ENVIRONMENTAL REPORT 2018

French Civil Aviation Authority (DGAC)

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EDITORIAL, **DIRECTOR GENERAL**

The ecological crisis impels us, year after year, to increasingly pay more attention to the environmental impacts generated by the expanding air transport sector. As a consequence, sustainable development is now an indispensable strategic pillar of civil aviation. Environmental challenges are widespread and involve both global and local issues. They must, therefore, be dealt with consistently if our actions are to be constantly more effective. The stakes may be high, but as this new report proves, they are not impossible.

The French Air Transport Convention's main 2018 event was driven by the same goal for consistent action. The "Environmental Performance" section led to thematic debates with all aviation sectors, in particular with residents, about global warming, biodiversity, noise pollution, air quality and air navigation optimization. These themes are already part of the DGAC's priority environmental actions. The Convention highlighted new solutions which need to be addressed and ensured that quality dialog between all the decision makers involved continues so that everyone actively participates in future measures.

Efforts to reduce noise pollution, in particular, must be further reinforced. Air quality must be given a greater priority. The impact of aviation-related activity on human health must be better assessed. The acceptability of air transport depends on these actions.

The fight against global warming is this century's greatest issue; civil aviation intends to play its full part in meeting this challenge. In 2016, the ICAO Assembly voted for CORSIA, an emissions offsetting scheme to attain carbon-neutral growth emissions in global civil aviation as of 2021. The scheme is making significant headway. I would especially like to draw attention to the work carried out by our French ICAO specialists, who decisively contribute to defining the latest technical regulations, and their efforts to support numerous French-speaking States in applying CORSIA rules.

Whilst the European regulations for CORSIA were being established, French airlines agreed to cooperate and ensure the success of the offsetting scheme by anticipating their legal obligations to start monitoring their CO_2 emissions.

France is a leading country in the aeronautic sector. Ongoing research and development will enable technological solutions to be developed for sustainable aviation. The French Council for Civil Aeronautics Research, supported by the DGAC, launched a range of energy transition actions in 2018. These actions will develop aircraft energy efficiency levels and generate the first research on future propulsion systems. The Commitment to Green Growth for the implementation of sustainable biofuels in France and discussions about a governmental road map outlining the ambition and strategy in this area are proof of the entire industrial sector's combined efforts to reduce aviation carbon emissions.

The aviation sector is stepping up its efforts to preserve biodiversity, given that one million living species could soon become extinct because of human activities. For a long time in France, airport biodiversity was considered incompatible with airport security; now, it is thought of as an ally in the fight against animal risks, provided that the model is changed and new practices adopted. This calls for a concrete shift in airport culture. I am certain that, in several years' time, a handful of pioneering airports in biodiversity issues will develop protocols, that these will quickly become an example and that protecting biodiversity will become the norm for all French airports.

Sustained growth in global air traffic attests to our societies' urgent need for this mode of transport. More than ever, air transport contributes, and I quote here the introduction to the Chicago Convention signed in 1944 under the aegis of the United Nations, in "creating and preserving friendship and understanding among the nations and peoples of the world". This growth will last if it is able to adapt to current and future constraints and if it meets the new expectations of our societies and the values which transcend them. Environmental issues are a main concern for our societies and convince us that civil aviation's future will be built on its sustainable development. I am confident that we will be able to meet this challenge.

Patrick Gandil,
Director General of Civil Aviation

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2018 **REVIEW**

The gradual implementation of the Carbon Offsetting and Reduction Scheme (CORSIA) is a constructive action for civil aviation and a manifestation towards global industry. Between March and September 2018, the Air Transport Convention's work was carried out within this particularly promising international context. The DGAC outlined regulatory, technological and operational perspectives such as biofuels, noise pollution and the development of Nantes-Atlantique airport.

THE AIR TRANSPORT CONVENTION
SUSTAINABLE DEVELOPMENT, A VISIONARY STRATEGY

In view of its strategic importance to the sector, the environmental acceptability of civil aviation was the main focus point of the Air Transport Convention throughout 2018.

In total, seven conferences and theme-based working groups brought together residents', environmental and professional associations, air transport federations, local politicians and authorities, transport users, researchers, and members of specialist organizations, like BruitParif and AirParif. Numerous contributions about the sector's impact on the climate and noise nuisance were published on a virtual platform which is widely available for the public.

A total of seven events dealt with the "environmental performance" pillar:

> "aviation and climate change" conference
> "airport biodiversity" conference
> two air pollution work sessions
> two noise pollution work sessions
> "operational measures to reduce the environmental impact of air navigation" conference

The most effective levers to tackle climate change, such as research, the environmental performance of aircraft, the use of sustainable biofuels for aircraft, and the CORSIA market initiative which was launched in 2019, were discussed during the "Aviation and climate change" lecture. The lecture was introduced by French Minister of Transport and ICAO Air Transport Director, Élisabeth Borne.
The biodiversity day was a reminder that there are almost 500 French airfields which are mainly covered in grassland which have been protected from urban development for many years. These semi-natural areas are often protected and shelter a wide variety of fauna and flora. The "HOP ! Biodiversité" association, amongst others, is a specialist in this area. (refer to p. 28).

The operational measures to reduce the environmental impact of air navigation lecture highlighted the constant progress reported throughout France due to the adoption of new air navigation procedures. In the coming years, these initiatives will need to be developed at national and European levels with backing from the digital transformation and an increasingly strong culture of consultation.

The Air Transport Convention assisted the preparation of the National Air Transport Strategy (SNTA). The strategy was revealed in 2019 with objectives through to 2025. Sustainable development is the SNTA's priority strategic pillar. Taking into account that the environmental performance of air transport cannot be achieved without the sector's support, but by it and with it, this perspective also greatly focuses on the technological evolution of aircraft and infrastructure. The strategy is accompanied by a €135 M government investment plan.

As the cradle of aviation, France is the second-ranked aeronautical country in the world today. The environmental course that it sets is particularly important to international aviation stakeholders as a whole.

CORSIA: **A COORDINATED ENVIRONMENTAL POLICY**

The use of new low CO_2-emission technologies, the renewal of fleets, the use of biofuels and the improvement of air navigation procedures are all necessary, yet insufficient. Which is the reason why the 38th meeting of the International Civil Aviation Organization (ICAO) adopted the Carbon Offsetting and Reduction Scheme for International Aviation, or CORSIA in 2016. In doing so, it confirmed its ambitious target of stabilizing worldwide carbon emissions from international aviation as of 2020.

CORSIA is the first worldwide CO_2 emissions offsetting scheme in an industrial sector. International flights that exceed the average level of CO_2 in 2019 and 2020 will be subject to the offsetting mechanism. A mandatory phase will begin in 2027 after an initial voluntary phase concerning the vast majority of international emissions.

The common goal of neutral growth prevents the accumulation of regional, uncoordinated or redundant measures. In 2018, operators introduced procedures and systems to collect the necessary data. Even if offsetting will only take effect after 2020, all aircraft operators have been obliged to measure the emissions produced by their international flights since January 1, 2019.

100,000
The 100,000 biofuel-powered flights barrier was broken in 2018. A performance that represents one day of worldwide traffic.

A PIVOTAL YEAR **FOR BIOFUELS**

There is a limited number of alternative energy sources available to air transport that could become operational rapidly. The development of aviation biofuels made from agricultural and forestry waste and residues, and from used food-grade oils, is a long process. But 2018 saw some significant progress, in which the DGAC was closely involved.

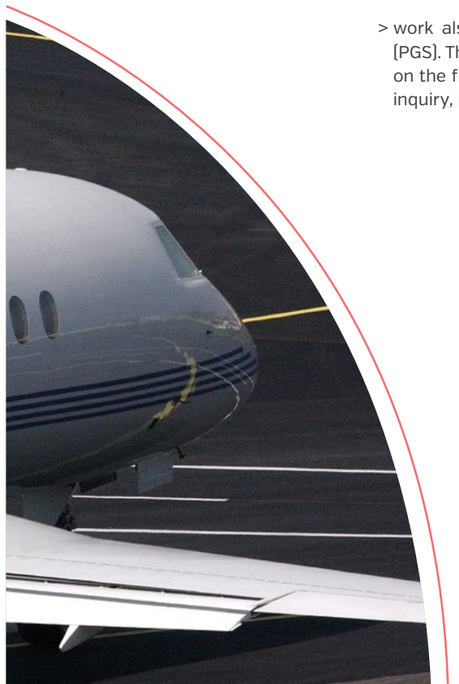
> written under the guidance of the French national alliance for the coordination of energy research (ANCRE), the report on the "Aviation biofuels road map" contained a complete review of the technologies available for the production of aviation biofuels. The document contained an assessment of the technical and economic maturity of the various solutions.

