QLAIR

QUALITY OF LIFE IN AIRPORT REGIONS

December 2009

Mitigation and compensation schemes

ARC

AIRPORT REGIONS CONFERENCE

Contents

Introduction

Quality of life in airport regions (QLAIR partners) is a project initiated by the Airport Regions Conference (ARC), and nine airport regions in Europe, in order to seek a European level playing field for policies dealing with the societal cost of airport operation and development. Within QLAIR, four short-term projects were started: 'information and communication procedures, ground noise in airport nuisance reduction policies, the impact of Air Traffic Management technology on spatial planning, and on innovative approaches to compensation schemes. This document focuses on the latter.

There is a strong interest within the QLAIR regions for noise mitigation and compensation policies and schemes. Mitigation and compensation schemes are ways to deal with negative and disproportionate effects of airport operations. The basis for mitigation and compensation policies is the recognition that aircraft noise and other emission (CO2, NOx, and other gases) generate negative effects on the quality of life of people living in the vicinity of airports. Mitigation and compensation of noise nuisance could improve the relationship between individual citizens and the airport, making aviation activity and its economic benefits, more acceptable for those living close to the airport or under flight paths. This report focuses on compensation schemes as well as investment programmes in the surrounding communities of an airport.

This chapter contains the project description of the short-term project 'Mitigation and compensation schemes'.

1.1 Project description

The project objectives are: increased knowledge regarding the strength and weaknesses of the current compensation schemes in various airport regions; and to develop new and innovative ideas for compensation, both collective, and individual. This includes an analysis of the basis for compensation (general-, income- or property based), fiscal and non-fiscal measurements, and (non-) recurring mechanisms.

Activities

Information gathering is an important aspect of this project. Not only the collection of data regarding information and communication systems, but also the update of knowledge of the partners and their other stakeholders in their region. The latter will be organised through workshop with subject matter experts, preferably from the regions involved. The project activities are:

1. Collection of information on the various compensation schemes and policies in each region. A (e-mail) survey has been developed in order to structure the information available, and to collect data from other regions besides the QLAIR partners.
2. Analysis of the available compensation schemes and the information needs of airport regions. This includes an analysis about the relation between aircraft noise/safety zones and the loss of welfare, as well as an assessment of the effectiveness of the different systems and the legal basis for each scheme.
3. Development of innovative ideas for compensation, both collective and individual. Input for this activity will be a (number of) workshop(s) in which subject matter experts will share their knowledge on compensation schemes. The following mitigation and compensation schemes have been discussed:
    a. Insulation of houses
    b. Buy-outs and removal aid, including case studies
    c. House value guarantee and compensation schemes
    d. Non-financial compensation schemes

4. Promotion of European guidelines for compensation schemes which are applicable within the legal tradition of the member states.

1.2 Structure of the document

This document describes the results of the project activities. The report starts with a chapter including both a theoretical framework, academic ideas on noise effects and compensation, followed by the legal basis of mitigation and compensation policies in the EU. The next chapter describes plans, concrete actions and results of mitigation and compensation schemes in each region. This is followed by a comprehensive overview of the mitigation and compensation schemes in each region. The report ends with a chapter describing the current role of the QLAIR partners (regional authorities) in mitigation and compensation schemes and a final chapter on minimal requirements in this policy area from the perspective of each QLAIR region and for ARC on a European level.

Theoretical and legal framework

1.3 Relevance and objectives

There is a strong interest within the QLAIR regions for noise mitigation and compensation policies and schemes. Mitigation and compensation are ways to deal with negative and disproportionate effects of airport operations The basis for mitigation and compensation policies is the recognition that aircraft noise and other emissions (CO_2, No_x and other gasses) generate negative effects on the quality of life for people living in the vicinity of airports. The purpose of establishing compensation and mitigation measures is to eliminate or reduce these negative impacts of airport operations when these cannot be avoided by applying any preventive or corrective measures, such as reduction at the source (aircraft technology) or by optimising flight paths, and change of runway use. Therefore, mitigation or compensation measures are often considered to be a last option.

The objectives for the QLAIR mitigation and compensation project are:

- to improve the knowledge on current mitigation and compensation schemes in the various airport regions;
- to assess strengths and weaknesses of the schemes and their effectiveness;
- to develop best practices and new and innovative ideas for airport regions;
- to determine minimum requirements that can be brought forward in European institutions.

1.4 Definitions

Mitigation is a set of policies and measures that will reduce or eliminate aircraft noise in houses, apartments and other buildings. Reduction of noise can be achieved by insulation of buildings, elimination of noise can be achieved by buying the property and move the inhabitants and/or users to another location with less (aircraft) noise.

Compensation measures are financial transactions with individuals that have been or will be disproportionately affected by airport and aircraft operations. Compensation measures include damage caused by new spatial plans related to airport expansion and/or operations. New or adjusted spatial plans can affect house owners, inhabitants and businesses with respect to property value (houses), income and profit reduction. It might even be possible that due to new spatial plans businesses are forced to relocate because of blocked or much longer access roads. Compensation can also apply in case of proven or perceived decreased health and living conditions, or in cases where a difference exist between calculated noise (which is the basis for many noise reduction policies) and measured or experienced noise.

1.5 Aircraft noise as a problem

Aircraft noise as a problem was first recognised in a meeting on 'Aircraft Noise in the Vicinity of Airports' in 1969, ICAO[1] and a number of its member states agreed on internationally standardised procedures for describing and measuring aircraft noise in the vicinity of airports. Since then aircraft noise has been at the core of international policy making, but mostly focussed on reduction of source noise. This has led to relative large reductions of aircraft noise.

Figure

Less attention has been given to local policies, but ICAO doc. 9184, Airport Planning Manual – part 2 Land Use and Environmental Control, 3rd edition (2002) provides best practices on land use planning. Also the EU study 'land-use planning and management in the EU" DG-TREN (2006) provides a detailed overview of local and regional practices.

[1] International Civil Aviation Organization, headquartered in Montreal, Canada

The annoyance of aircraft noise requires an appreciation of the physics of sound. Sound is a change in air pressure, wavelength, frequency, amplitude or purity. This is the technical explanation of how sound is transmitted through the air to the ear. Noise is generally defined as a sound that has an undesirable effect on people and is therefore unwanted.

In order to understand the undesirable effects of aircraft noise, the following definitions are used:

- The noise level is a measuring unit for the noise caused by one aircraft that is flying over a location on the ground.
- The noise burden is a measuring unit representing the noise generated by all aircraft landing or taking off at an airport during a year.

The noise burden is largely determined by three factors: the number of aircraft flights, the noise level of each aircraft, and the time of the day of the flight. In addition other factors play a role, such as flight paths, flight procedures, distribution of flights over different flight paths, runway use, and destination of the flight.

There are two kinds of health effects as a result of aircraft noise and noise perception: auditory and non-auditory effects. Auditory effects are damage to the hearing function, caused by noise levels of over 110 decibels or, when over a period of years, the noise burden over a 24 hour period averages more than 65-70 decibels.

Non auditory effects lead to situations where people are annoyed by aircraft noise. Annoyance has various appearances: interruption of conversations, sleep disturbances, concentration problems, stress. Higher noise loads lead to a higher percentage of people being annoyed. This relationship is described by the so called dose-effect relationship.

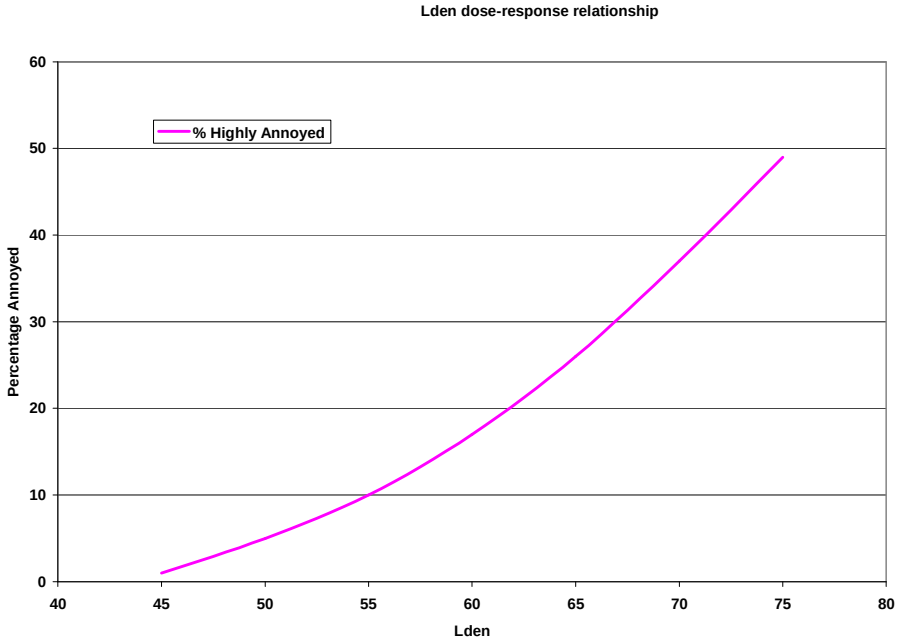


Figure 1, Lden dose-response relationship, source: EU WG 2, 2002

It is remarkable that the dose response relationship graphs for aircraft noise are higher than those for road or train noise.

