in 2013***

***2013 will remain a remarkable vintage in terms of international decisions on reducing the environmental footprint of aviation. In October 2013 the 38<sup>th</sup> Session of the International Civil Aviation Organisation (ICAO) Assembly adopted several resolutions to accelerate the reduction of the environmental impacts of aviation in future years.***

The race against climate change was at the heart of the ICAO Assembly's considerations. Delegations agreed unanimously to define a "market-based measure" by 2016 for worldwide application (such as a carbon exchange system). This will be submitted for adoption at the next Assembly, to come into force in 2020. Amongst the various options for reducing CO<sub>2</sub> emissions market-based measures have two basic advantages: they reduce emissions as soon as they are put into operation and at the lowest cost.

In terms of noise, a new aircraft noise standard (known as "Chapter 14") was adopted. From 2017 it will represent a gain of 7 decibels compared with the so-called Chapter 4 standard now in force.

Additionally in France new operating restrictions were put in place at airports where these were relevant. Furthermore, revision of noise nuisance plans (PGS) around Paris-Charles de Gaulle and Paris-Orly (they determine the areas where financial aid for soundproofing of dwellings is authorised) meet a concern about equity between local populations.

2013 also marked a turning point in the mobilisation of aviation for reducing atmospheric pollution. ICAO adopted a road map which should lead to a standard

concerning particle emissions from aircraft engines in addition to those already in force for other pollutants. In France a new body of concrete measures has been put in place to reduce locally pollutant emissions, NO<sub>x</sub> and particles amongst others.

Decisions taken at international level form the basis for mitigation of environmental impacts in France. As an illustration, the global standards for aircraft manufacturing affect all players uniformly and apply to all airports, in France and throughout the world. They reduce nuisances around our airports without reducing competitiveness in French aeronautical activities. For this reason the DGAC makes as big a contribution as possible to establishing these international decisions.

Environmental protection and competitiveness in national aeronautical activities must guide the environmental policy of the French Civil Aviation Authority.

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



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# THE KEY EVENTS OF 2013







## An important year for the climate

- On 24 April 2013 the European Union established a moratorium concerning CO<sub>2</sub> emissions from extra-European flights. This is the “Stop the clock” decision which exempts all flights between European Economic Area and third countries from the European ETS tool for 2012.
- The 38<sup>th</sup> Session of the ICAO

Assembly, which was held from 24 September to 4 October 2013, gave the green light to the establishment of a global system of market-based measures (such as the European ETS), with a view to limiting emissions due to civil aviation at their 2020 level. At the same time it imposes strict control of the European ETS by imposing prior agreement from third party countries concerned.

- Since the end of 2013 work has been carried out in the European Commission to adapt the European system to the conclusions of the ICAO resolution. On April 2014, the scope of European system was modified by a regulation: until 2016 the European ETS applies only to flights between two airports in the European Economic Area (overseas territories are excluded).



## Even quieter aircraft

- At the 38<sup>th</sup> Session of the ICAO Assembly a new standard, known as Chapter 14, reducing the regulatory limit currently in force by 7 decibels for the quietest aircraft (so-called Chapter 4) was adopted. It will apply to aircraft of 55 tons or more from 2017 and to others in 2020.



## Air quality under surveillance

- On 6 February 2013 the Inter-ministerial Committee for Air Quality drew up an air quality emergency plan (PUQA). It has concrete, sustainable solutions for improving air quality, especially

in the transport field. For air transport one of the measures in the air quality emergency plan is to restrict the use of auxiliary power units (APU) on airport platforms. It was also proposed to study modulation of landing fees as a function of the emissions of local pollutants from aircraft.



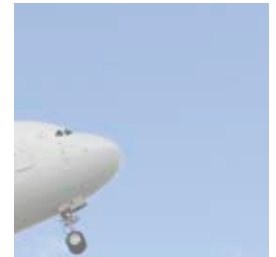
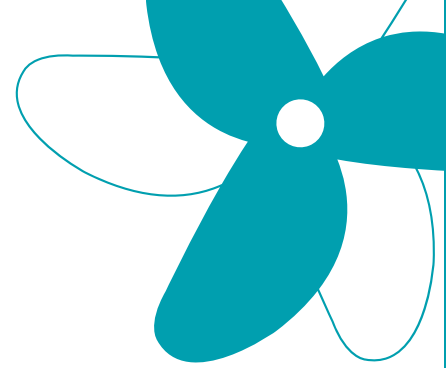
## A second wind for European research

- On 3 December 2013 “Horizon 2020”, the new European Union programme for financing research and innovation, was adopted. It is planned to last for 7 years from 2014 and succeeds the 7<sup>th</sup> framework technological research and development programme.

- 2013 also saw the completion of preparatory work intended to allow Clean Sky 2 to take off. The second phase of this European research programme uniting private and public partners starts in 2014. This initiative has been supported from the start by the DGAC. Its objective from now until 2020 is to validate technologies capable of increasing the output of aviation fuel in order to reduce CO<sub>2</sub> and NO<sub>x</sub> emissions and sound emissions by 20 to 30% in relation to the state-of-the-art for aircraft now entering service.

# INTERNATIONAL ACTIONS

*The agreement obtained by the ICAO at the end of the 2013 with a view to establishing a global market-based measures mechanism represents significant progress in reducing CO<sub>2</sub> emissions in international aviation. 2013 has also seen notable progress in noise pollution control and in terms of local air quality.*



## Sustainable aviation takes off at ICAO

The main challenge at the 38<sup>th</sup> Session of the Assembly of the ICAO (International Civil Aviation Organisation), which was held from 24 September to 4 October 2013, was the protection of the environment. This has been reinforced by the adoption of a series of important measures. In the field of noise pollution control the Assembly adopted a new standard reducing the regulatory limit of the standard known as “Chapter 4”, which is currently applicable, by 7 decibels. This measure will come into force from 31 December 2017 for all new types of aircraft of 55 tons and over, and from 31 December 2020 for those of less than 55 tons. As far as local air quality is concerned, the 38<sup>th</sup> session of the Assembly validated the road map designed to establish a standard limiting aircraft particle emissions by 2016.

Within the context of combating climate change, the Assembly has validated an indicator and a measurement procedure which will make it possible to establish a standard aimed at limiting aircraft CO<sub>2</sub> emissions from 2016 onwards. Furthermore, a road map has been adopted for deciding, in 2016, on a global market-based measure mechanism (MBM) to come into force in 2020. This result concerning MBMs was obtained due, in particular, to the support of International Air Transport Association (IATA).

●  
*For the ICAO the objective is to stabilise global carbon emissions from international aviation at the level achieved in 2020.*

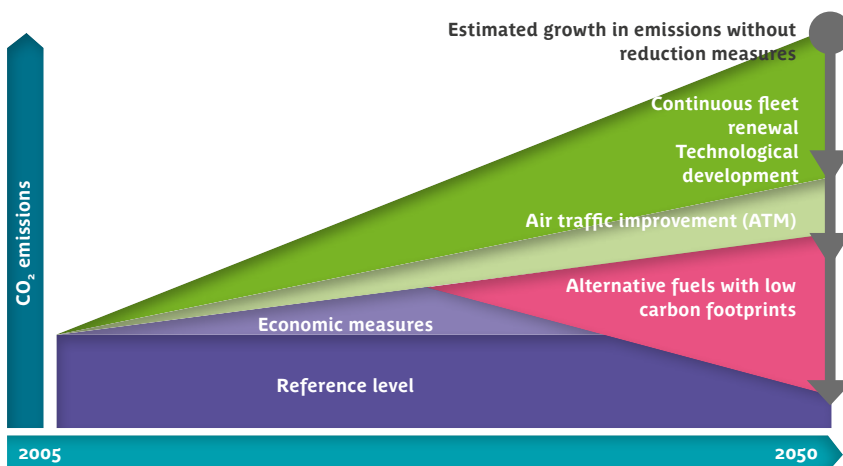




## Moving towards a global market-based measures system (MBM)

As well as technical and operational measures, market-based measures (MBM) help to reduce greenhouse gas emissions. At the 38<sup>th</sup> session of the ICAO Assembly the international community gave the green light to the setting up of a globally market-based measure mechanism (MBM). This “historic” agreement opens the way to the construction of a global regulation system by 2016. The preparatory work will be carried out jointly by an environmental advisory group, the CAEP and regional workshops. In the wake of this work the global MBM tool should come into force from 2020. With this agreement the aeronautical sector will, therefore, become the first large sector in the industry to commit itself to setting up a global system for the regulation of CO<sub>2</sub> emissions.