> government departments, Air France, Airbus, Safran, Suez and Total all signed the Commitment to Green Growth, which provides for the development of sustainable aviation biofuels in France. The findings of this public-private partnership will be published in June 2019.

> the Air Transport Convention also saw the announcement, by the DGAC and the General Energy and Climate Division, of France's ambition and strategy for the deployment of sustainable aviation biofuels, starting in 2020. The aim being to reach an incorporation level of 2% by 2025. At the same time, the DGAC contributed to the revision of the national low-carbon strategy, which now includes the long-term target of replacing 50% of fossil fuels with biofuels by 2050.

> the new version of the European Renewable Energy Directive applies a specific, incentive-based coefficient to the production of aviation biofuels, amongst the various types of renewable energy. The demand for sustainable biofuels is also emphasized. It also takes their high production costs into account.

> the DGAC actively participated in the ICAO's work to integrate biofuels in CORSIA.



THE DEVELOPMENT OF NANTES-ATLANTIQUE **A RESOLUTELY ENVIRONMENTAL APPROACH**

On January 17, 2018, the French government announced it decision to abandon its plans to build a new airport at Notre-Dame-des-Landes and to develop the Nantes-Atlantique platform. This decision was accompanied by a strong commitment to residents and local communities living near Nantes airport. The measures included covering up to 90%, or even 100%, of the cost of soundproofing residential housing. An airport nuisance offsetting fund will be set up.

> in the autumn, the DGAC launched and supervised the technical, legal, environmental and socio-economic studies in preparation for the future works.

> an environmental survey was launched to review the footprint of the airport and its surroundings, without waiting for the public inquiry, due to start in the spring of 2019.

> work also started on the revision of the Noise Pollution Plan (PGS). The revision of the Noise Exposure Plan (PEB) will be based on the findings of the public inquiry. It will be subject to a public inquiry, before being approved by official decree in 2021.

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INTERNATIONAL **MEASURES**

In 2018, it was Europe that led the efforts to achieve cooperation in favor of the environmental performance of air transport. Its initiatives included changes to legislation and aid for the implementation of the worldwide CORSIA CO_2 emissions offsetting scheme. The DGAC was active in both Morocco and Indonesia.

CLIMATE CHANGE
MORE STRINGENT LEGISLATION

The European Union's Emission Trading System (ETS) has been applied to industrial facilities in the European Union since 2005. It is based on the "polluter pays" principle, according to which each sector of activity has to return a quota for every metric ton of CO_2 emitted. Directive No. 2018/410 of March 14, 2018, provides for an annual reduction of 2.2% of the emission allowances made available on the market as of 2021. This means that the number of quotas allocated to the airlines for free will decrease each year.

In 2018, for the first time, the 80 airlines administered by France returned more than four million emission allowances, of which two million were allocated for free. Only three airlines did not fully meet their obligations. This means that they are liable to pay a total amount of €102 per unreturned quota, or more than €250,000.

LE CORSIA
HAS BEEN TRANSPOSED INTO EUROPEAN LAW

In accordance with the CORSIA system, extensive work was carried out to transpose ICAO rules on the monitoring, declaration and verification of emissions from international flights into European Union law. After being transposed into two regulations published at the end of 2018, these rules will enable European airlines to prepare their emissions records for 2019 and 2020. The records will serve as a carbon offsetting base as of 2021. Almost 60 people representing some 20 French airlines attended two meetings organized by the DGAC on the application of CORSIA. Additional provisions to the scheme will be adopted in 2019.

15
"Trainer States", including France, are helping 94 States roll out CORSIA.

ACT-CORSIA
WORLDWIDE ASSISTANCE

On July 3, 2018, the secretariat of the International Civil Aviation Organization (ICAO) launched ACT-CORSIA (Assistance, Capacity-Building & Training for CORSIA) to help its less advanced member States implement the CORSIA program. France is providing support, particularly for French-speaking States in Africa, through experts from the DGAC and in close cooperation with Canada.

Four sessions were held in Cameroon, Togo, Réunion and Morocco. Spain also attended the last session, which was open to non-French-speaking States. The DGAC helped provide assistance for 18 member States. France and Canada alone were responsible for training 20% of the member States. This initiative is a clear illustration of the bilateral partnership on the environment and the climate that was set up between France and Canada in April 2018 in Paris.

States in the Indian Ocean zone attended the training
Representatives from Madagascar, Comoros, Mauritius and Air Austral attended the training on Réunion.

THE CAEP: **AN IDEAS LABORATORY**

The Committee on Aviation Environment Protection (CAEP) is a technical committee of the ICAO Council, made up of about 500 experts designated by 25 States, including France, that examines the impacts of aviation on the environment as part of a three-year work program. The CAEP proposes the formulation of new policies and the adoption of new standards for aircraft noise, emissions from aircraft engines, and the establishment of additional, often market-driven, measures. The CAEP contributes, therefore, to the fight against climate change. These experts regularly meet in theme-based working groups to discuss the state of progress of the work in the selected program. Their conclusions are approved every three years by extended meetings of the Committee, providing, through the Council, input for the "Permanent policy and practices of the ICAO in the realm of environmental protection", adopted by the ICAO Assembly for application to all the member States and the sector.

Some 20 DGAC experts contribute to the work of the CAEP working groups.

HEADING FOR **MONTREAL!**

The French experts have been involved in the work on numerous subjects, such as:
> performance-based navigation,
> operational interdependence,
> the definition of new environmental indicators,
> operational noise-reduction measures,
> modeling tools and data calculations.

In 2018, in preparation for the implementation of the worldwide Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), the Alternative Fuels Task Force carried out important work to assess the environmental impact of the sectors accepted for the production of these fuels throughout their life cycle. Important work, co-led by a French expert, was done to approve the methodologies applied to the eligibility criteria that guarantee the quality of the offsetting units permitted by CORSIA. Together with its European partners, France also actively contributed to the adoption by the ICAO Council in June 2018 of the rules required to implement CORSIA in 2019.

The French experts were also closely involved in the work on the project to resume supersonic flights, instigated by the United States. While American industry wants these future aircraft to benefit from a standard that is less stringent than the standard applicable to subsonic aircraft, on the grounds that the supersonic technology would be different, France contributed to adopting a firm European stance on the need to apply the same requirements to these flights, while keeping the essential framework for dialog open in readiness for the CAEP meeting in 2019.

GENEVA AIRPORT **FRANCO-SWISS ENVIRONMENTAL COOPERATION CONTINUES**

The PETAL project, launched in 2017 to develop local dialog on noise nuisance around Geneva airport, consists of limiting flights over the shores of Lake Geneva by introducing new air traffic control operational methods. Between October 2018 and January 2019, the DGAC and Skyguide, the Swiss air traffic control authority, conducted a noise-measurement campaign in Chens-sur-Léman and Thonon-les-Bains. The DGAC had already completed an impact survey and an initial noise-measurement campaign, prior to the introduction of the procedure in April 2018. The second campaign on the same sites will verify its effects. The DGAC will publish its report in June 2019.

THE DGAC **IN JAKARTA**

The DGAC is contributing to a specialized Master's degree in air navigation service management, as part of the international training programs organized by the French school of civil aviation (ENAC). The DGAC's Environment Mission delivered training in the environmental impacts of air traffic to controllers from AirNav Indonesia.

HIGH-LIGHTS

HOW CAN WE IMPROVE NOISE PREVENTION IN A TWO-COUNTRY SITUATION? **THE EXAMPLE OF BASEL-MULHOUSE AIRPORT**

Located on the border between France, Switzerland and Germany, Basel-Mulhouse-Freiburg airport saw record-breaking traffic in 2018, with more than eight million passengers. Since the Environmental Noise Prevention Plan (PPBE) adopted in 2011 was coming to an end, a new plan has been finalized for 2018-2022. A broad and technical process...

> following preparatory meetings of a restricted working group, made up of the DGAC and the airport operator, the local authorities officially launched the process in May 2017.

> the final version of the draft Environmental Noise Prevention Plan was revealed on March 15, 2018, following numerous meetings with the airport operator.

> a statement was released at the meeting of the Consultative Commission for the Environment (CCE) on May 16, 2018.

> the ten towns involved in the PGS, the Saint-Louis local council, the Swiss Federal Civil Aviation Office (OFAC), the Basel city and Basel regional authorities and the Swiss noise-reduction commission (Fluglärmkommission) were all consulted from July to September 2018.

> between October and December, comments and suggestions were collected in an online public survey and the public registers in Colmar and Mulhouse.

