

WHAT IS THE BALANCED APPROACH?



Averting and reducing

aircraft noise

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Averting and reducing
aircraft noise

About the author

01dB contributes to reducing noise and vibrations to levels required by regulations or set out in sustainable development strategies. 01dB is aimed at town councils, and the industrial, transportation, public works and construction, wind power and leisure sectors.

This white paper was produced jointly with A-Tech / Acoustic Technologies, a pioneer in the balanced approach since 1997.

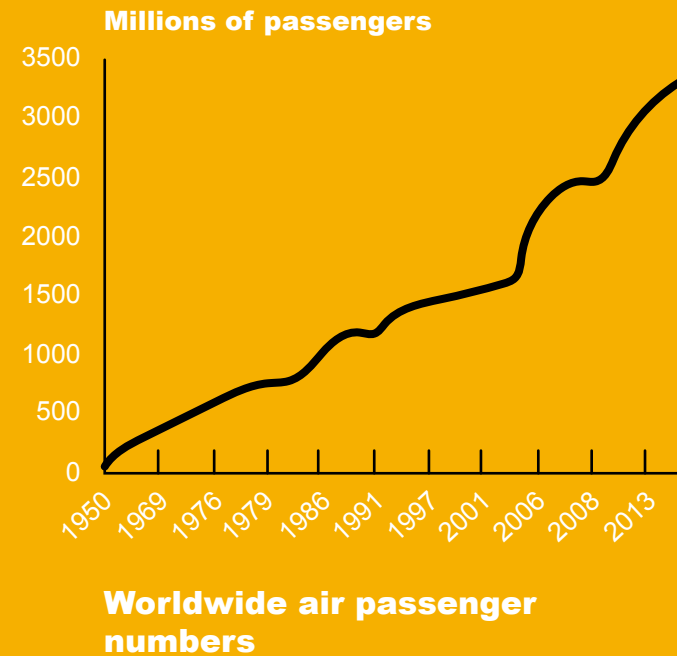


1. Noise management at airports: a necessity

Air traffic has increased considerably in recent years, and will continue to grow in the years ahead.

According to Airbus, Boeing and the International Air Transport Association (IATA), air traffic is expected to double in the next 15 to 20 years. More than 3.2 billion passengers were recorded in 2014, up from 1.5 billion in 2003. This number will reach 6.7 billion in 2032.

The consequences on the noise environment at airports are inevitable. Noise is systematically cited as a major disruption to day-to-day life by respondents in French surveys (TNS Sofres).



Source:

<http://transport.sia-partners.com/face-la-croissance-du-traffic-aerien-les-grands-projets-dinfrastructures-des-aeroports>

The main sources of environmental disruption at airports are noise pollution and atmospheric pollution. Noise has an impact on physical and mental health, and also on the quality of life of every person affected. According to the INRS*, noise can cause stress, sleep disruption, reduced cognitive performance** and cardiovascular disorders. The risk of occupational accidents is also increased due to warning signals and verbal communication being masked by noise.

To cope with the increase in traffic, and thus the increase in noise sources, it is essential to create a better controlled noise environment. Communication and discussions between airport managers and neighboring residents are also necessary.

** The INRS is the French national research and safety institute, a public body responsible for occupational health and occupational risk prevention.*

*** The term cognitive refers to all mind-related processes (language, memory, reasoning, motor coordination, perception and learning).*



2. What is the balanced approach?

The principle of the “balanced approach” to aircraft noise management was adopted by the ICAO (International Civil Aviation Organization) Assembly in 2001. ICAO guidance on the subject was published in 2004*.

This approach entails identifying the various noise problems at an airport and then analyzing the measures available to reduce noise. Four main methods are used to enhance the management of noise in the environment. The measures set out in the balanced approach are applied on a case-by-case basis, taking into account the specifics of each airport. This strategy allows airports to pursue their integrated development strategies.

* *“Guidance on the Balanced Approach to Aircraft Noise Management»*, Doc. 9829 AN/451, second edition 2008, ICAO

Source:

<http://www.icao.int/environmental-protection/Pages/noise.aspx>





THE ISSUES

ECONOMY



- Employment
- Controlled activity
- Investment

QUALITY OF LIFE



- Daytime and nighttime rest
- Health
- Affordable housing
- Mobility

ECOLOGY

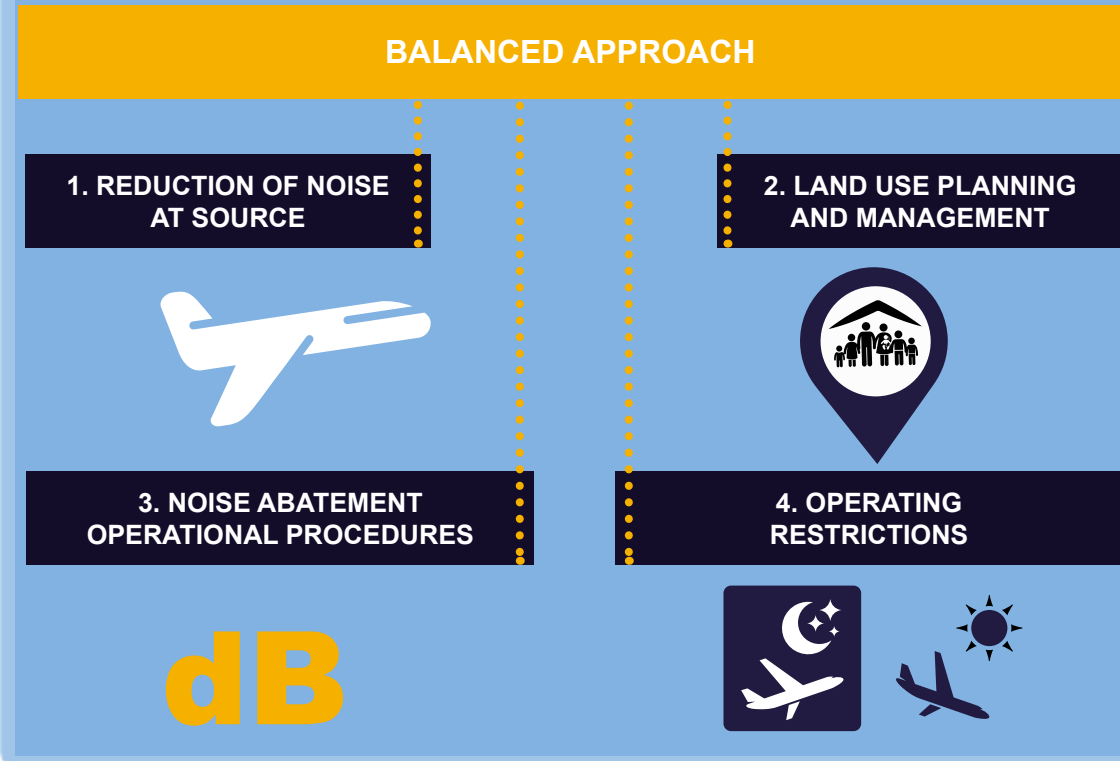


- Noise pollution
- Fine particulates
- Climate objectives



3. Applying the balanced approach

The four principal elements of the balanced approach are as follows:



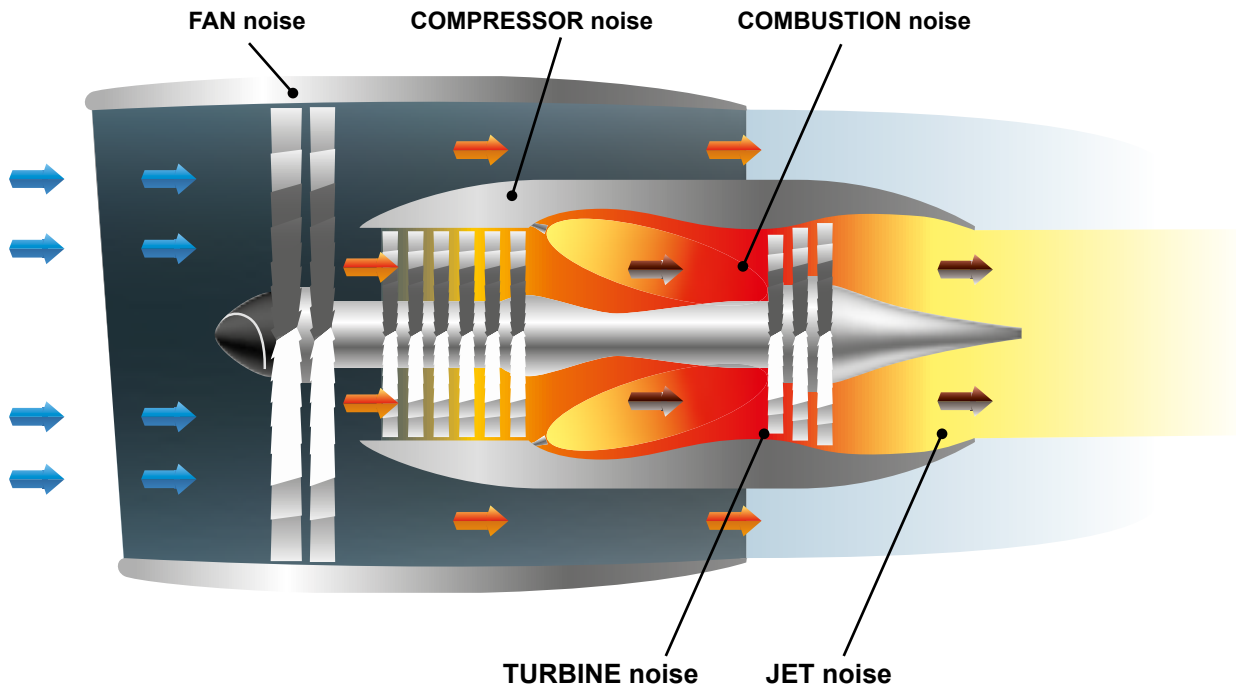
Each measure is applied as appropriate for an individual airport and its layout.