### KEY FACTORS IN THE REDUCTION OF CO<sub>2</sub> EMISSIONS



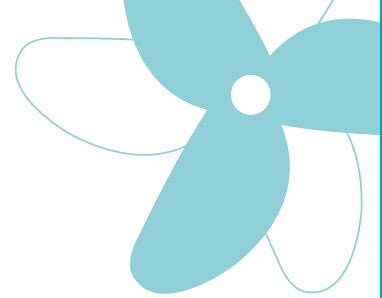
Contribution of the various measures for the reduction of CO<sub>2</sub> emissions from international aviation. (Source IATA)

## INDISPENSABLE MBMs

For the fight against greenhouse gases the ICAO has set itself an ambitious objective: maintaining global emissions of CO<sub>2</sub> from aviation at the same level from 2020 onwards. Given that the air sector is growing by 5% a year on average and the natural improvement in energy efficiency is about 2% a year, it is obvious that limiting carbon emissions from 2020 will require putting in place new additional measures within the context of a “basket of measures”. This set of measures includes market-based measures (such as exchange systems for emission rights, CO<sub>2</sub> emission compensation, or taxes),

the development of biofuels and technological measures such as the development of an aircraft CO<sub>2</sub> emission standard, and the improvement of air traffic control procedures. The MBMs are an essential lever, even more so as the technological measures and the development of aeronautical biofuels will only produce their effects over the long term.





## FRANCE IN FORCE AT THE ICAO

*The main purpose of the ICAO Assembly is to set the working programme for the next three years. 191 states were present.*

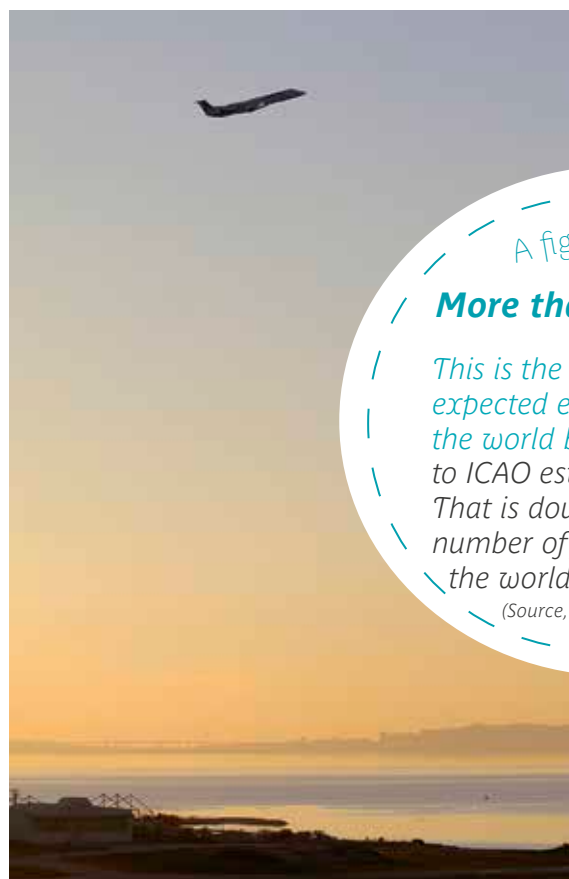
*During the 38<sup>th</sup> session of the Assembly, the French delegation worked on each of the major subjects deliberated. These were safety, security, the environment, air traffic control, and even passenger facilitation and rights. As our position regarding the bases of the proposals submitted to the Assembly was defined at European level, France took part in various preparatory working groups to validate the European positions. In addition a Frenchman was entrusted with the Chairmanship of the 38<sup>th</sup> session of the Assembly. Since December 2013 a Frenchman has also chaired the Air Navigation Commission, the main technical body of the ICAO.*

## The strictly managed European ETS system

In 2013 the European system for exchanging CO<sub>2</sub> emission quotas, ETS (Emission Trading Scheme) underwent several major developments. This system, which plans for all airlines to acquire and return quotas to compensate for the emissions of their flights arriving at and departing from European airports, was the subject of a so-called "Stop the Clock" European decision on 24 April 2013. Taking into account challenges from some countries the European Union decided to suspend the application of the ETS on flights for which arrival or departure takes place outside European territory. This decision was taken to facilitate international negotiations within the scope of the ICAO.

At the 38<sup>th</sup> session of the ICAO Assembly a resolution was taken to supervise strictly the European tool for the exchange of CO<sub>2</sub> emission quotas, by imposing a principle of mutual consent for third-party states with airlines that may be concerned. The resolution also provided for a clause exempting developing countries. Subsequent to this decision, the European Commission presented a proposal for a directive aimed at amending the directive in force and only applying the ETS obligations to the portions of flights above European air space from 1<sup>st</sup> January 2014. The Member States, including France, called for this proposal to be more in keeping with the spirit of the ICAO resolution, so as to facilitate negotiations for the definition and application of a global market-based measures mechanism from 2020.

The regulation modifying the European Directive scope was adopted on 14 April 2014. Until 31 December 2016 flights, other than those between two European Economic Area airports, are exempt from ETS obligations. Flights between Metropolitan France and French Overseas Territories are also exempt until 2016.



A figure

**More than 50 million**

*This is the number of flights expected each year throughout the world by 2030, according to ICAO estimations. That is double the current number of flights throughout the world.*

(Source, ICAO)

## IT'S GETTING WARMER!



According to the IPCC (Intergovernmental Panel on Climate Change) experts, the last three decades have been the hottest since 1850. At the end of the 21<sup>st</sup> Century the average temperature of the surface of the globe will be 1.5°C higher

than in the period between 1850 and 1900. From now on it is "extremely likely" that climate change is due greenhouse gases of anthropogenic origin. CO<sub>2</sub> emissions from aviation only represent about 2.5% of global greenhouse gas emissions. However this proportion could double by 2025 due to the strong growth in air transport.

(Source, IPCC)



## ASBUS AT THE SERVICE OF SUSTAINABLE AVIATION

The Aviation System Block Upgrades or ASBU programme was launched by the ICAO to put in place a "single tenant air space" by developing air traffic control system interoperability and the harmonisation of procedures and human performance. One of the aims of this programme stretching over fifteen years (four blocks from Block No.0 in 2013 to Block No. 3 by 2028) is to eliminate the obstacles to future environmental gains at a reasonable cost.

## The CAEP is on the front line fighting environmental pollution

The CAEP (Committee on Aviation Environmental Protection) has 23 member countries including France and, amongst others, is responsible on behalf of the ICAO Assembly for drawing up measures making it possible to reduce noise pollution and aircraft engine emissions. A dozen French experts take part in CAEP working groups.

In 2013 the DGAC (French Civil Aviation Authority) experts took part in a CAEP working group which made it possible to draw up the new noise standard reducing the authorised noise level by 7 decibels in comparison with the Chapter 4 standard which is currently in force. They have also worked on drawing up a standard limiting the noise from future supersonic aircraft. Drafting an international acoustic standard requires in-depth knowledge of the research and development of technologies designed to reduce noise pollution. During the 2013-2016 triennial cycle the CAEP continued the collection and monitoring of national and international research programmes.