Non-auditory effects are defined as 'all those effects on health and well-being which are caused by exposure to noise with the exclusion of effects on the hearing organ' (Van Dijk, 1986). Examples of non-auditory effects are:

- increase of blood pressure levels

- increased risk of hypertension
- sleeplessness
- fatigue
- increased risk of heart and respiratory problems
- poor performance at work or in school
- psychological problems (depressiveness, frustration)

The relationship between aircraft noise and non-auditory health effects is often inconclusive and thus not generally accepted. A limited number of research projects show a relationship between aircraft noise, annoyance and health and school performance (RIVM 2005, HYENA 2008), but the academic debate centres on the (statistical) significance of the relationship.

One of the reasons for the debate and inconclusiveness of research results might be the existence of so called non-acoustical factors of aircraft noise. These factors are based on the fact that noise itself only explains a relatively small part of variations in reactions to noise. Some put the share of non acoustical factors in explaining noise annoyance at 70%, but most studies indicate lower levels. It is assumed that lack of one or more of these factors can lead to the above mentioned non-auditory effects of aircraft noise. The most important non-acoustical factors are:

- being able to choose (for example between insulation and compensation)
- recognition of opinions (by policy makers or airport operators)
- perceived control and predictability
- influence on decisions
- trust

Special attention is contributed to the effects of aircraft noise during the night period. Aircraft noise during the night can lead to sleep disturbance, which can lead to the above mentioned auditory effects. Dose- response relationship for the night show annoyance levels at much lower noise levels.

1.6 Noise zones and contours as basis for policy

Despite the complexity of cause and effect, there is general political agreement that the surrounding of an airport needs to be protected from negative effects of aircraft noise. Land use restrictions apply in areas where aircraft noise levels exceed certain limits. According to the WHO average night noise levels should not exceed 30 decibels, with no single noise event larger than 45 decibels. During the day annoyance levels indicate an interval of noise loads of 50-55 decibels.

In order to achieve this protection, various spatial planning zones are being distinguished based on limitations to noise load levels and the auditory and non auditory effects.

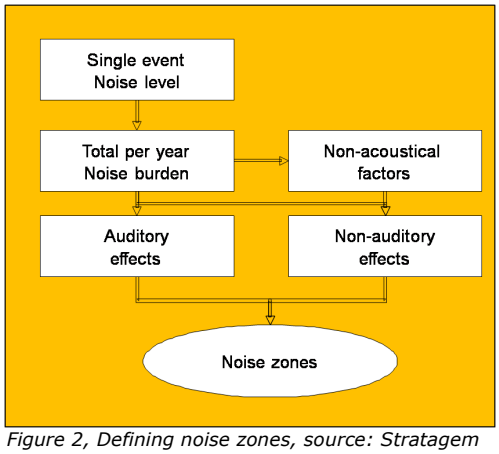


Figure 2, Defining noise zones, source: Stratagem

In general four noise zones can be distinguished:

1. no housing zone: no new or existing houses are permitted

2. no building zone: no new houses can be built, existing houses will be insulated
3. insulation zone: new and existing houses can be insulated
4. 'no restrictions' zone: no planning restrictions exist due to aircraft noise, but there can still be annoyance and complaints

On a local level, there is a huge difference in the definition of night and day operations of an airport, noise measurement or calculation, noise measuring units, and noise limits. Noise contours are the limits of noise zones. There are different methods for determining noise contours and noise zones. A distinction is made between day and night contours. The European standard for noise contour levels are measured in Lden and Lnight. The contours are the sum of factors that determine the noise impact for a period of a year: noise production of aircraft, the number of take-offs and landings, and the time of arrival and departure.

1.7 Emissions

Sources of emission are air traffic to and from the airport, airport operations on the ground, road traffic around the airport, including traffic with destination airport. Heavy road traffic causes most of the emissions in the vicinity of the airport.

Dutch research learns that the concentrations of emissions in urban areas are significantly higher than elsewhere. In the Schiphol area, Most of the emissions are caused by ground transport, this is measured to approx. 28 % (TNO-MEP). At the airport area there is a significant influence of emissions caused by air traffic. The load of the emissions is at the stock area of the airport (kerosene, koolwaterstof). At Schiphol, the emission levels are calculated based on the NLR model LEAS-iT (Local aviation Emission in Airport Scenarios-inventary Tool). The results of the measurements show that the permitted levels of PM_{10} are not exceeded. No_x is exceeded, but this is only partly due to the airport operations at Schiphol. In the past years, the total of emissions in the vicinity of the airport decreased. The emissions of air traffic to and from the airport and the share in total emissions has increased though. The expectation is that this will further increase in the future.

Measuring learned that there is no direct relationship between the concentrations and the number of emission complaints in the vicinity. This can be caused by the fact that the measurements are stretched over a longer period of time, while emission nuisance appears in shorter periods. Regionwide in the Province of Noord-Holland, the measure points do not show any recognizable influence from emissions at Schiphol Airport. This is a maximum of only a few percents (carbon monoxide, nitrogen dioxide and particulate matter (PM) or fine particles (Feinstaub/Fijnstof).

There are no cases known that citizens receive compensation for emission nuisance. At the provider side, emission charges are implemented at the airports of Bromma and Arlanda (since the 1990s), Zürich, Geneva, and Frankfurt and Munchen (since 2008). The purpose of emission charges is the 'polluter pays' principle. The income of the charges are intended to decrease the negative impact of air transport.

1.8 Mitigation schemes

In this section, mitigation schemes are described. The selection is limited to the schemes that are in use or scheduled to implement in the QLAIR regions. These are sound insulation, demolition, and buy-out schemes. Removal aid is incorporated in the paragraph on buy-out schemes. Each scheme is described in detail below. The examples of schemes in place in the various regions are described in chapter 0.

1.8.1 Sound insulation

Sound insulation is the oldest and most frequently used mitigation measure. Houses and buildings that suffer significantly from aircraft noise. In sound insulation schemes, not only aviation related law, but also building and environmental regulations need to be taken into account.

The criteria for implementation of sound insulating measures can differ per region. Sound insulation can be limited to bedrooms, or cover the whole dwelling. Definitions then are needed for determining what a bedroom is, or under what conditions a whole house will be insulated.

Even though dwellings are located in the designated area, this does not imply that all houses will be insulated. Exclusions can apply to houseboats or mobile homes, houses that are in bad shape, and that need reconstruction prior to glaze insulation, condemned houses, recreational houses, dwellings that are not suitable for permanent residence, or for which no residence permit has been granted.

Besides technical details, and in particular the way in which is taken into account the anteriority of the presence of the inhabitants compared to the sound harmful effect, but there is a general tendency to increase the appropriate sound-proofing, to accelerate the rates/rhythms of realization and to reduce, or to even remove, the share of financing left with the load of the inhabitants. This policy of insulation has many limitations. For example the fact that usually the criteria of attribution are defined starting from purely quantitative acoustic levels in studies do not show nuisance experienced by the inhabitants, or exclusion often badly included/understood inhabitants located just apart from the zones being given an aid to sound-proofing. The principal limit of these policies is that if the insulation is necessary, it is not sufficient. Indeed the residents (neighbours) of the airports would also like to be able to open their windows or to benefit from their garden without undergoing excessive harmful effects. The investigations show that the level of dissatisfaction remains high even after the realization of work of sound-proofing.

One of the specific problems of sound insulation schemes is the need for ensuring a good ventilation the residences, which is particularly important since studies show that the interior of residences is polluted generally more than outside because of certain chemical elements used in paintings, the coatings, the adhesives or furniture. Evaluations of the implementation of sound insulation measures show, for example on Schiphol, that the problem of ventilation is not dealt with satisfactory.

Another important aspect is recurrence. After a number of years, the applied sound insulation can be outdated, or due to changed flight paths, increased noise can appear above houses that first only needed partial insulation. Furthermore, if house owners decide to refuse the noise insulation, the question is whether future owners of the specific dwelling can apply for insulation in a later stage.

Communication of the implications of sound insulation, is a crucial aspect in the mitigation process. Sound insulation does not eliminate (aircraft) noise completely. Dissatisfaction about noise after reconstruction works for sound insulation can be prevented if citizens would be clearly informed what they may expect after insulation of their dwellings. Not only informing citizens, but also consulting them in the preparations for the sound insulation is essential.

1.8.2 Demolition

Demolition does not take place frequently. It is a scheme that is used only very limited. Even in small cases, where it is just a couple of older houses in bad shape, this attracts strong public attention, and mostly negative publications in the media. Because of this sensitivity, in the Netherlands, a resolution is adopted which gives citizens who live in a house to be demolished the right to stay in their dwelling. Only, if they move later, they are obliged to sell the house to the community. The right cannot be inherited, so if parents move, their (adult) children cannot stay. In an inventory of demolition cases, there are many different measures. If the necessary demolition does not include many dwellings, the measures are sometimes taken on an individual level.

