

Environmental Report

For 2010



Resources, land, habitats and housing
Energy and climate Sustainable development
Risk prevention Infrastructure, transport and the sea

Present
for
the future



Ministry for Ecology, Sustainable Development,
Transport and Housing

ENVIRONMENTAL REPORT FOR 2010

A question of choice



Three years after the launch of France's Environment Round Table or "Grenelle", 2010 for the civil aviation environment was a year of achievement and international consistency and for dealing with the difficult question of general interest.

The Government impetus taken up notably by the January 28, 2008 air transport agreement, has borne fruit in numerous areas of the environment.

During the year 2010, which saw "Grenelle 2" become law, most of the projects launched three years earlier met with success, or at least reached a decisive stage in their development. The completion of the projects to raise the height of aircraft trajectories in the Paris region and the ensuing public enquiry, the success of the consultation on implementing the Dermagne Report introduced by the President of the Republic at the official opening of Paris-Charles de Gaulle Airport's Terminal S3, the publication of the "helicopter decree", which has been awaited for 18 years, the improvement of soundproofing grants through several regulatory texts, and the development of Continuous Descent Approaches, have profoundly changed the relations between civil aviation and its environment.

What was happening on a national level was confirmed internationally. The historic agreement obtained during the ICAO's 38th General Assembly in autumn 2010 bears witness to a remarkable development in mentalities and augurs well for new-found solidarity between countries, economic players and citizens using air transport.

However, as the issues became more specific, so 2010 became the year in which we questioned ourselves. The debate on the meaning of general interest has probably never before been as lively. For, while the projects to reduce noise pollution uniformly for all residents living in the vicinity of airports, to protect the climate and to increase airports' economic capacities all logically meet with consensus, our society must recognise that it needs to establish the priorities that it intends to apply when various interests clash. Should the noise pollution suffered by the majority be reduced if the price to pay lies in exposing a small number of residents to noise that had not affected them until now? Are we prepared to take responsibility for the consequences of the economic and social development we would like to see? To what extent are we prepared to pay to protect our environment? What do we want: to protect local residents from aircraft noise by preventing housing construction nearby, or should we consider that the extraordinary economic opportunities and infrastructures offered by the proximity of an airport justify the development of housing near airports?

Today, we need to answer all these questions. The technical instruments exist. We now have to choose our future.

Patrick Gandil, Director, French Civil Aviation Authority



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TAKING ACTION EARLY ON TO PREVENT NOISE POLLUTION

In 2010, DGAC pursued its initiatives to prevent aircraft noise and aircraft engine emissions. These initiatives are both international, with the adoption of new environmental standards, and national, with the preparation of the Emissions Trading Scheme (ETS).

INTERNATIONAL ACTION



Work within CAEP

Members and experts of the ICAO's Committee on Aviation Environmental Protection (CAEP) worked within specialised groups on aircraft noise issues, gaseous emissions affecting local air quality and greenhouse gas emissions contributing to climate warming. Their goal was to study the solutions that, in the future, will contribute to reducing the impact of noise pollution and international civil aviation emissions. DGAC took part in these international meetings in 2010. Moreover, it financed the work of three independent experts, who participated in assessing the prospects – for 2020 and 2030 – of research on improving energy efficiency and reducing nitrogen oxide and noise pollution.

DGAC also took part in international discussions on aircraft engine certification standards in the fight against local atmospheric pollution. The work under way aims to define a new method of certification for emissions of non-volatile

particles and to improve the understanding of their consequences on health.

During its eighth meeting in February 2010, CAEP adopted stricter nitrogen oxide standards (-15% by comparison with previous standards) and launched the development of a new energy-efficiency standard in terms of CO₂ emitted per service unit before end-2013.

Climate change and noise pollution under study at ICAO

DGAC contributes to drafting the ICAO policy on fighting climate change. In 2010, DGAC took part in the work of an informal group set up by ICAO to define objectives that would be more ambitious than the annual 2% improvement in the world's energy efficiency decided during the high-level meeting in October 2009. The resolution that was finally adopted during the ICAO's 37th Assembly in October 2010 set additional collective objectives, such as carbon-neutral growth as of 2020. An important point in ETS implementation in Europe is that certain states can take more ambitious measures before 2020. A threshold was set to exclude from these obligations those states whose international air traffic is below 1% of the world's total international air traffic. Finally, the previous ban on states implementing market measures, such as ETS, without a mutual agreement on the part of the third countries was replaced by an obligation to enter negotiations with these countries.

As regards reducing noise pollution, the DGAC's acoustic certification experts worked within ICAO to develop a three-yearly programme on revising aircraft acoustic certification standards. This work was completed in February 2010.

DGAC also work on updating acoustic standards and on the related technical manual.

Green flights to reduce emissions

As part of the Atlantic interoperability initiative to reduce emissions (AIRE), the Department of Air Navigation Services (DSNA) signed four contracts with the SESAR, a European joint undertaking, to organise a number of demonstration flights. These flights are intended to validate the innovative concepts and procedures for their future application on the ground, during descent for landing, cruising and oceanic flights. The expected benefits in terms of reduced gas emissions are in the thousands of tonnes of CO₂ for each assessment. For DSNA, three regional centres (CRNA) and three air navigation service providers (SNA) are partners in projects grouping Air France, Adacel, Airbus, Aéroports de Paris, Navportugal, NATS and the FAA.



A NETWORK OF NIGHT ROUTES

As part of the Single European Sky programme, DSNA is playing an active role in developing a network of night routes at higher altitudes in the European air space as part of FABEC (Functional Airspace Block for Central Europe), which should optimise air routes and consequently reduce fuel consumption and cut gas emissions.



SIMULATIONS TO PREVENT NOISE POLLUTION

One of the main aims of Committee on Aviation Environmental Protection (CAEP) is to seek solutions that will reduce the impact of international air transport on the environment. CAEP uses models and databases provided by Member States. An assessment team was set up to determine the modelling tools that would be the most effective when studying noise, local air quality, greenhouse gas emissions and the economy. The models under study were used to analyse two major issues: the effects of reduced thrust take-off and the effects of a possible action on nitrogen oxide (NO_x) emissions.

AIR TRANSPORT'S ZONE OF RELEVANCY



In 2010, DGAC pursued its initiatives to develop the complementarity between two different means of transport – aircraft and high-speed trains – and reposition the air transport sector within its zone of relevancy, i.e. keeping planes for journeys for which there is no rail alternative under three hours.

It also played a role in drawing up the national transport infrastructure plan [SNIT], which aims to introduce the transport orientations of France's Environment Round Table process ("Grenelle"). Regarding air transport, SNIT details projects that are designed to optimise the use of air transport and to re-centre its zone of relevancy, notably by developing mode-to-mode switching between air and rail transport.

In 2010, DGAC contributed to the debate on the interconnections of the high-speed train networks in the

A KEY FIGURE

- Air-rail mode-to-mode switching enables annual savings of over **300,000 tonnes of CO₂**, the equivalent of 8% of emissions of domestic traffic.

south, east and west of France, and particularly on the high-speed TGV train station due to be built near– or on the site of – Paris-Orly airport. This new TGV station will link it to the high-speed lines in the south, east and west of France.

DGAC monitored several projects under study to interconnect planes and trains in the French provinces. These included the railway station that could be built at the future Notre-Dame-des-Landes airport at Nantes or another at the Basel-Mulhouse EuroAirport.

It also followed other projects to serve the Paris airports, including CDG Express, the Grand Paris Express automatic metro and the Roissy-Picardy line.