In the field of air quality the work concerned the development of a standard limiting fine particle emissions into the atmosphere.

In terms of fighting climate change the CAEP is finalising a draft standard limiting CO<sub>2</sub> emissions from aircraft. Furthermore in November 2013 the committee suggested to the Assembly of the ICAO that work is carried out on the technical elements of the future global market-based measures mechanism. In particular it would need to study the activities of monitoring,

declaration and verification of CO<sub>2</sub> emissions and also the quality criteria for useable quotas.

In the wake of the 18<sup>th</sup> session of the Assembly the CAEP has also undertaken work on the analysis of aeronautical biofuels, especially in order to assess their benefit in terms of reducing greenhouse gases by 2050. The CAEP is attempting to assess the environmental gains from the improvement in the management of air space obtained within the framework of the ICAO programme of Aviation System Block Upgrades or ASBU. The preliminary study has already shown a potential reduction of 4% in the environmental impact of aviation for the first of four blocks (Block No.0).





## FABEC A GREENER EUROPEAN SKY

FABEC was created in 2010 with the task of managing European airspace more homogeneously. The purpose of this functional airspace block, which includes Germany, Belgium, France, Luxembourg, the Netherlands and Switzerland, is to improve the performance of air traffic control in an area where one of the densest air traffics in the world is developing. FABEC has a surface area of 1.7 million km<sup>2</sup> with 240 airports and represents more than 5.5 million flights a year, i.e. more than half of controlled European flights. FABEC, a major step in the creation of a single European sky, makes it possible to reduce the impact of air transport on the environment by optimising flight levels and trajectories.



*As well as maintaining a high level of security, FABEC makes flights more ecological due to more direct air routes and thus a reduction in fuel consumption.*

## FABEC's most ecological routes

Within the context of setting up FABEC (Functional Airspace Block European Central) the DGAC and its five European partners calculated the average deviation between the most direct air route and the route actually followed. They are committed to reducing this difference by 5% between now and the end of 2014. The reduction of nearly 8% observed at the end of 2013 shows that this objective could be greatly exceeded. This result represents a reduction in the distance travelled of approximately ten million kilometres (6.21 million miles). In compliance with the commitments undertaken by these seven<sup>(1)</sup> FABEC air navigation service providers, the main airports in this functional airspace block have continued to implement continuous descent approach procedures. Four additional airports implemented these procedures in 2013.

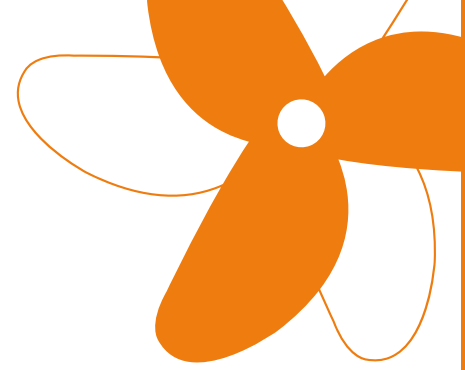
(1) Surely this should be "six" because the DGAC has 5 partners and there are only six countries in the list below.



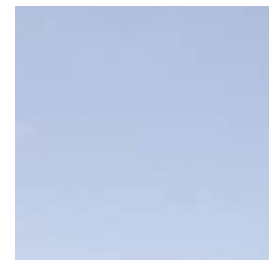
# Preventing nuisances

*The DGAC has continued its work in order to measure and monitor air quality around French airports better. In terms of the prevention of noise pollution the DGAC has, in particular, finalised the drafting of the PEB (noise exposure plan) for Paris-Le Bourget airport. It has continued its actions for acoustic certification and public information.*





# The prevention of gas emissions



At national level the emissions of nitrogen oxides (NO<sub>x</sub>) due to air transport were 2% of all the NO<sub>x</sub> emissions generated by transport in 2011. However the aviation share is constantly increasing. So it is important for the air sector to act.

The DGAC is involved in the Air Quality working group of the Authority for Airport Nuisance Control (ACNUSA). The aims of this working group are to define the relevant indicators and to improve information about air quality given on airport websites.

Its task is also to formulate recommendations for the monitoring of air quality at and around airports and to establish a common methodology for calculating polluting emissions at source.

Within the context of the Air Quality Emergency Plan (PUQA) the DGAC has started a study on the relevance and feasibility of modulating landing fees depending on aircraft NO<sub>x</sub> emissions.

*To adhere to air quality standards, the actions undertaken require reinforcement particularly as far as diffuse pollution of local origin from transport and the residential sector is concerned.*



## NO<sub>x</sub> EMISSIONS ARE INCREASING

According to some predictions, if no action is taken in Ile-de-France the share of nitrogen oxide emissions attributable to the air sector could go from 8% in 2008 to 13% in 2020, well behind that of road traffic (39% in 2020) and that of the residential and tertiary sectors (24% in 2020). However, the implementation of atmospheric protection plans would contain this increase by limiting the share of nitrogen oxide emissions from the air sector to 11% of the regional total. From the health point of view, nitrogen oxides may cause respiratory problems, bronchial hyperactivity in asthmatics and increased sensitivity of the bronchi to microbial infections in children. As far as the environment is concerned nitrogen oxides participate in the phenomenon of acid rain and attack the ozone layer.

(Source Airparif)

# The prevention of noise pollution



A figure

**54371**

This is the number  
of aircraft movements  
at Paris-Le Bourget airport  
in 2013

(Source: ADP)

Paris-Orly airport

## CONTROL OF URBAN DEVELOPMENT AROUND AIRPORTS

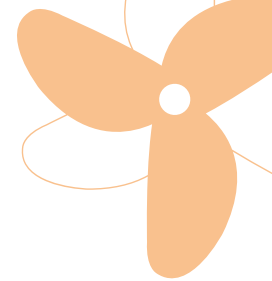
The noise exposure plan (PEB) is an urban development document that aims to limit construction to avoid the establishment of new populations in areas exposed to noise pollution caused by air traffic. It anticipates the development of air activity and infrastructures, and also the development of air traffic procedures for the next 15 to 20 years. The PEB established the areas with more or less exposure to noise (two areas of loud noise A and B, one area of moderate noise C and one area

of low noise D with compulsory information) for the twelve largest airports. About 215 airports are now concerned with a PEB.

In 2013 the draft PEB for Paris-Le Bourget airport, the largest European business aviation airport, was drawn up. It should be formally adopted in 2014.

The work of drafting PEBs for Alençon Valframbert, Calais-Dunkerque, Chalon-Chamforgeuil, Dieppe-Saint Aubin, La Réunion Roland-Garros, Les Mureaux Verneuil, Nouméa-La Tontouta, Nouméa-Magenta, Troyes-Barberey and Valenciennes-Denain continued in 2013; the PEBs for Cholet le Pontreau and Clermont-Auvergne have been approved.





TBM 850 business aircraft from Socata

The improvement in aircraft acoustic performance encourages the development of more environmentally friendly air transport.

### ACOUSTIC CERTIFICATION OF AIRCRAFT

Commercial aircraft must be subject to standardised acoustic certification measures by the ICAO. The aim of this certification is to encourage manufacturers to design ever quieter aircraft. Aircraft are classified in different chapters depending on their noise level. The standard currently in force, known as Chapter 4, concerns public transport aircraft certified since 2006. In the field of light aviation in 2013, on behalf of the European Aviation Safety Agency (EASA) the DGAC certified the light aircraft, APM from the aeronautical manufacturer, Isoire Aviation, and the business aircraft, TBM 850 from Socata. The DGAC also certified 52 aircraft equipped with silencers.

The NoisedB database is a source of easily accessible, accurate and exhaustive information. It was developed by the DGAC and has become an international reference. In 2013 it was enhanced with new data concerning more than 800 aircraft. It now contains the certified noise levels for more than 11,000 public transport aircraft.



