

Aviation noise: Managing and Mitigating Noise Impact



Horizon 2020

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Aviation noise:
Managing and Mitigating Noise Impact



The following proceedings are published after a fruitful event at the European Parliament in Brussels, Belgium on 6 March 2018 during which the ANIMA project was officially launched and presented to the outer world. This successful event was hosted by Finnish Member of the European Parliament (MEP), Mrs Merja Kyllönen (GUE/NGL).

ANIMA stands for “Aviation Noise Impact Management through Novel Approaches”. The ANIMA project is a people-oriented research project. It aims at identifying and diffusing best practices to lower the noise annoyance endured by communities around airports. The project also tries to better understand the non-acoustical factors which influence noise annoyance, but also to improve the quality of life of communities surrounding airports.

ANIMA is financially supported by the European Union’s Horizon 2020 research and innovation programme. Horizon 2020 is the biggest EU Research and Innovation programme ever and it is the financial instrument implementing the Innovation Union. ANIMA project is a 48-month project with a total budget of over €7.4 million. The project also partakes in Future Sky, a global initiative aiming at addressing major challenges faced by the European Air Transport by 2050.

The project consortium is formed of 22 project partners. ANIMA is coordinated by ONERA (Office National d’Etudes et de Recherches Aérospatiales) in close cooperation with:

- The Manchester Metropolitan University
- Netherlands Aerospace Centre (NLR)
- Airport Regions Conference (ARC)
- Safran Aircraft Engines (SAE)
- Airbus Operations SAS
- Anotec Engineering S.L.
- Budapesti Muszaki Es Gazdasagtudományi Egyetem (BME)
- Deutsches Zentrum Für Luft-Und Raumfahrt E.V. (DLR)
- Environnons
- Erdyn Consultants
- Heathrow Airport Limited
- Institutul National de Cercetare-Dezvoltare Turbomotoare - Comoti
- National Aviation University, Kyiv (NAU)
- Nacionalni Institut za Javno Zdravje (NIJZ)
- Institute of Sound and Vibration Research
- Regia Autonoma Aeroportul Iasi
- Schiphol Nederland B.V.
- Transport Systems Catapult Limited (TSC)
- Universita Degli Studi Roma Tre (UR3)
- Universite de Cergy-Pontoise
- Zeus GmbH

Mrs Merja KYLLÖNEN
Member of the European Parliament, GUE/NGL


Merja Kyllönen is a Finnish Member of the European Parliament (MEP) for the Finnish Left Alliance, which is a member party of the Confederal Group of the European United Left-Nordic Green Left. In the European Parliament, she is sitting in the Committee on Transport and Tourism. Mrs Kyllönen was the Minister of Transport in the Finnish government between 2011 and 2014 and Member of the Finnish Parliament between 2007 and 2014.

As a preserver of the environment and public health, MEP Merja Kyllönen emphasizes the importance of the efforts that are being made on noise research. Aviation noise annoyance has an inseparable impact on the health of humans and animals. The discussion about aviation noise is in her eyes a societal issue as our way of living is changing. People travel more often, and goods are being delivered fast, which requires a broad air cargo/air network. Therefore, she welcomes ANIMA Project with open arms as it is set up in order to try to tackle this big problem of aviation noise, which bothers over four million European citizens.

Mrs Kyllönen encourages the partners of the ANIMA project to keep up the good work as R&D to non-acoustical factors of noise annoyance is a missing link in the research process for mitigating aviation noise.

MEP Kyllönen regrets the unacceptable fact that residents of airport regions feel helpless because their concerns or claims are not heard or treated with the right level of attention. She encourages stakeholders to treasure the value of dialogue as this is essential to reach the best possible solution to the aviation noise problem.

“When it comes to environmental issues, it is important to interact with one another as we have a common challenge and common interests. We must learn from the past to not make the same mistakes over and over again, because our planet, our people and our health are at stake. Therefore, we must speak, listen, learn, cooperate, give and share info and get together. ANIMA is a good platform for a change of vision. Information and good practices can be shared.”



**“ Non-
acoustical
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ANIMA was launched in October 2017, thanks to the financial support of the INEA – the externalised Innovation and Networks Executive Agency – and with the staunch political support of the European Commission. ANIMA is also part of a wider initiative named Future Sky and promoted by the EREA – the Association of European Research Establishments in Aeronautics – in order to address the key challenges that may imperil the traffic growth in midterm horizons.

What is ANIMA and does it differ from other research projects on Aviation noise?

ANIMA stands for “Aviation Noise Impact Management through Novel Approaches”. ANIMA thus is about noise impact and not about the noise itself. ANIMA is about management – and not necessarily about reduction. This does not mean reduction is not important, but it is tackled in other projects. We are also discussing novel approaches in the project.