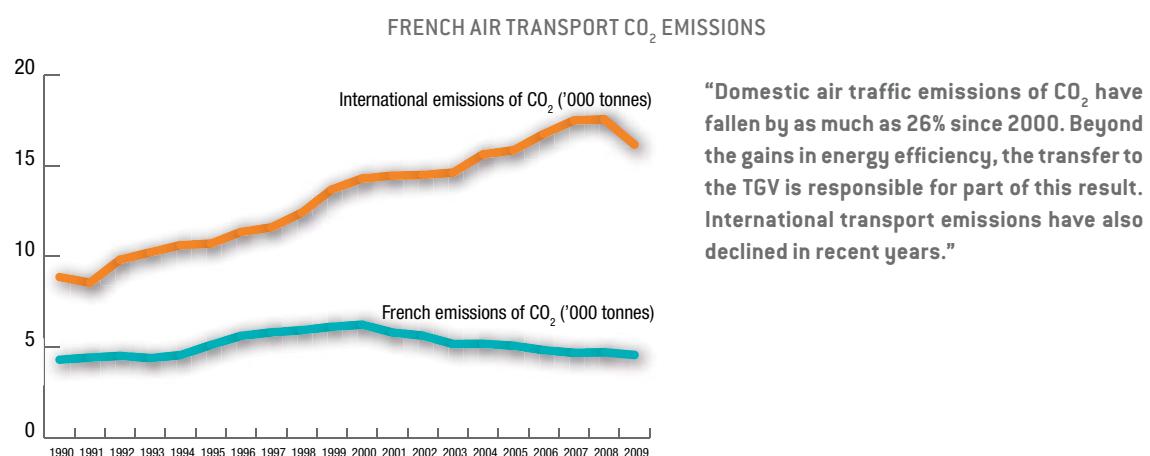
In tandem with the government's General Directorate for Infrastructures, Transport and the Sea, DGAC also took part in the European project ERANET on the feasibility of a large high-speed freight rail network.

Meanwhile, the CAREX project, also part of the Environment Round Table, which aims to transfer to the rail network part of the air and postal freight that transits via Paris-Charles de Gaulle Airport, is also under study.

COMPLEMENTARY TRANSPORT SYSTEMS

As part of the Grenelle Round Table, representatives of the air transport sector undertook to develop intermodal transport, which would make air and train transport complementary and reserve air transport for its zone of relevancy. This corresponds to using aircraft for journeys for which there is no rail alternative under three hours.

The development of connections between TGV stations and airports is part of this complementarity policy. An estimated three million passengers a year use the TGV station in Terminal 2 of Paris-Charles de Gaulle Airport. The three-yearly enquiry will measure the development of this complementarity.



TOOLS FOR GREATER EFFICIENCY TOMORROW

Preparing ETS

In 2010, with the launch of the CO₂ emission quota trading system, activities and emissions in the sector were monitored for the first time. DGAC studied and approved over 500 monitoring plans. In September 2010, DGAC stepped up its ETS unit to deal with the numerous dossiers remaining to be submitted. The ETS unit met with five airline companies on site to help them comply with the European directive, but also to provide the ETS agents with more information. In 2010, the implementation of the ETS directive in French law reached a milestone with the decree of October 21, 2010, which made the necessary amendments to the legislative part of the environment code. And on August 9, 2010, an order pertaining to the verification of airlines' declarations was passed.

Controlling urban-planning in the vicinity of airports

Noise Exposure Maps (PEB) are tools that allow the relevant authorities to contain the number of people moving into areas exposed to noise pollution from air traffic. These Maps concern 216 airfields in France. The draft map for Paris-Orly airport produced by DGAC and Aéroports de Paris and submitted to the Environment Consultative Committee at the end of 2009, was finalised in 2010. The minister responsible for civil

aviation approved the formal revision of the Paris-Orly Noise Exposure Map in July 2010. The current map for this major hub located in a highly urban area dates from 1975. It required revision so that it would take into account the expansion of the hub, the adoption of the Lden noise index (see box) and the improvement of aircraft fleets since that time.

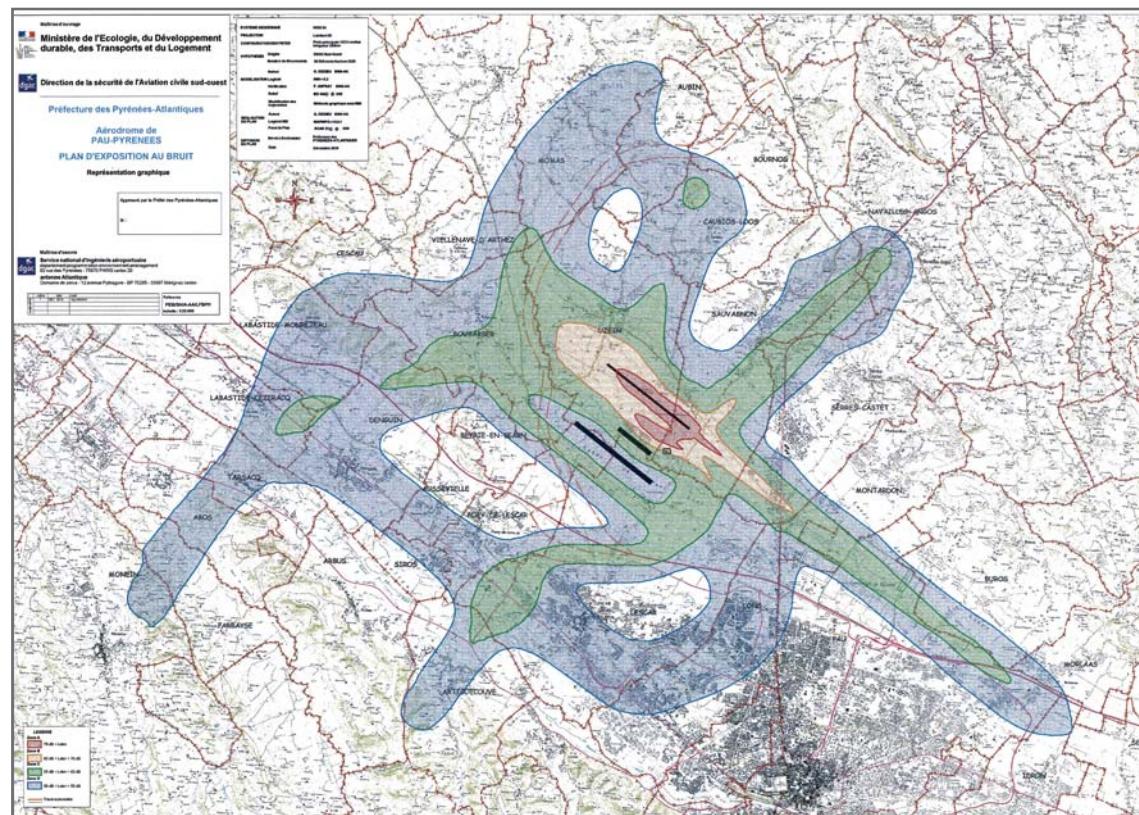
In 2010, several PEBs have been approved, namely those of Rennes, Pau and Ajaccio Campo Dell'Oro airports. Besides advancing the revision of Noise Exposure Maps, DGAC is also committed to encouraging the production of PEBs adapted to airports where there is little or irregular traffic.

Aircraft acoustic certification

In 2010, DGAC started acoustic certification work on behalf of AESA, the European Aviation Safety Agency, on the military transport aircraft A 400M.