Demolition of dwellings is a sensitive subject, and is mostly limited to dwellings that are old and or in bad condition. The number of demolition cases is limited.

1.8.3 Buy-out

Removal aid includes the cost and efforts to assist citizens leaving their current dwellings. Removal aid can be offered under certain circumstances. Policies can include to assist citizens when they are requested to move. Assistance can be done by ways of seeking for a new house, reimbursement of actual moving cost, financial support to decorate the new dwelling. Removal aid policies can be used to put pressure on the moving of citizens, if there is a condition included that the assistance will only apply within a specific time frame. In that case, citizens who do not leave their dwellings before the due date, cannot apply for removal aid, or have only partial benefits from this kind of mitigation.

1.9 Compensation schemes

1.9.1 Compensation of depreciation of property value

Whereas in section 1.5 the mitigation measures apply to existing and new dwellings in existing and new or revised noise zones, the first compensation policies for aircraft noise had the objective to compensate for damage due to change of spatial plans. This change of spatial plans always is related to:

- development of new airports
- development of new runways
- development of new flight paths

The basic theory behind this property value compensation is that, if new or changing airport operations create new noise zones, the value of property will depreciate in line with noise burden calculations. One of the fears of citizens living near the airport is that their property has lost value due to airport expansion and increased noise nuisance, which reduces the opportunity to move to another area if they want to. In many cases, they do not want to move urgently, but want to secure the opportunity to move by safeguarding the value of their property. This can also attract newcomers in the airport area, who are not disturbed by a certain level of noise nuisance.

According to Stallen & Smit (1999), the offer to make a move possible, can reduce nuisance, and will not always lead to an actual move. The fact that people experience aircraft noise as a nuisance which cannot be controlled, makes the problem bigger. If citizens get the opportunity to move to an area where the noise levels are significantly lower, they will not by definition move, but they will feel better having this option.

In 1994, Booz-Allen & Hamilton analysed the impact of noise on house values. They found that the effect of noise on prices was highest in moderately priced and expensive neighbourhoods. In two moderately priced neighbourhoods in northern Los Angeles, an average of 18.6 % higher property value was found in the quiet neighbourhood, or 1.33 % per dB of additional quietness.

In airport expansion, exercises on property value have been carried out earlier. For Seattle-Tacoma Airport, calculations were made that proposed expansion would cost five nearby cities USD 500 mln in property values and USD 22 mln in real estate tax revenue.

The Regional Dialogue Forum in Germany has analysed that house buyers in the vicinity of airports would pay 10 % more for the same dwelling, if this was located in a quiet area. The analysis further showed that people are prepared to pay extra for living in an area within easy reach of the airport, however, this is eliminated by the fact that they want to be compensated for the noise nuisance.

Other research has learned that a house in the immediate vicinity of the airport would sell for 10.1% if it were located elsewhere. Randall Bell has developed a list of over 200 conditions that impact real estate values. He considers airport proximity as unfavourable. Property buyers are partially influenced by discounts on property. Even though extreme discounts are provided, property buyers will not live in a highly noise affected area under any conditions, and therefore have no interest in buying, renting or reselling such properties (Bell, 2001).

Aircraft nuisance costs are most commonly expressed as a percentage change in residential property values per decibel of noise exposure. The percentage of value loss differs from various studies and areas. On average, this is between 7 – 15 % for houses that are attractive and well-maintained, in the higher end of the middle range.

Measuring the impact of noise on property market values is frequently done on the basis of linear regressions and hedonic modelling. Van Praag and Baarsma (2000) have concluded from a review of hedonic price surveys that "aircraft noise has a negative and statistically significant effect on housing prices, i.e. NDI is around 0,6% on average…This means that a house of USD 200.000 would sell for 12% less, that is USD 176.000, if located in a noisier zone with 10 % more noise exposure than elsewhere.

The recognition of such depreciation has led to specific compensation policies in three airport regions (London Gatwick, Frankfurt and Amsterdam Schiphol).

1.9.2 Other compensation schemes

There is a variety of other options for aircraft noise compensation. In this report two are further elaborated:

- Compensation as a consequence of a difference between calculation of noise burden and measured/experienced noise burden
- Financial compensation as a means to restore happiness

Other measures, such as investment in airport regions and investments in dealing with non acoustical factors of aircraft noise are subject of a new project, which QLAIR can further explore in 2010.

Problems arise when policies are based on calculated noise contours and measurements and/or perceived noise levels are much higher than the calculated levels. In the Schiphol region these (individual) cases are called the case of poignant sorrow inhabitants. Currently there is no theoretical framework for these individual cases although a new foundation has been established to deal with this problem.

A second category of financial compensation has been subject of academic research in recent years. This research is based on the assumption that inhabitants in an airport noise zone could be financially compensated for enduring the effects of aircraft noise. This system is based on contingent value methodology or stated preference surveys, in which inhabitants were asked what level of financial compensation could be in order to accept a change of environmental service flows. This method is based on questionnaires and is associated with many problems, such as strategic responses.

Van Praag en Baarsma (2000) were able to introduce the Cantrill ladder of life question as information on well being. The research also permitted a difference between home owners and renters/tenants. The research identified the following relationships:

- Compensation per household decreases towards more noise affected households.
- The number of households eligible for compensation decreases towards more noise affected areas.
- The level of compensation for home owners is twice the level of tenants.
- The level of compensation for houses with insulation is 1/3rd of the houses without insulation.

The first two relationships have to do with the effect that where citizens seem to be used to the noise, compensation decreases.

Another method of researching how compensation can increase acceptance is to reverse the question. How much money are residents willing to pay in order to reduce the number of flights. Faburel (2007) has applied this methodology to Orly airport. In the survey 51% of the sample of residents indicated a willingness to pay for an annoyance ban as result of a reorganisation of flight paths. The average WTP is about EUR 7 per month per household. The reasons to refuse the WTP are: not be annoyed, the polluter should pay, and fear of a permanent tax.

In another study on the willing to pay method, showed an outcome of 25% of the population that was willing to pay (day and night same percentage) to halve the overall number of flights. The majority (68% day, 64.5% night) was not willing to pay at all. They are categorised as follows:

- 28.3 % was not bothered about aircraft, and found that a reduction is not worth anything to them.
- 13% was bothered by aircraft, but do believe the benefits of the airport outweigh the cost in term of noise.
- 26.1% is bothered by aircraft, but do not believe that any changes would take place.
- 33.3% is bothered by aircraft, but not willing to pay, because they claim that they have a right to a quiet environment.
- 2.9% other.

The results of all research on willingness to pay and financial compensation for inhabitants in noise areas are still inconclusive for policy makers. First of all, most respondents are not interested in financial transactions.

1.10 EU legal framework

The legal basis for compensation and mitigation differs per region. In some countries, it is included in national law, in others it is a local or regional measure, or the mitigation or compensation is provided by the airport operator on a voluntary basis.

The EU directive 2002/49/EC demands action plans by all EU member states to 'preserving and reducing environmental noise where necessary and particularly where exposure levels can induce harmful effects on human health and to preserving environmental noise quality where it is good'. The action plans are necessary for all agglomerations with more than 250.000 citizens, places near major roads which have more than six million vehicle passing per year, major railways, and major airports. The action plans should be drawn up not later than 18 July 2008. An important part of EU directive 2002/49 is the standardization of noise measures, introducing Lden and Lnight as the standards for the future. A first step towards standardization is the drawing up of noise maps using Lden and Lnight.

The EU directive 2002/30/EC regulates the so-called 'balanced approach' (resolution A33/7 of ICAO). The directive recommends to implement economic measures (noise charges for aircraft) before imposing noise restrictions and other operating measures. A balanced approach is the evaluation of a mix of policies (limitation of noise at source, environmental planning, operational procedures for noise control, operating restrictions. The directive also recommends a cost benefit analysis, including all parties. Here a potential link to compensation for inhabitants is offered.

Mitigation and compensation schemes per region

This chapter gives an overview of the mitigation and compensation schemes as applied or proposed in the QLAIR regions. Each region is listed with its legal basis, noise contours, numbers on spending, and the applicable mitigation and compensation schemes.

1.11 Schiphol Airport region

1.11.1 Legal basis

The legal basis for zoning and noise insulation are laid down in the Regulation for noise insulation measures (Regeling Geluidswerende Voorzieningen - RGV) and the Airport Lay-out Decree (Luchthavenindelingsbesluit).

Zoning rules imply that the construction of new buildings within the designated contour (in this case 35 Ke)is not allowed and houses within the 40Ke/26 Laeq contours are eligible for noise insulation. The RGV originated in 1997 was amended in 2006 by the Minister of Transport. This amendment started the third phase (GIS 3) of the insulation project and provided new and more up to date noise index contours.