ANIMA starts from well-established facts:

First fact: Aircraft Noise at source has been reduced

In the past years, huge efforts have been put on the reduction of noise at source. These efforts were conveyed through numerous projects, many of them having been supported by the successive R&D Framework Programmes of the European Commission. Clean Sky and SESAR are probably the best-known of these projects and they are the last stage of a continuous chain of studies which started in the last years of the twentieth century. Clean Sky integrates numerous bricks of “Noise Reduction Technologies” in platforms of demonstration and SESAR implements “Noise Abatement Procedures” for the Single European Sky. As a matter of fact, the aircraft noise per operation – to say

per landing or per take-off – actually and significantly decreased. But not the annoyance. In reality, this demonstrates the importance of the notion of annoyance. Annoyance to aircraft noise might be thought of as just a perception or feeling out it is a fact to be taken into account.

Second fact: The number of movements remains stable or even decreases at major airports, and increases significantly at secondary airports

A common way to explain the annoyance increase is that the traffic would have dramatically increased and therefore the noise reduction gains per operations by a strong increase of the number of operations would have been decimated. This idea is mostly false, at least for the major European hubs. Paris Charles de Gaulle had 500 000 movements in 2010 and 479 000 in 2016. London Heathrow in 2010 had 455 000 movements and 475 000 in 2016. Frankfurt had 464 000 movements and 463 000 in 2016.

The growth is indeed moderate even if, thanks to a better passenger load factor, the number of passengers strongly increased. This idea of an exploding number of movements is actually true for emerging airports where neighbouring communities are not complaining yet. For instance, at Iasi airport in Romania which is a partner in ANIMA, there were 1800 movements in 2005 whereas 11 700 in 2017. In the meantime, Sofia airport, in Bulgaria went from 32 000 to 58 000 movements.

Nevertheless, in the same years, the point is that, as far as we know, areas nearby are still seen as attractive around these airports because of the low cost of real estate and because of the associated job

opportunities. There are environmental problems, of course, but the annoyance has not yet begun at these airports.

Third fact: Several studies have shown that the annoyance due to certain levels of aircraft noise has increased around major airport hubs

The dose-response curves on which the EU noise directive was built in 2002 assumed that less than 5% of people were severely annoyed by noise levels at 50 dB. In reality, it seems to be more than 15% of the population. At 65dB, 25% of the people were highly annoyed; while now it is 45%. It is likely that the banalisation of air transport shifted mental representations, from a dream aspiration to a highly-technological way of travelling for elites, to a mere nuisance. Although, this increase in annoyance levels needs to be substantiated, especially because observations are not Homogeneous. For instance, we do know that communities around certain airports are less complaining than communities around other airports which experience the same level of noise. Why is that? What are the cultural factors playing a role there? Or are the discrepancies coming from different noise management practices?

The key point of ANIMA (not a technology-driven project): Understanding where is the annoyance within the noise. Understanding to what extent noise is the actual source of complaints about noise-assigned annoyance. Understanding if and how other environmental features may compensate the noise burden and help to tolerate possible traffic growth. Understanding what are the mitigation practices successfully deployed by

airports and which ones are not working.

This ANIMA project is particularly important because we cannot rely only on technology in the quest for a silent air transport system. On the one hand, technology has made impressive signs of progress but may tend to saturate. The EU objectives for 2020 as set by the Advisory Council for Aviation Research and Innovation in Europe – the so-called ACARE – and as endorsed by the European Commission, were to lower by half the noise per operation when compared to the year 2000. Thanks to R&D, the midterm objective was reached in 2010. However, 2020 full objective will be reached only by 2030. And the new objectives set for 2050, – to lower the noise per operation by 65%; is certainly challenging as it is easier to gain the first decibels than the last ones.

On the other hand, the very nature of noise regulations in EU countries is such that houses are allowed to be built closer to airports when the noise footprints are decreasing. Airports are more silent than twenty years ago but around some airports, houses are closer. This could become an issue for policy-makers.

ANIMA suggests putting efforts on three axes:

Axis one: to assess the existing practices of airports on noise management and mitigation and issuing the best practices.

Axis two: to deepen the scientific knowledge on annoyance and especially on the non-acoustical factors that are influencing this annoyance. Before considering axis three, it has to be underlined that for this aim, the ANIMA consortium is gathering a wide variety of experts from 22 Countries. Some are

acousticians, of course, but some are specialists in land-use planning; some are environmental sociologists and some are airport officials in charge of implementing noise regulations. We are convinced that progress may arise mostly at the crossroads of our various disciplines.