> after a meeting between the State authorities and the localities covered by the PEB, the draft was submitted to the CCE, prior to being approved by the local State representative.

Preliminary traffic simulations were conducted, prior to the adoption of the revised PEB in 2004. The project kicked off at the start of 2019 with a presentation of the various hypotheses to the local authorities.

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PREVENTING NUISANCES

Air and urban regulations are being changed in response to the continual development of France's largest cities. These changes can call on the work done by the Consultative Commissions for the Environment (CCE) and the site visits that are part of the process to adopt or modify noise pollution plans and noise exposure plans. This well-established culture of dialog has now been supplemented by numerous initiatives intended to modify landing and take-off procedures or to renew fleets of aircraft. More sustainable airport infrastructures are also helping prevent noise pollution.

ON THE RIGHT **FLIGHT PATH**

LESS NOISE **AT PARIS-CHARLES-DE-GAULLE**

The global weighted measured indicator (IGMP), which is calculated on the basis of real-time noise measurements, is used to assess the acoustic environment at Paris-Charles-de-Gaulle over a whole year. In 2017, it revealed a further drop in noise levels, despite a slight increase of 0.7% in traffic. This trend is the result of the modernization of the fleets and changes to the movements according to the time of day (daytime/evening/night).

GREATER PARIS **DIGITIZED AIR TRAFFIC**

Since the start of 2018, information on air traffic in the Paris region has been distributed exclusively in digital format to subscribers. This information is also available on the web site of the French Ministry of the Ecological and Inclusive Transition. This new monthly format allows traffic information to be updated on a more regular basis, provides greater accessibility on all media and offers greater flexibility.

VITRAIL **IS ACCESSIBLE TO RESIDENTS**

Residents living near airports can view flight paths almost in real time using the Aéroports de Paris (ADP) group's VITRAIL software. The traffic data shown in VITRAIL is sourced from the DSNA. VITRAIL also provides access to data from noise measurement stations. Similar work is being continuing at other major airports, in coordination with any operators who have expressed the need for it, with a view to launching online data as of 2019.

MARSEILLE-PROVENCE AIRPORT **STEPPING UP THE USE OF NEW APPROACHES**

The new GNSS 31 satellite approach procedures avoid flying over the north-west districts of the city of Marseille, including L'Estaque. The DGAC, the main airlines flying into and out of Marseille (Air France, Ryan Air, etc.) and Marseille-Provence airport have collaborated to increase the use of these new procedures. The conditions of use of the procedures and the corresponding aeronautical information have been redefined. An internal report by the pilot is required in the event of any particular difficulties and when the procedure in use is not followed. Efforts will continue to improve the environmental situation of the L'Estaque district and the 16th arrondissement of Marseille.

AIR TRAFFIC IMPACT STUDIES
100% APPROVAL RATE

Air traffic impact studies (EICA) are conducted before changing or creating procedures on airport platforms. They are then submitted to the Consultative Commissions for the Environment (CCE) before their operational implementation. 100% of the cases submitted in 2018 were approved, including:

> the creation of low-altitude RNAV departure procedures at Paris-Charles de Gaulle,
> changes to the interrupted approach procedure (API) at Nantes-Atlantique,
> the creation of new RNAV arrival and departure procedures at Carcassonne.

Applications regarding the main French airports are also submitted to the French Airport Pollution Control Authority (ACNUSA). The authority approved all the air traffic impact studies (EICAs) covering:

> the changes to the departures procedure on Runway 8 at Paris-Orly,
> the creation of a continuous descent approach procedure for Runway 4 at Nice-Côte d'Azur,
> changes to the departures procedures on Runway 15/33 at Basel-Mulhouse.

REGULATIONS AND DIALOG
A WINNING COMBINATION

CONSULTATIVE COMMISSIONS FOR THE ENVIRONMENT
ESTABLISHING LOCAL DIALOG

The Consultative Commissions for the Environment (CCE) establish permanent dialog with airport users, operators and residents, under the auspices of the departmental and regional State representatives, and with the support of the DGAC. They work to reconcile the interests of all the interested parties. For example, in North DSAC, in addition to the CCEs of the three main airfields (Paris-Charles de Gaulle, Paris-Le Bourget and Paris-Orly), the DGAC supported the CCE at Beauvais, Chavenay, Chelles, Coulommiers, Lille-Lesquin, Lille-Marcq-en-Baroeul, Lognes, Meaux, Saint-Cyr-l'École and Toussus-le-Noble by contributing its technical knowledge of aviation activities. The DGAC proposes constructive solutions that help the CCEs assess the proposed measures and inform the State representatives of the cost-to-benefit ratio.

LYON-BRON
MORE DISCREET PIAGGIO AIRCRAFT

With its three airfoils (a canard, the wing and tail fins), the Piaggio Avanti business aircraft is currently the fastest turboprop aircraft, reaching 398 knots (738 km/h). While its fuel consumption is low, compared with its performance, the five-blade propellers are relatively loud. Repeated discussions of the CCE at Lyon-Bron, and a significant number of complaints by local elected representatives and residents have resulted in the airplane being banned at night.

MADE-TO-MEASURE PEBS **IN NORTH DSAC**

The North DSAC is updating its PEBs. Three were approved in 2018 (Les Mureaux, Meaux-Ebly and Persan-Beaumont) and eight are currently being created or revised (Lognes, Calais, Lille-Marcq, Chavenay, Amiens, Étampes, Saint-Cyr-l'École and Coulommiers). Of the 25 airfields that currently have a PEB, 12 were drawn up in accordance with Decree No. 2012-1470 that caters for the requirements of airfields where the traffic is light or irregular. This is particularly the case of general aviation airfields.

BORDEAUX'S PPBE
COMBATING THE NOISE MADE BY HUMAN ACTIVITY

The DGAC took part in the preparation of the environmental noise prevention plan (PPBE) commissioned by the Bordeaux-Métropole (federation of municipalities) authorities. Unlike the airfield's noise pollution plan (PGS) and environmental noise prevention plan (PPBE), which focus on aviation-related activity, the city's environmental noise prevention plan (PPBE) considers all urban and suburban sources of noise. Based on the transposition of the European Directive of June 25, 2002, which introduced strategic noise maps, environmental noise prevention plans consist of taking action on the noise produced by aviation, road traffic, railways and industry over a 5-year period.

NANTES PGS
TO BE ADOPTED IN 2019

The revision of the noise pollution plan at Nantes-Atlantique, which local residents and the French Airport Pollution Control Authority (ACNUSA) had been demanding for several years, was launched shortly after the decision to abandon the project to build a new airport at Notre-Dame des Landes. It will be adopted in 2019.

POSSIBLE REVISION OF THE NOISE EXPOSURE PLAN (PEB) AND NOISE POLLUTION PLAN (PGS)
AT TOULOUSE-BLAGNAC

The approvals of the revisions of the noise exposure plans (PEB) of the neighboring airfields at Nîmes-Garons and Montpellier-Candillargues have been signed. The possibility of an associated revision of the noise exposure plan (PEB) and noise pollution plan (PGS) at Toulouse-Blagnac is necessary given the context and local needs. This has been submitted to the Consultative Commission for the Environment (CCE). The group will publish its conclusions in 2019.

HIGH-LIGHTS

CAN NOISE **EXPOSURE PLANS (PEB) AND NOISE POLLUTION PLANS (PGS) BE PREPARED AT THE SAME TIME?**

Noise exposure plans and noise pollution plans are prepared or updated separately, mainly on the basis of changes in the local context and the expression of local needs. Coinciding needs mean that Toulouse airport will be revising its noise exposure plan (PEB) and its noise pollution plan (PGS). A complex operation that is, nonetheless, possible.

JOINT PROJECTS **IN PARIS-CDG AND LE BOURGET?**

Elsewhere, the French Airport Pollution Control Authority (ACNUSA) has asked the DGAC to look into the creation of a common noise exposure plan (PEB) and noise pollution plan (PGS) for Paris-Charles-de-Gaulle and Le Bourget airports. But this possibility faces a legal obstacle, because the law requires each airport to have its own specific noise exposure plan (PEB) and noise pollution plan (PGS). If the benefits of a common plan are confirmed in 2019, the law will have to be changed.

STRINGENT **CHECKS**

Breaches of navigation rules and procedures are centralized by the DGAC and then sent to the French Airport Pollution Control Authority (ACNUSA), which examines them and decides on the action to be taken. These breaches include the failure to respect time slots, the use of inappropriate approach procedures, exceeding noise thresholds on arrival or departure, engine tests at night, etc. Operators are liable to the payment of fines of up to €20,000, or even €40,000 for certain infringements regarding breaches of night time restrictions or the acoustic performance of aircraft.

