

ENVIRONMENTAL REPORT

2015

French Civil Aviation Authority [DGAC]



MINISTRY FOR ENVIRONMENT, ENERGY AND SEA
www.developpement-durable.gouv.fr

France Ecologie Energie ecologiEnergie @dgac





2015 will be remembered as the year of COP21; in the Paris agreement 195 delegations committed to maintain the increase in the average global temperature below 2 degrees and to aim towards 1.5 degrees.

Civil aviation must do its part to help achieve this. Although the aviation sector is only responsible for 2 % of global CO2 emissions, it is working to limit its emissions in the future. France has taken an active part in the work of the International Civil Aviation Organization [ICAO], which resulted in a new standard for aircraft CO2 emissions being adopted in February 2016 by the ICAO's Committee on Aviation Environmental Protection.

The aviation industry worldwide is also working to implement a global emissions offsetting scheme, the Global MBM [market-based measurement], from 2020. This scheme was adopted by the 39th ICAO assembly in October 2016.

The GMBM mechanism should help to offset CO2 emissions that exceed the level reached in 2020. It complements other measures such as technological advances, operational and infrastructure improvements and the use of biofuels.

The DGAC [French Civil Aviation Authority] is also deeply involved in the area of innovation. The Civil Aeronautic Research Council [CORAC] continues to contribute towards aeronautical research, which includes carrying out new work on aircraft configurations, embedded systems and advanced functionalities as well as the aerospace factory of the future. Direct support has also been given to industry projects, such as those related to the next generations of turboprops which are more fuel efficient and therefore emit less greenhouse gases.

2015 also marked the advent of Solar Impulse, an electric motor aircraft powered solely by solar energy, which started a round-the-world flight with stopovers on 9 March 2015 that ended in July 2016.

The 100 % electric E-Fan aircraft made its first Channel crossing on 10 July 2015. Intended for the training of new pilots, the E-Fan incorporates several technological innovations; it is almost silent and it does not emit any pollutants. It is expected to be put

on the market in 2017. The E-Fan will be mass produced at a new assembly factory which will be built at Pau-Pyrénées Airport.

Research on biofuels has continued and three biofuels were certified for commercial use in 2015. Added to kerosene, they are a good way of reducing CO2 and fine particle emissions. The DGAC also supports research in the area of materials and structures to reduce the weight and the fuel consumption of aircraft through the use of lighter composite materials.

The airport sector has not been left out: the law on energy transition for green growth was enacted on 17 August 2015. The operators of the 11 largest airports in mainland France and Corsica must develop an action plan to reduce their emissions of pollutants and greenhouse gases. These regulations complement the voluntary steps taken by these airports, which are very aware of the issues. We are proud to be able to say that 10 of the 11 European airports that joined the Airport Carbon Accreditation program in 2015 are French.

In 2015 the Working Group on night flights at Paris-Charles de Gaulle, chaired by the Prefect Guyot, delivered its report. It identified specific actions to be taken in order to reduce the negative impact of night flights. These are now being implemented!

Finally, the DGAC is looking out for new issues that deserve its support: it recently became a member of the Hop! Biodiversity Association that was founded in 2015 by the company Hop!, a subsidiary of Air France. The association aims to promote biodiversity in the areas controlled by airports.

It is up to our industry to meet these challenges in order to grow whilst looking after the environment and to demonstrate the industry's ability to adapt to everyone's benefit.

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



INTERNATIONAL MEASURES

PAGE 06

THE HIGHLIGHTS
2015

PAGE 04

PREVENTING
ENVIRONMENTAL NUISANCE

PAGE 10

SUMMARY ENVIRONMENTAL REPORT

French Civil Aviation Authority (DGAC)

GLOSSARY
PAGE 32

REDUCING THE EFFECTS
OF ENVIRONMENTAL NUISANCE

PAGE 18

PREPARING FOR
THE FUTURE

PAGE 26

THE HIGHLIGHTS 2015

THE NEW CONQUEST OF THE SKY

Marked by COP21, in 2015 France and international air transport bodies confirmed their strong commitment to the environment. Encouraged by technological innovation and advances in international regulations, aviation's environmental revolution is already underway.



INCREASINGLY GREEN INTERNATIONAL STANDARDS

The United Nations 21st climate change conference, referred to by the acronym COP21, was held in France from November 30 to December 12, 2015. All air transport stakeholders attended the conference. COP21 stands as a powerful signal for continuing the work at the next meeting of the International Civil Aviation Organization (ICAO).

In September 2016, the ICAO is expected to reach a decision on setting up a global market-based system of measures aimed at offsetting aircraft CO₂ emissions that exceed the levels observed in 2020.

CONTINUING TECHNOLOGICAL ADVANCES

The round table entitled "Air transport and sustainable development: Technological progress in the aviation sector" was one of the landmarks of COP21. A few months earlier, the 51st International Paris Air Show had demonstrated that most of the technological innovations developed by the aeronautics sector in some way reflect the emergence of more efficient and sustainable aviation.

ENERGY TRANSITION

2015 also saw the passing of the law of August 17, 2015 on energy transition for green growth. The fight against climate change and the strengthening of France's energy independence are the prime objectives of this law. As stated in article 45, the operators of the

11 main airports in metropolitan France are required to draw up a costed action program for reducing the airborne and greenhouse gas emissions generated by airport operations.

HOP! BIODIVERSITY

Founded in 2015 by Hop!, an Air France subsidiary, the Hop! Biodiversité association has been awarded the Ministry for the Environment, Energy and Sea's "Energy and ecological transition for the climate label". The association is convinced that airport biodiversity can be a vector of

territorial richness. Its mission is to evaluate and promote biodiversity for more natural management of airport areas.

The air transport industry is committed to sustainable conquest on land and in the skies.

INTERNATIONAL MEASURES

According to the estimates of the Intergovernmental Panel on Climate Change (IPCC), air transport represents 2 % of global greenhouse gas emissions. Notwithstanding this relatively low impact, civil aviation is taking action to control its emissions against a backdrop of 5 % growth in traffic per annum. Together with an emissions offsetting scheme, flight procedures designed to reduce fuel consumption and the development of aircraft biofuel are part of a package of measures aimed at achieving “carbon-neutral growth” by 2020.

**5%
PER ANNUM**

This is the traffic growth forecast. To stabilize carbon emissions at their 2020 level, the ICAO has developed the “basket of measures” concept.

THE ICAO MAINTAINS ITS ENVIRONMENTAL COURSE

TOWARDS A GLOBAL OFFSETTING SYSTEM

France is actively involved in the ICAO's work on developing a Global Market-Based Measure (MBM) Scheme, the future global scheme for offsetting aviation greenhouse gas emissions. Discussions on this ambitious scheme's implementation arrangements continued in 2015 and 2016 and led to the adoption of the scheme by the 39th assembly of the ICAO in October 2016.

All greenhouse gas emissions that exceed the level reached in 2020 will be offset by the purchase of carbon credits on the CO₂ trading market. As this is a global scheme, the rule will apply to all airlines for their international routes. But

this is subject to having reliable data on the emissions of the various airlines. That is why it is necessary to develop a system for monitoring, reporting on and verifying airline emissions, referred to as the Monitoring, Reporting and Verification (MRV) system. The GMBM will take into account the special circumstances and respective capabilities of States to allocate offsetting obligations.

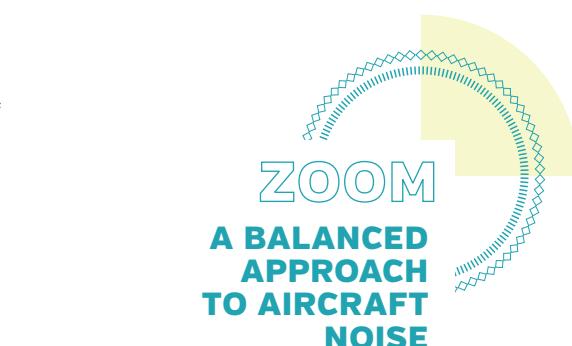
UNDERSTANDING THE OFFSETTING MECHANISM

Within the European Economic Area, each airline will be allocated "free carbon emission rights" [EU ETS]. If air carriers exceed them, they will have to purchase more on the carbon market, supplied by companies that have managed to reduce their emissions. The aim is to raise quota prices by reducing free rights allocated over the years; that will force airlines to plan their emission reductions in advance. The system developed by the ICAO will be somewhat different, as it will consist in carbon emissions above a given threshold being offset by the purchase of carbon reduction credits sourced from projects in other economic sectors that have reduced their CO₂ footprint.