For axis one, for instance, we have started compiling for analysis how the regulations' stack is implemented by airports. By all means, all European airports are subject to the EU 2002/49 Environmental Noise Directive and to the so-called "Regulation 598/2014 on the introduction of noise-related operating restrictions at Union airports within a Balanced Approach". Nevertheless, because of the subsidiary principle, they are also subject to numerous other national, federal, regional or even local regulations. We initiated an assessment of the wide discrepancies between different local situations in order to find out and to exemplify the best practices in terms of land-use planning, in terms of possible operational improvement and restrictions, and, as far as possible, by taking into account intermodality and interdependencies with other nuisances. Ideally, at the end of the project, we would like to be able to say: "for your airport with these or those features, you could implement this set of noise-wise measures in this given order and you should avoid doing this". Certainly, big hubs have their own noise experts who are able to cope appropriately

with regulations, but for smaller regional airports, the ones which are developing rapidly, there is a strong need for such a support.

Let me emphasise that in the ANIMA project, four airports are direct partners – two big hubs, Heathrow and Schiphol, and two regional airports, Iasi and Kiev. Even for large airports, there are probably possible improvements, for instance, we are going to review the numerous studies made on relations between aircraft noise and health impacts as well as between aircraft noise and annoyance. We are currently continue to explore the exact relation between expressed annoyance and actual health Impact. Regardless of the answer to this question, it is likely that most of the recent knowledge associated with either health impact or annoyance has not been integrated into airports' noise impact mitigation policies. We would like to be able to provide innovative recommendations to airports in this regard.

Communities around certain airports are less complaining than communities around other airports which experience the same level of noise. Why is that?



On the other hand, axis two of ANIMA is more about upstream research and aims at refining knowledge on non-acoustical factors influencing annoyance. For example, we will test if communications' campaigns or engagement interventions are actually effective in lowering annoyance. We will thus perform a certain number of annoyance surveys with partnering airports, before and after, such campaigns and interventions held with focus groups.

Beyond this example, we would like to achieve defining actual annoyance profiles. In this regard, we will develop and use some tools – especially smartphone applications – to

allow communities to record noise and to express annoyance. The noise recording is not the important point, the important point is to catch who is expressing annoyance when and during which kind of activity. If we succeed in merging this information with GSM-based data about location and additional data from social media, we could thus replace the classical noise maps by time-varying and profile-dependent annoyance maps; and therefore, to pave the way for some more personalised techniques of remediation. Obviously all gathered personal data will be anonymised for ethical reasons.

Does this mean that ANIMA is the Holy Grail that would provide definitive answers to all these questions and which would provide definitive solutions to the noise

issue? Obviously not, as the considered scope is very wide and because ANIMA is a research project without any capacity of enforcement. That is why the third axis of the project is so important.

Axis three is thus about capitalising the acquired knowledge on annoyance and maintaining the associated “European Roadmap on Aviation Noise Research”.

The idea is to enrich the existing technology-driven research projects with a capacity to forecast the annoyance impact of given noise reduction technologies, of given new aircraft architectures or of given new fleet scenarios.

We ultimately aim at passing from low noise design to low annoyance conception. And beyond

the mere environmental issue, we are convinced that this conceptual move would help to reinforce the European leadership in the global competition.

To this end, ANIMA will coordinate a European-wide network of experts and research actors – including coordinators of other European research projects. Together, we will support the roadmap process, stimulate the emergence of novel approaches to overcome gaps and propose targeted collaborations in line with the EU strategy for international cooperation in research and innovation. This roadmap and the long-term network of experts would not be the least asset of ANIMA.

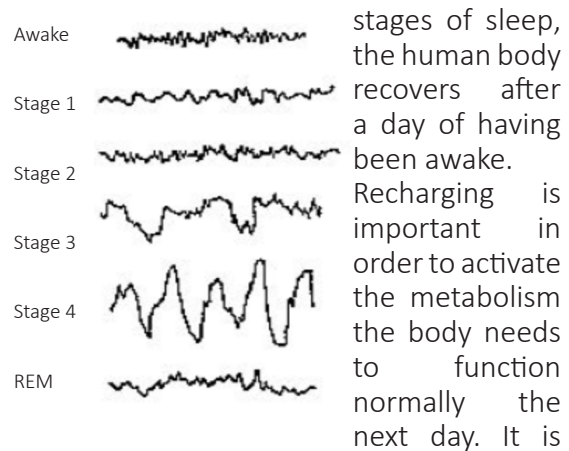
“We aim at passing from low noise design to low annoyance conception”

Mr Marco PAVIOTTI
 Policy Officer, DG ENV, European Commission

People affected by aviation noise above certain levels might be annoyed¹, not sleep well, be subject to coronary artery heart disease or stroke. Affected students perform worst. According to the World Health Organisation (WHO), cardiovascular diseases (CVDs) are the major cause of death for humans in the European region.