The insulation scheme differentiates between day-time and night-time noise insulation, both are controlled by their own noise exposure indexes: 40 KE for day-time and 26 LAeq for night-time. At the moment, a study is performed to transform the KE contours for Schiphol to Lden contours. Aim is to find a "best fitting" Lden contour for 40 Ke. This study is expected to be completed in 2009. Until then the KE and Laeq contours will prevail as legal noise exposure contours. The anticipated new limits are 58 dB(A) Lden and 48 dB(A) Lnight.

Under the Regulation for noise insulation measures, three phases of insulation were executed: GIS 1, 2 and 3. GIS-3 is still running. Each dwelling is reviewed once per phase. If a previous owner did not apply for insulation, the new owner is not allowed to apply within the same project. The insulation schemes exclude a number of dwellings within the noise contour zone. The building permit of a dwelling must be older than 23 October 1996, as the houses that are built afterwards meet the legal noise requirements of the adjusted Construction Decree. Furthermore, holiday homes, temporary homes, and houseboats are excluded from insulation. More detail on the GIS-programmes is described in chapter 0.

Figure 4, GIS-3 Noise exposure contours for daytime insulation (Ke)

Figure 3, GIS-3 noise exposure contours for nighttime insulation (LAeq)

The Dutch national Spatial Planning Act outlines compensation measures in case citizens are in such a way harmed by changing of spatial plans, that is not reasonable that they carry the burden by themselves. In case of damage caused by spatial planning, the aggrieved party should receive financial compensation. A judge can decide otherwise, however if the injured has not been compensated within a reasonable period of time, he can claim for financial compensation, according to the Spatial Planning Act.

When the fifth runway came into operation, this meant an extension of noise zone- and safety zones. The expansion of the airport and the related changes included a wide variety of stakeholders. For the citizens it would not be clear to whom they could address their questions and complaints regarding the expansion. Therefore, a damage board (Schadeschap) was set up, which by authorisation of public authorities of national, regional and local level, received the powers to deal with all kinds of requests for compensation, related to the airport development. The conditions under which a citizen is eligible to receive funding are connected with the measures in the Dutch Spatial Planning Act (formerly art. 49, now book 6).

1.11.2 Mitigation

Sound insulation schemes

Since 1990, the total number of people who suffer from sleep disorder has decreased with 40%, while the number of aircraft movements increased with 100%. The decrease is not equally spread, and at certain areas, an increase of sleep disordered people has taken place due to a new runway.

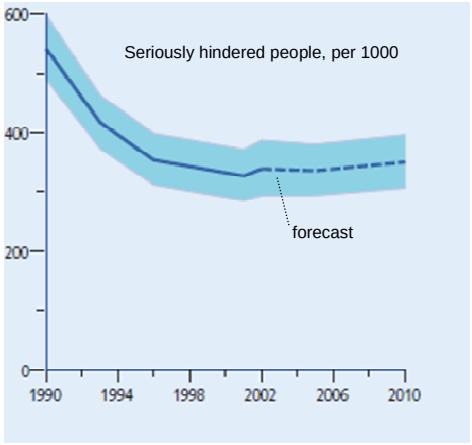


Figure 5, Noise nuisance
Source: MNP, 2005, Breugelmans et al., 2004

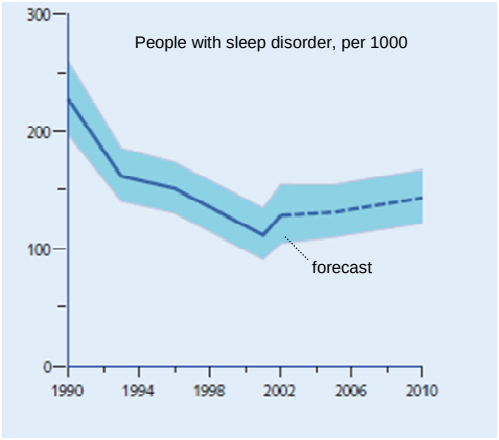


Figure 6, Sleep disorder
Source: MNP, 2005, Breugelmans et al., 2004

In the first insulation project (GIS-1), from 1984 – 1997, 3.700 houses, schools, and assisted-living centres were insulated. The total cost of GIS-1 was EUR 126,8 mln which is about EUR 34.000 per dwelling spent. In the second project, GIS-2, 8.500 out of 11.000 houses within the noise zone were insulated. The others were already 'noise proof', or the owners did not want sound insulation. In some of the cases, dwellings could not be insulated due to construction constraints. The average insulation cost per dwelling was EUR 47.000. In the current noise zone (GIS-3), 12.000 houses are located. Approximately 7.000 homes have already been insulated for a total cost of EUR 358 mln. It started in 2006 and will be concluded at the end of 2010. In this program, 5.000 houses will receive (extra) insulation. This can include houses that have been subject to previous insulation schemes. Funding for sound insulation is generated by supplemental landing charge levied on all aircraft landing on Schiphol and by the Ministry of Transport. The cost of GIS-3 is estimated at EUR 99,3 mln.

Table 1, Sound insulation overview Schiphol airport region

Project	Time frame	Insulated dwellings	Cost in EUR	Average cost in EUR
GIS-1	1984 - 1997	3.700	126.8 mln	34.270
GIS-2	1997 – 2008	8.500	396.6 mln	46.659
GIS-3	2006 – 2010	5.000	99,3 mln pm	??

The actual insulation of dwellings includes insulation of the living and dining room, and bed rooms. Night insulation only covers insulation of bed rooms. The insulation includes replacement of glazing, insulation of sealing and dormer, mend cracks, replacement of heaters that are mounted against the outside wall, adjust chimney top hoods, installation of the (filters).

In the Schiphol region, the insulation schemes have been evaluated thoroughly, both in a citizens survey, and by the National Audit Office (NAO) in the Netherlands in 2004. The NAO concluded that the sound insulation scheme has been carried out inefficiently. There was a lack of control on the financial means, and a part of the money has been spent unjust. Delays in decisionmaking led to claims from contractors. Furthermore, instead of the expected serial work, i.e. for the same houses, the same insulation work, the reality was that a lot of work was based on individual preferences. Property owners did not like the adjustments and asked for specific solutions or just partial insulation. Also, more houses were insulated at the end, than initially scheduled and budgeted. It seemed that contradictories in the various schemes resulted in conflicting rules. The most important lesson learned, is that insulation schemes can be complex mechanisms. Without proper project management and a thorough control on the activities to be carried out, the time planning and cost can get out of hand easily, with dramatic consequences.

The insulation projects in the Netherlands are the most expensive ones compared with other countries. Still, there are inhabitants with complaints about aircraft noise. The complaints are caused by the fact that gardens and other outside spaces cannot be insulated. Also, people want to be free in deciding to sleep with the windows open, which reduces the effects of insulation completely. Research from Stallen & Smit (1999) argues that if citizens have a say in the decision of what to insulate, this will reduce the nuisance of noise. Therefore, a menu of choices within the insulation scheme is essential for an optimal result. Loosening the current tight rules (i.e. in the Schiphol region) could take away absurdities in the system. Furthermore, a properly insulated house should be valued more than not- or poorly insulated houses.

In November 2008 a survey was held under 304 inhabitants that participated in the GIS-2 programme. Two thirds of the respondents is satisfied with the insulation measures, 57% says that noise has decreased, 33% noise levels are equal and 10% indicates an increase in noise. 79 % of the houses with daytime noise insulation indicated lower noise levels, for houses with night time insulation this was only 39%. Many of the respondents indicated that more choice and/or a financial compensation (by means of lower taxes) are better policies. Financial compensation is the most preferred option.

One of the results of the 'Alderstafel' consultation/mediation process is that there will be more flexibility for citizens regarding mitigation, opposed to the current situation, where houses are insulated or not.

Demolition and buy-outs

Debates regarding demolition of houses in the vicinity of Schiphol date back from the 1980s, due to airport expansion plans (extra runways) and unacceptable noise levels after airport expansion. In the early nineties, members of parliament pleaded for the demolition of 4.300 houses in the vicinity of Schiphol Airport. They argued that the cost for insulation were beyond all limits, especially in relation the cost of new building, and with regards to the bad state of most houses concerned. They feared that under these circumstances, the windows would be fully insulated but that the walls would let through the noise, which would eliminate the effects of the insulation completely.

Currently, buy-outs and demolition of houses are based on noise (71 dB(A)) and external safety contours. According to the Luchthavenindelingsbesluit of 2004, 67 houses and 14 houseboats are subject to demolition/removing. The municipalities are responsible for the implementation of the decision. Some inhabitants did not accept the offer for a buy-out. These citizens are not allowed to make any adjustments to their houses. If they want to move in a later stage, they cannot make a claim for any facility. It is also forbidden to build any new house or building within the demolition zone. All houses within the zone should be demolished in 2015. The proposed budget in 2009 is EUR 11 mln, for the year 2010 this is EUR 9 mln. At the moment, no budgets have been reserved for the period after 2010. Occasionally, inhabitants living in areas that experience unacceptable noise (ground noise) or noise levels that are not reflected in noise calculations have received offers for buy-out.