THE CARBON STANDARD UNANIMOUSLY RECOMMENDED

After six years' work, the 23 Member States (including France) of the CAEP have agreed on an international standard for the certification of aircraft CO₂ emissions. The measure will apply to new aircraft types from 2020 and to all aircraft rolling off production lines from 2023. Forecasts of growth in air traffic by 2050 require early action, given that the effects of the standard depend on the relatively long renewal time of fleets. The ICAO has thus set out to draw up precise assessment criteria, consistent with the advances



The CAEP has developed a method for controlling noise nuisance according to the distinctive features of different airports. **The principle of this "balanced approach" is based on four pillars:**

NOISE ABATEMENT at source by using quieter aircraft;

PLANNING AND MANAGING LAND use around airfields;

USING OPERATIONAL NOISE ABATEMENT PROCEDURES;

IMPOSING RESTRICTIONS on the noisiest aircraft.

For instance, operating restrictions are imposed on the noisiest aircraft when the first three measures have proved unsatisfactory.

recently accomplished by the manufacturers. Wide-bodied aircraft, which produce more than 90 % of emissions, are indeed benefiting from increasingly sophisticated environmental technologies and are thus subject to more stringent requirements in terms of carbon emissions. The unanimous decision paves the way for adoption by the 36 Member States of the ICAO Council.

NON-VOLATILE PARTICLES: THE CAEP KILLS TWO BIRDS WITH ONE STONE

The CAEP's 2013-2016 program is not confined to CO₂ emissions. Certification of aircraft engines with regard to non-volatile particulate matter [nvPM] has also made significant progress.

On the occasion of its 10th meeting, the Committee ratified the first standard based on instrumentation and measurement work on turbojet engines. In order to maintain margins for continual improvement, this standard subject to modification will closely monitor developments in the environmental performance of engines.

DID YOU KNOW?

THE FIRST ENVIRONMENTAL RESOLUTIONS PASSED BY THE ICAO DATE BACK TO 1971. THEY CONCERNED NOISE AND THE ACOUSTIC CERTIFICATION OF AIRCRAFT.



COP21 THE AIR TRANSPORT SECTOR ON BOARD

IN MARCHING ORDER FOR THE 39TH ICAO ASSEMBLY

In 1997, the Kyoto Protocol entrusted the ICAO and its 191 Member States with the responsibility of limiting international aviation CO₂ emissions. Under the aegis of the United Nations, the ICAO thus works in this field to implement standards and practices recommended worldwide. The United Nations Conference on Climate Change, which was held in Paris in December 2015, concluded with the adoption of the Paris Agreement. The success of COP21 stood as a major milestone, a few months before the 39th Assembly of the ICAO.

All the stakeholders of the air industry were present at COP21. Ongoing talks on GMBM took up most of the day devoted to transport. Organized by the French Civil Aviation Authority [DGAC] in partnership with the French Aerospace Industries Association [GIFAS], the round table on innovation shined the spotlight on the achievements of the French Council for Civil Aeronautics Research [CORAC]. For example, the government funds research projects on new-generation engines, structural materials or even the E-FAN, an electrically-propelled aircraft.

Part of the Air Transport Action Group [ATAG], industrialists in the aeronautics sector restated their objectives of improving energy efficiency in aircraft and achieving carbon-neutral growth. Manufacturers more particularly underscored the environmental advances of the engines of the future, such as the CFM LEAP-1B, developed by SNECMA and GENERAL ELECTRIC, chosen for the Boeing B737 MAX and the Airbus A320 Neo.

3 FIGURES RELATED TO THE PARIS AGREEMENT

177
signatory countries

100
billion dollars allocated

Temperature increases limited to
2 °C,
or even 1.5° C by the end of the century

RESPONSIBLE AVIATION LANDS AT LE BOURGET

The 51st international air and space show was held from June 15 to 21, 2015. New materials, fuel-efficient engines, reductions in aircraft noise... the aeronautics sector is all the more committed to green growth as this offers it many opportunities for development. In this area, French SMEs and mid-sized companies specializing in composite materials and electronics emerge

relatively unscathed. The CORAC presented the key characteristics of the aircraft of the future, while the "Ciel de demain" [Tomorrow's skies] exhibition showcased the numerous solutions implemented in France and elsewhere to improve energy efficiency and reduce air transport's carbon footprint.



THE SINGLE EUROPEAN SKY MOBILIZED

FABEC MAKES ROUTES SHORTER

Between 2011 and 2014, the 7 partners of the Functional Airspace Block Europe Central [FABEC], namely the DGAC's French air navigation services authority [DSNA], the air navigation service providers of five European states and the Maastricht control center, managed to reduce by 12% the average gap between the most direct air route [selected in the flight plan] and the route actually followed. No fewer than 268 direct routes were thus validated, including 86 for the DSNA alone. These 7

partners again committed to reducing the average deviation by a further 10 % by 2019.

Furthermore, the main airports in FABEC have continued to implement continuous descent approach procedures: two more French airports [Nice and Basel-Mulhouse] introduced these procedures in 2015.



50 000

Is the number
of air routes
existing in 2015

80 %

The reduction in
fuel consumption
per passenger
and per kilometer
in 50 years

SESAR PROGRAM MORE DIRECT ROUTES IN ORDER TO USE LESS FUEL

By plane just as by any other means of transport, a straight line is not just the best way of moving forward; it also saves fuel, and therefore reduces gas emissions. This subject is central to the Single European Sky ATM Research [SESAR] R&D program, which makes recommendations for all phases of flight, in consultation with manufacturers and air traffic control operators. No fewer than 70 organizations and companies study the most direct routes and the flight levels that offer the best efficiency. The stated aim is to reduce the environmental impact by 10% by adopting new navigation systems and reducing holding procedures.

The R&D program ended in 2015. It will be implemented through to 2020 and beyond, under the leadership of the SESAR Deployment Alliance, a unique inter-professional body made up of four airlines, 25 airports and 11 air traffic control services.

These technological advances go hand in hand with the daily actions of air traffic controllers. By applying the DSNA's recommendations for improved Horizontal Flight Efficiency [HFE] they have managed to reduce carbon emissions by about 315,000 tons in 2015.