## SPOTLIGHT

**AIR FRANCE IS REDUCING THE NOISE FROM ITS A320S**  
*In the wake of measures taken by the DGAC Air France has decided to fit its entire fleet of A320s, 130 aircraft, with noise reduction kits from June 2014.*

*The vortex generators placed in front of the cavities under the aircrafts' wings will make by it possible to reduce the whistling caused by these aircraft during descent phases by up to 11 decibels.*

## THE NOISE OF NIGHT FLIGHTS IS UNDER DISCUSSION AT PARIS-CHARLES DE GAULLE

The question of noise pollution from night flights was central to meetings of the Environmental Consultative Committee (CCE) for Paris-Charles de Gaulle in 2013. In order to encourage constructive dialogue between the representatives of professionals, local and regional authorities and associations, and to lead to consensual measures in this field, the Prefect of the region has suggested setting up a working group. This working group, the management of which will be entrusted to a Prefect and the secretariat provided by the DGAC, will have the task of identifying the actions to be taken to reduce the pollution of night flights at the airport.



## NOISE REDUCTION AT SOURCE

The DGAC has been referred to by local residents' associations and in 2011 became committed to seeking the origin of a particular noise produced by aircraft in the A320 family. After having presented the results of acoustic measurements performed around Paris-Charles de Gaulle airport, Airbus was able to determine the origin of the bothersome noise. It came from cylindrical cavities located under the aircraft's wings. The purpose of

these cavities is to remedy overpressure in tanks during fuelling operations. When the aircraft is in flight air is introduced and creates resonance. The physical phenomenon is similar to that of panpipes. Airbus has found a technical solution to remedy the noise. This involves placing a vortex generator in front of the cavities to prevent this resonance. Not only do the vortex generators suppress the resonance but they also enable the aircraft

noise to be reduced by 11 dB(A) around the approach trajectory over a distance of 12 to 50 kilometres (7.5 to 31.25 miles) from the runway threshold. This gain of 11 dB(A) represents a halving of the perceived noise. This technical solutions was approved by the certification authority in December 2013.



## ON THE PATH OF AIRCRAFT NOISE

VisioBruit, developed by the DGAC, is an educational tool incorporated into Environment Offices at Paris-Charles de Gaulle and Paris-Orly. It enables the general public to acquire basic ideas about acoustics interactively and educationally and also simple, accurate information about the measurement of various noise indices. VisioBruit also makes it possible to compare the noise generated by the passage of an aircraft with other noises with the same acoustic power. Placing this tool on the Internet is being studied.



### CALIPSO

CALIPSO (Classification of Light Aircraft according to their Noise Performance Index) was set up by the DGAC as a new tool which makes it possible to provide relevant data on light aircraft (less than 8618 kg) noise. The innovative nature of this classification lies in the use of an acoustic performance index, the reference for which is the noise of a conversation. This classification makes it possible to reveal the noise produced by the aircraft in the current flight situation, particularly during circuits which are the main source of nuisance to those living around aerodromes. France is the first country to produce a classification system based on measurements taken in real flight situations. The database constructed provides precious information which will, in the end, lead to exhaustive knowledge about the noise of light aircraft. It shows that recent aircraft may be less noisy than some fitted with a noise reduction device (known as "silencers"). It

also provides assistance when choosing aircraft for fleet renewal. Calipso, when made available to forums, could be a useful aid in deciding on noise reduction measures. The list of classified aircraft may be consulted via the CALIPSO application accessible on line since 1<sup>st</sup> July 2013 (\*).

\* <http://www.developpement-durable.gouv.fr>

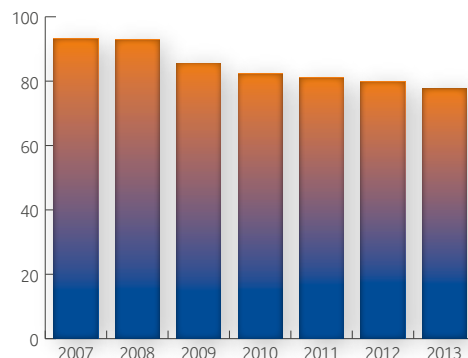


## NOISE ENERGY AT PARIS-CHARLES DE GAULLE

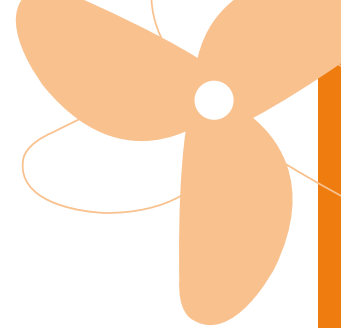
### IT'S DROPPING!

The weighted global index measured (IGMP in French) makes it possible to monitor the sound energy level emitted by air traffic at Paris-Charles de Gaulle. In July 2013 the DGAC, which monitors this, presented the indicator value for 2012 to ACNUSA. It has continued to reduce reaching the lowest level ever observed: 79.8 (with 100 being the average sound energy level for 1999, 2000 and 2001), This reduction is explained by a reduction in traffic and the progressive arrival of more acoustically efficient aircraft in airline fleets.

### DEVELOPMENT IN THE GLOBAL NOISE ENERGY INDICATOR AT PARIS-CDG



# A More Environmentally Friendly airport



Nantes-Atlantique airport

The first High Environmental Quality (HEQ) labelled airport, the Aéroport du Grand Ouest, the future Nantes airport, should meet these two imperative requirements. Firstly to allow one of the most dynamic regions in France to continue and deepen its opening up to Europe. Then to end the noise pollution suffered by the residents surrounding Nantes Atlantique airport, who are overflowed at low altitude by ever more aircraft, and to lift the restrictions on urban development which weigh heavily on the south of the Nantes agglomeration.

The Dialogue Commission set up by the Government in 2012 has asked the DGAC to perform a study on the noise suffered by the residents if the current airport was maintained. This study, presented to associations for and against the future airport showed that the noise pollution would, in this case, concern 50% more people by 2030. At the same time the decrees authorising the work on provisions concerning the Water Law and protected species were published in December 2013. In compliance with the recommendations of the College of Scientific Experts, also appointed at the end of 2012, the content of these directives has been strengthened. The environmental compensation measures and the recommendations to contractors have been specified and completed.

## SPOTLIGHT

### A VERY NOISY FUTURE FOR THE NANTES-ATLANTIQUE AIRPORT

*On 28 October 2013 the DGAC presented the results of the study performed on the evolution of noise pollution around the current Nantes Atlantique airport, in the hypothesis that it maintains its activity. Forecast maps for noise and assessments of the number of residents subject to noise pollution were produced for traffic of 6, 7 and 9 million passengers by 2030. The results clearly show a strong increase in noise pollution and the populations affected. In the long term nearly 80,000 inhabitants would, in fact, be concerned. As a comparison, with the future Aéroport du Grand Ouest the number of inhabitants suffering from aircraft noise should not, in the end, exceed 2700.*



## INFORMATION TOOLS FOR THE STATUS OF AIR TRAFFIC

The DGAC, concerned about transparency and public information, has set up a tool to display characteristic days of airport traffic at Ile-de-France airports. This interactive tool can be consulted on the Ministry website<sup>(1)</sup>. It enables the traffic flows for these days to be seen above the communes in the Paris region.

In 2013 the DGAC continued its work with a view to developing a tool to display characteristic days of traffic for the main regional airports. Internet surfers can see these days on the Ministry's website in 2014.

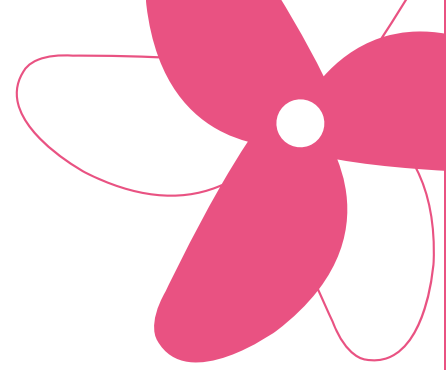
The DGAC has also continued its study to envisage the posting of the display online in almost real time (with a 30 minute delay) of the traffic around the various airports.