In 2002, it was decided through a motion in parliament ('Motie Hofstra') that citizens living in demolition zones, cannot be forced to move. Only after moving, or after death of the last inhabitant, the particular dwelling can be demolished or marked with a declaration of unfitness for human habitation.

1.11.3 Compensation

Damage caused by spatial planning

A damage planning coordination board (Schadeschap) is set up in order to deal with planning damage caused by the Polderbaan (new 5th runway). By authorisation of the responsible public organisations at national, regional and local level, it received the authority to deal with claims for compensation of planning damage as the result of airport development. The Schadeschap thus offers citizens one point of contact. Only claims from inhabitants and businesses within the insulation noise zones can submit claims.

In total 2708 requests were received, 192 approved. The total budget of the Schadeschap is EUR 97,4 mln, of which EUR 27 mln has been spent. An evaluation of the regulation, based on a response of 163 cases, showed that the average claim was EUR 43.000. 80% of the respondents actually received a compensation, 50% of these is more or less in agreement with the amount awarded, the other 50 % is not in agreement. 82% wanted to receive a financial compensation, 10% wanted to be bought out.

Other compensation schemes

In the Schiphol area, a number of people are considered under the category 'poignant cases'. An independent foundation has analysed how many citizens could apply for a special compensation measure due to noise nuisance from airport operation. Both the airport operator, the regional authority (Provincie Noord-Holland) together with the national government have each made EUR 10 mln available for these poignant cases. This has been agreed between airport and citizen representation groups at the Alders table.

In 2007, about 90 poignant cases were identified. Examples are people who live and work in the same building, but have been compensated only for the living area. Also, people who live outside the noise contour, but experience the same burden, would be able to apply for funding from this foundation. The current cases will be reviewed with more flexibility than in the past. However, each of the cases should demonstrate that there is actual damage. Without any clear proof, no compensation will take place. The financial means will also be used to fund initiatives to improve the quality of life in municipalities very near the airport.

1.12 Frankfurt Airport region

Legal basis

In 2002, the Hessian Ministry of Transport defined a noise zone where the number above threshold at night is higher than 6 x 75 db(A), and the Leq at night is higher than 55 dB(A). A new Aircraft Noise Act (Fluglärmgesetz) has been implemented in Germany. The Act implies general regulations on limited structural use, noise protection and assumption of costs for noise protection measures, compensation in

case of building bans and the disturbance of the private outer living area, such as garden, or balcony, in areas around the airport. Therefore the law defines different noise protection zones at day and night, which are not the same for new or heavily restructured airports.

Noise zones for existing civilian airports

Daytime (6:00 to 22:00)

Zone 1: $L_{eq(3)}$ > 65 dB(A): noise insulation for residential buildings and facilities requiring special protection (kinder gardens, schools, hospitals etc.) financed by the airports;

Zone 2: $L_{eq(3)}$ > 60 dB(A)

Nighttime (22:00 to 6:00)

$L_{eq(3)}$ > 55 dB(A) and/or L_{max} (NAT – number above treshold) > 6 x 72 dB(A): noise insulation for residential buildings and facilities requiring special protection (kinder gardens, schools, hospitals etc.) financed by airports.

No new hospitals, homes for the elderly and similar facilities can be built in the noise zones. In daytime noise zones no new schools, kindergartens and similar facilities can be built. In daytime noise zone 1 and the nighttime noise zone new residential buildings are banned.

Noise zones for new or expanding civilian airports

Daytime (6:00 to 22:00)

Zone 1: $L_{eq(3)}$ > 60 dB(A): noise insulation for residential buildings and facilities requiring special protection (kinder gardens, schools, hospitals etc.) financed by the airports

Zone 2: $L_{eq(3)}$ > 55 dB(A)

Nighttime (22:00 to 6:00)

$L_{eq(3)}$ > 53 dB(A) and/or L_{max} > 6 x 72 dB(A) (until 31 DEC 2010)

$L_{eq(3)}$ > 50 dB(A) and/or L_{max} > 6 x 68 dB(A) (effective 01 JAN 2011): noise insulation for residential buildings and facilities requiring special protection (kinde rgardens, schools, hospitals etc.) financed by airports.

In daytime noise zones no new schools, kindergartens and similar facilities can be built. In daytime zone 1 and the night-time zone new residential buildings are banned. The disturbance of outside living areas (such as gardens and terraces) daytime noise zone 1 will be compensated.

Mitigation

Sound insulation

Since 1983, houses in the airport area of Frankfurt have been insulated to reduce the nuisance of aircraft noise at home. The airport paid EUR 7.5 mln for noise insulation in the period from 1983 until 1989. Since 2002, EUR 76 mln is spent on the insulation of 17.500 houses. This included sound insulated windows, ventilation systems, and external roll-down shutters, with the purpose to safeguard the sleep of the citizens near the airport.

With the noise zone settlement in 2002, Frankfurt airport had to reimburse noise insulation cost for houses, hospitals, elderly homes, schools and kinder gardens. The owners had to apply for noise insulation. The airport's 'Umwelterklärung 2005' states that a budget of EUR 76 mln was available for noise insulation for the dwellings in the area around the airport. It was estimated that 17.500 households in 15 municipalities around the airport were eligible to the insulation scheme. No numbers are available regarding the actual spending. By May 2008, the airport received approximately 5.400

application forms (source: Umwelterklärung 2008). They confirmed 5.000 claims and accepted to reimburse 13.500 dwellings.

Table 2, Sound insulation overview Frankfurt Airport

Project	Time frame	Insulated dwellings	Cost in EUR	Average cost in EUR
	1983 - 1989	Unknown	7.5 mln	4.343
	2002- 2009	17.500	76 mln	

The insulation of houses as regulated in the new Air Traffic Noise Law has not been implemented yet.

Demolition and buy-outs

The 'Fraport CASA' programme contains provisions to purchase houses in the heavily affected area of Flörsheim am Main, Raunheim, and a small number of houses in Kelsterbach. In addition it offers property owners the opportunity to receive compensation for reduced housing and property values. The total number of houses and buildings that are eligible in the CASA programme is 1.200. A number of citizens were not willing to apply for the CASA programme, as they were not satisfied with the offered compensation.

Experience with demolition due to airport expansion in Germany is in the vicinity of München. In 1980, due to airport expansion, the entire village of Franzheim was demolished. Its 500 inhabitants have been resettled.

Compensation

Damage based compensation

Within the CASA programme, homeowners can also apply for financial compensation. This is for owners who acquired their homes after 2002 are entitled to a compensation of EUR 100/sqm, and EUR 150/sqm if acquired before 2002. The home owner has to commit that he will then tolerate any impact of nuisance from airport operations. This is a prerequisite for any compensation payment. This is applicable to all houses within an area where the real estate is overflown by aircraft at less than 350 meters. Also in the case of financial compensation, many home owners have not applied for this scheme, due to the dissatisfaction of the height of the compensation.

Other compensation schemes

The Environment Fund was set up in 1997. This is an initiative by Frankfurt Airport and has no legal framework. Since 1997, the airport operator Fraport financed over 250 projects in the Frankfurt region. 50 % of the budget is spent on protecting the green environment, 25% is spent on educational environmental projects, and 25% is spent on ecological projects.

1.13 Gatwick Airport region

Legal framework

Gatwick Airport falls under the Nationally Significant Infrastructure Projects. In 2008 a new Planning Act has been drawn up, in which the boundaries of airport development are prescribed. If citizens suffer from developments due to the Planning Act, compensation is payable by the appropriate authority, or by the secretary of state, depending of the specific nature of the harm.

Gatwick is presently in a consultation process with regards to its Environmental Noise Directive and Draft Noise Action Plan 2010-2015. The Government's policy for aircraft noise includes land use and planning policies. These are set out in planning policy guidance (PPG) note 24 (see Section five, Background to aircraft noise and legal context), which planning authorities are obliged to take into consideration

The Government's White Paper on 'The Future of Air Transport', stated that in addition to controlling and reducing aircraft noise impacts, a proportion of the large economic benefits provided by airport

development should be used to mitigate their local impacts. The principal mitigation measure for aircraft noise impacts is the provision of acoustic insulation and can be required on a statutory basis under section 79 of the Civil Aviation Act 1982 at Gatwick Airport. In practice, however, all Gatwick Airport's current noise insulation schemes are provided on a voluntary basis and meet the expectations of the Air Transport White Paper. Specifically, airport operators are expected to offer households subject to high levels of noise (69 dB(A) Leq or more) assistance with the costs of relocating; and offer acoustic insulation (applied to residential properties) to other noise sensitive buildings, such as schools and hospitals, exposed to medium to high levels of noise (63 dB(A) Leq or more).

To address the impacts of future airport growth Government also expects the airport operators to offer to purchase those properties suffering from both a high level of noise (69 dB(A) Leq or more) and a large increase in noise (3 dB(A) Laeq or more); and offer acoustic insulation to any residential property which suffers from both a medium to high level of noise (63 dB(A) Leq or more) and a large increase in noise (3 dB(A) Laeq or more).