It also pursued its actions to re-certify Airbus planes from Chapter III to Chapter IV, which is more stringent: admissible noise levels associated with the three certified flight phases are lower by 10 dB than those in Chapter III. Re-certification sometimes requires an engine adjustment to reduce noise emissions. Work to certify light aircraft equipped with silencers was also continued.

NOISE EXPOSURE MAP - PAU-PYRÉNÉES AIRFIELD - DECEMBER 2010





Airbus A400 M.

The CALIPSO project

The CALIPSO project [Acoustic classification of light aircraft according to their sound performance index], developed by DGAC, classifies the aircraft into different categories according to the level of noise they produce in real flight situations. This classification can be used to reduce the noise in the vicinity of light aircraft airfields, while protecting the interests of the people using them. On this basis, aircraft traffic is adjusted in line with the airfield's local situation. For example, only certain aircraft categories will be authorised in certain time periods. Acoustic classification also allows labelling to be introduced.

In 2010, DGAC finalised a measurement protocol designed to translate the noise produced during the flight stages that generate sound pollution. CALIPSO should be available at the end of 2012.

Modulating landing fees in line with acoustic performance

Following the commitments made by air transport representatives at the Environment Round Table, an adjustment was made to the landing fee based on aircrafts' acoustic performance. This has enabled airfield managers to modulate landing fees in line with aircraft acoustic performance (six acoustic groups were set up) and the time period during the day (three time slots were established). Air transport companies are encouraged to use the day-time slots and to continue to modernise their fleets. Many French airports, including Paris-CDG, Paris-Orly, Paris-Le Bourget,

Nice Côte d'Azur, Lyon-Saint Exupéry, Marseille Provence and Toulouse Blagnac, have passed on these adjustments in their prices.



TAKING THE LDEN INDEX INTO ACCOUNT

Since 2002, France – and indeed Europe – has adopted a new acoustic index: the Lden (Level day evening night), which assigns different values to flights depending on the time of day, evening and night. These values come from a sociological survey. According to the Lden index, evening flights are assigned a value increased by 5dB, while night flight values are increased by 10dB. Since the introduction of this new noise indicator, Noise Exposure Maps are being revised throughout the country.



THE SOURCES OF LIGHT AIRCRAFT NOISE

The noise generated by light one-engine aircraft comes largely (51%) from the propellers. The engine is responsible for 44% of the overall noise generated by the aircraft, and the aerodynamic noise from the airframe represents on average the remaining 5% of the overall noise.

These noise levels vary markedly during different stages of a flight.

Source: APAME - Association to Promote Electrical Aircraft.

A KEY FIGURE

- In 2010, Aéroports de Paris reduced its primary energy consumption per passenger by **15%**, and is now aiming to meet the target of a 20% reduction by 2020 laid down in the Convention of January 28, 2008.

The **centralised geothermics** work carried out at Orly should enable ADP to reach the national target of **23% of renewable energy** in 2020. A decision has also been taken to build a biomass plant at Paris-Charles de Gaulle.

The second Aéroports de Paris economic regulation contract

In the summer of 2010, Aéroports de Paris (ADP) signed a second economic regulation contract with the French state for the 2011-2015 period. Certain of its objectives concern sustainable development problems at Paris airport hubs. During the period from 2011 to 2015 €39 million will be devoted to reinforcing ADP's environment policy, which will focus notably on containing energy consumption, efficient energy production, developing renewable forms of energy such as geothermal energy and biomass and improving rainwater management.



EFFICIENT AIRPORT INFRASTRUCTURES



Notre-Dame-des Landes, the first "Grenelle" airport

In December 2010, following a favourable decision by the French Council of State, the minister in charge of transport signed a concessionary contract for the construction and running of the future Notre-Dame-des-Landes airport. This is the first airport to be built as part of the Environment Round Table process. The Aéroport du Grand Ouest is not a new airport as such, but a transfer of the Nantes-Atlantique Airport for environmental and safety reasons. The project chosen will be extremely environmentally friendly and equipped with low-consumption buildings and optimised flight and taxiing time. It should bring down the number of people exposed to noise pollutants substantially, and enable the airport to fit into its natural environment by limiting periurbanisation and saving the site of the Grand Lieu Lake, an area listed under Natura 2000.

A new runway and a new "greener" terminal on Mayotte

In June 2010, the plan to build a new runway for the airport on Mayotte, a French island in the Southern Indian Ocean, was given the go-ahead by the National Committee for Public Debate. This project involves building a 2,600-metre runway that will be adapted for direct long-haul flights to France. Flights will no longer stop over at Réunion Island, which will generate substantial CO₂ savings.

In 2010, following the consultation launched by DGAC, a manager was appointed to oversee the construction of the new terminal, which was built largely in wood to fit into its surroundings. The project also entailed saving energy by using photovoltaic panels and rainwater.



Mayotte airfield.

A KEY FIGURE

- **Fifty per cent** of the aircraft landing at Notre-Dame-des-Landes Airport, i.e. some 10,000 aircraft a year, fly over Nantes city centre at below 500 metres. Over 40,000 people are exposed to noise pollution linked to air traffic.
(Source: Notre-Dame-des-Landes Airport Syndicat mixte d'études).

2.

DEALING WITH NOISE POLLUTANTS TO REDUCE THEIR IMPACT

With the publication of the decree restricting helicopter traffic, the coming into force of the decree that exonerates neighbouring residents from making advanced payments for soundproofing work and the provisions of the Law of July 12, 2010 concerning the reduction of polluting emissions, the fight against noise pollution and aircraft emissions pushed ahead in 2010. The year was also marked by a major, complex ongoing project: raising flight paths over airports in the Paris area.

RESTRICTING SOURCES OF NOISE



Restricting operations

At Nice-Côte d'Azur Airport, new restrictive measures have been in force since October 2010. They aim to gradually put a stop to night flights by Chapter III aircraft with a margin lower than 13 EPNdB.

The experiment conducted in 2009 that consisted in restricting the number of daily movements between July 1 and September 15 at the Grimaud (Var) heliport was successfully renewed in 2010.

The noise generated by helicopters arriving and departing from the numerous helicopter pads being used on the Saint-Tropez peninsula since the closure of the Saint-Tropez heliport in 1998, has been sharply reduced by a system introduced by the Prefect authorising the use of only a handful of designated helipads.

On October 20, 2010, the decree limiting helicopter traffic in densely populated areas came into force, putting an end to a period of 18 years during which there was no text that

put the "Noise" law of 1992 into application. This text banned tourist flights in densely populated areas [shown in the ICAO aeronautical maps on a scale of 1/500,000°], while at the same time maintaining indispensable training periods for pilots. The decree also introduced the possibility of operating restrictions in airfields in these areas.

ZOOM QUIETER HELICOPTERS

● Blades that make less noise, streamlined back rotor arms, silent air intake... Over the past 20 years, helicopter manufacturers and research bodies have made headway in reducing helicopters' noise levels by more than half.
[Source: Eurocopter]



PERCEIVED NOISE POLLUTION: AIRCRAFT COME FAR BEHIND CARS

According to the survey carried out in May 2010 for the French Ministry of Ecology, Energy and Sustainable Development and the Sea, transport is considered to be the main source of noise pollution. For the people interviewed, road traffic is the biggest nuisance (59%), well ahead of air traffic (14%) and rail transport (7%). Air transport bothers young families more (24%), Parisians (22%), inhabitants of towns with fewer than 30,000 inhabitants (20%) and people living in private houses (18%).

(Source: TNS-Sofres survey conducted on May 10 and 11, 2010 among 1,000 people aged 18 and over).