AT BORDEAUX-MÉRIGNAC

A total of 31 reports of breaches of environmental regulations were sent to airlines and 24 investigation files were sent to the French Airport Pollution Control Authority (ACNUSA).

AT NANTES

The method used to record regulatory breaches, introduced in 2015, is now fully operational. The monitoring group, chaired by the operator with the help of the DGAC, raises awareness amongst the airlines of the environmental aspects of flight paths. A document containing the procedures to be followed is regularly updated and distributed to all the pilots who use the platform.

AT NORTH DSAC

Six airports and one heliport (Paris-Charles-de-Gaulle, Paris-Orly, Paris-Le Bourget, Beauvais-Tillé, Toussus-le-Noble, Pontoise-Cormeilles and Issy-les-Moulineaux) are subject to ministerial operational restrictions. 401 cases were reported on these seven platforms:

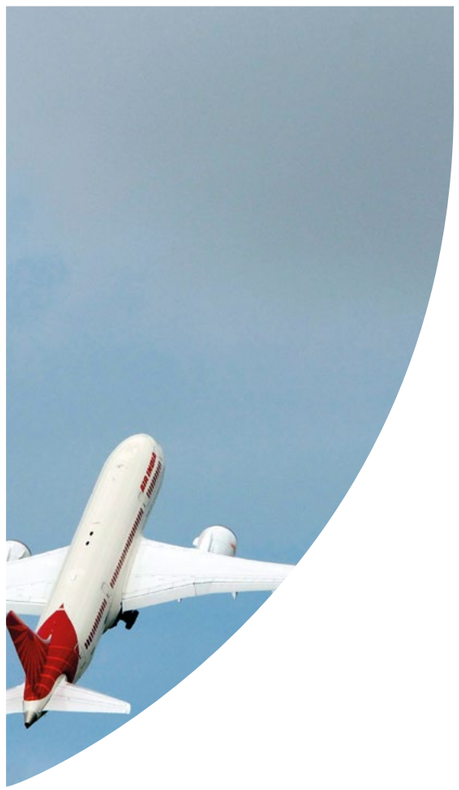
> 227 failures to respect time slots,
> 59 failures to respect aircraft noise performance levels,
> 87 failures to respect the environmental protection volumes,
> 26 failures to respect procedures for the use of auxiliary power units (APUs),
> one failure to respect the curfew at Orly,
> one failure to respect the silent period at Toussus-le-Noble.

CANNES-MANDELIEU **LOOKS FORWARD TO BOLD ENVIRONMENTAL SOLUTIONS**

The Alpes-Maritime State representative called on the DGAC, following the meeting of the Consultative Commission for the Environment (CCE) in June 2018, to draw up an action plan to improve the aeronautical environment around Cannes-Mandelieu airport.

WIND TURBINES: **YET MORE PROPELLERS**

The DGAC is one of the instances that is consulted on all projects to build onshore or offshore wind farms. In 2018, it approved 181 wind turbines in north-east France. In keeping with the DGAC's criteria, the wind turbines are white and equipped with lights that flash white by day and red at night.



HIGH-LIGHTS

THE DIFFICULT CHOICE BETWEEN **MOBILITY AND OUR HABITAT**

Published in October 2018, the World Health Organization (WHO) "Environmental Noise Guidelines for the European Region" recommend a significant reduction of the thresholds of exposure of the population to noise made by aviation, road traffic and railways. For the aviation sector, the applicable thresholds of 55 dB by day are consistent with the indexes used to define noise exposure plans (PEB) and noise pollution plans (PGS).

The scale of the WHO's recommendations is surprising. They correspond to the minimum ambient noise to which the inhabitants of Paris are exposed (45 dB) and, at night, to the noise in a calm street, free of road traffic (40 dB). Adopting these new limits would require a complete overhaul of the entire system used to take airborne noise into consideration. This measure would have serious impacts on the urbanization of the areas in question, incur costs for soundproofing and inevitably raise the question of the development of air traffic on certain airports.

EMISSIONS
GOING FURTHER...

POLLUTION PEAKS
A RAPID REACTION

The procedure for episodes of peak pollution was triggered in July 2018. The DGAC enforced two measures.

> at Paris-CDG, Orly and Le Bourget airports, only engine tests conducted in preparation for a flight were permitted.
> runway circuit training was forbidden on some 15 airfields in the Paris region.

The national action plan also requires the DGAC to demand tighter control by the French air transport police (GTA) to limit the time during which *auxiliary power units* (APUs) are used during pollution peaks.

THE ENERGY TRANSITION LAW
CONFIRMATION OF THE TARGETS

Article 45 of the French energy transition law for green growth (TECV) requires the 11 airports subject to control by the French Airport Pollution Control Authority (ACNUSA) to reduce the intensity of their greenhouse gas and air pollutant emissions by 10% in 2020 and by 20% in 2025, in comparison with 2010. The airports in question have to draw up action plans. In particular, the article specifies that airplanes that are parked or taxiing, which are responsible for between 75% and 95% of emissions, are also concerned.

The airports' action plans have been sent to the French Environment and Energy Management Agency (ADEME), which then established a nationwide review. While still inviting them to go even further, the ADEME's 2018 report considers that the measures taken by the airports should enable the targets set by the law to be reached.

3%
Following on from Paris-Charles-de-Gaulle, Paris-Orly is expected to cut taxiing time on departure by 3%, thanks to the local departure management system.

THE ATMOSPHERIC PROTECTION PLAN FOR THE PARIS REGION
MISSION 2020...

The atmospheric protection plan for the Paris region was approved by official decree on January 31, 2018. The plan aims to return the concentration of air pollution to levels below the limits defined by the European Union for PM10 particles and nitrogen dioxide (NO_2).

No less than 46 concrete actions have been identified in the fields of transport, air transport in particular, agriculture, industry, and residential and tertiary constructions. A significant improvement of air quality is expected as of 2020. The air transport sector has been assigned with the following tasks:

> decrease emissions from APUs and ground vehicles and machinery,
> reduce emissions caused by taxiing aircraft by adopting the local departure management system (GLD) and taxiing with one of two engines stopped, or two of four for four-engine aircraft,
> improve knowledge of the volume of emissions by airport in the Paris region.

PARIS-CHARLES-DE-GAULLE AND PARIS-ORLY
ENVIRONMENTAL TRAINING FOR AIR TRAFFIC CONTROLLERS

In response to the particular needs of the Paris region, the DSNA has developed an environmental module specifically for Paris-Charles-de-Gaulle and Paris-Orly airports. The program has been included in the further training sessions for air traffic controllers.

9%
of greenhouse gas emissions on Réunion are due to aviation
(source: CITEPA)

OVERSEAS
MORE AND MORE ENVIRONMENTAL INITIATIVES

RÉUNION ON THE MOVE
FOR THE ENVIRONMENT

The French Civil Aviation Safety Authority (DSAC) for the Indian Ocean, the northern localities on Réunion and the operator of Roland Garros airport have launched an initiative to discuss the territorial climate, air and energy plan (PCAET). First set up in 2016, this system aims to facilitate estimates of greenhouse gas emissions and to draw up reduction plans in various sectors, including aviation. So far, the discussions have reviewed the ongoing and future actions:

> the tax relief on the purchase of new aircraft has made a difference. Réunion and Mayotte airports now host more latest-generation airplanes,

> the airport is making a significant effort in terms of equipment and infrastructure (a bioclimatic terminal, a runway safety zone made of recycled glass, etc.),

> the volume of waste has been halved in just a few years,

RÉUNION - ROLAND GARROS
A BIOCLIMATIC TERMINAL

Réunion-Roland Garros airfield has launched an investment program intended to control the temperature in the public area of the terminal, without using air conditioning. After a first stage that focused on the airtightness and the insulation of the building roof terrace, 2018 saw the installation of three ventilation chambers, or vacuum wells, in which the hot air in the public hall rises naturally due to the effect of the wind on the roof. The system is completed by large-diameter air fans and openings fitted with blinds. As a consequence, the humidity levels and temperature in the terminal are more comfortable during hot and busy periods. Feedback from passengers was very positive, right from the start of the hot season in December 2018. The airport intends to remain in the forefront of airport environmental innovation. La Société Aéroportuaire Aéroport Réunion Roland Garros (SAARRG) has approved a project for a 15,000 m² bio-climatic terminal. A world premiere!

AN ARRESTOR BED **ON MAYOTTE**

The arrestor bed installed at Roland Garros airport has been imitated elsewhere. A similar system, designed by Runway Safe, has been installed at the end of runway 16 at Dzaoudzi-Pamandzi airport. Like on Réunion, this solution uses recycled glass foam pellets that are highly friable and are crushed by the weight of the aircraft's wheels in order to absorb the kinetic energy of an aircraft that overshoots the runway. The 71-meter long and 50-meter wide *engineered material arresting system* is 7 cm thick at the point of impact and 47 cm thick at the end of the arrestor bed.