In 2005, after consultation, Gatwick Airport launched a number of schemes including voluntary blight mitigation, noise relocation and insulation schemes. In 2008, Gatwick Airport launched a noise insulation scheme for homes. The Noise Insulation Scheme has been developed following extensive consultation with residents, local authorities, local MPs and business partners since 2006. Feedback gathered has been used to refine the scheme and to improve it wherever practically possible. The aim of the scheme is to help reduce the impact of airport noise on households closest to Gatwick Airport and it is based on predicted noise contours for a future scenario of Gatwick Airport serving 40 mln passengers per year.

There is a separate residential day and night noise insulation scheme. Maps detailing the boundaries for noise insulation schemes and relocation schemes are contained in Annex 7 of the Scheme (see Figure 7 and Figure 8). Three boundaries apply for the noise insulation scheme: 1) day time air noise boundary of 66dB(A) Laeq; 2) night time air noise boundary of 90dB(A) SEL; 3) households that are located outside these contours but are within the preferred ground noise boundary.

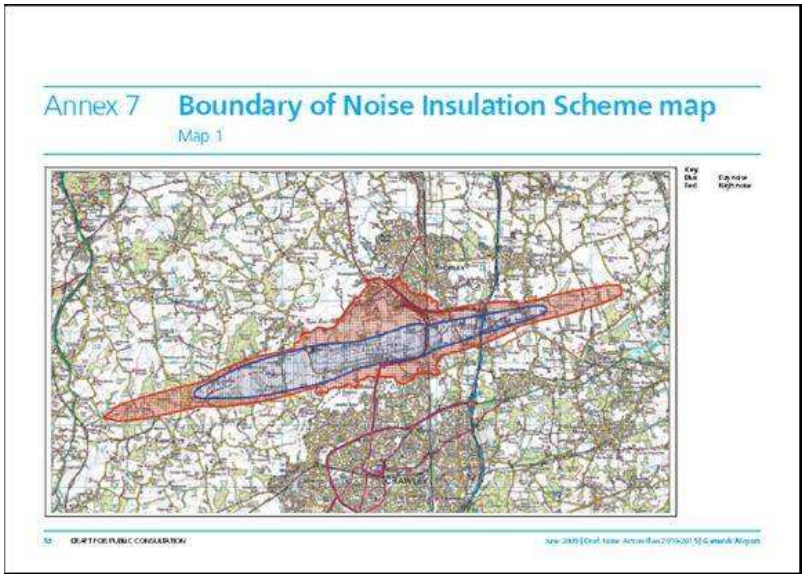


Figure 7, Annex 7 of the Noise Insulation Scheme, map 1

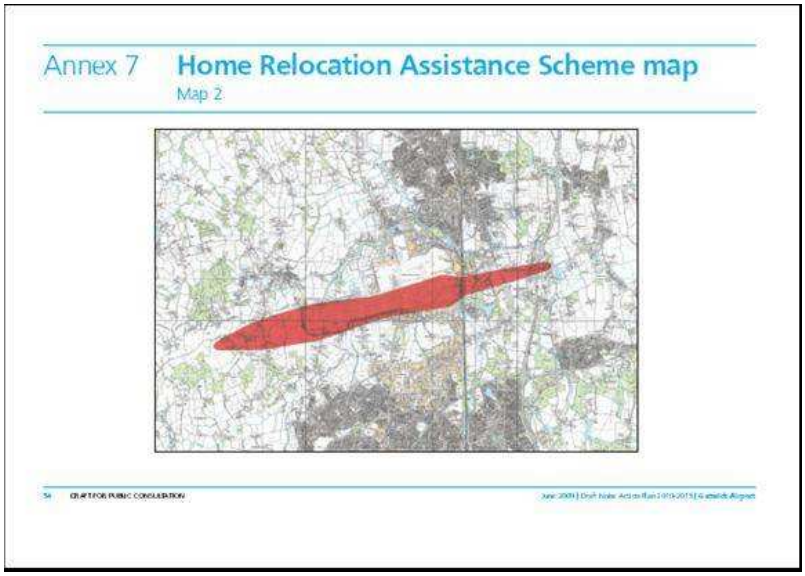


Figure 8, Annex 7 of the Noise Insulation Scheme, map 2

Mitigation

Sound insulation

The current sound insulation scheme is officially launched in 2008 for homes. It offers to meet the full cost of loft insulation, ventilation, and secondary glazing, if these measures are identified as appropriate in the initial survey prior to insulation works; and to pay 50% of the cost of high specification double-glazed replacement windows. Priority in the insulation works is given to households in the order of the boundaries as described above.

Demolition and buy-outs

Within the Gatwick area, debates on demolition of houses due to plans for a second runway took place in the 1970s. Due to heavy opposition, it was decided to further develop Heathrow and Stansted, which eliminated demolition plans around Gatwick.

A home relocation assistance scheme is to provide assistance to those who want to move to a quieter area.

Compensation

Damage caused by spatial planning

Gatwick Airport, in close cooperation with West Sussex County Council has drawn up a home owner support scheme. Objective of the scheme was to protect the value of eligible properties, should a second runway be developed after 2019. The scheme would apply to home owners in the area that would be the 66 db (A) Laeq contour after the completion of the second runway.

House owners within this contour zone are eligible for financial compensation up to a maximum of GBP 12.500.

Innovative compensation schemes

The Gatwick Community Trust is an independent charity set up by the legally-binding agreement between West Sussex County Council, Crawley Borough Council, and Gatwick Airport, following publication of the airport's Sustainable Development Strategy. Gatwick Airport donates an annual amount of GBP 100.000 in the Trust from its tax income. In addition, the Trust receives money raised through noise fines set by the UK government on those aircraft that infringe any noise limits at Gatwick Airport.

The Gatwick Airport Community Trust has received GBP 100.000 annually, until March 2009. Since 1995, more than GBP 3 mln has been spent on community projects in the Gatwick area, which covers parts of Surrey, West Sussex, East Sussex and Kent.

Also, BAA has its own Communities Trust, which was set up in 1996. Until now, GBP 4 mln was spent to causes in the communities close to the airports that fall under BAA. The trust is linked to the turnover of BAA. It has focused on local community projects, such as global youth volunteering programmes, to create opportunities for young people. Furthermore, it serves to protect the environment, it promotes active local communities and it aims to break down barriers to employment. Four times a year, communities and organisations can apply for subsidy out of the Trust.

1.14 Paris CDG Airport region

Legal basis

Noise zoning around airports in France is under the competence of the central government. The independent authority ACNUSA acts as an advisor for noise policies. In Ile-de-France (Roissy-CDG and Orly airports), ADP, the airport authority, has the responsibility for the insulation program. For the larger airports Noise Exposure Maps (Plan d'Exposition au Bruit – PEB) are prepared. They define the land use constraints, and estimates developments in air activity, the extension of infrastructures and developments in air traffic procedures in 10-15 years time.

In this planning document four noise zones are defined for Paris CDG: 70, 65, 56, 50 Lden. The maps are prepared using a specific public enquiry procedure based on the opinion of communities, the consultative committee, ACNUSA and agreement of ministers. The Noise Exposure Map is approved by order of the prefect. ACNUSA can recommend its revision. The Noise Exposure Map is appended and transcribed in the comprehensive development area map and other town planning documents. Of the 600 airports in France, 190 of them have a PEB. Noise exposure is measured in Lden

No specific compensation measures are set up for damage due to adjustments in spatial plans.

Mitigation

Sound insulation

PEB's are maps at the scale of 1 / 25 000 indicating the areas exposed to noise.

The importance of exposure is indicated by the letters A, B, C or D.

Zone A: Exposure to loud noise
Zone B: Exposure to high noise
Zone C: Exposure to moderate noise
Zone D: Exposure to low noise

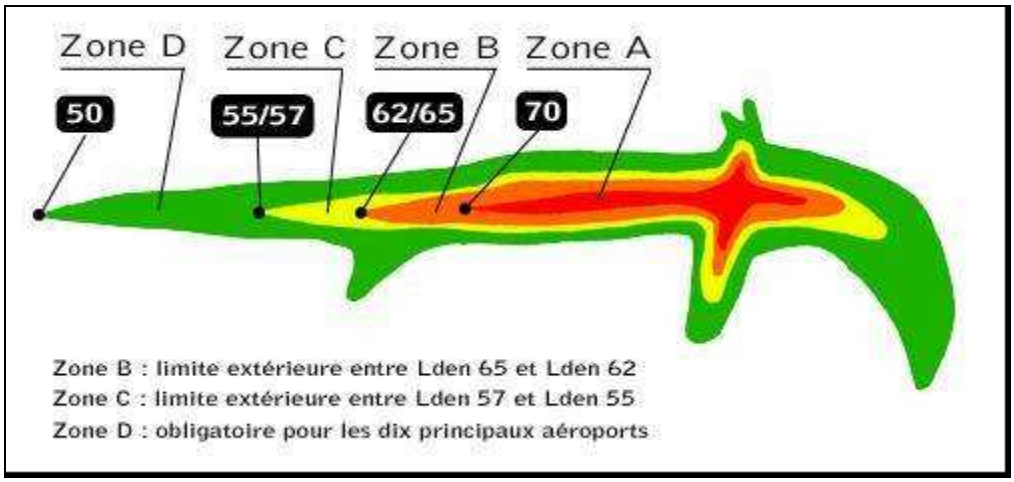


Figure 9, PEB zones, source: ACNUSA

The compensation document includes the Current Noise Plan (Plan de Gêne Sonore – PGS). This provides the basis for soundproofing subsidies, and is revised every four or five years. It recognises three noise zones: 70, 65, and 56 Lden). The Soundproofing programme includes sound insulation facilities for 110.000 dwellings, of which 65.000 for the area around Paris Charles-De-Gaulle and 45.000 for the area around Paris Orly. Only ten major airports in France have PGS maps. Houses within these three PGS zones are eligible for noise insulation.