3.1. Reduction of noise at source

Generally speaking, this element of the balanced approach is not under the control of airports, as it relates to aircraft manufacturers. The ICAO (International Civil Aviation Organization) states that the term “reduction of noise at source” relates to the intrinsic characteristics of aircraft, not the manner in which they are used.

ORIGINS OF ENGINE NOISE AND AERODYNAMIC NOISE SOURCES ON AN AIRCRAFT



Source: IROQUA (French research initiative for aeronautical acoustic optimization)

Aircraft characteristics can be modified to reduce noise at source.

For example, noise may be caused by the air speed at the outlet of a turbine ejection nozzle, or by a supersonic speed at the tip of an impeller blade. By reducing the diameter of the rotation disc of an impeller by adding an additional blade, the noise will be reduced because the speed of the blade tip will decrease.

In recent years, manufacturers have faced increasingly strict noise regulations.

For example, the restrictions applicable to Boeing 727 and Douglas DC-9 aircraft built in the 1960s were less stringent than those for the Boeing 767 or Airbus A319 aircraft built in the 1980s and 1990s.

In addition to meeting national regulations, all aircraft must comply with the acoustic certification standards set by the ICAO: an aircraft certified in accordance with these standards can fly and land anywhere in the world, but it may need to meet additional criteria in order to be used in certain countries with more restrictive rules (European countries, the U.S., etc.).



3.2. Land use planning and management

The AQTA (Quebec air transport association) has noted that conflicts between citizens and air transport operators stem primarily from land use and urban development issues.

Land use planning and management can be effective in ensuring that activities taking place near airports are compatible with aviation. The goal of this principle is to minimize the population affected by aircraft noise by means of zoning. Different noise zones around the airport are defined to take account of aspects such as population density, increased airport traffic or logistics activities.

Additional measures may nevertheless be required in zones which remain affected.

Land use planning and management methods may be categorized as follows:

Planning instruments

- Ensure that planning is coherent (i.e. take the current and future situations into consideration)
- Draw up a legal definition of zones and compatible uses
- Consider relocation rights for land owners
- Offer compensation

Action instruments

- Building regulations
- Soundproofing programs
- Construction of noise control screens (generally in the form of embankments) to minimize noise from aircraft on the ground
- Purchase and sale of land and homes, expropriation/relocation
- Assignment of compatible uses to purchased land
- Land management review
- Grants for relocation and rehousing of affected residents

Financial instruments

- Long-term investment (infrastructure enhancements)
- Tax incentives
- Airport fees (set as a function of noise impact)



3.3. Noise abatement operational procedures

These procedures aim to minimize noise pollution around the airport by optimizing how aircraft use the facilities.