NEW CALEDONIA
A HEIGHTENED ENVIRONMENTAL CULTURE

The fact that New Caledonia is an island, together with its rich biodiversity, is probably why the local civil aviation directorate (DAC) personnel is particularly aware of the environment.

The partnership between the DAC and the WWF has been renewed for 2019-2021.
If focuses mainly on:

> the production of dry forest seedlings in the DAC's nursery,

> logistical support for the management of restoration projects (storage and transport),

> financial support amounting to €10,000 per year for the restoration of the Caledonian forest,

> sending messages to all the pilots in New Caledonia to raise their awareness of the importance of fire and the need to protect the forests.

> educational tours for personnel and family to raise environmental protection awareness.

Most of the personnel has now adopted the habit of car-sharing. Following the purchase of five hybrid vehicles, plans are now afoot to buy electrically assisted bicycles.

Collectors have been carefully sorting the waste (paper, batteries, recyclable materials) for several years now. This is a significant initiative in a place where waste sorting has not yet been widely adopted by the local authorities.

Long trips to mainland France and Corsica have been limited as far as possible. This is true of the oral examinations of the French school of civil aviation (ENAC) or the technical seminars with the various technical and safety departments of the DGAC. Renewing the equipment used for video conference figures amongst the goals for 2019.

HIGH-LIGHTS

GREEN PROJECTS **IN NEW CALDONIA**

The new noise map of the vicinity of Nouméa-Magenta airfield has been presented to the urban planning departments. In Loyalty Islands province, a general construction plan (PCG) was drawn up for Lifou-Wanaham airfield that defines the environmental criteria applying to the development of the airport. An environmental study analyzes the effects of the project on the environment and makes recommendations on measures to avoid, limit or offset any impacts. The wastewater from Nouméa-Magenta airfield is discharged into the mains network, while rainwater is returned to the natural environment. The run-off water from the floors of the hangars and parking areas for airplanes and helicopters flows into hydrocarbon separators in order to reduce the volume of effluents returned to the ocean. An environmental impact study (EIE) of the redevelopment of the airfield resulted in the authorization of the land-clearing operations. The study also specified the offsetting measures to be included in the contracts. Numerous measures (acoustic, protection from the sun, insulation, natural ventilation, natural lighting) will be taken to improve the energy and environmental performances of the buildings and passenger comfort. Special planting works will be completed in 2019 and 2020.

All the projects managed by the New Caledonia DAC are certified "green projects".

ENVIRONMENTAL **SENTRIES**

In New Caledonia, the DAC encourages pilots to make a note of the coordinates of ash farming operations, or ground clearance with fire, that take place in the summer months.

ENVIRONMENTAL
REPORT
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REDUCING POLLUTION

The environmental impact of air navigation can be reduced by re-examining approach and take-off procedures. Moreover, reducing fuel consumption and gas emissions, the allocation of direct routes by air traffic controllers and the strengthening of environmental charters are also used as levers to guarantee the sustainable development of civil aviation and reduce noise nuisance in the vicinity of airports.

REDUCING NOISE BY **IMPROVING FLIGHT PERFORMANCE**

PARIS-ORLY TURNS **TO THE EAST**

Over the last 15 years, the DGAC has investigated many changes to the departure procedures on Runway 8 in easterly wind conditions. The suggestions made by associations and local authorities resulted in new opposition due to the possible relocation of the nuisances. After 18 months of dialog with the stakeholders, in August 2018 a new "RNAV" satellite procedure was introduced. This solution favors flights over non-built-up areas, without affecting the general organization of aircraft flows.

USING MICROPHONES **TO OBJECTIVELY MEASURE NOISE NUISANCE**

Two noise measurement campaigns were conducted in Boussy-Saint-Antoine, Ris-Orangis and Bures-sur-Yvette in the summer. A second series of measurements will be taken in the same places in 2019 in order to assess the impact of the changes to the departure procedures from Runways 08 and 24 at Paris-Orly.

A NATIONAL STRATEGY **FOR 2025**

As part of the Air Transport Convention, the DSNA symposium at the Eurocontrol Experimental Center in Brétigny organized by the DGAC, illustrated the operational measures to reduce the environmental impact of air navigation. The actions taken, such as the Visual RNAV at Bordeaux-Mérignac, the satellite procedure at Marseille-Provence, or the changes to the departures from Paris-Orly were all presented in no fewer than seven demonstration workshops. Innovative projects currently under development were also presented, such as the use of continuous descents at Paris-Charles-de-Gaulle and the interactive display of flight paths. A number of working initiatives also focused on noise nuisance. All this work, which is documented in the summaries of the Convention, helped develop a national strategy for 2025.

A THREE-DIMENSIONAL INDICATOR **TO MEASURE FLIGHT PERFORMANCE**

400,000 METRIC TONS OF CO_2 EMISSIONS SAVED

Tactical management of air traffic resulted in a CO_2 reduction of almost 400,000 metric tons in 2018. The reduction in fuel consumption amounts to 128,000 metric tons.

OPERATIONAL RESTRICTIONS AND AIDS FOR RESIDENTS **THE RIGHT BALANCE**

TOULOUSE-BLAGNAC
MONITORING DEEP INTO THE NIGHT

As a means of improvement, the DGAC and Toulouse-Blagnac airport have launched a study to look into the possibility of making specific use of the runways in the middle of the night, due to the concerns of residents' associations about the rise in traffic between midnight and 6:00 a.m. Trials are due to begin in the spring of 2019.

NEW RESTRICTIONS
AT NANTES-ATLANTIQUE

Following the online survey between April 26 and May 28, 2018, three measures have been taken to restrict night operations of the noisiest aircraft at Nantes-Atlantique from March 31, 2019:

> a permanent ban on so-called Chapter 2 aircraft (the noisiest kind),

> a ban on Chapter 3 aircraft with an aggregate margin below 8 EPNdB taking off and landing between 10:30 p.m. and 11:00 p.m.,

> Chapter 3 aircraft with an aggregate margin below 13 EPNdB can no longer take off or land between 11:00 p.m. and 6:00 a.m.

Using EPNdB to express perceived noise

The EPNdB is the effective level of perceived noise used for the acoustic certification of aircraft. This index, which uses decibels, attempts to express the human ear's real-time perception of the noise made by an aircraft.

ACOUSTIC CERTIFICATION

Acoustic certification proves that an aircraft has the level of performance required by the regulations at the time of its design. The more recent the aircraft, the higher the required level of performance. Annex 16 of the Chicago Convention contains three chapters dedicated to transport aircraft. Chapter 3 covers aircraft designed after 1977, Chapter 4 covers aircraft designed after 2006 and Chapter 14 came into force in December 2017.

ACOUSTIC MARGIN

The acoustic margin is the gap between the noise made by an aircraft and the limit authorized by the certification. It is expressed in EPNdB. The higher the acoustic margin, the better the acoustic performance.

RAFALE TRAINING CENTER IN MÉRIGNAC
TIGHT FLIGHT PATHS

Dassault Aviation has opened a Conversion Training Center (CTC) in Mérignac to train Indian and Qatari pilots on the Rafale aircraft. In-depth studies were conducted with the DGAC to optimize the flight paths of the combat aircraft when landing and taking off at Bordeaux-Mérignac airport. The results of the various sound models were sent to the local residents and politicians sitting on the monitoring committee, coordinated by the DGAC and Dassault Aviation, under the chairmanship of the local State representative. These exchanges, which also involved the airport operator, resulted in the approval of the "Rafale procedures". This was an opportunity for the DGAC to demonstrate its capability to incorporate the special case of fighter aircraft using a civil airport. The dialog will be permanent. A web site has been opened and will be maintained by Dassault Aviation to receive complaints about Rafale flights, for as long as the CTC remains open.

CONSULTATIVE COMMISSION FOR RESIDENT AIDS
AID OF UP TO 100%

In 2018, the Consultative Commission for Resident Aids (CCAR) at Bordeaux-Mérignac airport agreed to fund the soundproofing of 31 individual housing units. 17 of these applications were entitled to 100% funding. The amount spent on the works totaled €395,619. These subsidies are funded by the airlines that use the airport and pay the French tax on airport pollution (TNSA).