Strategic noise mapping

The European Directive of June 25, 2002 made noise maps and plans to prevent noise in the environment (PPBE) compulsory. It applies particularly to the major airports (with over 50,000 movements per year) and should allow for a global assessment of exposure to noise. These tools should also lead to a common approach to reduce and prevent the effects of noise. DGAC has completed the noise maps of nine French airports, enabling noise maps to be duly drawn up in 2010. The Basel-Mulhouse Airport submitted its plan for public consultation between September and November 2010. The PPBEs for Marseille Provence and Nice Côte d'Azur Airports were presented to their respective Environmental Consultative Commissions, and submitted to the Prefecture before being made available to the public. Several plans, such as that concerning Toulouse-Blagnac Airport, are in the process of being drafted.

Assisting light aviation

In 2010, the DGAC's inter-regional services paid out a total of €86,500 to those affiliated aviation clubs that applied for it to help them reduce noise pollution caused by light aircraft. This enabled aviation clubs, such as those at Royan, Angoulême, Les Mureaux, Coulommiers, Megève and Roanne, to finance noise reduction by installing exhaust silencers and three-bladed propellers or winches to tow gliders, as they are quieter than traditional tow planes.



OPTIMISING AIR NAVIGATION PROCEDURES

Raising arrival altitudes at Paris airports

Throughout 2010, DGAC pursued its initiatives to raise aircraft arrival altitudes by 300 metres, to meet the objective set at the Environment Round Table to reduce by half the noise perceived by inhabitants living near Paris airports. During the year, the phase concerning the raising of flight arrival altitudes, in the presence of an east wind, from 900 to 1,200 metres at Paris-Orly, was the subject of a public enquiry. For Paris-CDG Airport, a real-time simulation of the planned raising of arrival altitudes from 1,200 to 1,500 metres [Phase III], also the subject of a public enquiry, was organised on the largest scale to date. Nearly one hundred air traffic controllers were called upon to approve the new air traffic system.

The Continuous Descent Approach procedure

The continuous descent approach procedures, laid down in the DSNA's strategic orientations to reduce noise in the vicinity of airports, are now operational. During 2010, these procedures were introduced or experimented at Paris-CDG, Paris-Orly, Lyon, Marseille, Toulouse and Strasbourg. Studies are also under way to assess Nice Côte d'Azur, Basel-Mulhouse, Bordeaux-Mérignac and Nantes Atlantique Airports. Ultimately, these procedures will concern France's ten largest airports first and foremost. They cannot be extended to all French airports for technical reasons (notably the flight paths of other aircraft).



ZOOM

- When the Instrument Landing System (ILS) interception level is lifted from 900 to 1,200 metres, noise on the ground is reduced by 3 to 4 dB, or by half of the acoustic energy. This noise reduction concerns the whole flight area above 1,200 metres, or a perimeter of 20 km around the runway.
- By reducing engine speed thanks to the elimination of horizontal flight stages, continuous descent allows for a reduction in fuel consumption (and at the same time in CO₂ emissions) and the noise pollution around airports. At Paris-Orly Airport, for example, continuous descent enables a Boeing 747 to save up to 800 kg of kerosene and cut the noise level by 4 to 7 dB.

HELPING LOCAL RESIDENTS

Financing soundproofing

The Aviation Noise Inconvenience Tax (TNSA in French), which is used to finance soundproofing grants, brought in €56.5 million in 2010. The crisis that affected air transport explains the slight drop in takings by comparison with the previous year. Soundproofing finance is intended for those households near the ten largest French airports, who live in the zone covered by the noise inconvenience plan. In 2010, the number of housing units benefitting from a favourable opinion on the part of the Consultative Commissions for Subsidies to Nearby Residents to carry out soundproofing work stood at 4,765.

The soundproofing subsidy system made two major breakthroughs in 2010. The first is related to the decree of May 25, 2010, which was introduced to exonerate local residents from paying the cost of soundproofing work in advance. The DGAC also undertook to increase subsidies in the case of particularly costly work. These measures completed the actions already undertaken since the system was launched to improve the way it works and to increase the subsidies



for certain categories of applicant (group applications for soundproofing grants made by condominiums, social housing blocks and groups of individually owned houses).

Two new airfields to be covered by the soundproofing grant system

Furthermore, two new airfields are to be covered by the soundproofing grant system in 2011: Beauvais-Tillé and Paris-Le Bourget. The corrected Finance Law for 2010 made it possible to include the local residents of Le Bourget airport in the soundproofing grant system. Moreover, Beauvais-Tillé Airport was also included in the grant system when the threshold of 20,000 movements by aircraft of over 20 tonnes was exceeded on December 21, 2010. DGAC is currently working on drawing up a noise inconvenience plan as quickly as possible to determine the residents entitled to claim a subsidy for each of these airports, so that the first grants can be paid out as soon as possible.



In 2010, all the airports concerned by the soundproofing study had sufficient resources to face residents' demands.



RESIDENTS OFTEN UNAWARE OF SUBSIDY SYSTEM

The TNS-Sofres survey conducted in 2009 on behalf of DGAC showed that 91% of local residents who had benefitted from soundproofing grants were satisfied with the system. One-third of the people eligible for the grants declared that they were not aware of their existence. At the request of DGAC, Aéroports de Paris organised a communication campaign in June 2010 in the form of posters and flyers in areas near airports to improve information for local residents.



The use of products to remove black ice is strictly regulated and rain water is filtered.

TAKING ACTION FOR THE LOCAL ENVIRONMENT



Protecting local air quality

Since the Law of July 12, 2010 on the national commitment to the environment, players in the air transport sector have been encouraged to reduce their local polluting emissions during extended pollution peaks. To this end, DGAC has put forward a plan of action aiming to postpone some forms of training and to further restrict the use of auxiliary power units (APU). APUs are used to provide the aircraft with electricity and air-conditioning and to start the engines. For long-haul flights, the use of APUs during a stopover results in the consumption of 300 kg of fuel, generates 945 kg of CO₂ emissions and 2 400 g of NO_x⁽¹⁾. Airports in the Greater Paris area are committed to a number of actions intended to promote the use of less polluting substitution equipment, such as using electricity on the ground. In 2010, the Civil Aviation Technical Services, STAC, in tandem with Airbus, conducted a digital simulation survey of aircraft movements at Paris-CDG. The aim was to assess the impact of taxiing using alternative energy sources on capacity and the environment. This survey assessed the gains per aircraft in terms of fuel consumption and polluting gas emissions.

(1) Source: CITEPA.

A KEY FIGURE

- On a national level, air transport's share of NO_x emissions is small, but increasing: it rose from 0.5% in 2000 to 0.9% in 2008. Other emissions of atmospheric pollutants (CO, SO₂, COV) due to aviation are lower, at 0.3%.

Source: DGAC

Fighting water and ground pollution

After the results obtained with the DGAC's experiments with rhizospheres at Paris-Orly Airport, a pilot site was set up at the hub in 2010 to confirm the findings of the first stage of the study. The installation of filters, planted with rose bushes, improved the management during the winter of surface run-off water laden with products to remove black ice and frost.

In 2010, STAC published an initial report at national level on the assessment of the performance of products designed to remove black ice at French airports and initiated two new study plans on the recommendations regarding the use of these products.

HEIGHTENED SENSITIVITY TO LOCAL AIR QUALITY

According to the enquiry carried out in 2010 by DGAC on the "image of civil aviation", CO₂ emissions are still considered as the most important factor in the pollution that can be attributed to air transport (40% of respondents). However, the "pollution of local air" appears for the first time as the second most important factor (31% of responses against 25% in 2009), ahead of "noise" (29% vs. 34% in 2009).