Support for soundproofing is funded by the Aviation Noise Tax (TNSA) and paid by airlines according to their traffic. There is an advisory committee to assist residents and the tax is used for soundproofing homes, schools, local health and social, and exceptionally, to acquire, demolish and relocate the occupants or restructure land. For Paris CDG airport the PGS covers 60 municipalities and 64,000 houses.

Demolition and buy-outs

No schemes

Compensation

Compensation for damage caused by spatial planning

No schemes

Other compensation schemes

In the Paris CDG area, a Public Interest Group for employment (GIP employ Roissy CDG) brings together all the main stakeholders for a better coordination of policies in the field of employment and training. Furthermore, there are a number of initiatives to help young people to get a job at the airport. Also, initiatives for a better physical access to the airport have been developed for the citizens in the vicinity of the airport, for example with 'transport on demand' systems.

A Territorial Pact for Employment and Training (Pacte Territorial pour l'Emploi et la Formation) is under study for both Paris CDG and ORY. The Paris scheme focuses on increasing the accessibility to airport jobs and markets for citizens in airport regions. No current examples are known.

1.15 Dublin Airport region

Legal basis

No specific compensation measures are set up for damage due to adjustments in spatial plans, other than demolition and buy-out schemes. These are not included in a legal framework.

Mitigation

Sound insulation

The opening of a new runway at Dublin Airport will reduce noise nuisance in a certain area but will also increase noise levels in other areas. Therefore, an insulation scheme will be offered to residents with houses within in the 63 db noise contour. Approximately 120 houses are located within the noise contour. The scheme will applicable after the opening of the new runway. Also, ahead of the opening of the new runway, five schools will be insulated.

Mitigation and buy-outs

Due to the development of a new runway, which will have a negative impact for a number of houses that fall within the 69 dB noise contour. A voluntary house buy-out scheme will be made available for citizens that live in this noise contour. The scheme will be available for at least one year after the opening of the new runway which will provide the citizens an opportunity to assess the impact on their quality of life.

The airport operator has also committed to provide a sound insulation scheme for schools, prior to the opening of the new runway. This applies to five schools.

Compensation

Damage caused by spatial planning

No policies

Other compensation schemes

No policies

1.16 Brussels

Legal basis

There is no legal scheme for insulation, demolition or buy-out purposes. No specific compensation measures are set up for damage due to adjustments to the spatial plan.

Mitigation and compensation

Compensation and mitigation issues have been on the agenda in the early 2000s. However, there is no political agreement or commitment.

1.17 Helsinki-Vantaa

Legal basis

The existing aircraft noise areas are based on a noise management plan. The Civil Aviation Administration (CAA) was required a noise management plan as a part of an environmental permit (15.12.1992) for the third runway at Helsinki-Vantaa Airport for bringing the runway into service.

The third runway was taken in use in November 2002. The plan covers the development of the airport up until about 2020. The aircraft noise areas have also been included in regional plan, which was approved in 2004 by the Uusimaa Regional Council. Hence all the municipalities concerned have to follow the aircraft noise areas (Lden 55 dB and 60 dB) in their land use plans (master and detail land use plan). The city of Vantaa has approved a new master plan in December 2007 which also includes Lden 50 dB areas. It is only allowed to have small-scale supplementary building within the Lden 55 dB area. This area covers 22 % of the city. Over Lden 60 dB no new houses are allowed. In the area between Lden 50-55 dB there are only local regulations for noise insulation, without specific focus on aircraft noise.

CAA has renewed the entire environmental permit at the end of 2007, due to expired water protection regulations. The environmental legislation has thoroughly changed since the permit for third runway has

been granted in 1992. The new application includes all the environmental issues at the Helsinki-Vantaa airport. Noise nuisance is one of them.

Application has been under public inquiry in 2008. Besides local people also local authorities as the city of Vantaa have compiled its statements. Because an environmental permit for Helsinki-Vantaa airport is of national interest, it is not the local or regional environmental authorities but one of three national environmental permit authorities (Western Finland Environmental Permit Authority) that will grant a new environmental permit. A new permit is not yet been issued, but it is expected that by the end of 2009 Western Finland Environmental Permit Authority is ready to make the decision after CAA has complemented its application.

The application covers the development of the airport up until about 2025. Growth of operation is expected to increase to 334.000 operations. In earlier planning for the year 2020, 308.000 operations (compared to 184.000 operations in 2008) were foreseen. This would mean enlargement of the aircraft noise areas because it is not expected to have significant less noisy aircraft in the near future.

The proposed enlargement of aircraft noise areas would cause large problems for land use. A few new housing areas in the master plan should be rejected. A question, which arose during the public inquiry, was what happens after 2025 or after 334000 annual operations if air traffic will continue increasing further on. Will the aircraft noise areas still enlarge? Are we now planning land use in the area, which are covered by aircraft noise in the future? What is the capacity of the airport? Are there limits for development of the airport? CAA is reluctant to have any restriction for air traffic. One problem is that Finnish legislation does not recognise any compensation for aircraft noise.

The noise level guidelines are applied in land use planning, traffic system planning, in building permit processes and also in environmental permit processes, while assessing noise impact on neighbourhood. The guidelines are not used to determine any kind of mitigation nor compensation.

Table 3, Noise level guidelines Finland

Outdoors	**Daytime $L_{Aeq(7h00-22h00)}$**	**Night time $L_{Aeq(22h00-7h00)}$**	**New area Night time $L_{Aeq(22h00-7h00)}$**
Residential areas	**55 dB**	**50 dB**	**45 dB**
Recreation areas in urban areas and areas in their vicinity	**55 dB**	**50 dB**	**45 dB**
Areas serving nursing institutions	**55 dB**	**50 dB**	**45 dB**
Areas serving educational institutions	**55 dB**	**-**	**-**
Holiday resort areas (sommer cottages, camping sites, etc.), recreation areas outside urban areas and nature protection areas	**45 dB**	**40 dB**	**40 dB**
Indoors			
Dwellings, sickrooms in hospitals, guest rooms in hotels, motels and so on	**35 dB**	**30 dB**	**30 dB**
Educational and conference facilities	**35 dB**	**-**	**-**
Business and office facilities	**45 dB**	**-**	**-**

Mitigation

Sound insulation

There are general requirements for the sound insulation for new buildings. These requirements are included in the building ordnance. This is a special collection of local regulations for building and construction. The purpose is to give flexibility for local government how to control building processes, because the needs to control vary from larger cities in scarcely populated rural areas. The building ordnance is based on the Land Use and Building Act, approved by the city councils. On the basis of the building ordnance one cannot require that sound insulation in existing buildings should be improved.

There is no insulation action plan as there is no legislation to set up such a plan. There are neither financing measures to support the owners of dwellings to apply sound insulation. Overall, the current legislation does not recognise any compensation due to impacts of aircraft noise.

Demolition

No policies

1.17.1 Compensation

There are no policies regarding compensation. There is a case though, where a land owner prosecuted the civil aviation authority in order to receive compensation for the reduction of reservation for housing in the master plan, due to increased aircraft noise. The consequence changing the master plan was that the land owner could not build houses or buildings on his land anymore. The land was either suitable for business activities due to this change. The owner now is awaiting the decision of the court.

1.18 Barcelona

The types of measures in Spain follow three levels of action, namely habitat protection (linked to the impacts on the EU Natura 2000 network), mitigation due to noise nuisance, and the improvement of quality of life in local communities in airport regions.