AIRPORT POLLUTION TAX
HOW IT WORKS

An airfield must meet a number of conditions to have a noise pollution plan (PGS) and the soundproofing aids that are funded by the French tax on noise pollution (TNSA). In this case, the airfield comes under closer scrutiny by the French Airport Pollution Control Authority (ACNUSA). One example is Lille-Lesquin airport, which, in 2018, approached 20,000 annual movements of aircraft with a maximum take-off weight equal to or greater than 20 metric tons. Reaching this threshold triggers the application of the French tax on noise pollution (TNSA) and the establishment of a noise pollution plan (PGS). If an airport is accredited by the French Airport Pollution Control Authority (ACNUSA) in 2019, its first noise pollution plan (PGS) will only be implemented in 2020. Only the residents within the area covered by the noise pollution plan (PGS) are entitled to soundproofing aids.

REDUCING NIGHT FLIGHTS
WITH LANDING FEES

At Rennes airport, night flights between 10:00 p.m. and 6:00 a.m. are subject to a 47% hike in landing fees. This measure, which was first introduced in 2016, has since been renewed. This fee, which the airlines pay to the airport, is calculated on the basis of the maximum take-off weight on the aircraft's airworthiness certificate.

PARIS-CHARLES-DE-GAULLE AND LE BOURGET
IMPROVEMENT OF THE HANDLING OF REQUESTS FOR AID FOR SOUNDPROOFING

At the end of 2018, there were about 3,000 outstanding applications for financial aid for soundproofing in the vicinity of Charles-de-Gaulle and Le Bourget airports. The improvement of this system was one of the subjects addressed by the Air Transport Convention. The applications should be processed more efficiently by 2021.

CONCERTED ACTION
TO SOUNDPROOF HOUSING

Nantes-Atlantique is the only airport operator in western France with a noise pollution plan (PGS) that allows for subsidies for the soundproofing of housing and buildings. Since the plan was introduced in 2003, 902 of the 1,751 housing units covered by the noise pollution plan (PGS) have been soundproofed, and a further 35 will be soundproofed in 2019. The first group operation covered 88 housing units on the same estate, of which 81 were eligible for soundproofing subsidies. At the time of the meeting of the Consultative Commission for the Environment (CCE), 55 applications had been made. Most of the eligible applications under the 2003 noise pollution plan (PGS) have already been investigated.

HIGH-LIGHTS

WHAT IS A BALANCED APPROACH?

European Union Member States are entitled to apply operational restrictions to major airports in order to protect local residents against aircraft noise. The decision-making process must meet the conditions of the "balanced approach" developed by the ICAO. The balanced approach is based on four principles that can be used to reduce nuisances at the lowest economic cost:
> noise abatement at source by using quieter aircraft,
> planning and managing land use around airfields,
> using operational noise abatement procedures,
> decisions on operational restrictions.

The measures must improve the acoustic environment around airports in the Union in order to maintain or improve the quality of life of the local residents and the compatibility between the aviation activities and residential zones, in particular with regard to night flights.

EFFECTIVE **DIALOG**

FLIGHTS OVER GREATER PARIS **AN ATTENTIVE DGAC**

The DSNA, the French Air Navigation Service Provider, answers questions from parliamentarians, elected representatives, residents' associations and individuals regarding flights over Greater Paris. The Environment Mission handled 436 questions in 2018. The queries concerned mainly:

> the start of the new satellite procedure (RNAV) on August 16, 2018, for departures from Paris-Orly in the East-facing wind configuration,
> the PRISALT project,
> the work on Runway 4 at Paris-Charles de Gaulle (July 9 to October 10) and on Runway 3 at Paris-Orly (August 6 - 9).

The Environment Mission provides analyses, maps and graphics explaining the overflight conditions. The web site of the Ministry of the Ecological and Inclusive Transition also provides information in the form of:

> an FAQ,
> operational restrictions on airports for environmental reasons,
> a monthly newsletter containing information on air traffic in the Paris region,
> the ENTRACT tool displaying characteristic days.

CONVENIENT **ONE-STOP-SHOPS**

The spread of one-stop-shops in French airports has made it easier to make and handle complaints about failures to follow air traffic procedures. For example, Bordeaux-Mérignac airport forwarded 58 environmental questions and complaints to the DGAC.

CLOSER DIALOG IN **FACE-TO-FACE MEETINGS**

In addition to its institutional consultative instances (Consultative Commissions for the Environment and the French Airport Pollution Control Authority), the DSNA also maintains dialog with politicians and residents' associations. In 2018, no fewer than 50 working meetings were held.

WEATHER INFLUENCES **NOISE PERCEPTION**

The predominantly easterly wind for a part of 2018 (50% of the time at Roissy and 47% at Orly, while, on average, the wind comes from the west for 60% of the year) changed the perception of noise nuisance by residents living in the vicinity of the Paris airports. As a consequence, the DGAC received complaints from people who are not usually exposed to noise.

COMPLAINTS: **STRIKING THE RIGHT BALANCE**

While the one-stop-shops for residents make it easier to receive and handle complaints, they are also open to abuse. The DGAC observed an increase in the number of complaints about medical helicopters flying near hospitals.

AEROBATICS **INITIATIVES FOR PEACEFUL COHABITATION**

The nuisances caused by aerobatics activities can be explained by the powerful aircraft engines and the atypical use of the engine (frequent stops and accelerations). At Montluçon-Guéret airport, the local aerobatics club signed a charter with the local State representative and the DGAC to create new flight paths for aerobatics aircraft.

A noise-measurement campaign at Biscarrosse resulted in a code of good practice being drawn up. But the development of homes close to the airfield has made this cohabitation more problematic. The creation of a flight path for aerobatics that passes over the forest is being investigated. The use of silencers is another solution, on the condition that the silencers are specifically adapted to the aircraft type in use. But the vintage aircraft belonging to the inhabitants of the flying village cannot be fitted with silencers.

HELICOPTER SERVICES TO SAINT-TROPEZ **ON THE WAY TO A LONG-TERM SOLUTION**

The system in place in Cogolin, Gassin, Grimaud, Ramatuelle and Saint-Tropez since 2009 is based on a network of about ten "responsible helisurfaces" whose use is regulated by official orders. The ruling of the Toulon administrative tribunal in February 2018 canceled the official order which made no mention of the limit of 200 movements per year in order to reduce noise pollution. Since the ruling, several projects to create permanent helipads on the Saint Tropez peninsula are aiming to meet the technical criteria defined by the DGAC and the criteria of the environmental assessment ordered by the regional environmental and housing authority (DREAL).

HIGH-LIGHTS

FLYING VILLAGES, **WHERE YOU CAN PARK YOUR AIRCRAFT IN THE FRONT GARDEN**

The very first flying villages sprung up in the United States just after World War II, at the time of the Luscombe, Piper Tripacer and Beechcraft Bonanza. Strictly for residents only, these hamlets are always located in quality environments, in the immediate vicinity of an airfield. Since the first village of this kind in France was built at Talmont Saint-Hilaire (Vendée) in 1996, eight more have been created, including the Les Lacs flying village in Biscarrosse.

MODERNIZING AIRCRAFT

MORE ECONOMICAL AIRPLANES **IN MAYOTTE**

The Mayotte-based airline, Ewa Air, has acquired two new ATR 72-600 aircraft from the Franco-Italian constructor ATR. These latest-generation aircraft significantly reduce fuel consumption and noise. Even if it is not subject to the compulsory declaration of CO_2 emissions required by CORSIA, the Mayotte-based airline's decision will have a direct effect on the reduction of its carbon footprint.

A HIGH-PERFORMANCE **ENGINE-PROPELLER COMBINATION**

The DGAC has certified the SONACA 200 and a series of DR400 aircraft equipped with a ROTAX engine and a three-blade DUC propeller. This engine-propeller combination reduces noise and CO_2 emissions.

LIGHT AVIATION**FAIRLY DISTRIBUTED AIDS**

The DGAC and the French national consultative commission for aids for light and recreational aviation (CNCAALS) contribute to the improvement of our quality of life. By way of example, grants of €9,000 have been awarded to several flying clubs in western France.

> The Beauvoir Fromentine flying club has installed a silencer on one of its aircraft.
> The Ile et Vilaine glider club hired two silent microlights on the occasion of the French glider Grand Prix.
> The Angers, Mayenne and Brocéliande glider sites all acquired winches.

NoisedB
470 AIRPLANES REGISTERED IN 2018

The NoisedB database contains the certified noise levels of more than 13,000 public transport aircraft. NoisedB, which came online in 2006, is a source of information for the development of the ICAO's standards. More than 470 aircraft were added to NoisedB in 2018.

CALIPSO: **1,000 CLASSIFIED AIRCRAFT!**

The DGAC's classification of light aircraft according to their sound performance index, or CALIPSO, ranks light aircraft in four categories. CALIPSO's primary objective is to establish a long-term dialog between airfield users and local residents, and to provide the consultative instances with objective data regarding perceived noise. In 2018, the DGAC classified the 1,000th airplane.