3.

CONSULTING, COMMUNICATING, AND FULFILLING COMMITMENTS

While follow-up on commitments undertaken remains central to DGAC priorities, notably within the framework of the Environment Round Table process, 2010 was also marked by increased consultation with and greater transparency for partners and the general public.

LASTING COMMITMENTS



Follow-up to the convention of January 28, 2008

Three years after signing the convention committing all air transport industry players to step up their efforts to ensure their sector is increasingly respectful of the environment, DGAC published its third annual progress report. The report shows that the signatories have all mobilized despite the crisis, which hit the sector hard. Among the main results obtained in 2010 are the Council for Civil Aviation Research (CORAC) technological demonstrators' programme, the signing of the agreement on Central European Functional Airspace Block (FABEC) and implementing the ETS Directive in French law.

All the commitments made in the air transport sector in 2008 were discussed at length and action has been taken to reach the targets set by the convention.



A new environment charter for Cannes

In 2010, DGAC took part in the work to develop an acoustic energy indicator for the Cannes Mandelieu Airport. The creation of this indicator is part of the framework for the airport's second charter for the environment, signed in June 2010.

The Global Weighted Measured Noise Index (IGMP)

Introduced by decree on January 28, 2003, the Global Weighted Measured Noise Index (IGMP), created to track acoustic energy emitted every year by air traffic at Paris-CDG,

aims to ensure that it does not exceed the average level reached in 1999, 2000 and 2001. In 2010, DGAC, which is responsible for monitoring the IGMP, submitted the 2009 value of the index to the independent monitoring authority for airport noise pollution, ACNUSA: 85.6 [base 100: 1999-2001 average]. The value of the index fell sharply by comparison with the year before to reach its lowest level since it was created. The fall was due to a decline in traffic (-6%) caused by the economic crisis, but also the fact that many airlines had upgraded their fleets with new aircraft, which put up a better acoustic performance.

AN INDICATOR BASED ON NOISE MEASURED

The IGMP was set up to improve assessments of the acoustic environment at the Paris-Charles de Gaulle hub. The indicator is based on real-time noise measurements by a network of eight stations situated under the aircraft trajectories in the continuation of the airport's four runways. It determines the total acoustic energy measured for take-offs and landings for one year, with regard to the reference (an average of the years 1999 to 2001).

The indicator is weighted to take into account the highest noise level in the evening (when it is multiplied by three between 6 pm and 10 pm) and during the night (when it is multiplied by ten between 10 pm and 6 am). This is the only regulatory indicator based on the noise measured that has also provided a series of statistics for seven years now.



SUSTAINED COMMUNICATIONS

The action taken by the Environmental Consultative Committees in 2010

The Environmental Consultative Committees, or CCEs, were introduced by the Law of July 11, 1985 on urban planning in the vicinity of airports. CCEs offer local residents, aviation sector professionals and community representatives, a place for dialogue and consultation. During 2010, there were 45 CCE meetings to discuss environmental issues related to airport development and operations.

The Civil Aviation Safety Services (DSAC) for northern France took part in 11 CCE meetings in 2010. The Paris-Le Bourget Airport CCE met for the first time in December, gave its opinion on a planned decree to restrict operations and was informed of the raising of ILS interception altitudes.

In the central-eastern region, DSAC took part in six CCE meetings, including one on Lyon-Saint Exupéry Airport, which examined the "commitments for the environment" for the 2011-2013 period. Meanwhile, DSAC for southeast France convened CCE meetings for Nice Côte d'Azur, Marseille

Provence, Montpellier Méditerranée, Cannes Mandelieu and Aix-les-Milles airports.

In western France, DSAC took part in six CCE meetings in 2010, while in the southwest, it met with elected officials and residents' associations at five CCE meetings. The CCEs at Mulhouse-Habsheim and Colmar-Houssen airports decided to draft a charter for the environment for each airport. And finally, the Toulouse-Blagnac Airport CCE declared that it was in favour of the new operation restrictions.

Consultations at Paris-CDG

Following the publication in December 2008 of a report written by Jacques Dermagne, then President of France's Economic, Social and Environmental Council, on the conditions for the sustainable development of the Paris-CDG platform, a working group was set up under the aegis of the Prefect of the Ile-de-France region around Paris, and met in May 2010. The group has eight committees formed by institutional and economic players and members of associations, and their



A KEY FIGURE

- France's leading airport, with 1,500 aircraft movements a day, Paris-Charles de Gaulle is covered by a Noise Exposure Map (PEB), which concerns 620,000 residents in the vicinity, according to the Noise Exposure Map approved in 2007. The PEB is an urban-planning document that aims to discourage new inhabitants from making their home in areas affected by noise generated by airport activity. It marks out four "zones"⁽¹⁾ and these constraints are imposed on three of the four.

[1] The fourth zone, known as Zone D, which is only compulsory for the biggest airport platforms, is only obliged to provide information.

aim is to implement Jacques Dermagne's recommendations. DGAC ran two of the eight committees, and worked throughout the year to develop measures to reduce noise pollution in consultation with local authorities and residents.

In 2010, DGAC also participated in a working group on night flights set up as part of the Paris-CDG Airport CCE's permanent committee. The working group made headway on several subjects, such as the structure of night flights and the specifics of regulating noise pollution.

More generally, these meetings bringing elected officials, local residents, air transport and state representatives together made for a constructive exchange of information on how to find a balance between the quality of life and dynamic economic activity at Roissy.

SEEKING GREATER TRANSPARENCY

Measuring noise

DGAC conducted several campaigns to measure noise during the year 2010. At Marseille Provence Airport, the noise-measuring operation was associated with a study of the impact of a new arrival procedure. A campaign lasting several months and requiring the installation of ten mobile measuring stations was launched around Paris-CDG Airport to specify the values of the noise generated by aircraft on the ground in Paris airports.

Meanwhile, measuring campaigns related to the automatic detection of the noise of thrust reversers were conducted in 2010 at Toulouse-Blagnac and Nice Côte d'Azur airports.



Impact studies

In 2010, DGAC conducted several studies on the impact of noise regarding new procedures for the airports of Nice Côte d'Azur, Marseille Provence, Cannes Mandelieu, Bordeaux-Mérignac, Toulon-Hyères and La Môle-Saint-Tropez.

Noise and air under surveillance

DGAC contributed to the implementation of the epidemiological study on the effect of aircraft-generated noise on human health, which continued through 2010. DEBATS [Discussion on the effects of aircraft noise affecting health] is the first of its type. It aims to get a better grasp of the consequences of aircraft noise on health by monitoring a sample of 1,200 residents living near three French airports – Paris-CDG, Lyon-Saint Exupéry and Toulouse-Blagnac. The study conducted by the national research institute on transport and transport safety ([INRETS]) and initiated by ACNUSA, will attempt to highlight the effects of noise on the quality of life, sleep, cardio-vascular pathologies, mental health and the death rate. The year 2010 was devoted to finalising the scientific protocol of this major study launched in 2009 and due to continue until 2016.

Work also continued in 2010 on SURVOL (Health and environmental monitoring of the airport hubs of Paris-Charles de Gaulle, Paris-Orly and Paris-Le Bourget). Launched in 2009, SURVOL aims to study the impact of air traffic on the environment around the three Paris airports. DGAC continues to take part in this study, which should strengthen noise and atmospheric pollution monitoring and make information available to the public on the Internet.

Analysis of atmospheric samples conducted in the Paris-CDG laboratory.