(1) <http://www.developpement-durable.gouv.fr/Journees-caracteristiques-traffic.html>



# Reducing the impact of nuisances

*The fight against noise and polluting emissions caused by aviation has made progress on several fronts in 2013. A year marked, in particular, by advances in restrictions on night flights, more environmentally friendly approach procedures, more direct flight paths and better protection of local residents.*



# Limiting noise sources



Marseille-Provence airport

## MORE SEVERE OPERATING RESTRICTIONS

The operating restrictions put in place at some airports are aimed at reducing noise pollution caused by the noisiest aircraft during certain time slots, particularly at night. These restrictions should be drafted in the context of a balanced approach. In 2001 the ICAO defined this concept, which requires that measures for noise reduction at source, urban development control tools and improvement of air traffic control procedures are favoured before operating restrictions are implemented.

In 2013 restriction measures were strengthened at several airports. At Toulouse-Blagnac, only so-called Chapter 3 aircraft, the least noisy (with an acoustic margin higher than 10 EPNdB<sup>(1)</sup> compared with the limit allowed by the certification), have been authorised between 2200 and midnight since 1st April 2013 (limit already set at 13 EPNdB from midnight to 0600). At Marseille-Provence, the prohibition made on the noisiest Chapter 3 jet aircraft (acoustic margin lower than 10 EPNdB) landing or taking off

between midnight and 0600 has been extended from 28 October 2013 to between 2200 and midnight.

(1) The EPNdB (Effective Perceived Noise Decibel) is the baseline unit making it possible to express the effective perceived noise level.



With the new European regulation which should come into force in 2016, the operating restrictions could concern aircraft which up to now have been considered compliant in terms of acoustic levels.

## SPOTLIGHT

### QUIETER NIGHT FLIGHTS AT THE WORLD'S AIRPORTS

In 2012 about 250 airports receiving national or international flights imposed operating restriction measures for night flights. European airports were the most numerous in putting in place this type of measure (12% did so) ahead of airports in North America (5%), the Middle East (4%) and those in Africa, Asia/Pacific, Latin America and the Caribbean (1%).

(Source: World Conference on Air Traffic - March 2013)



## PREVENTION IS BETTER THAN CURE

The production of noise maps and environmental noise prevention plans (PPBE) have been made compulsory by the European Directive of 25 June 2002, particularly for large airports. The aim of the PPBEs is to prevent noise pollution linked to air traffic by reducing noise levels if necessary. They are based on global assessments of exposure of populations to noise, established by the noise maps. The production of PPBEs based on this mapping is continuing. The PPBE for Paris-Orly was approved on 14 March 2013. Those for Paris-Charles de Gaulle and Paris-Le Bourget should be submitted for deliberation in 2014.

The noise mapping for the nine main French airports is published on the website of the Ministère de l'Écologie, du Développement Durable et de l'Énergie (Ministry for Ecology, Sustainable Development and Energy) (<http://www.developpement-durable.gouv.fr>).

*Noise maps and environmental noise prevention plans should make it possible to prevent and also reduce effects due to noise exposure.*



*Light pleasure aircraft*

## AID FOR LIGHT AVIATION

The DGAC assists light aviation in encouraging the integration of its activities into their environment. The Inter-regional Civil Aviation Directorates (DSAC/IR) encourage debate between users and residents to find more suitable solutions (modification and limitation of circuits, identification of sensitive areas, etc.).

The DGAC also supports light aviation in its actions to limit noise pollution. The DSAC/IRs therefore pay promotional grants to aeroclubs which invest in projects that make it possible to reduce aircraft noise at source. This concerns actions such as the installation of exhaust silencers, tri-blade propellers on flying school aircraft or tow winches to reduce the number of movements of glider towing aircraft.

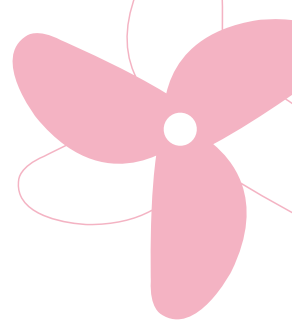
Nearly 90,000 Euros were paid to aeroclubs in 2013 to assist in installing this equipment. Thirty-three aeroclubs benefitted from these grants for the installation of thirty-one exhaust silencers, two quieter propellers, a silent engine, and also for the purchase of three glider tow winches, two towing aircraft and two runway vehicles.

## LIGHT AVIATION WEIGHS HEAVY

does not exceed 5.7 tons for aircraft and 2.7 tons for helicopters. In 2011 some 128,810 licence holders were members of 3469 associations. The global activity of light aviation is growing slightly, with about 1,222,000 flight hours in all the activities.

(Source: <http://www.developpement-durable.gouv.fr>)





A figure

**2 to 5 décibels**

*This is the gain obtained at 25 km (15.6 miles) from the runway threshold due to continuous descent approach procedures put in place at Paris-Charles de Gaulle and Paris-Orly airports.*

*(Source DGAC)*

## Optimising air navigation procedures

The on-route air navigation centre North (CRNA/Nord) has put an innovative high altitude air traffic device into service for arrivals from the North-West into Paris-Charles de Gaulle. This tool is designed around a convergence point called "Point Merge", located about 70 km (43.75 miles) from the airport. If there is heavy traffic the air traffic controller asks the pilot to follow an arrival route in the form of an arc of a circle until authorised to rejoin the point merge. This new procedure enables the pilot to optimise his descent and therefore emit less CO<sub>2</sub>. At Paris-Orly a project to evaluate this "Point Merge" concept has been started in the scope of the European SESAR research programme. The aim is to facilitate continuous descent approaches for aircraft arriving in a west-facing wind configuration.

The DGAC is also continuing to implement continuous descent approach procedures. Continuous descent approach, a central element in the DGAC's environmental policy, makes it possible to avoid variations in engine speed by removing the level-offs during descent. It limits noise pollution and gas emissions. Eight airports (Paris-Charles de Gaulle, Paris-Orly, Bordeaux-Mérignac, Lyon-Saint-Exupéry, Marseille-Provence, Nantes-Atlantique, Toulouse-Blagnac and Strasbourg-Entzheim) have implemented such procedures and Bâle-Mulhouse airport is planning an evaluation phase for 2014.



### KNOWING MORE ABOUT CO<sub>2</sub> EMISSIONS FROM COMMERCIAL AVIATION

The DGAC has developed a software tool enabling passengers to learn about the CO<sub>2</sub> emissions linked to their flight. This CO<sub>2</sub> calculator has been accessible online since 2007 (<http://eco-calculateur.aviation-civile.gouv.fr>). The entry into force on 1<sup>st</sup> October 2013 of Decree No. 2011-1336 concerning information on the quantity of carbon dioxide emitted during a transport service makes this information compulsory. The use of reliable, updated data by carriers is therefore essential. In 2013 the DGAC undertook work intended to improve this eco-calculator from 2014. It will then take into account the fuel consumption actually observed.

## MORE DIRECT AIR ROUTES

According to studies conducted by the Environment Mission of the Air Navigation Services Agency (DSNA) on the Metropolitan France scale more than 85% of the CO<sub>2</sub> generated by air transport is emitted above an altitude of 2000 metres (6000 feet). The DGAC policy in this field involves favouring the reduction of gaseous emissions above this altitude. In 2013 several air traffic management projects were conducted in this field.