CARBON EMISSIONS

Energy facilities:
26 %

Industry:
19 %

Forestry:
17 %

Agriculture:
14 %

Buildings:
8 %

Transport:
13 %

Waste
and wastewater:
3 %

**AIR
TRANSPORT:
2 %**

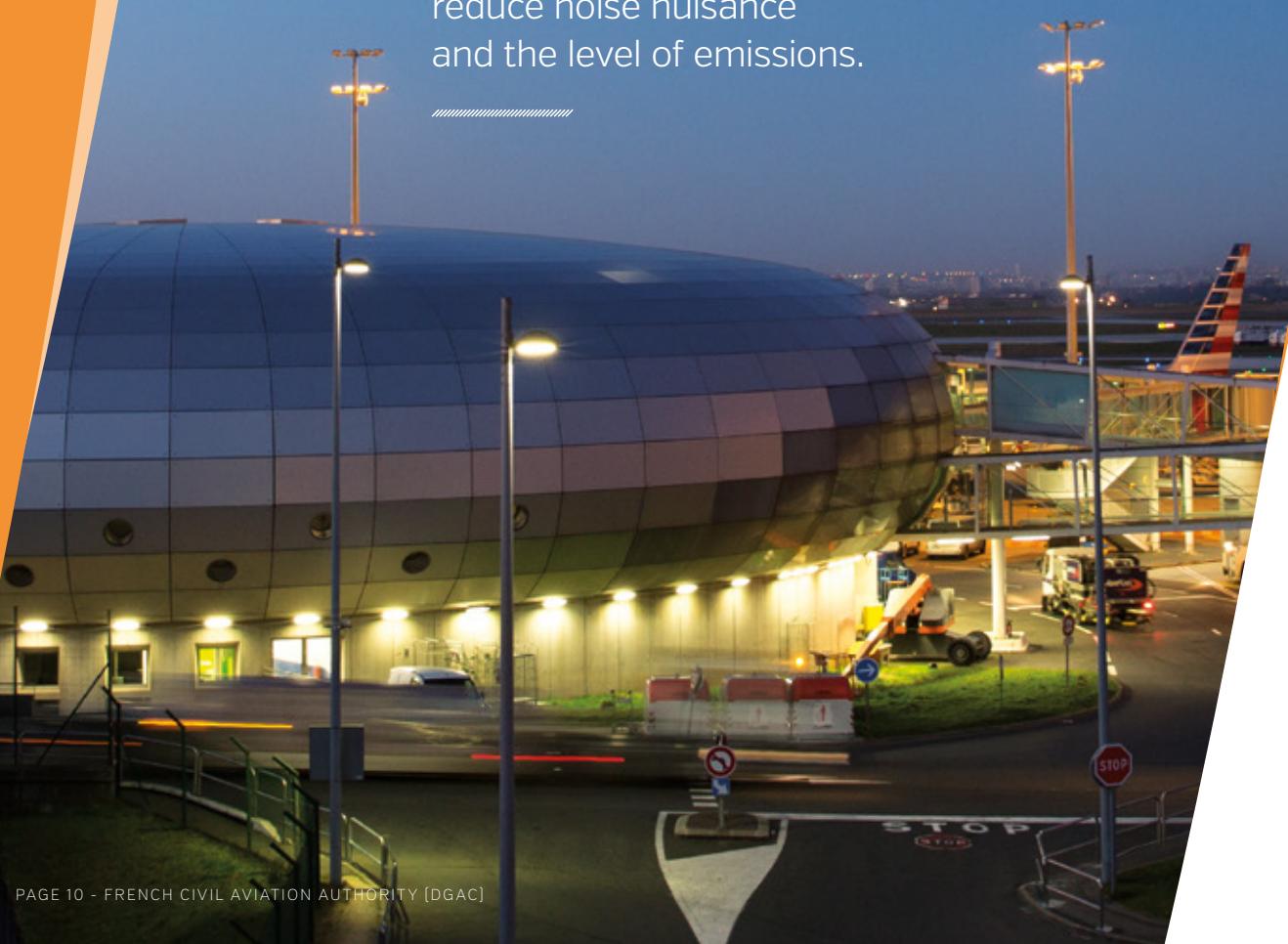
ZOOM

THE INCREASE IN AIR TRAFFIC IS NOT JUST A CHALLENGE IN TERMS OF TRAFFIC CONTROL, PILOT TRAINING OR AIRPORT ORGANIZATION; IT IS ALSO A UNIQUE OPPORTUNITY FOR IMPROVING THE ENERGY EFFICIENCY OF AIRCRAFT TO RENEW FLEETS.

The Airbus A350, which came into service at the beginning of 2015, consumes 25 % less fuel than aircraft of the previous generation.

PREVENTING ENVIRONMENTAL NUISANCE

The development of air transport is commensurate with the growing need for mobility in France and throughout the world. Acceptance of this movement depends to a great extent on the environmental performance of aircraft and facilities on the ground. The DGAC combines several initiatives to address the concerns of local residents near airports: in the short term, adapting air navigation procedures to effectively reduce noise nuisance and the level of emissions.



AIR POLLUTION: IMPROVING AIR QUALITY

Improving air quality near airports cannot rely solely on the gradual renewal of aircraft fleets. Lawmakers, air transport authorities, manufacturers and airlines all have a range of options.

Article 45 of French law no. 2015-992 of August 17, 2015 on energy transition for green growth states that the operators of the 11 main airports must draw up an action program to reduce carbon emissions and airborne pollutants generated directly by the ground-based activities of the airport, more particularly with regard to aircraft taxiing and vehicle traffic in and around the airport. The objective is to reduce carbon emissions and airborne pollutants by at least 10 % by 2020 and at least 20 % by 2025 compared with 2010 levels. The French Environment and Energy Management Agency (ADEME) will assess these measures in 2017.

The effects of regulation remain limited if not accompanied by technical advances. To reduce the use of auxiliary power units (APUs) on aircraft, the French Airport Pollution Control Authority (ACNUSA) especially recommends using electricity networks at 400 Hertz. At Nice airport a standalone power supply system called "pop-out" cuts the use of APUs for corporate aviation to 15 minutes on average (against 30 minutes previously).

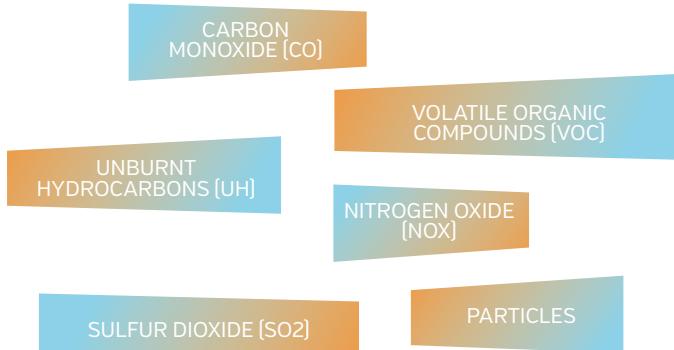




500 TREES!

In June 2015, the New Caledonia Civil Aviation Directorate participated for the 4th year running in an environmental restoration program organized by the New Caledonia WWF. Several of the planted deciduous forest saplings are taken from endangered native species. The operation is enriching New Caledonia's floristic diversity while fighting against invasive species. The partnership has been extended for 3 years.

FOR THE AIR SECTOR, THE MAIN EMISSIONS AFFECTING AIR QUALITY ARE:



THE LTO CYCLE, A RELIABLE INDICATOR BELOW 1,000 METERS

The standard Landing-Take Off (LTO) cycle includes the following average times:

- > **4 MINUTES'** approach or descent
- > **26 MINUTES'** taxiing on arrival and departure
- > **42 SECONDS** during the take-off phase
- > **APPROXIMATELY 3 MINUTES'** climbing

This enables precise measurement of air traffic emissions below 1,000 m, where they directly affect air quality. While cruise flight also contributes to air pollution, this is limited by the dispersion and evaporation that occurs at high altitudes.

THE STATE IS STILL THE REGULATOR

When the State undertakes an open offer of shares of airport management companies, as it did at Nice and Lyon, which has no effect in

environmental terms: the obligations concerning noise or air quality remain the same and are binding on the new airport operator.

CUTTING CO₂ EMISSIONS

“GREEN” FLIGHTS ARE COMING

In 2015, an Airbus A321 powered by biofuel made a weekly flight between Toulouse and Paris-Orly. The experiment, initiated by Air France in partnership with the DGAC as part of “Lab’line for the future”, taught many lessons.

The incorporation of 10 % “farnesane”, a cane sugar-based fuel produced by Total-Amyris, reduces greenhouse gas emissions; this reduction could reach 80 % compared with the original fossil-based kerosene if it was totally replaced by farnesane.

AÉROPORTS DE PARIS (ADP) IS MORE VIRTUOUS

To cut emissions produced by airport infrastructures by 50 % between 2009 and 2020, Aéroports de Paris has decided to increase the proportion of renewable energies in its final energy consumption to 15 %. Its improved energy efficiency target is 1.5 % per annum for the 2016-2020 period.

A shallow geothermal facility brought into service at Paris-Le Bourget airport in 2015 covers nearly 70 % of heating requirements.

THE OVERSEAS DEPARTMENTS SHOW THE WAY

In New Caledonia, the air terminals of Koné and Lifou have given rise to a program based on sustainable building principles. In the same spirit, the high schools of Pouembout and Mont-Dore have adopted the “green sites” approach and will have photovoltaic facilities. Lastly, an initial phase of back-fitting works has com-

menced at the Nouméa-Magenta airfield, including, among other things, the installation of oil separators.

In French Polynesia, the National Civil Aviation Service [SEAC PF] has saved the equivalent of 30 tons of CO₂ thanks to a photovoltaic installation on its buildings.