This classification can also be used to contain noise nuisance during sensitive periods. "Flight privileges" can be granted according to the aircraft's acoustic category. System trials will take place at Toussus-Le-Noble airfield from April 1 to September 30, 2019.

MORE SUSTAINABLE **AIRPORTS**

HOP ! BIODIVERSITÉ
A COLLECTIVE COMMITMENT

In 2018, HOP ! Biodiversité included four airlines, the DGAC and 13 airports, all of which contribute to an initiative in favor of the biodiversity of airfields. These partners all collaborate closely with ecologists and scientists from the French Museum of Natural History and the CNRS. Three years after the organization was created in 2015, no fewer than 2,200 species of fauna and flora, including 220 species of birds, have been listed at just 14 airports.

The HOP ! initiative Biodiversité has heralded a deep-seated change of culture. Instead of considering all birds as a safety risk to air transport, the organization is addressing these issues by species. It proposes preventive measures for the management of grassland that will make it less attractive to any species that can cause problems.

Most of the organization's members already allow the vegetation on their sites to grow higher than previously. Leaving vegetation to grow up to heights of 40 or 50 cm provides cover for insects and seeds against certain bird species and predators. The increasing scarcity of voles keeps birds of prey off airports, and the removal of leguminous plants does away with pigeons. This proactive approach focuses, first and foremost, on participative science which involves airport stakeholders. The overarching idea is to adapt the complete airport platform to the safety requirements. The program is funded by the DGAC and the member airlines.

RÉUNION AIMS **FOR CARBON NEUTRALITY**

Roland Garros airport has received Level 2 Airport Carbon Accreditation (ACA). It now plans to reach Level 3 in 2019. There are four possible levels:

1. Assessment of the airport's carbon footprint
2. Reduction of the carbon footprint through special management measures
3. Optimization of the reduction, including commitments by the airlines and the airport's service providers
4. Achievement of carbon neutrality

THE FILTER WETLANDS AT PARIS-ORLY **HAVE PROVEN THEIR WORTH**

Since 2014, the rainwater at Paris-Orly airport has been treated by a system equipped with a biological basin planted with reeds that work like filters. A sludge-drying system was installed in 2017. During the winter, the wetlands can treat almost 500,000 m³ of polluted water. The treated effluents are 100% compliant with the official order on discharge.

HIGH-LIGHTS

LIMITING THE USE **OF APUS**

Parked aircraft need electricity for air conditioning and to pressurize the cabin, but also to start the engines. At Toulouse-Blagnac, all the nose-in parking places have a 400 Hz electric power supply, so the use of auxiliary power units (APUs) is very limited. Discussions have started on the introduction of a ministerial regulation. These directives are in line with the code of good conduct that the airlines using the airport have adopted.

HIGH-LIGHTS

AIRPORT CARBON ACCREDITATION
FRENCH AIRPORTS LEAD THE WAY

The independent Airport Carbon Accreditation program launched by ACI Europe has since been adopted in North America, and spread to Asia Pacific and Africa. It has also been imposed on airports in Latin America and the Caribbean. The 239 certified airports account for 43.1% of annual worldwide passenger traffic. With 37 airports of all sizes in the scheme, France is the country with the most accredited airports in the world. Nice and Lyon airports are already carbon-neutral.

WHEN FAUNA, FLORA AND AVIATION **CO-EXIST**

How hawks, goats and sheep are helping maintain our airports Several Western France Airports operators in western France, including Nantes, Brest and Caen, have installed hives to encourage the survival of their bee population. At Nantes airport, Harris Hawks are used to scare off other species of birds to make take-offs safer, while grassland is kept in good condition by goats and sheep.

NANTES, BREST AND RENNES
FRESH AIR IN THE WEST

The findings of the air quality measurement campaign near Nantes-Atlantique airport in August and September 2017 have been published. According to Air Pays de la Loire, an organization accredited by the French Ministry of the Ecological and Inclusive Transition, the results are typical of suburban areas and compliant with the regulatory standards. The airport was certified by the Airport Carbon Accreditation program in 2015 (level 1). Brest airport's certification has also been renewed. On December 7, 2018, Rennes airport received Level 2 accreditation.

ENVIRONMENTAL
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Fench Civil Aviation Authority (DGAC)

2018

INNOVATING

Increasingly stringent environmental regulations have created an opportunity to adopt new approaches and technologies in aviation. There is no single solution to breaking new ground in the reduction of the environmental impacts of air transport. Instead, a range of steps have to be explored, developed and combined in order to achieve the stated goals. In the field of aircraft manufacturing, significant improvements can still be made in the consumption of internal combustion engines, in the performance of the technologies used for onboard energy, in materials and in aerodynamics. But it is also necessary to prepare for the longer-term transition towards a new energy mix, in particular by exploring the electrification of aircraft propulsion. Unprecedented efforts will have to be made throughout the French aeronautics sector in order to explore all of these fields.

VULCLIM WILL SOON BE **OPERATIONAL**

The French Civil Aviation Technical Department (STAC) has developed a methodology to assess climatic vagaries and their potential impacts on airfields by 2100. An easy-to-use assessment tool will be made available to airfield operators in metropolitan France in the first half of 2019. Vulclim uses a simple multiple-choice questionnaire to produce a vulnerability matrix highlighting a platform's weaknesses with regard to climate change.

TOULOUSE-BLAGNAC: **AN ENVIRONMENTAL HUB**

The DEMETER project, or Airbus pact, which is an extension of the environmental cooperation program between Airbus and the Greater Toulouse city authorities, brings together many varied regional initiatives related to the aeronautical ecosystem. This platform of best practices ranges from the mobility of personnel (the Airbus Airport zone and, soon, the DGAC at Toulouse-Blagnac airport), to the promotion and development of aviation biofuels (Biohub), the dismantling of end-of-life airplanes with ATR, and the creation of a biodiversity atlas of the airport area (Biozona).

AIR AUSTRAL: ACTIVELY CONTRIBUTING **TO AERONAUTICAL RESEARCH**

The International Air Transport Association (IATA) predicted that airlines' fuel bills would rise by 27.5% in 2018, compared with 2017, at its general meeting in Sydney. Air Austral launched an experiment with the ambitious goal of cutting aviation fuel bills by €50,000 and reducing the carbon footprint by 250 metric tons of CO_2 per year and per aircraft. The experiment aimed to save up to 6% of fuel when climbing through the use of optimized climb profiles. A specialized company will use flight data records to produce performance models specific to each type of aircraft operated by Air Austral. At the same time, the Réunion-based airline will help enrich the start-up's two other applications, which optimize the cruise and descent phases respectively.

HIGH-LIGHTS

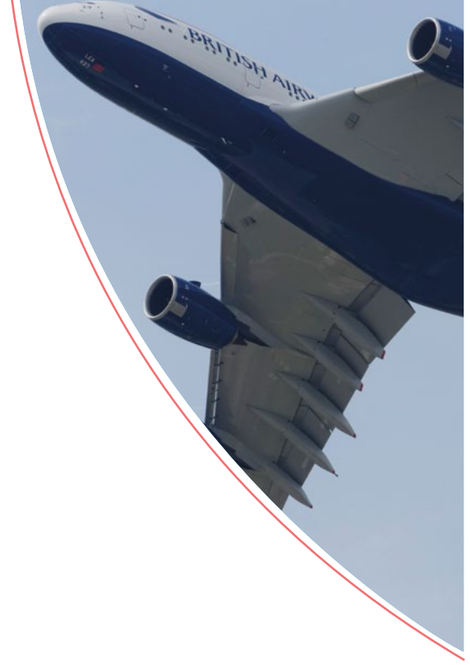
USING THE FULL POTENTIAL OF ARTIFICIAL INTELLIGENCE **TO OPTIMIZE FLIGHT PATHS**

Transavia commissioned a service provider to slash its CO_2 emissions by almost 7,000 metric tons per year, thereby making annual savings of €1.3 million. The flight path optimization market is estimated to be worth about $1.7 billion per year.

HIGH-LIGHTS

THE CORAC:
10 YEARS OF INNOVATIONS

Founded in July 2008 in the wake of the Grenelle environmental round table, the French Council for Civil Aeronautics Research (CORAC), chaired by the French Minister of Transport, brings together all the French actors in the sector: industrial manufacturers, airlines, airports, as well as academic organizations, like the French national office of aerospace study and research (ONERA). The Environmental Thematic Network (RTE) covers a broad variety of projects, from the study of condensation trails, to the reduction of aircraft consumption or the diversion of the noise from jet engines by the fins.