IMPACT STUDIES FOR THE LARGEST AIRPORTS

The Department of Air Navigation Services (DSNA) systematically conducts an impact study (EICA) when air traffic is modified at any one of France's ten largest airports. Each study must be presented to a CCE, then referred to ACNUSA. A public enquiry is carried out beforehand when there are major changes to air traffic. All the modifications concerning a flight level beneath 1,980 metres come under this definition (FL 65) as does an average daily flow of at least 30 flights made by aircraft equipped with jet engines, when the surface area of the new over-flight zone exceeds the surface area before the modification by at least 10%.

A CO₂ CALCULATOR THAT CAN BE CONSULTED ON THE INTERNET

In line with commitments made at the January 28, 2008 convention, the National Federation of Commercial Aviation, FNAM, in liaison with DGAC, set up a CO₂ calculator on the Internet. Henceforth, 100% of FNAM company passengers can see the average emissions for a flight leaving or arriving in France. In addition, they can also consult the FNAM's website to read the "Best practice guide in compensating for CO₂".



Informing the General Public

In 2010, the DGAC system of measuring noise and visualising aircraft trajectories, Vitrail, was installed in two new communities in the Ile de France region, at their request. The System provides local residents with information on the conditions for over-flights, with just a 30-minute delay for security reasons. In 2010, Vitrail could be consulted in 21 local urban or rural communities in the Ile de France region – two more were added in early 2011 – and in the Environmental and Sustainable Development Centres at Paris-CDG and Paris-Orly.

DGAC developed VisioBruit, a new educational tool that provides the general public with the basic notions of acoustics and enables them to listen to simulations of the most common aircraft noises. It also provides simple information on the calculation methods of different noise indexes. It is currently being installed at the Paris-CDG Environment Centre.

Administrative penalties

In the case of non-compliance with environmental regulations, ACNUSA issues administrative penalties that can lead to fines. Since April 1, 2010, ACNUSA has handled the whole procedure, which was previously shared with the CNPN which has been closed.

Since it was founded in 1999, ACNUSA has issued over 3,800 penalties for breaches of the rules set by the Minister to curb noise pollution around airfields. The total sum of the fines incurred amounts to € 28 million.

A KEY FIGURE

- In 2010, DGAC dealt with 554 requests for information from local residents, elected officials and associations. The questions largely focused on noise, over-flight altitudes, night over-flights, increases in traffic and projects to improve the situation conducted as part of the Environment Round Table process.

Extending the competence of ACNUSA

The law known as "Grenelle 2" of July 12, 2010, broadened the scope of ACNUSA to atmospheric pollution generated by aviation around the main French airports. The independent monitoring authority has now renamed the Controlling Authority of Airport Pollution. The Authority will also guarantee the reliability of information and transparency in debates on matters regarding atmospheric emissions.

A GUARANTEE OF TRANSPARENCY

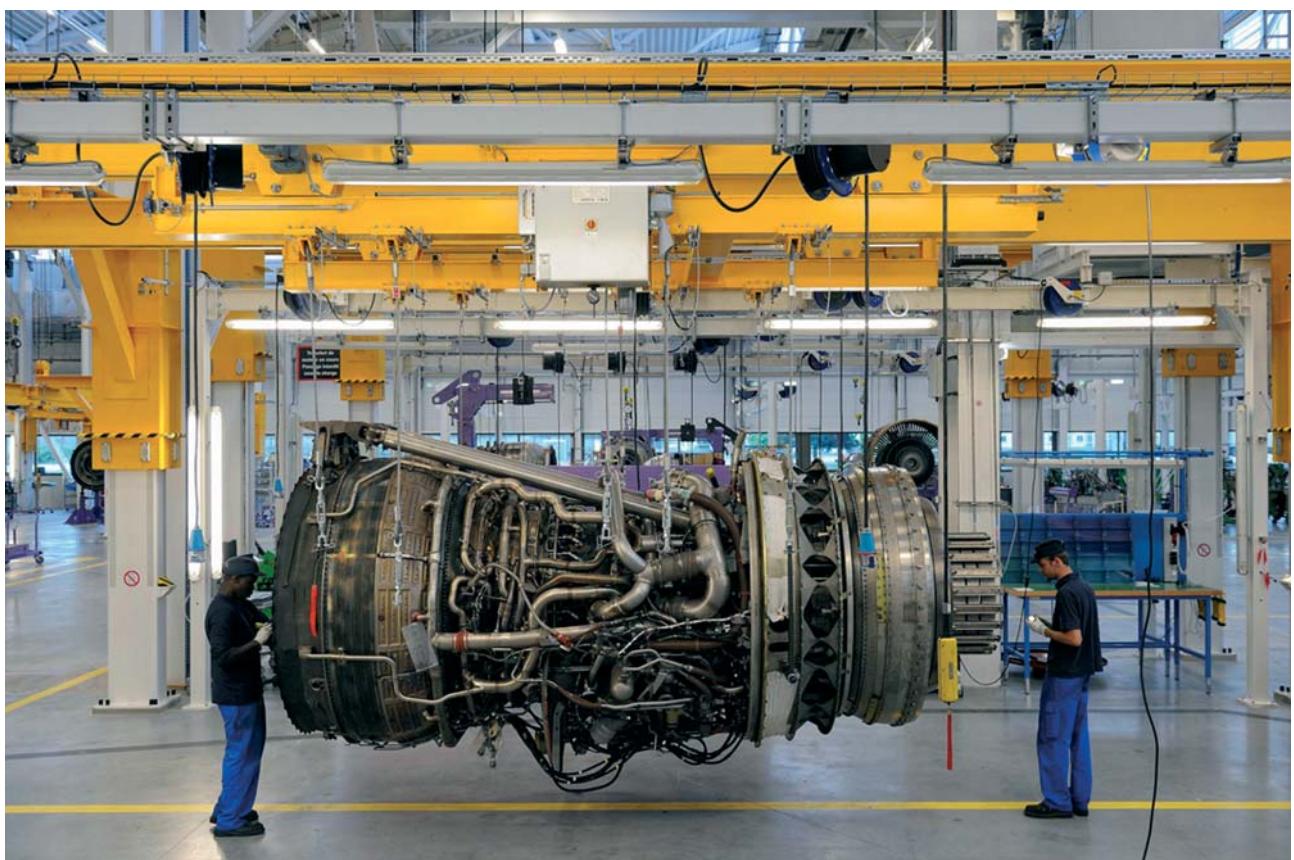
Since the conditions of monitoring atmospheric pollutants and the diffusion of information to the general public are already laid down in the law of December 30, 1996 on air and the rational use of energy, a law known as "LAURE", a balance between the competence of the Authority and other existing prerogatives had to be maintained. The Law of July 12, 2010 provides for the completion for air transport of a number of general clauses that are already applicable, by making ACNUSA competent to issue general recommendations on matters of air quality, a legislative modification that should guarantee transparency in the debates on airport environment.

4.

PREPARING THE FUTURE

In 2010, DGAC stepped up its action in favour of sustainable aviation by broadening the scope of its support for innovation. It sustained its involvement in the large national and European technological research and development programmes, such as that of CORAC, the Strategic Council for Civil Aviation Research, and Clean Sky. DGAC also supported the French industrialists and research bodies involved in innovative aeronautics projects, such as the design of new types of engine or research into alternative types of fuel.