NEW METHODS FOR MEASURING ENVIRONMENTAL IMPACT

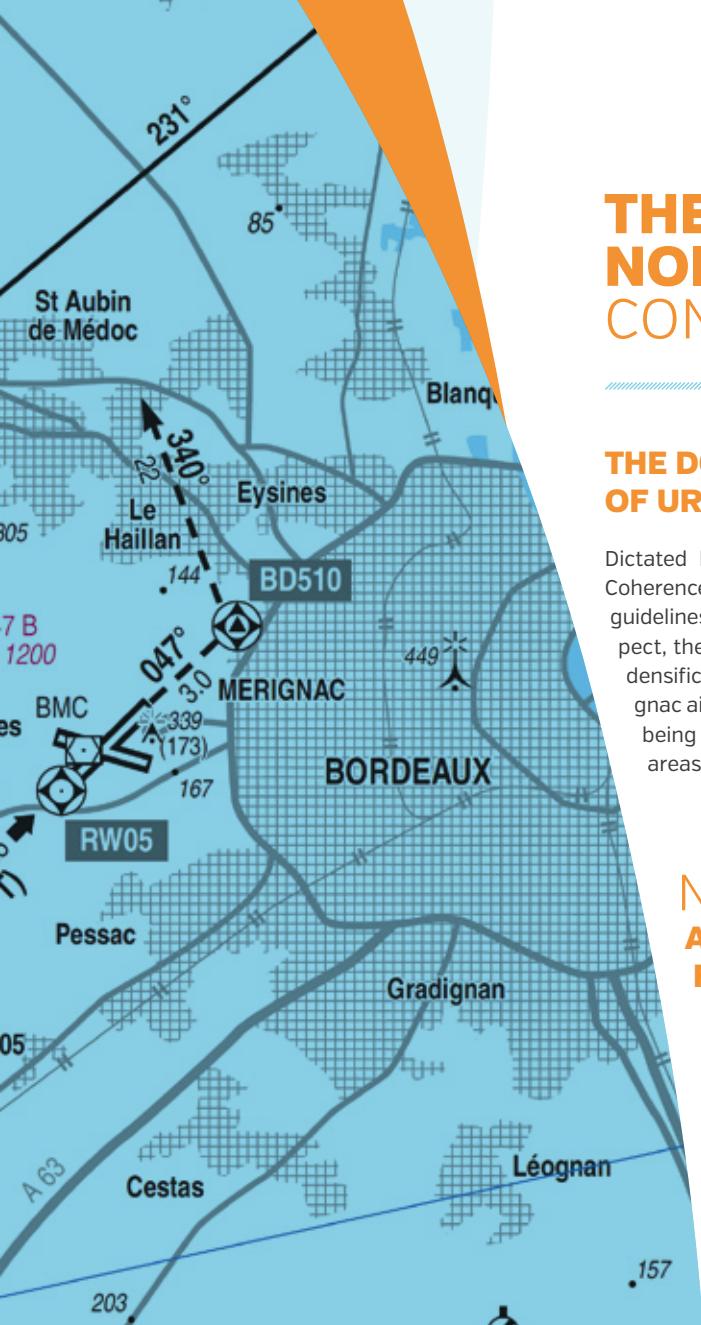
The ACNUSA has approved the new methodological guide on air traffic impact assessments [ATIA] published by the DGAC [DSNA]. Such assessments are set in motion when Instrument Flight Rules [IFRs] are created or modified. The ATIA guide specifies the applicable assessment protocols according to the environmental context and occupancy of the airport concerned. The next development, planned in 2016, will include a special

section on fuel consumption and carbon emissions [CO₂] methods and analytical tools.

Furthermore, since 2015 the DSNA has also assessed the environmental impact [CO₂] of modifications to “en-route” flight paths [i.e. outside airspaces provided for traffic to and from airfields].

50 %
Is the reduction in carbon emissions by 2050 compared with 2005, according to the target set by the International Air Transport Association (IATA).





THE FIGHT AGAINST NOISE POLLUTION CONVERGING EFFORTS

THE DGAC AT THE HEART OF URBAN TRANSFORMATIONS

Dictated by the accelerating growth of major metropolises, revisions to "Territorial Coherence Schemes" (SCoT) follow on from one another. These documents lay down broad guidelines for the sustainable development of territories over several decades. In this respect, the conurbation of Toulouse has factored in the issues that restrictions on urban densification raise for air transport in the north and south airspaces of Toulouse-Blagnac airport. An observatory of planning permissions appended to the NEP is currently being studied with a view to assessing the actual control of urban development in the areas most exposed to noise. Focus groups will meet in 2016 to set it up.

NEPs, A BALANCED AND EFFECTIVE TOOL FOR CONTROLLED URBAN PLANNING

Noise exposure plans (NEPs) limit construction around airfields to prevent new populations from being exposed to aircraft noise. NEPs are governed by a preventive paradigm. They take into account all short-, medium- and long-term assumptions about development and use of airfields.

They result in a cartographic document with two to four noise zones (zones A and B for loud noise, zone C for moderate noise and zone D for low noise), delimited by curves corresponding to values (expressed in dB(A)) of the Lden (Level day, evening, night) noise index.

Only noise zones A, B and C impose restrictions on land use in the vicinity of the airfield concerned. Zone D, mandatory

on major airfields but optional on others, does not impose any construction limitations; it does however impose reinforced soundproofing on buildings.

In 2015, the airfields of Chartres-Métropole, Bourges, Chalon-Champforgeuil, Tarbes-Lourdes-Pyrénées, Orléans-Bricy, Troyes-Barbey and Saint-Rambert-d'Albon were provided with a NEP or had theirs revised. The draft NEP for the Paris-Bourget airfield has been approved by the Consultative Commission for the Environment (CCE) and the ACNUSA. It should be adopted by the end of 2016, after a public inquiry.

The noise in the environment prevention plan (PPBE) is appended to the NEP. The PPBES for Paris CDG and Le Bourget airports were the subject of a public consultation that took place between February and April 2015.

RNAV VISUAL APPROACHES: A FIRST AT BORDEAUX MÉRIGNAC!

The number of passengers at Bordeaux-Mérignac airport keeps increasing (up 7.7 % in 2015). Supplementing the "low noise" procedures published in the aeronautical information publication (AIP) "Information Aéronautique", a satellite-aided visual approach procedure has been introduced on runway 05. Between September and October, more than 120 RNAV Visuals were flown with the help of Air France. This has significantly reduced flight times and dispersion of flight paths at low altitude. It has also furthered understanding of implementation conditions for these procedures and has provided input for international work on the subject.



FROM THE ATIA TO THE PUBLIC INQUIRY

When changes in air traffic significantly modify overflights of municipalities bordering airports, the residents are consulted as part of a public inquiry provided for by decree. In order to make the public inquiry more relevant, the DSNA has suggested to the Air Transport Authority (DTA) that it lay down new criteria for activating the procedure. Its proposals are being considered and in 2016 will extend to the method for selecting municipalities to be included in public inquiries.



A FOCUS GROUP FOR NIGHT FLIGHTS AT CDG

The focus group on night flights at Paris-Charles de Gaulle airport continued its work until June 2015 under the chairmanship of prefect Régis Guyot.

The prefect of the Île-de-France region set up this focus group in 2014 to address the pressing demands of associations and elected representatives sitting on the airfield's CCE, with a remit to identify concrete measures to take to reduce night flight nuisance.

Guyot submitted his report to the prefect of the Île-de-France region in November 2015. The report was then presented to

Paris-Charles de Gaulle airport's CCE on December 18, 2015. Its main recommendations are as follows:

> **widespread implementation of continuous descents** relating to the implementation of new "closed RNAV" flight paths between 12:30 a.m. and 5:00 a.m. [the only time slot in which air traffic control can standardize continuous descents];

> **for one-week periods**, scheduled alternation of the closure of each of the dipole antennas for maintenance, along with advance notification of local residents;

> **improved operation of the "ACNUSA" penalties system;**

> **annual assessment of flight punctuality;**

> **identification of reasons for near-night flights.**

A monitoring committee has been set up to oversee the implementation of the proposals.





NOISE ABATEMENT ASSESSMENT

The ORTOL project (named after the point of convergence of aircraft on approach), which, as part of the European SESAR program, has been the subject of an extensive campaign of measurements around Orly Airport, at 11 observation sites. This has underscored the acoustic gains achieved by the new procedure and has paved the way for further studies.