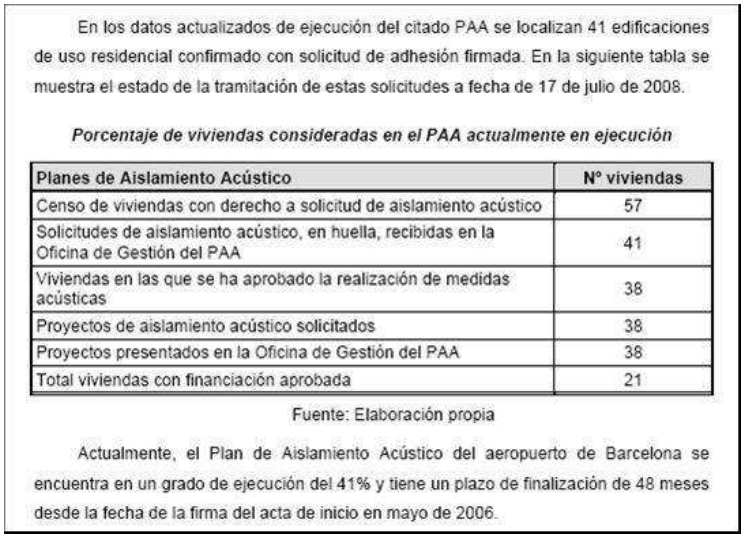
Legal framework

The Acoustic Insulation Plan for Barcelona Airport is founded in the Environmental Impact Assessment and the Environmental Impact Statement (D.I.A.) for the proposed expansion of the airport of January 18, 2002. Among the actions cited in the Environmental Impact Statement are 'measures to protect the population affected by the impact of noise', more particularly the population living within the Lden 65 dB(A) contour and or the Lnight contour of 55 dB(A).

Houses within those contours are eligible for noise insulation. The insulation activities are monitored by the Committee on Environmental monitoring of the expansion of Barcelona Airport (CSAAB), which consists of the following organizations:

- General Directorate of Environmental Quality and Evaluation, Ministry of Environment
- Environment Directorate General of Civil Aviation of the Ministry of Public Works.
- Generalitat de Catalunya.
- Councils of Barcelona, Castelldefels, Gavà, El Prat de Llobregat, Sant Boi de Llobregat and Viladecans.
- Public corporation Spanish Airports and Air Navigation (Aena).

The Commission's functions include resolving requests from stakeholders on its inclusion in the Plan for Acoustic Insulation (PAA) for Barcelona Airport, agree on the amount to finance, from the promoter (Aena), and monitoring the implementation of the Plan. The Plan is executed by Aena which sees to it that the houses affected will, after insulation comply with Annex 5 of the Standard for Basic Building: NBE-CA - 88 Acoustics in Buildings.



En los datos actualizados de ejecución del citado PAA se localizan 41 edificaciones de uso residencial confirmado con solicitud de adhesión firmada. En la siguiente tabla se muestra el estado de la tramitación de estas solicitudes a fecha de 17 de julio de 2008.

Porcentaje de viviendas consideradas en el PAA actualmente en ejecución

Planes de Aislamiento Acústico	Nº viviendas
Censo de viviendas con derecho a solicitud de aislamiento acústico	57
Solicitudes de aislamiento acústico, en huella, recibidas en la Oficina de Gestión del PAA	41
Viviendas en las que se ha aprobado la realización de medidas acústicas	38
Proyectos de aislamiento acústico solicitados	38
Proyectos presentados en la Oficina de Gestión del PAA	38
Total viviendas con financiación aprobada	21

Fuente: Elaboración propia

Actualmente, el Plan de Aislamiento Acústico del aeropuerto de Barcelona se encuentra en un grado de ejecución del 41% y tiene un plazo de finalización de 48 meses desde la fecha de la firma del acta de inicio en mayo de 2006.

Figure 10, Plan for Acoustic Insulation for Barcelona Airport, source: Aena

Mitigation

Compared to other regions, the number of houses eligible for insulation is relatively small: 57 houses are entitled to insulation, and for 41 houses requests were made to the PAA. The realization rate as of May 2006 is 41%. The total plan must be completed at or before May 2010.

Project	Time frame	Insulated dwellings	Cost in EUR	Average cost in EUR
	- 2010	41		??

Compensation

The compensation measures differ per region. In Ciudad Real, three measures have been put in place: local labour recruitment, economic investments, and set up of a foundation for the socio-cultural promotion of local communities.

1.19 Warsaw

Legal basis

The compensation scheme is based on the resolution that has set the Reduced Land Use Zone. The purpose of the scheme is to give inhabitants an incentive to move or to receive financial funds for insulation of the housing (investment)

Mitigation

Sound insulation and buy-out

Inhabitants of compensation area (zone M), can apply to Polish Airport State Enterprise (airport owner) for compensation. The application has to be submitted within two years (before August 2009). Application for money to invest in new windows and doors that contribute to sound insulation of dwellings. The owner of the properties has to state if his dwelling needs insulation, which should be in harmony with Polish law.

1.19.1 Compensation

Damage caused by spatial planning

Inhabitants have to prove that due to the airport operations, they cannot fully use their property, or land owners with land that is intended for house building, but are forbidden by the airport to start building the house. The airport operator has not yet reimbursed any compensation claim. It has difficulties with the property valuation. An independent expert should value this, however, there is doubt concerning the assessment of technical conditions.

Innovative compensation schemes

No policies

Best practices

Reviewing current practices in the field of mitigation and compensation leads to the conclusion that only in the area of sound insulation policies and measures, comparisons can be made and best practices determined.

Housing insulation programs were identified in seven of the nine QLAIR regions. Only Brussels and Helsinki/Vantaa regions have no insulation programs running, although in Helsinki there are areas identified where insulation would be needed while there is no implementation program foreseen.

The principal drawback to insulation is that insulation is necessary, but often not sufficient, to increase quality of life. Most residents near the airports would still like to be able to open their windows in the summer or use their garden without the aircraft noise. That is why in most evaluations the level of dissatisfaction remains high even after the realization of sound-insulation measures.

In addition the following lessons can be learned:

- Being able to choose between various options of insulation (even not to do it) is an important element for inhabitants for valuing the effects
- Voluntary schemes offered by the airport without consent of the region or inhabitants are not effective.
- Inhabitants are mostly interested in financial compensation.
- Implementation of insulation programs so far has been inefficient, in time and cost.
- Properly informing citizens and potential newcomers should be part of the compensation policy.

Buy-out and compensation schemes are scarce. Only in the Schiphol, Gatwick and Frankfurt regions compensation schemes for value depreciation of inhabitants is available. In the Schiphol and Gatwick regions the appreciation of these schemes is high. In Frankfurt the scheme has very limited effect, as it is offered by the airport in return for compliance with and acceptance of aircraft noise effects.

Buy-out schemes are currently only used for complete buy-out of inhabitants and the demolition of the house. The problem with buy-out, but also other individual compensation schemes is, that there is no sound basis yet for noise annoyance based compensation schemes. The dose-effect relationships and possible, but still unproven, health effects as a result of aircraft noise are still inconclusive. Only one individual compensation scheme is currently being developed in the Schiphol region for those households that severely suffer from aircraft noise and which are not covered by existing policies or measures.

Current role and ambition of regional authorities

The current role of regional and local authorities in mitigation and compensation measures is very limited. Most policies are designed and implemented by the national authorities and financed by the aviation sector by means of noise related charges or by budgets resulting from agreements between the aviation sector and the public authorities.

Only in the Schiphol, Frankfurt, Brussels and Gatwick regions there is a clear and visible role for the regional authorities. This limited role can be explained by two factors. First, most regional authorities have only a planning authority, which limits their role in day-to-day airport operations policies. Brussels is a special case, where the Flanders Region, is holder of the environmental permit. Whether this provides a region with the governance to be more involved in mitigation and compensation policies remains to be seen. In the other three regions, the governance structure around airport policy ensures automatically a certain involvement. Thus, in order to create or improve the role of regional authorities, full support and agreement from the airport operator and national government is required.

Still, the ambition of QLAIR and ARC is to increase the role of the regional authorities, as these organisations can better represent the local concerns of inhabitants and property owners.

Innovative ideas and minimum requirements

1.20 Innovative ideas

As best practices are limited, the QLAIR project has identified various opportunities for new and innovative ideas for mitigation and compensation schemes. Especially two kinds of policies deserve more research and development. The first has to do with providing choice to inhabitants to leave their house under fair conditions and thus provide an alternative. The second concerns the development of a compensation scheme, which no longer takes only the dose-effect relationships as the basis for spatial planning and airport noise policies, but uses more advanced quality of life indicators as the basis for determining negative effects of aircraft noise. Before such scheme can be implemented, research need to proof the relationship between quality of life and aircraft noise exposure, but also the most effective way of financial compensation (tax, income, recurrent, one time).

1.21 Minimum requirements

Based on the QLAIR review of policies minimum requirements can be formulated. These minimum requirements are the basis for improving the EU level playing field. The following five are most important:

- Communication of the implications of sound insulation is a crucial aspect in the mitigation process. Sound insulation does not eliminate (aircraft) noise completely. Dissatisfaction about noise after reconstruction works for sound insulation can be prevented if citizens would be clearly informed what they may expect after insulation of their dwellings. Not only informing citizens, but also consulting them in the preparations for the sound insulation is essential.
- Efficiency of the mitigation and compensation policies needs to be safeguarded, especially in terms of decision and implementation time. Now, most people get frustrated by lack of progress or information about the timing.
- Specific attention is required in those cases where spatial planning rules require specific actions, such as insulation, but implementation is unavailable or being withhold or delayed.
- Specific efforts need be facilitated in order to develop Action Plans including new economic and regulatory incentives, as well as develop governance models where local and regional representation of citizens living and working near airports can be improved.
- Use the same noise measures, EU wide

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