EUROPE'S CUTTING-EDGE RESEARCH



Curbing air transport's environmental footprint

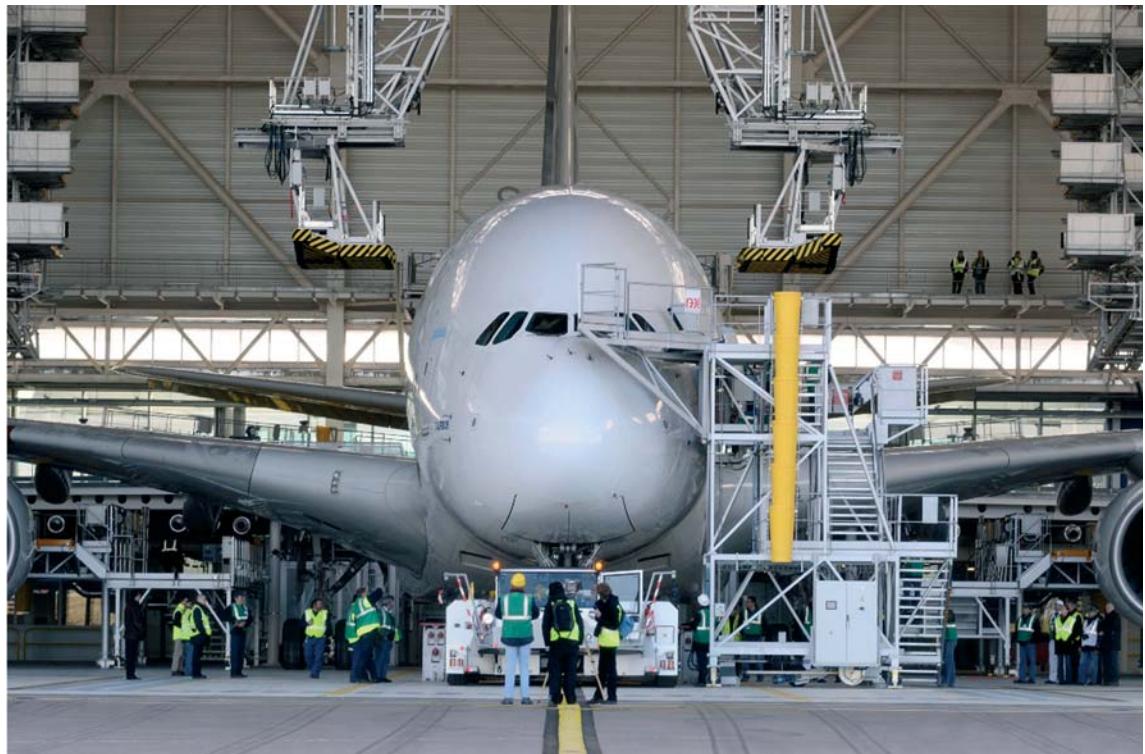
The joint European research project, Clean Sky, pursued the development of its six technology demonstrators ("smart" fixed-wing aircraft, eco-design, green regional planes and helicopters, more environmentally friendly engines, systems and operations) capable of curbing air transport's environmental footprint. This major aeronautical research programme has a seven-year budget of €1.6 billion. Work is also being conducted to step up the use of electric energy on board aircraft instead of hydraulic and pneumatic energy.

Initial results for Clean Sky

On September 29, 2010, an Airbus A380 in Toulouse flew a demonstration flight using the first technology developed as part of the Clean Sky programme. The Advanced Lip Acoustic Panel [ALEAP] is an air intake intended for the low-bypass turbofan, which reduces the noise made by the plane. Clean Sky obtained other results in 2010: the manufacture of wing and blade coverings for turbofan engines, in-flight trials of airborne guidance systems for helicopters in order to optimise trajectories from an acoustic standpoint, the development of new alloys, surface treatments and machining processes without chemicals.

A FEW FIGURES

- Since 2009, **248** projects have been launched as part of Clean Sky for total funding of **€138** million. In 2010, five new calls for project proposals were published for a total of **€100** million; **325** partners, including 65 French, are involved in the various projects under way.



The **Clean Sky** initiative will enable European research to design environmentally friendly aircraft for the future by adopting a global approach to all the technical aspects.



THE CORAC'S FIRST BREAKTHROUGHS FOR THE GREEN PLANE

Technological demonstrators take priority

CORAC laid down its road map in 2009, and in 2010 set up a programme of technological demonstrators, which is one of the national Investment Programme priorities for the future (PIA). Estimations put the cost of the demonstrators at one billion euros, to be divided equally between the state and the aeronautics industry. The demonstrators chosen by CORAC notably involve an increased use of compound materials, improved engine performance, modular avionics and optimised "more electric" management on board. They should enable aircraft technologies due to go into operation between 2020 and 2025 to be developed to maturity. In 2010, CORAC also worked on improving the understanding of the interactions between aviation and the atmosphere by defining the issues to be studied on: the forming of trails and induced clouds; their impacts on the climate and;

pinpointing strategies to avoid these phenomena. DGAC has participated in defining the objectives for the technological projects and plays a coordinating role on the CORAC's steering committee.



A KEY FIGURE

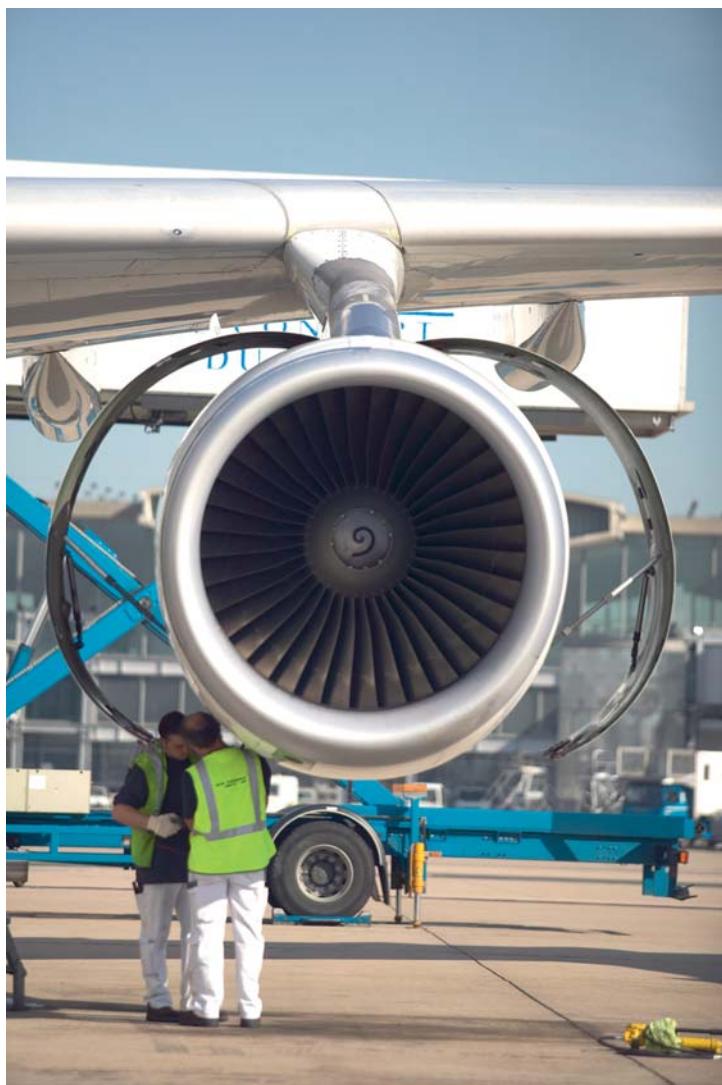
- The continuous improvement in air transport's energy efficiency has gone hand in hand with the growth of air traffic. According to CITEPA, CO₂ emissions have fallen by **32%** per passenger/freight kilometre transported since 1990.