CALIPSO, OBJECTIVE MEASUREMENTS

The benchmark adopted by the French Civil Aviation Technical Service (STAC) laboratory for noise measurements in the area around airfields is that of a loud conversation, namely 68 decibels (value A). Values that exceed that threshold are rated B, C or D. The CALIPSO protocol (French acronym for “classification of light aircraft according to their noise performance index”) is constructed on the basis of this

objective indicator. The results of these measurements serve as a benchmark when consultations between users of an airfield and local residents are held. More than 300 light aircraft are now rated and 2000 can be through equivalence. In 2015, the STAC contributed its expertise to the DTA to adapt CALIPSO to aircraft variable-pitch propeller aircraft.

THE STAC COMES TO YOU...

Owners of light aircraft, including flying clubs, can log onto the DGAC site to register their aircraft according to their noise class. If their aircraft are not listed, their noise levels can be measured at Montargis, Mauléon or Moissac. The STAC can travel anywhere in metropolitan France where there are at least 20 aircraft that need to be evaluated. It has a new laboratory truck for that purpose.





NoisedB : **MORE AND MORE CERTIFIED AIRCRAFT**

The DGAC develops NoisedB under the aegis of the ICAO. This database contains the certified noise levels of more than 11,500 public transport aircraft. It has become an international benchmark since being put online in 2006. More than 260 aircraft were added to NoisedB in 2015.

CONSTANT REDUCTION IN SOUND ENERGY AT PARIS-CHARLES DE GAULLE

Instituted in 2003, the weighted aggregate measured indicator evaluates changes in sound energy at Paris-Charles de Gaulle airport. Calculated from noise measurements taken by a network of eight stations aligned with the center of the runways, this indicator measures sound energy for take-offs and landings over a one-year period. It must not exceed 100. The DGAC presented the value of the index recorded for 2015 in July 2016. It has been falling constantly compared with the previous year and was 71.6 in 2015 [against 76.9 in 2013 and 75.5 in 2014]. Never has the reduction been so significant and the sound level so low.

A NEW GENERATION OF SUPERSONIC AIRCRAFT

In 2015 the ICAO continued developing a noise standard for supersonic aircraft. This is about preparing for the advent of next generation aircraft by 2025.

REDUCING THE EFFECTS OF ENVIRONMENTAL NUISANCE

Air transport keeps adapting and innovating to reduce its environmental footprint, and its acoustic footprint in particular. While encouraging technical progress, the DGAC controls the application of regulations, supports the modernization of flying clubs and gets involved with local residents. The results are more than perceptible.

AN ALL-ROUND VIEW

REGULATIONS: LESS NOISE!

Noise prevention can entail restrictive measures. No fewer than thirteen airports and one heliport (Issy-les-Moulineaux) in France are subject to environmental orders aimed at reducing the noise nuisance caused by their heavy traffic. In 2015, for the airfields in the jurisdiction of the DSAC Nord alone, 239 fines were issued for breaches of these rules and reported to the ACNUSA. On runways, the excessive use of auxiliary power units (APUs) was the subject of 7 infraction procedures.

40 000

The amount in euros of fines that can be imposed by the ACNUSA on airlines that breach airport operating restrictions, more particularly at night

NANTES-ATLANTIQUE EFFECTIVE NOISE ABATEMENT MEASURES

The increase in traffic at Nantes-Atlantique requires particular vigilance. To ensure that airlines follow current environmental procedures, a process that makes it possible to identify aircraft that deviate from their nominal flight path has been developed at Nantes-Atlantique, in collaboration with the SNA West, following the example of Toulouse, Marseille and Lyon. The control and detection process is based on the requirement to make a turn at 400 feet to avoid flying over the center of Nantes. A study of balanced approaches is also being carried out. It aims to limit night-time use of airports by the noisiest aircraft: at present, only aircraft having turbojet engines with a cumulative margin of more than 8 EPNdB (Effective Perceived Noise level in decibels) can use the airport at night.

The restriction order applying to Cannes-Mandelieu airport was modified in 2015. The noisiest aircraft are now banned there; in exchange, the maximum weight of aircraft allowed to land or take off has been increased from 22 to 35 tons.



NOISE AND EMISSIONS TOULOUSE-BLAGNAC CHOOSES THE PACKAGE OF PROCEDURES

Pilots are offered the satellite departure procedure, which avoids the overflight of city centers. The SNA South and users are working together to promote its use.

After several experimental phases, the continuous descent procedures between 10:00 p.m. and 6:00 a.m. were being followed by 55 % of traffic in early 2015.

In accordance with the recommendations of best practices code, the use of APUs is limited. All "contact" loading stands/gate positions are equipped with 400 Hz.



AIR QUALITY: ASSESS AND ACT

POLLUTION PEAKS: COMBINED SOLUTIONS

The DGAC's national action plan for tackling prolonged pollution peaks was rolled out for the first time in March 2014 in the Île-de-France and Rhône-Alpes regions. Stricter controls of the use of APUs, a ban on engine testing and on aerodrome circling for training purposes have been applied. The measures in this plan supplement those recommended by the interministerial order of March 26, 2014. This national plan was not applied in 2015, as the short duration of pollution episodes did not warrant it. The updated plan, which aims to promote the plan's new measures,

was launched at the end of 2015. Apart from the cyclical measures resulting from the national action plan, the solution envisages global and long-term efforts, notably including improved airport infrastructures and renewed fleets. Engine manufacturers are not the only ones making advances, as Safran and WheelTug, for instance, are developing electric taxiing systems. In the long term, innovation is the greatest ally of environmental advances.

AN AIR QUALITY PRIMER

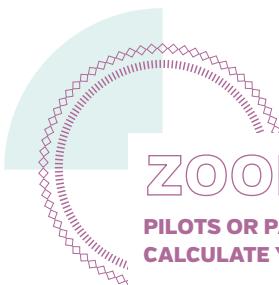
The STAC's Planning, Capacity & Environment department cooperates with airfield managers and the DGAC's services engaged in an environmental process. Its new guide proposes guidelines and recommendations for running an air quality measurement campaign on an airport. In the absence of obligations at the national level, the regulations based on European directive 2008/50/EC apply. The maximum values it specifies must be complied with.



FIGHTING CO₂ EMISSIONS

CO₂ EMISSIONS IN "3D"

In 2015 the DSNA continues its process of measuring and monitoring the energy efficiency of flights. To that end it uses a "3D" indicator combining the horizontal and vertical aspects of each flight path. The result is expressed as a quantity and a percentage of excess fuel consumption, and thus of excess gas emissions. The DSNA has set itself annual targets for improving this indicator. The DSNA has also finalized its contribution to the "FABEC HFE" project for calculating horizontal performance indicators. An invitation to go further, why not by proposing a support service for the FABEC's operational projects in 2016 or 2017...



ZOOM

PILOTS OR PASSENGERS, CALCULATE YOUR EMISSIONS!

On a flight from Paris to New-York, roughly 400 liters of kerosene are used per passenger.

The fuel consumption and carbon emissions calculator provided by the DGAC can be consulted at the following URL:

<http://eco-calculeur.aviation-civile.gouv.fr/>

The calculator looks likely to evolve: article 67 of the energy transition law imposes the provision of information on emissions of all greenhouse gases.

CARBON ACCREDITATION AIRPORTS IN THE FRONT LINE

For an airport operator, managing greenhouse gases consists in achieving total compensation for its carbon footprint in stages. A target that imposes a reduction of indirect emissions generated by airport activity, but also of internal emissions generated by the operation of platforms. From this perspective, the Paris-Charles de Gaulle, Paris-Orly, Paris-le Bourget, Nice-Côte d'Azur, Lyon-Saint Exupéry, Marseille-Provence, Toulouse-Blagnac and Cannes-Mandelieu airports, which were the first to sign up to the Airport Carbon Accreditation (ACA) program, were joined in 2015 by 11 new operators (La Rochelle, Nantes, Rennes, Clermont-Ferrand, Grenoble, Chambéry, Dinard, Quimper, Poitiers, Saint-Nazaire and Ancenis). The ACA program issues 4 successive accreditation stages:

1. Mapping of emissions
2. Reduction of direct emissions
3. Optimization of indirect emissions
4. Carbon neutrality

The cooperation of interested parties enabled ADP to achieve ACA level 3 in 2012. The new biomass power plant at Paris-Charles de Gaulle alone saves 18,000 tons of carbon a year while reducing the cost of energy. Geothermics, energy-saving lighting systems, solar panels, fleets of electric vehicles, shorter taxiing times, limited use of APUs, the construction of intermodal stations and traffic plans for enterprise zones are now part of an airport ecosystem.