CORAC
RESEARCHING THE ENERGY TRANSITION OF AIR TRANSPORT

The research by the French Council for Civil Aeronautics Research (CORAC) supported by the DGAC in 2018 focused mainly on the reduction of the environmental impacts of air transport, and in particular the preparation of the next generation of ultra-high-bypass ratio (UHBR) engines for commercial aviation. This research activity, which accounted for one half of the DGAC's support budget, is in line with the goal of a global 20% increase in the energy efficiency of the next generation of aircraft. It already points towards additional gains by the following generation, after 2030, thanks in particular to the first research activity into new air propulsion configurations with boundary layer ingestion (BLI) and electric energy storage solutions for hybrid propulsion. 2018 also saw the launch of work on the reduction of development and production cycles, which has become an essential pre-condition to speeding up fleet renewals and improving the environmental balance of air transport, in view of the current manufacturing capacity overload.

IMPACT
A BETTER UNDERSTANDING OF THE IMPACT OF CIVIL AVIATION ON THE CLIMATE

The goal of the IMPACT project, managed by the CORAC's environmental thematic network (RTE) and funded by the DGAC, was to contribute to the reduction of the uncertainty about the impact of civil aviation on the climate, and in particular the uncertainty surrounding condensation trails, aviation-induced cirrus clouds and emissions of NO_x and particles. Its work has led to a more precise quantification of this impact in 2050, by the using the IPCC's global methods for the climate and the chemistry of the atmosphere, and enriching them to take account of the various disruptions caused by aviation. The impact of air transport was measured in terms of the rise in the temperature of the atmosphere, in which the distinction was made between the impact of the emitted CO_2, which remains in the atmosphere for about 100 years, and the impact of NOx, or condensation trials, which are very short-lived. The results of the IMPACT project were unveiled in March 2018 at the "Aviation and climate change" lectures at the Air Transport Convention.

HIGH-LIGHTS

AVIATION AND GLOBAL WARMING WHICH SCENARIO IN 2050?

The air transport sector is thought to currently account for an estimated 2% of overall global warming. CORAC studied two traffic scenarios to estimate the situation in 2050:

1. The so-called "ICAO" scenario, in which CO_2 emissions from air transport stabilize after 2020,
2. The so-called "ATAG" (Air Transport Action group) scenario, which aims to reduce these same emissions by 50% in 2050, compared with 2005.

According to the simulations based on these assumptions, aviation is expected in 2050 to contribute by 2.2% and 1.8% respectively to global warming.

MOSIQAA
BETTER AIR QUALITY PREDICTIONS AT AIRPORTS

Launched in 2016 by the CORAC's RTE and funded by the DGAC, the MOSIQAA project is the first phase of a global research program into the methods and tools used to assess the air quality at airports. The ultimate goals of this program are to quantify the contribution of the various sources of pollution on an airport, to identify the conditions, and in particular the weather conditions, resulting in chronic exposure or occasional pollution peaks, and to assess the technological and operational means of improving air quality. In 2018, the first simulations were conducted in the MOSIQAA project using tools that are more advanced than the standard tools in order to explore more restricted time-and-space scales and to detect phenomena that had previously been ignored, such as local accumulations of pollutants, short peaks of concentration or the effects of the position of buildings. In 2019, this work will be completed by sensitivity studies that will identify the most influential parameters and concentrate data acquisitions for future measurement campaigns that will be conducted in a second phase in cooperation with an airport.

IMPROVING THE VERTICAL FLIGHT PATHS
AT PARIS-CHARLES-DE-GAULLE

As part of the SESAR 2020 "Enhanced Arrivals and Departures" project, the DSNA and Eurocontrol's Experimental Center in Brétigny-sur-Orge are researching a new approach to facilitate and strengthen the regulation of parallel and simultaneous approaches specific to the complex air traffic control operations at Paris-Charles de Gaulle. The DSNA is continuing to research how to make both pairs of the airport's runways independent and how to generalize quieter, continuous descent.

FEAT
A DATA MANAGEMENT PROGRAM

The DSNA's objective is to automatically and reliably capture, store and process its data through the implementation of a Big Data environment. The FEAT (Flight Efficiency Analysis Tool) project, was launched to continue research and develop applications in the field of flight performance and air traffic impacts in the area.

SUPERSONIC AIRCRAFT
SPECIFIC ENVIRONMENTAL STANDARDS

Europe is preparing for the possible introduction of the supersonic American aircraft currently being developed. In 2018, the DGAC's experts took an active part in the development of the future standards applying to noise levels on take-off and landing. The work also looked into the methods of measuring the sonic "booms" that occur in the cruise phase.

HIGH-LIGHTS

SUPERSONIC
PROGRESS VERSUS THE ENVIRONMENT

Do the environmental standards that apply to all forms of innovation necessarily rule out the return of supersonic aircraft for passenger transport? Progress seems to have ground to a halt since the retirement of Concorde in 2003. This is a unique situation in aviation history, in which innovation has never ceased since Clément Ader's very first flight.

Managing the time zones is the first challenge. Will we accept to reach our destination at 3:00 a.m.? Will local residents be prepared to put an end to the curfew at the major airports in France and Europe? Other dissuasive problems include the 90-decibel sonic booms, high fuel consumption, greenhouse gas emissions and the low passenger numbers. However, some 20 projects are currently underway in America and Russia. International experts are very divided on the final outcome of these projects. In Europe, research budgets are mainly used to fund hybrid-propulsion subsonic aircraft and alternative "low-carbon" fuels.

ECOLOGICAL **AVIATION FUEL?**

The idea of aviation fuel produced from the biomass is gaining ground at the ICAO. To begin with, the product would be added to conventional aviation fuel. But in the short term, the relatively low price of fossil oil is not conducive to the significant investments by the oil industry required to develop this solution.

THE AIRPORT OF THE FUTURE
THE ENAC OPENS NEW HORIZONS

On November 22, 2018, the French School of Civil Aviation (ENAC) organized the second Aviation and Sustainable Development Convention, which focused mainly on the airport of the future. The increase in the number of airports will not keep pace with the rise in worldwide air traffic. Therefore, overpopulated airports and the provision of smooth services will be major issues. Artificial intelligence will be particularly useful in optimizing the energy consumption of infrastructures and buildings, by adjusting the heating and lighting in real time, for example.

HIGH-LIGHTS

THE HYDROGEN AIRPORTS **OF THE FUTURE**

Tarbes and Toulouse-Blagnac airports will be the experimental platforms used for the production and distribution of hydrogen in the "Hy Port" project managed by Engie Cofely and the Occitanie regional authority. Ultimately, an electrolyzer will be installed to test the new onboard aircraft taxiing systems powered by fuel cells. This source of energy will also power the functions used on the ground (parking, maintenance vehicles, etc.).

ENVIRONMENTAL REPORT

Fench Civil Aviation Authority (DGAC)

2018

GLOSSARY

A

ACA: Airport Carbon Accreditation

ACNUSA: French airport noise control authority

APU: Auxiliary Power Unit

C

CAEP: Committee on Aviation Environmental Protection

CALIPSO: Classification of light aircraft according to their sound performance index

CBS: Strategic noise maps

CCE: Environmental Consultative Committee

CNCAALS: National advisory committee fund for light and recreational aviation

CO_2: Carbon dioxide

CORAC: French Council for Civil Aeronautics Research

CORSIA: Carbon Offsetting and Reduction Scheme for International Aviation

D

DAC: French Civil Aviation Directorate

DGAC: French Civil Aviation Authority

DSAC: French Civil Aviation Safety Authority

DSNA: Air navigation service provider in France

E

ENAC: French school of civil aviation

EICA: Air traffic impact studies

ENTRACT: Characteristic aeronautical path environment

G

GES: Greenhouse gas

GNSS: Satellite navigation procedures

GLD: Local departure management

GTA: French air transport police

I

IGMP: Global weighted measured indicator

ICAO: International Civil Aviation Organization

M

MOSIQAA: Modeling and simulation of air quality in airport environments

N

NoisedB: ICAO database of the certified noise levels of aircraft

O

OFAC: Federal Office for Civil Aviation

P

PCG: General composition plan

PEB: Noise exposure plans in France

PGS: Noise Pollution Plan

PPBE Environmental Noise Prevention Plan

R

RTE: French environment theme network

S

SESAR: Single European Sky ATM Research

SNA: Air navigation service in France

STAC: French Civil Aviation Technical Department

T

TNSA: Tax on airport nuisances

V

VULCLIM: STAC tools used by airports to assess their vulnerability to climate change

W

WWF: World Wide Fund for Nature

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