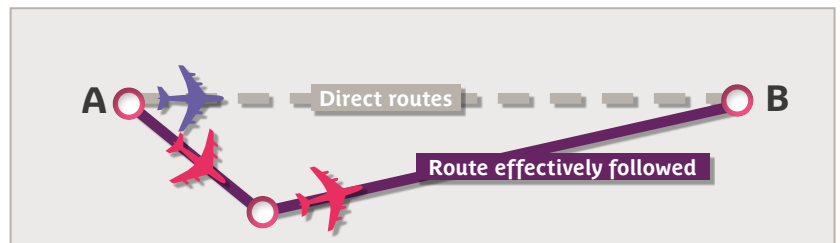
The "We Free" project, set up within the framework of the SESAR common enterprise and the AIRE (Atlantic Initiative to Reduce Emissions) programme, consists of creating specific direct routes during certain weekends between Paris, Milan and Rome. These optimised flights enable fuel economies to be made, and because of this CO<sub>2</sub> emissions are reduced. Studies are ongoing to put these routes into service permanently. Similarly, to enable airlines to choose the most direct routes in the upper airspace the first stage of the Free Route Airspace (FRA) project, developed within the context of FABEC, concerned the implementation of 29 direct routes that can be used at night in 2013.



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## MEASURING THE IMPACT OF NEW PROCEDURES

The studies of the impact of air traffic (EICAs) supply information that makes it possible to understand and assess the environmental impact generated by the creation or modification of an instrument flight procedure at a French airport. The EICAs are conducted by the DSNA and should be presented to CCE and to ACNUSA when the change concerns one of the main French airports. Several impact studies were performed in 2013, particularly at Bâle-Mulhouse, Cannes-Mandelieu, Marseille-Provence, Nantes-Atlantique and Toulouse-Blagnac.



Horizontal efficiency, i.e. the ratio between the length of direct routes and that of routes effectively followed, was 97.36% in 2013, an improvement on 2012.

## SPOTLIGHT

### LESS NOISE FOR THE NORTH OF MARSEILLES

A new approach procedure came into force on 2 May 2013 at Marseille-Provence airport. This procedure favours overflying the sea and avoiding the areas to the north of Marseille, including L'Estaque. In total about 9200 inhabitants are no longer overflown due to this approach procedure.

## A FINGER POINTED AT CO<sub>2</sub>

According to a survey on the image of French aviation performed in January 2014<sup>(1)</sup> CO<sub>2</sub> emissions are the most important air transport nuisance factor. Noise and pollution of local air came 2<sup>nd</sup> and 3<sup>rd</sup> according to those surveyed.

(1) Survey performed on a representative sample of 1005 people.

# Aiding local residents

## NOISE NUISANCE PLANS

Noise nuisance plans (PGS) constitute the curative aspect of the French system of air noise control. Around an airport it marks out the noise zones within which the local residents are entitled to financial aid for the work of soundproofing their premises. It is a tool intended for already established populations.

Today the local residents of the 12 main French airports<sup>(1)</sup> may benefit from this aid, the financing of which is provided from the receipts from the air noise pollution tax (TNSA)<sup>(2)</sup>. This device implements the polluter pays principle. The noisiest aircraft at the most bothersome times are the most heavily taxed. This encourages the aircraft operators to modernise their fleets.

At the beginning of 2013 a procedure for revising the PGS for Paris-Charles de Gaulle and Paris-Orly airports was started. After the procedures for informing and consulting the communes, the Consultative Commission for Aid to Local Residents (CCAR) and ACNUSA, the two PGS projects were approved by Interprefectoral Decree in December 2013.

The revised PGS for Paris-Charles de Gaulle airport concerns 64 communes (as opposed to 60 in the old PGS) and 96,306 dwellings, i.e. nearly 26,000 additional dwellings.

The revised PGS for Paris-Orly airport concerns 37 communes (as in the old PGS) and 51,542 dwellings, i.e. nearly 4000 additional dwellings.

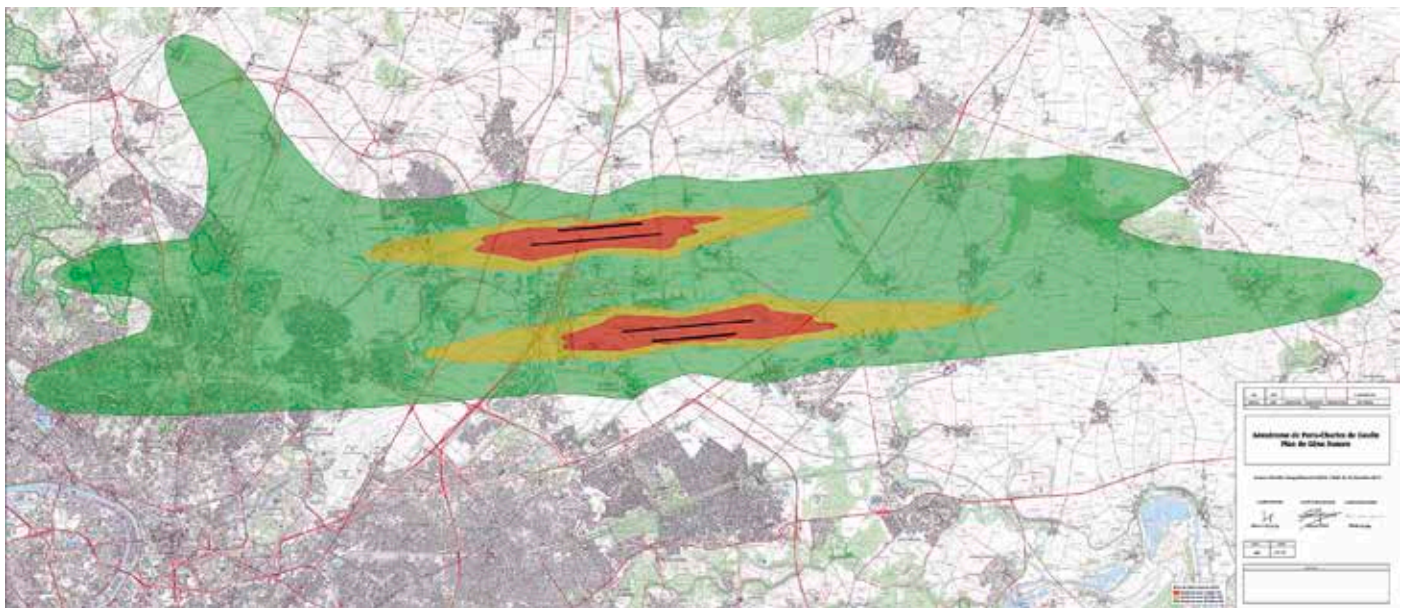
(1): Bâle-Mulhouse, Beauvais-Tillé, Bordeaux-Mérignac, Lyon-Saint Exupéry, Marseille-Provence, Nantes-Atlantique, Nice-Côte d'Azur, Paris-Charles de Gaulle, Paris-Le Bourget, Paris-Orly, Strasbourg-Entzheim and Toulouse Blagnac.

(2) Exception for Bâle-Mulhouse airport where a specific contribution, the noise fee, is applicable.

## SPOTLIGHT

*In 2013 the tax on noise pollution (TNSA) brought in 48.4 million Euros. These receipts had reduced compared with 2012 basically due to the reduction in April 2013 of the tariffs applicable to Paris-Charles de Gaulle, Paris-Orly and Nice-Côte d'Azur airports. To a lesser extent it is also due to the reduction in the number of movements.*

## NOISE NUISANCE PLAN - PARIS - CHARLES DE GAULLE AIRPORT



## CCE ACTIVE IN ILE-DE-FRANCE AIRPORTS

During 2013 five meetings of Environmental Consultative Committees (CCE) were organised at the three large Ile-de-France airports. The meeting of the CCE for Paris-Orly airport provided the occasion to present information concerning the new PGS draft, projects for work concerning the platform and adherence to

regulations in force. At the Paris-Charles de Gaulle airport numerous points were discussed, like the revision of the PGS, the technical solution found by Airbus to resolve the special noise from aircraft in the A320 family, night flights and also the implementation of continuous descent procedures. At Paris-Le Bourget, during

the two meetings that were held, the CCE notably gave its opinion on the implementation or continuation of different air navigation procedures and a reminder was made, at the request of the permanent committee, of the regulatory night tool (types of aircraft prohibited at night, time slots, etc.).