ZOOM
Since June 2015, ADP has been the first major airport group to have an ISO-certified energy management system [ISO 50001]. The group has integrated a sustainable development and corporate social responsibility policy into its business plan in order to become a European benchmark in this field.

THE CHOICE OF LOCAL CONSULTATIONS

CONSULTATIVE COMMISSIONS FOR THE ENVIRONMENT THE COLLECTIVE SPIRIT WINS OUT

Instituted by the law of July 11, 1985, CCEs must be consulted regarding any major questions concerning the development or operation of any airfield that could have an environmental impact, like a modification of flight paths, the adoption or revision of a noise exposure plan, or the introduction of "low noise" time slots. They also draw up environmental or sustainable development charters, and engage in new lines of thinking and experiments, like those conducted by the focus groups on night flights at Paris-Charles de Gaulle.

In 2015, it was in a CCE session that the difficulties of introducing the new avoidance procedure for the north-west districts of Marseille were explained to local residents before a second experiment on a simulator was decided. The Toulouse-Blagnac CCE also raised a variety of environment-related subjects – including reduction in night flights, a new route to China, development of halls A and D, widening the airport's access roads – related to the rapid development of the Toulouse metropolis, which has led the airport to anticipate an increase in traffic (9.6 million passengers a year by 2020 against 7.7 today).

40 %

The reduction in flights in the middle of the night in Toulouse (between midnight and 6:00 a.m.), compared with 2010

Source: Toulouse-Blagnac Airport CCE, December 16, 2015.

Three equivalent boards (local residents and environmental protection associations, local authorities and aeronautical professions) sit on them alongside the government. CCEs are the preferred place for discussions and dialog between the different stakeholders. Their existence also furthers transparency in public awareness campaigns.

LOCAL RESIDENTS AND OPERATORS TOWARDS JOINT ENVIRONMENTAL MANAGEMENT

A national Collaborative Environmental Management (CEM) protocol bringing together local residents and air operators was signed on June 19, 2015 at the 51st International Paris Air Show. The aim is to bring together the various stakeholders in an informal setting, in order to encourage information sharing and the search for concrete solutions to nationwide environmental issues. A CEM platform has been set up for this purpose, made up of:

- > **The Union Française Contre les Nuisances d'Aéronefs (UFCNA)**
- > **The Fédération Nationale de l'Aviation Marchande (FNAM)**
- > **The Union des Aéroports Français (UAF)**
- > **The DGAC/DSNA**

The platform convenes twice a year to deal with subjects such as procedures (departure and arrival, satellite-assisted navigation, taxiing, piloting) or new

environmental management tools for air traffic (SESAR program, emission standards and measurements). The approach is new in Europe. It aims to provide a better understanding of everyone's expectations, constraints and demands regarding the reduction of air transport's environmental footprint.



ZOOM

BORDEAUX-MÉRIGNAC FEWER ENVIRONMENT-RELATED COMPLAINTS

Environmental breaches in the area around Bordeaux-Mérignac airport resulted in 5 fines in 2015. For the record, 11 fines were issued in 2013 and 6 in 2014. This downward trend shows that the published procedures in place are now being followed by airlines.

THE MAISONS DE L'ENVIRONNEMENT (ENVIRONMENTAL CENTERS) WELCOME YOU

Run by Aéroports de Paris, the "Maisons de l'environnement" of Paris-Orly and Paris-Charles de Gaulle bring together former air traffic controllers and sustainable development specialists. On Mondays and Wednesdays the public can get concrete information there on the nature and frequency of overflights, flight paths and air traffic regulation in the

Île-de-France region. The controllers put their experience and knowledge to good use to answer any questions related to the management of air traffic in Île-de-France. The Paris-Charles de Gaulle "Maison de l'environnement et du développement durable" will move to the new head office of Aéroports de Paris at the end of 2016.

QUIETER A320S

In 2012 the DGAC noted that A320 aircraft emitted a whistling noise around the approach path. Airbus has since developed a technical solution that suppresses this noise, caused by cylindrical cavities situated under the wings. The cavities behave like panpipes; the airflow enters them and creates a resonance. The solution consists of placing a deflector in front of the cavities. Air France has swiftly initiated a program to equip its fleet,

which will be completed at the end of 2016. Lufthansa, Easyjet and British Airways have also initiated this process. Acoustic measurements taken by the DGAC near Bordeaux-Mérignac airport reveal a significant noise reduction, in the order of 6 decibels at 23 km from the runway threshold.

AN AERIAL GÉOPORTAIL

Familiar to hiking enthusiasts, the Géoportail application also concerns the air sector. With its new online application ENTRACT [Environnement Trajectoires Aéronautiques Caractéristiques], from 2016 the DSNA will publish all relevant information on flight paths and overflights of local residents. Accessible on the site of the Ministry for the Environment, Energy and Sea, ENTRACT will cover the 11 main French airports.

On Géoportail, the DGAC also offers the public several documents concerning noise mapping or alternate airway plans around airfields. It features all current noise nuisance plans (PGS), as well as many of the noise exposure plans and alternate airway plans, the others being currently scanned by the French National Airport Engineering Service.





NOISE ABATEMENT: ADVANCES AND OBSTACLES

SOUNDPROOFING AIDS FOR LOCAL RESIDENTS

The local residents living near the 11 main French airfields can, under certain conditions, benefit from aids to fund the soundproofing of their homes. The areas eligible for these aids are listed in a noise nuisance plan, based on estimated traffic, applicable air traffic procedures and infrastructures that will come into service in the year following

the publication of the government order approving the plan. In practice, the noise nuisance plan consists of a cartographic document showing three noise zones [I, II and III], demarcated like the noise exposure plan by curves indicating noise index values L_{den} .

DID YOU KNOW?

THE LDEN INDICATOR IS USED TO MAP NOISE AROUND AIRFIELDS AND DRAW UP A NOISE NUISANCE PLAN, NOISE EXPOSURE PLAN OR STRATEGIC NOISE MAPS.

THIS OVERALL NOISE LEVEL INDICATOR DURING THE DAY, EVENING AND AT NIGHT IS USED TO QUALIFY THE DISCOMFORT CAUSED BY NOISE EXPOSURE.

IT IS CALCULATED USING THE

« L_{DAY} », « $L_{EVENING}$ », « L_{NIGHT} »,

**INDICATORS IN THE 6:00 A.M. - 6:00 P.M.,
6:00 P.M. - 10:00 P.M. AND 10:00 P.M. - 6:00 A.M. TIME SLOTS.**

**A +5 dB(A) WEIGHTING IS APPLIED IN THE EVENING AND
+10 dB(A) AT NIGHT TO FACTOR IN GREATER SENSITIVITY TO
NOISE DURING THESE TIME SLOTS.**

TNSA THE POLLUTER-PAYS PRINCIPLE SERVING LOCAL RESIDENTS

The scheme for soundproofing homes around main airfields is fully funded by the tax on air noise nuisance [TNSA]. Collected by the operator of the airfield concerned, it is paid

by airlines for each take-off of over 2 tons on the polluter-pays principle. The noisiest aircraft flying at the most bothersome times are taxed the most. The TSNA mechanism also

imposes a virtuous circle: while improving the soundproofing of homes, it also offers aircraft operators an incentive to modernize their fleet.

¹ Basel-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 and Toulouse-Blagnac.

² With the exception of the Basel-Mulhouse airfield, where a noise fee applies in lieu of the TNSA.

ADDRESSING DWINDLING RESOURCES

As the home soundproofing scheme is experiencing funding problems, especially in Île-de-France, due to dwindling TNSA income, combined with a sharp rise in expenditure and a cap on the TNSA since the initial Finance Act for 2014, certain measures were taken in 2015 to adapt and sustain this scheme:

- > on January 1st, 2015, the provisions of the French Code of Environmental Law applicable prior to 2012 were reintroduced, namely differentiated amounts of aid: for individual applications, 80 % in general, which can be increased to 100 % subject to means-testing; concerning group operations, 100 % for soundproofing studies and 95 % for soundproofing works;
- > on April 1st, 2015, modification of TNSA tariffs to allocate additional income to Île-de-France while trying to maintain the situation in the provinces as much as possible; then a €0 rate on November 1st, 2015, for the tariff at the Lyon-Saint Exupéry airfield, the soundproofing being completed in 2016 and the operator having enough cash to meet the planned expenses;

> at the three airfields in Île-de-France, implementation of the aid plan on the basis of the instruction of December 12, 2014 setting the framework for an annual plan according to the following prioritization criteria: level of exposure to noise, grouped operations, age of the application;

> a follow-up study by the general council for the environment and sustainable development on the linking of soundproofing and heat insulation measures.