THE ENVIRONMENTAL BENEFITS OF CORAC

Some extremely ambitious goals should be reached with the technological breakthroughs sought by the CORAC demonstrators: reductions of 50% in CO₂ emissions, 80% in NO_x emissions, and 50% in perceived noise by 2020. Modular avionics aims to cut fuel consumption by 5% thanks to greater efficiency in the interactions between airborne and ground systems and optimised air traffic management. The objectives of one of the demonstrators, "advanced turbofan propulsion" powerplant for medium-haul planes, are to reduce CO₂ emissions by 16% and noise emitted by between 6 and 8 dB by 2018.

A GREATER EFFORT IN FAVOUR OF RESEARCH BODIES



In 2010, DGAC accompanied the national aerospace laboratory, ONERA, in its initiatives to contribute to the reduction of air transport's environmental impact. DGAC supported the testing of counter-rotating open rotor engines, which allow for a 25% reduction in consumption by comparison with a traditional engine. DGAC support also made it possible to develop an evaluation infrastructure for air transport systems (IESTA), which is able to measure the acoustic impact and the gaseous emissions of current and future aircraft fleets.

France has taken its support for aeronautical technological research to **a level never reached before**, in order to face the simultaneous challenges posed by **competition** in the industry and the **sustainable development** of air transport.

THE ENGINE AS THE MAIN SOURCE OF ENVIRONMENTAL GAINS

Much of the current research on aircraft engines aims to reduce gaseous emissions and their acoustic levels. The use of compound materials, with a titanium or ceramic matrix, enables the reduction of the mass of certain parts, and consequently their consumption. Another promising direction for research lies in increasing the bypass ratio in turbofan engines. The "open rotor" or propfan jet engine, which has no fairing, and fan blades on the outside of the compressor or the turbine, should reduce consumption substantially. Research is due to be pursued to improve its acoustic performance.





A POLICY OF SUPPORTING INDUSTRIAL PARTNERS

DGAC devoted a large part of its 2010 technological research budget to aeronautical programmes to increase air transport's performance with regard to the environment. The DGAC support covered all areas and disciplines of aeronautics, such as the increased use of compounds materials, new engines or their integration into the airframe.

Greener engines

Research projects designed to improve engine performance with regard to the environment have focused on reducing their mass, their thermodynamic and aerodynamic efficiency and controlling the airflow inside the engine.

Improved energy management

The concept of the "more electric" aircraft relies on optimising the management of the airborne electric energy intended for avionic equipment and systems, and the design of generators and high-performance electric energy storage systems. Research is being carried out on fuel cells, which reduce the release of greenhouse gases and noise pollution.

Intelligent mission management

DGAC has also supported the design of airborne/ground data exchange systems and decision-making processes that optimise traffic management and flying aircraft in real-time to satisfy different criteria, such as consumption or the amount of noise produced in landing or take-off.

Fuels for tomorrow

The study of conditions of use of new energy sources and biofuels in air transport was pursued during the year: performance levels, the inclusion of air transport needs in national and international energy policies, such as the Emissions Trading Scheme (ETS), monitoring environmental, social and economic impact indicators and the quality of biofuels throughout the production process.

In 2010, the SWAFEA programmes (Sustainable way for alternative fuels and energy for aviation) entered its last year of study. Financed by the European Commission and steered by ONERA, SWAFEA will allow the performances of several energy alternatives to be compared to fossil fuels, their industrial feasibility and the impacts of their use to be assessed and recommendations for their development to be drawn up.

A FEW FIGURES

- Over the past 50 years, fuel consumption per aircraft seat has fallen by 70% and noise by 6dB (Source: EADS), and according to Airbus, some 85% of the technologies used in today's aircraft allow airlines to reduce the environmental footprint of their flights.

ALTERNATIVE FUELS: IN-FLIGHT TESTS ARE STEPPED UP

In October 2009, a Qatar Airways A340-600 made a six-hour flight fuelled with synthetic kerosene, and in November of the same year, the first Air France-KLM aircraft was fuelled with bio-kerosene. In 2010, an A320 of the Brazilian company TAM made an experimental flight with a biofuel made with the oil from the Jatropha curcas, a plant grown in tropical and sub-tropical climates. Lufthansa, meanwhile, has experimented with several flights using a mixture of hydro-treated vegetable oil and kerosene.

Sources: airline companies, GIFAS, INRA.



GLOSSARY

A

ACNUSA: French Independent Monitoring Authority for Airport Pollution
ADP: Aéroports de Paris (Paris Airports Group)
AESPA: European Aviation Safety Agency
AIRE: Atlantic Interoperability Initiative to Reduce Emissions
ALEAP: Advanced Lip Acoustic Panel
APAME: Association for the Promotion of Electrical Engine Aircrafts
APU: Auxiliary Power Unit

C

CAEP: ICAO's Committee on Aviation Environmental Protection
CALIPSO: Acoustic classification for light aircraft in accordance with their acoustic performance
CAREX: Cargo Rail Express
CCAR: Assistance for Local Residents Consultative Committee
CCE: Environmental Consultative Committee
CITEPA: Interprofessional Technical Centre for the Study of Atmospheric Pollution
Clean Sky: A European Union programme to coordinate and optimise research into a more environmentally friendly aviation industry
CNPN: French National Commission for the Prevention of Nuisances
CO₂: Carbon dioxide
CORAC: Council for Civil Aeronautical Research
CRNA: French regional air traffic control centres

D

DEBATS: Study on the effects of aircraft noise on human health
DGAC: French Civil Aviation Authority
DSAC: French Civil Aviation Flight Safety Group
DSAC-IR: French Civil Inter-regional Aviation Safety Department
DSNA: French Department of Air Navigation Services

E

EICA: Air Traffic Impact Study
EPNdB: Effective Perceived Noise in Decibels
ERANET: European Research Area Network
ETS: Emissions Trading Scheme

F

FAA: US Federal Aviation Administration
FABEC: Functional Airspace Block for Central Europe
FNAM: French Federation of Commercial Aviation

G

GIFAS: French Aerospace Industries' Association

I

ICAO: International Civil Aviation Organisation
IESTA: Air transport systems' evaluation infrastructure
IGMP: Global weighted measured noise index
(for Paris-Charles de Gaulle Airport)
ILS: Instrument Landing System
INRA: French National Institute for Agricultural Research
INRETS: French National Institute for Transport and Safety Research

L

LAURE: Law on air and the rational use of energy
Lden: Level day evening night

N

NATS: National Air Traffic Services
NO_x: Nitrogen oxide

O

ONERA: French Aerospace Lab

P

PEB: French abbreviation for Noise Exposure Map
PIA: French abbreviation for Investing in the Future Programme
PPBE: French Plan to Curb Environmental Noise

S

SESAR: Single European Sky ATM Research
SNA: Air Navigation Services
SNIT: French national transport infrastructure plan
SO₂: Sulphur dioxide
STAC: Civil Aviation Technical Service
SURVOL: (literally, "overflight") a four-year study carried out on communities living near Paris's Charles de Gaulle, Orly and Le Bourget airports, as part of a regional health and environment plan
SWAFEA: Sustainable way for alternative fuels and energy for aviation

T

TNSA: French aviation noise inconvenience tax

V

VisioBruit: an educational tool enabling the general public to acquire basic notions of acoustics and to listen to the real noise made by the most common aircraft
Vitrail: System for monitoring aircraft noise and displaying flight paths
VOC: Volatile Organic Compound

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