## ASSISTANCE WITH SOUNDPROOFING

A figure

**more than 60,000**

*It has already been possible to soundproof more than 60,000 dwellings due to this device.*

The number of dwellings which obtained a favourable opinion in 2013 from the Consultative Commissions for Aid to Local Residents (CCARs) for the performance of soundproofing work was 6770 with a global sum of €85.5M in aid. This number of dwellings is the highest reached to this point (it was 3816 in 2011 and 6728 in 2012). The amount of aid also increased very distinctly (it was €47.7M in 2011 and €67.2M in 2012).

The basic reason for these developments is the generalisation of aid rates of 100% introduced by the Decree dated 23 December 2011 which had a particularly high encouraging effect.

Furthermore the Government decided to extend the application of this 100% aid rate until 31 December 2014 in the Decree dated 3 March 2014.

The local residents who recently became eligible for soundproofing aid due to the new noise nuisance plans for Paris-Charles de Gaulle and Paris-Orly could therefore take advantage of the 100% aid rate if they so wished.



Nice-Côte d'Azur airport

*The soundproofing aid tool implements the "polluter pays" principle: the noisiest aircraft at the most bothersome times are the most heavily taxed.*

# Acting for the local environment

## AN EMERGENCY PLAN FOR AIR QUALITY

On 30 April 2013 the Interministerial Committee for Air quality (CIQA) launched the implementation of the emergency plan for air quality (PUQA). One of the measures in this emergency plan concerns airports and limitation of the use of APUs (Auxiliary Power Units), powerful auxiliary motors designed to produce electricity onboard aircraft when they are parked. The statement provided on 18 December 2013 reported the advances

made in this field: regulatory restrictions at the three Ile-de-France airports as well as at Nice and Nantes, development of substitute fixed equipment at several airports like Marseilles or Toulouse.

Within the context of the PUQA the DGAC launched a study in 2013 on the feasibility and relevance of modulating landing fees as a function of nitrogen oxide (NO<sub>x</sub>) emissions from aircraft.

## ACNUSA IS TAKING A CLOSER INTEREST IN LOCAL AIR QUALITY

The objective ACNUSA set itself is better understanding of the impact of airport activities on local air quality. It launched a working group on local air quality on 12 April 2013. Three large work orientations

have resulted: the definition of relevant indicators and improvement of information on airport websites, recommendations on monitoring of air quality at and around airports and setting up a common

methodology for calculating emissions at source.



### LIMITING THE USE OF APUS

The use of auxiliary power units (APUs), which supply electrical power and air conditioning in the cabin and enable the engines to be started, is regulated at several airports particularly the three large Ile-de-France airports. In 2013 the air transport police (GTA) carried out a series of experimental controls on the regulation in force at Paris-Charles de Gaulle, Paris-Orly and Paris-Le Bourget. The report of this experimentation led to the setting up of a formalised procedure between the DGAC and the GTA. Since January 2013 the controls on the use of APUs at the three Paris airports have been continued. They can now give rise to a report and failures to

## SPOTLIGHT

*In terms of environmental impact an auxiliary power unit (APU) emits between 15 and 30 times more CO<sub>2</sub> and NO<sub>x</sub> than the ground power unit (generator unit known as the GPU) which itself emits more than the 400 Hz electricity supply. (Source CORAC)*

comply are liable to sanctions from ACNUSA. The regulatory measure aimed at limiting the use of APUs has been incorporated into the revised Atmospheric Protection Plan (PPA) for Ile-de-France, which was adopted in March 2013.

Other airports have taken measures aimed at restricting the use of APUs. At

Nice-Côte d'Azur, an innovative system offering electrical power and air conditioning installed on the business aviation parking area near the Promenade des Anglais should be operating in 2014. At Toulouse-Blagnac airport all the parking stands in contact are now equipped with 400 Hz electrical network connections.

## DE-ICING AND CLEARING ICE BE CAREFUL OF FLOORS

In 2013 the Civil Aviation Technical Department (STAC) put in place a project of studies into the impact of de-icing and ice clearing products on composite materials in aircraft and runway lights. Furthermore STAC continued its work to optimise the operational procedures for clearing snow and ice.



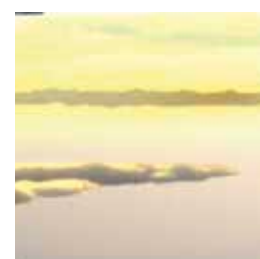
# PREPARING THE FUTURE

*Faced with the challenges of competition and sustainable development in air transport France is actively supporting aeronautical research. In 2013 the DGAC took part in CORAC work, supported industrialists working on technological breakthroughs and gave its support to research on the emergence of aeronautical biofuels. It is also very involved in current European research programmes.*





# The work of CORAC



The French Council for Civil Aeronautics Research (CORAC) was created in 2008. Under the direction of the DGAC and the Groupement des Industries Françaises Aéronautiques et Spatiales (GIFAS - French Aeronautical and Aerospace Industries Group) it brings together the entire French aeronautical community. CORAC is taking over the European objectives of improving the performance of air transport by 2020 and 2050.

Within the scope of the programme of investment in the future the DGAC has continued its action of supporting the seven large technological demonstrators<sup>(1)</sup> developed within CORAC. In particular it has supported work within the context of the GENOME demonstrator with a view to optimised management of onboard energy. The objective of this demonstrator, which unites 49 industrial and academic partners, is to validate new technologies for «more electric» aircraft<sup>(2)</sup>. A new project concerning the «cockpit of the future» was also launched in 2013. It will concern new forms of interaction between pilots and systems.

In 2013 the DGAC also participated in the various works of the aeronautical and environment thematic network created in 2009 within the framework of CORAC and has financed some of its work. For the first time in-flight measurement campaigns have been performed in the wake of aircraft to assess the impact

of condensation trails on climate. At the same time the DGAC has participated in work on air quality and the acoustic impact of aviation conducted within this thematic network. In particular all this work has made it possible to draw up a first statement of the scientific studies required in the field of noise and to suggest the broad guidelines in terms of research.

*(1) A technological demonstrator is an experimental device making it possible to validate new technological bricks in real conditions of use.*

*(2) Aircraft which uses more electrical energy by replacing hydraulic and pneumatic energy.*

## EUROPEAN RESEARCH LOOKS FORWARD TO 2050

To take into account the development of environmental challenges a new long-term vision for the European aeronautical sector has been proposed by the Advisory Council for Aviation Research in Europe (ACARE). Flightpath 2050 has set ambitious environmental objectives by 2050 such as a reduction of CO<sub>2</sub> emissions per passenger km of 70%, of 90% for NO<sub>x</sub> emissions and of 65% for perceived noise, compared with the reference year 2000.

## SPOTLIGHT

*On one of today's aircraft 3% of the energy supplied by the engine is allocated to powering onboard systems (hydraulic systems, "onboard computer", etc.). The GENOME platform targets a fuel consumption gain of at least a third of this energy that is not devoted to the engine. As an example it would represent more than 450 tons annually just for the Paris-Toulouse shuttle.*



### REDUCING THE NOISE POLLUTION EMITTED BY AIR TRAFFIC

The first work carried out by the aeronautical and environment thematic network on noise has highlighted the necessity of continuing support for efforts to reduce noise at source within the context of the balanced approach defined by the ICAO, and also to have a better understanding of the factors influencing the annoyance experienced by people exposed to a given noise level. Only interdisciplinary work will enable the question to be treated fully.