FLYING CLUBS AIDS SUBJECT TO CONDITIONS

The DGAC grants operating subsidies to approved flying clubs that apply for them. Such aids for light aviation are granted as a priority for noise abatement measures such as exhaust mufflers, three-blade propellers, winches, etc. They are subject to the flying club undertaking to classify the aircraft concerned according to CALIPSO criteria.

A budget of 90,000 euros has been shared out among the different DSAC/IR under the National Consultation on Aids for Light Aviation [CNAAL]. Thirty or so flying clubs have applied to have their aircraft fitted with three-blade propellers and exhaust mufflers. The equipment list includes a new generation lighter-than-air aircraft burner.



PREPARING FOR THE FUTURE

The announced increase in air traffic, the digitizing of aircraft construction as well as air traffic management and the convergence of European work on moving towards a single sky lead the authorities and manufacturers in the air sector to support and engage in ever more innovative programs. Environmental protection is one of the aspects driving forthcoming technical and operational revolutions.



THE GREAT LEAP FORWARD OF EUROPEAN RESEARCH

CLEAN SKY: ACT II

The DGAC is a member of the group of State representatives in the biggest European aeronautics research program. Nearly 800 manufacturers, research organizations and SMEs have joined an unprecedented public-private partnership aimed to rapidly develop technologies essential to clean, innovative and competitive aviation. The first Clean Sky cycle had made significant advances in integrated systems and propulsion (turbofan with unducted fan, high by-pass engine). So the European Commission very logically launched the Clean Sky 2 program in July 2014: ecodesign, fixed wings, hybrid helicopters, cockpits, fuselages of the future, electric aircraft, and more. The development of technological demonstrators also extends to "small aviation" (aircraft with up to 19 seats).



DID YOU KNOW?

A ROTORCRAFT IS AN AIRCRAFT EQUIPPED WITH ONE OR MORE ROTORS, CONSISTING OF ROTOR BLADES REVOLVING AROUND A MAST. THE HELICOPTER IS THE BEST-KNOWN ROTORCRAFT.



ZOOM

AN OPEN ROTOR, WHY?

In July 2015 the Safran group tested an open rotor designed for future generations of single-aisle aircraft. Developed within the framework of the Clean Sky program, the project is based on a revolutionary architecture comprising a conventional gas generator and a turbine driving counter-rotating propellers. With no shroud, more air can be stirred, thereby cutting fuel consumption and CO₂ emissions by 30 %. It should also reduce noise levels by 10 decibels compared with the current generation of engines. Flight tests on Airbus A340 are expected in 2019.



THE DAY AFTER TOMORROW, THE COLLABORATIVE SKY

After years of development, and while the number of aircraft in flight keeps increasing, the SESAR project will soon take the European sky into the digital age. But before transforming aircraft into connected objects communicating with one another and ensuring smoother air traffic, manufacturers still have many milestones to reach. Because not everything relies on improved on-board systems. Smooth operation of the "collaborative sky" presupposes modernizing and synchronizing all the systems and protocols used by air traffic control centers. For controllers, this will mean changing from controlling a point on a screen to controlling a flight path. All-electronic environments (touch screens, VHF communications replaced with electronic data interchange, automatic aircraft conflict detection systems,

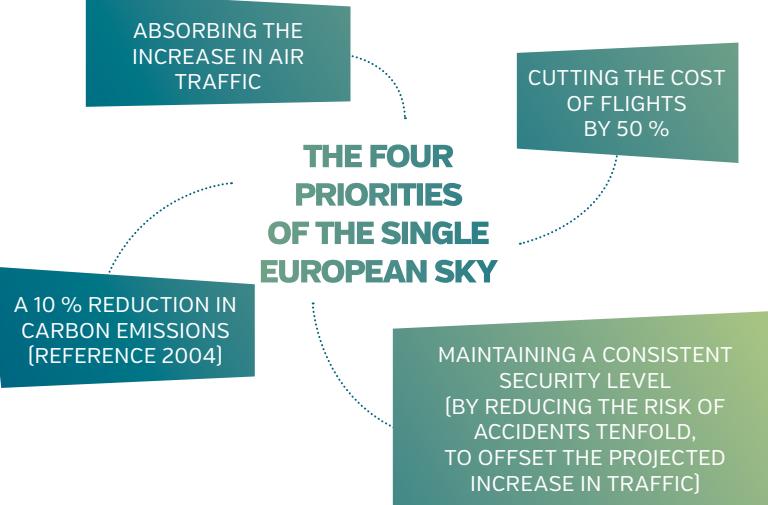
etc.), automation, the dematerialization of air control (sector-less control towers, virtual control centers) are just some of the functions on the drawing board. Thanks to artificial intelligence and satellite links, "4D" flights are about to transform the established parameters of air navigation and control.

The challenge is both technical and financial. The initial deployment phase alone represents a budget of 6 billion euros until 2025. Certification stages specific to the air sector imply that deployment will take a long time. One can anticipate the gains of such a revolution in environmental terms. Simpler and more direct flight paths (the free route concept) will cut fuel consumption, flight times and emissions. The development of precise

satellite-aided navigation options will minimize the acoustic impact on populations overflown. In spite of the hurdles that still have to be overcome, such as the securing of systems and different countries abandoning a form of sovereignty over air control, initiatives comparable to SESAR are on the increase in various parts of the world (United States, Australia and Russia). From a single sky, we will soon have to move towards an open, shared and jointly operated sky. The DSNA publishes a regular letter on the progress of the SESAR project.

A MATTER OF SYNCHRONIZATION

"4D" flight control factors in space, but also the time needed to reach a predefined waypoint. In addition to adjusting flight paths in real time, this new approach should mark the end of black boxes.



SUPPORTING THE AERONAUTICAL INDUSTRY

THE FACTORY OF THE FUTURE TAKES SHAPE

In the first four months of 2016 two series of R&D projects were formalized by contract with aeronautics manufacturers within the framework of the PIA 2: on-board systems and advanced functions [SEFA, 2 agreements], and the aeronautical factory of the future [6 agreements]. The sudden emergence of 3D printing and the digitizing of assembly lines do not only serve to improve output rates and the competitiveness of French companies, these new design modes determine the environmental performance of the next generation of aircraft.

On Airbus' Saint-Nazaire site, collaborative robots - or cobots - are assigned to low value-added tasks, thereby allowing operators to concentrate on their core business. In Béarn, Safran's subsidiary Turbomeca, specialized in helicopter turbines, has gained a decisive lead in the design and organization of production. Albeit gradual, this technological breakthrough will free the industry from the technological processes of the 60s and 70s.

COMPOSITE MATERIALS: MOVING EVER FURTHER

The DGAC backs research programs in the field of materials and structures in order to reduce the weight and consumption of aircraft. Composite materials, which are lighter and have equivalent mechanical properties to metal parts, are increasingly being used. They make up 53 % of the materials in the A350, i.e. weight savings of 15 tons compared with metal structures.



10 to 15 %

The percentage of sales revenue that French aeronautics companies reinvest in R&D

ZOOM

WHEN ROBOTS CANNOT MANAGE WITHOUT PEOPLE

Cobots take charge of tedious and repetitive operations that may pose a health risk to technicians and qualified craftsmen in the aeronautical industry. They often take the form of a mechanical arm and move in the same space as the operator.





TOWARDS GREENER AIRFIELDS

VULCLIM ADAPTING AIRFIELDS TO CLIMATE CHANGE

How to assess the vulnerability of airfields to climate change? In 2015 the STAC developed an analytical method based on the scenarios of the Intergovernmental Panel on Climate Change (IPCC) in cooperation with airport operators. It factors in flooding, storms, smoke from forest fires, and more. Nice-Côte d'Azur is thus the first airfield to have a vulnerability diagnosis. An assessment tool will soon be offered to airport operators.