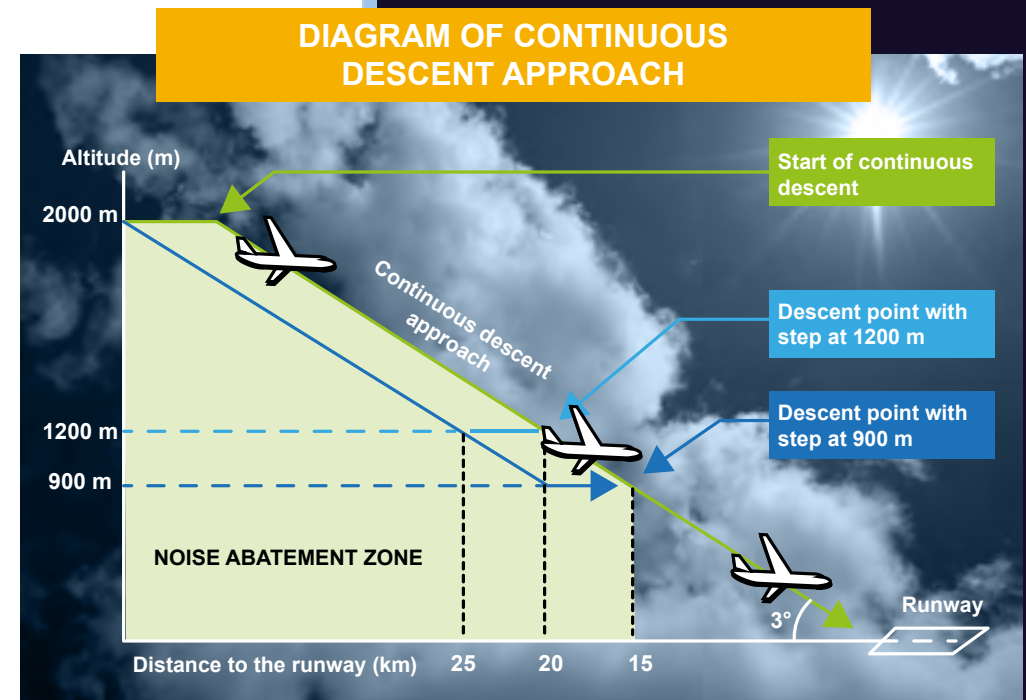
The possibilities include noise preferential runways and routes, and noise abatement procedures for take-off and landing.

The appropriateness of any of these measures depends on the physical layout of the airport and its surroundings.

For example, by extending the usable runway in the direction away from inhabited areas, aircraft can fly at higher altitude when they pass above nearby residential buildings. This technique is used at Montreal-Trudeau airport.

Another technique is to require pilots to make a turn once they have reached a safe altitude, thereby avoiding overflying certain zones.

Lastly, a continuous descent approach procedure can be implemented. This technique enables crews to avoid the conventional step-down approach which makes greater use of the engines during descent. Noise and fuel consumption are both reduced.



Source:
French ministry of the environment,
energy and marine affairs

3.4. Operating restrictions

Restrictions can be placed on aircraft operating at certain airports. There are four types of operating restrictions:

- Global restrictions which apply to all traffic at an airport
- Restrictions specific to certain aircraft types (depending on their noise emissions characteristics)
- Partial restrictions which apply at certain periods (times of day, daytime/nighttime, days of the week)
- Progressive restrictions which entail gradually decreasing noise exposure over a period of time before reaching the target noise level.

Some countries, especially industrialized countries, have considered banning certain noisy aircraft from their airports. This measure can have serious economic implications for the airlines concerned, however.

All these measures have been proven. However, the ICAO advice is to start with the first three principles, keeping operating restrictions as a last resort.



4. A few examples

BRUSSELS SOUTH CHARLEROI AIRPORT: 87 COMPLAINTS PER YEAR ON AVERAGE

Brussels South Charleroi airport has applied the principles of the balanced approach since 2001. A full range of measures has been taken to enable the sustainable development of the airport, including noise reduction procedures, planning, better land use management and tried-and-tested soundproofing plans. The overall balanced approach implementation rate is 86%. The airport constantly manages its noise problem in order to allow controlled development of its activities.

LIÈGE: 27 COMPLAINTS PER YEAR ON AVERAGE

Liège airport carried out its first noise optimization and reduction studies, and drew up prevention plans, in 1997. It was a pioneer in the balanced approach, applying these principles and measures well before they were recommended by the ICAO. The overall balanced approach implementation rate is 86%, as at Charleroi. The airport continues to take an active approach via noise abatement procedures, land use planning and management, and tried-and-tested soundproofing plans.

MANCHESTER: 838 COMPLAINTS PER YEAR ON AVERAGE

Manchester is an example of an airport which applies soundproofing measures, financial tools, operating restrictions, monitoring, communication and consultation. It has, however, only reached an implementation rate of 50% for land use planning and management and noise abatement procedures, probably due to its location well away from the city. Its overall implementation rate stands at 87%.



FIND OUT MORE



For more information

01dB – A noise-monitoring partner for local authorities and companies in France and around the world.

ACNUSA: <http://www.acnusa.fr/en/>

Sources

<http://transport.sia-partners.com/face-la-croissance-du-traffic-aerien-les-grands-projets-dinfrastructures-des-aeroports>

<http://www.icao.int/environmental-protection/Pages/noise.aspx>

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