## Support for industrial partners

The research programmes supported by DGAC in 2013 covered all aeronautical fields. These research efforts contribute to the objectives for the protection of the environment set by ACARE. The work carried out in 2013 on future generations of cockpits should, therefore, make it possible in the long term to reduce the environmental impacts of aviation by adapting cockpits to future air traffic systems. The other research programmes supported by the DGAC in 2013 endeavour

to make aircraft quieter and more energy efficient. This effort is shared by all the players in aviation, from light aviation to public transport, not forgetting business aviation and helicopters. Furthermore, expected significant technological progress involves work on improving design methods on which the aeronautical manufacturers, "architects" of tomorrow's green aircraft, are working hard with the support of the DGAC.

## SPOTLIGHT

### FROM THE NOISE OF THE CARAVELLE TO THAT OF THE A320

*Research conducted for several decades has made it possible to reduce aerodynamic noise and noise from aircraft engines considerably.*

*In the 1960s a jet aircraft like the Caravelle produced as much noise as 125 aircraft from the current generation like the Airbus 320.*

*(Source CORAC Summary Report 2009)*



1960s Caravelle jet

## AN ELECTRIC TWO-SEATER

Presented at the last Le Bourget air show, the E-Fan is an innovative all-electric aircraft concept, built entirely of composite materials. With the support of the DGAC, this technological demonstrator is driven by two electric motors which in turn drive shrouded propellers. Such technological innovations will enable noise around airports to be reduced significantly. Other advances, such as the rear wheel being driven by a small electric motor, make it possible to reduce the noise impact of this two-seater designed for short journeys (45 minutes to an hour), such as initial pilot training. The E-Fan, the inaugural flight of which took place on 25 April 2014, should make it possible to progress research into electric propulsion. (Source Airbus Group)



# Future fuels for aeronautics



In 2011 Europe drew up a road map entitled “Biofuel Flight Path 2020”, the aim of which was to reach an annual production of 2 million tons of aeronautical biofuels known as “drop in” (able to be mixed with conventional kerosene without any modifications) by 2020. It involves supporting production, storage and distribution of sustainably produced biofuels for aviation. Within the context of this road map in 2013 the DGAC continued its promotional actions for the Initiative for Future Aeronautical Fuels (Ini-FCA) launched in 2007. Ini-FCA brings together the French players in air transport, the aeronautical industry, energy and agriculture. Basically it aims to identify and programme the research requirements in this field for the future. The Ini-FCA’s work concerns the technological, economic and environmental elements required for the

launch of significant production of aeronautical biofuels. The DGAC has also continued to finance the CAER (Alternative Aeronautical Fuels) research programme sponsored by IFP-Energies Nouvelles. The purpose of the CAER programme is to identify new industrial networks for aeronautical fuels and to undertake a global analysis of their environmental impact from production to use. In 2013 the DGAC also took part in various European round tables to establish increased collaboration in the biofuel field.





## SPOTLIGHT

On 20 June 2013 an A321 took off from Toulouse for Paris-Le Bourget with an aeronautical biofuel. This flight, named "Joining our Energies", was organised jointly by Air France, Airbus, Total and Safran. It shows the technical ability of the partners to incorporate these new fuels.

(Source Joint communiqué <http://total.com/fr/medias/actualite/communiqués> Airbus, Air France, Safran and Total)

### QUALIFICATION, AN ESSENTIAL STAGE

Before being used by commercial aircraft all aeronautical fuel must be "qualified". In fact it must meet numerous requirements: be able to undergo significant variations in temperature and pressure without degrading, have an energy density as high

as that of kerosene, be compatible with all driving mechanisms, etc. Qualification of a new fuel, like the certification of a new aircraft, makes it possible to ensure that no risks are taken unnecessarily.

In the case of a biofuel, these constraints are

also added to the necessary adherence to the environmental and socio-economic criteria of sustainable development as well as the need to preserve agrifood balances.

## Becoming involved in European research

A figure

**550**

*This is the number of partners in the European Clean Sky initiative. About 40% of them are SMEs.*

The DGAC is involved in the drawing up and implementation of large European research programmes. In 2013 it was an active participant in European negotiations on the definition of the "Horizon 2020" programme. Adopted by the European Directorate-General for Competitiveness on 3 December 2013, this new programme for financing research and innovation in the European Union for the 2014-2020 period succeeds the 7<sup>th</sup> Technological Research and Development Framework Programme (RDFP). With 79 billion Euros "Horizon 2020" refocuses financing onto three main priorities: scientific excellence, industrial leadership and societal challenges.

The DGAC has also supported the Clean Sky joint technological initiative from its launch. This European research programme founded on the public-private partnership principle was launched in 2008 to validate the technologies required for the emergence of more environmentally friendly aviation by 2020. In 2013 the preparation work for the 2nd phase of Clean Sky was achieved. Clean Sky 2, intended to be incorporated into the European "Horizon 2020" programme, has set itself the objective of developing and bringing to fruition breakthrough technologies which will make it possible to reduce, by 20 to 30%, CO<sub>2</sub> emissions, NO<sub>x</sub> emissions and sound emissions in relation to new generation aircraft which will enter service from 2014.

### VALIDATING FUTURE TECHNOLOGIES

The Clean Sky programme is organised on six large themed technological platforms: the intelligent wing aircraft, the green regional aircraft and the green helicopter, systems encouraging green air operations, low environmental impact engines and eco-design. All this is completed by a technological appraiser responsible for predicting the impact of these technologies within a given journey, an airport or a global fleet. The open-rotor engine aircraft, the laminar wing, the composite structures tested to full scale and the all-electric regional aircraft are some examples of the major demonstrators developed as part of Clean Sky. (Source Clean Sky)



## A

**ACARE:** Advisory Council for Aeronautics Research in Europe  
**ACNUSA:** French Independant Monitoring Authority for Airport Pollution  
**AESA:** European Aviation Safety Agency  
**AIRE:** Atlantic Initiative to Reduce Emissions  
**APU:** Auxiliary Power Unit  
**ASBU:** Aviation System Block Upgrades

## 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  
**CCAR:** Commission consultative d'aide aux riverains  
**CCE:** Environmental Consultative Committee  
**CIQA:** Interministerial Committee for Air quality  
**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-FAN:** Aircraft electrical propulsion project  
**EICA:** Air Traffic Impact Study  
**EPNdB:** Effective Perceived Noise in Decibels  
**ETS:** Emission Trading Scheme

## F

**FABEC:** Functional Airspace Block European Central  
**FRA:** Free Route Airspace

## G

**GIFAS:** French Aeronautical and Aerospace Industries Group  
**GTA:** Air transport polices

## H

**HQ:** High Environmental Quality

## I

**IATA:** International Air Transport Association  
**ICAO:** International Civil Aviation Organisation  
**IGMP:** Weighted Global Measured Indicator  
**Ini-FCA:** Initiative on future aviation fuels  
**IPPC:** Intergovernmental Panel on Climate Change

## M

**MBM:** Market-based measures

## N

**NoisedB:** International reference for the study of the development of aircraft acoustic performance  
**NO<sub>x</sub>:** Nitrogen oxide

## P

**PEB:** French abbreviation for Noise Exposure Plan  
**PGS:** French abbreviation for Noise Nuisance Plan  
**PPA:** Atmospheric Protection Plan  
**Point Merge:** Airport point where trajectories converge  
**PUQA:** Air Quality Emergency Plan

## S

**STAC:** French Civil Aviation Technical Department


## T

**TNSA:** French aviation noise inconvenience tax

## V

**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 a leaf with a central vein and several smaller veins branching out. The leaf is rendered in a light, muted green color with a subtle gradient, giving it a soft, ethereal appearance. It is positioned in the lower-left quadrant of the page, partially overlapping the contact information.

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