THE CÔTE D'AZUR'S AIRPORTS TOWARDS AN ECOLOGICAL CONVERSION WITH NO COMPROMISES

The Aéroports de la Côte d'Azur (ACA) group, which operates the Nice, Cannes-Mandelieu and Saint-Tropez airports, has undertaken to achieve the highest level of Airport Carbon Accreditation by 2018 and reduce the carbon emissions of its airport infrastructures by 50 % per passenger by 2020. Nice-Côte d'Azur airport has been using 100 % green energy [hydroelectric power] since January 1st, 2015. In 2016 this will be extended to the two other airports managed by ACA.

ALTERNATIVE FUELS: A LITTLE MORE EFFORT!

The successful round-the-world flight of the Solar Impulse should not overshadow the considerable potential of biofuels. Originating from the biomass or renewable sources, biofuels incorporable into kerosene are a good way of reducing carbon and fine particle emissions. They are also paving the way for alternative supplies, thereby reducing Europe's energy dependence. Three biofuels were certified for commercial use in 2015:

- > **Biomass To Liquid (BTL), converted by the Fischer-Tropsch process (50 % incorporation)**
- > **Hydrotreated Esters and Fatty Acids (HEFA) derived from animal or plant fats (50 % incorporation)**
- > **The Direct Sugar to Hydro Carbons (DSHC) chain, 10 % incorporation (Total-Amyris's Farnesane fuel)**

To be used on existing aircraft, their properties must be comparable to those of kerosene. Their efficiency and production costs also need to be improved. An inter-ministerial mission underscored the obstacles facing the biofuel sector in 2015. The lack of farmland and natural resources used to produce biofuels is curbing their development. However, while biofuel for the motor vehicle industry faces short-term difficulties due to the vast number of vehicles to supply, the aeronautics sector could more legitimately make use of this technology. Experiments have produced encouraging results: according to ONERA, bio-kerosene fuels could represent 45 % of consumption by 2050.



ELECTRIC AND HYBRID AIRCRAFT AFTER THE E-FAN

Designed for training beginner pilots and towing gliders, the 100 % electric E-Fan aircraft completed its first Channel crossing on July 10, 2015. Presented at the France pavilion during COP21, its industrial development is backed by the State as part of its program of investments for the future. Its line production is being set up in Pau. Airbus has set itself an ambitious yet realistic target: after the hybrid E-Fan with 4 seats, the group hopes to fly a 100-seater aircraft by 2030. Biofuels could then assist electric power.



GLOSSARY

A

- ACA:** Aéroports de la Côte d'Azur
- ACA:** Airport Carbon Accreditation
- ACNUSA:** French Airport Noise Control Authority
- ADEME:** French Environment and Energy Management Agency
- AIP:** Aeronautical Information Publications
- APU:** Auxiliary Power Unit
- ATAG:** Air Transport Action Group

B

- BTL:** Biomass To Liquid (*biofuels certified in 2015 and processed using the Fischer-Tropsch process*)

C

- CAEP:** Committee on Aviation Environmental Protection
- CALIPSO:** Classification of light aircraft according to their sound performance index
- CCE:** Environmental Consultative Committee
- CEM:** Collaborative Environmental Management
- CNAAL:** National consultation on light aircraft aids
- CO:** Carbon monoxide
- COP21:** 2015 Paris Climate Change Conference
- CORAC:** Civil Aeronautic Research Council
- COV:** Volatile organic compounds

D

- DGAC:** French Civil Aviation Authority
- DSAC:** Civil Aviation Safety authority
- DSHC [the subsidiary]:** Direct Sugar to Hydro Carbons (*Sector specialising in hydrocarbons aiming at up to 10 %*)
- DSNA:** Air Navigation Service Provider in France
- DTA:** French air transport directorate

E

- E-FAN:** All-electric aircraft concept
- EICA:** Air traffic impact studies
- ENTRACT:** Characteristic aeronautical path environment

F

- FABEC:** Functional Airspace Block Europe Central
- FNAM:** National Commercial Aviation Federation

G

- GIEC:** Intergovernmental Panel on Climate Change
- GIFAS:** French Aerospace Industries Association
- GMBM:** Global emissions compensation scheme

H

- HC:** Unburned hydrocarbons
- HEFA:** Hydrotreated Esters and Fatty Acids (*biofuels certified in 2015 and derived from animal or vegetable oils*)
- HFE:** Horizontal Flight Efficiency

ICAO: International Civil Aviation Organization

IFR: Instrument flight rules

IGMP: Global weighted measured indicator

L

- Lden:** Level day, evening, night (*noise ratio*)
- LTO:** Landing Take Off (*standard take-off cycle*)

M

- MBM:** Market Based Measures
- MRV:** Monitoring Reporting Verification (*System for the Monitoring, Reporting and Verification of emissions by airlines*)

N

- NoisedB:** ICAO database of the certified noise levels of aircraft
- NOX:** Nitrogen oxide

O

- ONERA:** National Office of Aeronautical Studies and Research
- ORTOL:** The name of a waypoint used by approaching aircraft

P

- PEB:** Noise Exposure Plan
- PGS:** Noise Disturbance Plan
- PPBE:** Environmental Noise Prevention Plan
- PSA:** Aviation Easements Plan

R

- RNAV visual:** Satellite-assisted visual approach procedure

S

- SCoT:** Territorial coherence schemes
- SEAC PF:** State Civil Aviation Department in French Polynesia
- SEFA:** Systèmes embarqués et fonctionnalités avancées
- SESAR:** Single European Sky ATM Research (*European research program*)
- SNA:** Air Navigation Service
- SO₂:** Sulphur dioxide
- STAC:** Civil Aviation Technical Department

T

- TNSA:** Tax on aircraft noise

U

- UAF:** Union of French airports
- UFCNA:** French union against aircraft noise



ENVIRONMENTAL REPORT

2015

French Civil Aviation Authority (DGAC)

**A publication
of the French
Civil Aviation Authority**

Ministry for environment,
energy and sea

50, rue Henry-Farman
75720 Paris cedex 15

Tel.: 01 58 09 43 21
Fax: 01 58 09 35 35

Editorial Coordination:
DTA – Bureau de l'environnement

Design and Production:
Atelier SPRLVRS
97 rue d'Aboukir - 75002 Paris
Tél. : 01 83 64 76 74
www.sprlvrs.com

Editorial:
Béatrice Grumler, Édouard Durand, Chloé Strack

Picture credits:
Cover P. PIGEYRE pour Airbus SAS ;
Pages 10, 15, 17, 26, 28: Gwen LE BRAS pour
Aéroports de Paris SA ; Page 30: Aéroports de la
Côte d'Azur / J. KELAGOPIAN ; Pages 4, 5, 6, 27, 29:
H. GOUSSÉ pour Airbus SAS ; Pages 2, 3:
J.V. REYMONDON pour Airbus SAS ; Pages 23, 24:
P. MASCLET pour Airbus SAS ; Pages 11, 20, 34, 35:
S. RAMADIER pour Airbus SAS ; Page 18:
P. PIGEYRE pour Airbus SAS ; Page 25:
A. DOUMENJOU pour Airbus SAS ; Pages 11, 13, 14:
Airbus ; Pages 12, 16, 21: Véronique
PAUL / DGAC - STAC ; Pages 7, 29: Richard
METZGER / DGAC - STAC ; Page 22: Gabrielle
VOINOT / DGAC - STAC ; Page 20: Marie-Ange
FROISSART / DGAC - STAC ; Page 18 et 19:
Aurélie HERVÉ / DGAC - STAC ; Page 25 : Alexandre
PARINGAUX / DGAC - STAC ; Pages 16, 17, 19:
Vincent COLIN / DGAC - DSNA ; Page 9 : Sylvain
CAMBON / DGAC - DSNA ; Page 31 : Airbus,
C.BRINKMANN pour Airbus SAS; Page 8: MEEM/DICOM

Printer:
Bialec





FRENCH CIVIL AVIATION AUTHORITY [DGAC]
50, RUE HENRY-FARMAN, 75720 PARIS CEDEX 15
TEL.: 01 58 09 43 21 - FAX.: 01 58 09 35 35



www.developpement-durable.gouv.fr