The European Commission is aware of the fact that capacity for airports is scarce, and that solutions need to be found. Moreover, airport operations are as well affecting citizens living around airports. The most conflicting issue seems to concern night operations which are on one side a potential for the airport expansion, but on the other a health risk for citizens living nearby the Airport. The sleeping pattern and/or quality of sleep can be affected due to the night operations.

To understand specifically the effects on sleep, irregularities of brain functioning during different phases of sleep can be recorded, using an EEG² technology. During sleep, humans progressively move towards deeper sleep stages. During these deeper



stages of sleep, the human body recovers after a day of having been awake. Recharging is important in order to activate the metabolism the body needs to function normally the next day. It is

proved that loud noise interrupts sleep and eventually prevents people from reaching the deeper stages of sleep, which affects their health due to inadequate recovery. It is a fact that aviation noise affects sleep, but the studies on the effects that sleep interruption has on the human body in the long run are still insufficient. Therefore, further research is essential.

A graph similar to the one hereunder³ was published by the American Academy of Sleep Medicine and Sleep Research Society on “the recommended amount of sleep for a healthy adult”.

	Hours of sleep				
	6	7	8	9	10
General health	Red	Red	Green	Green	Yellow
Metabolic	Red	Red	Green	Green	Yellow
Cardiovascular	Red	Yellow	Green	Green	Yellow
Mental	Red	Yellow	Green	Green	Yellow
Immune function	Red	Yellow	Green	Green	Yellow
Pain	Red	Yellow	Green	Green	Yellow
Mortality	Red	Yellow	Green	Yellow	Red

1. Guski,R.; Schreckenberg, D.; Schuemer, R. WHO Environmental Noise Guidelines for the European Region: A Systematic Review on Environmental Noise and Annoyance. Int. J. Environ. Res. Public Health 2017, 14, 1539.

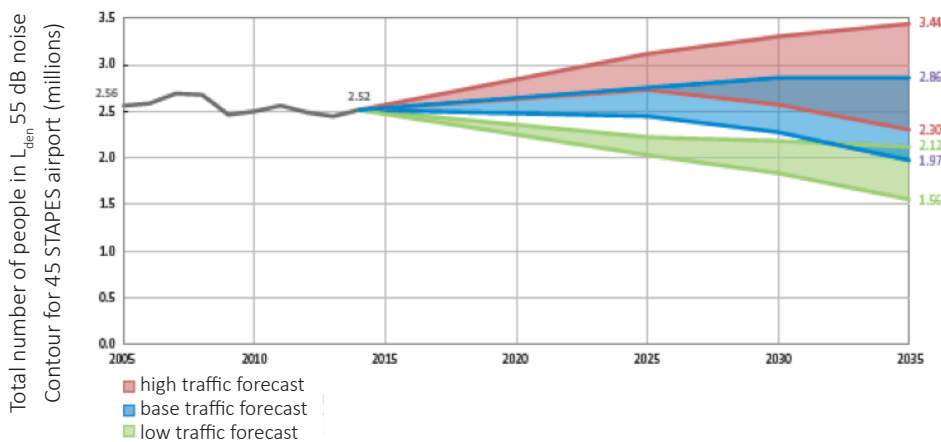
2. An electroencephalogram (EEG) is a test used to find problems related to electrical activity of the brain. An EEG tracks and records brain wave patterns. Small metal discs with thin wires (electrodes) are placed on the scalp, and then send signals to a computer to record the results. Normal electrical activity in the brain makes a recognizable pattern. Through an EEG, doctors can look for abnormal patterns that indicate seizures and other problems. (Source: KidsHealth)

3. Watson NF, Badr MS, Belenky G, Bliwise DL, Buxton OM, Buysse D, Dinges DF, Gangwisch J, Grandner MA, Kushida C, Malhotra RK, Martin JL, Patel SR, Quan SF, Tasali E. Joint consensus statement of the American Academy of Sleep Medicine and Sleep Research Society on the recommended amount of sleep for a healthy adult: methodology and discussion. J Clin Sleep Med 2015;11(8):931–952.

Based on available evidence, the graph shows how the hours of sleep are associated with health effects, divided by category. The colour range goes from red till green (red-yellow-green) where red being very likely a dangerous state, yellow potentially, and green being the recommended number of hours or good health.

Overall, 7-8 hours as a minimum is recommended for a healthy adult, while below 7 hours sharply increases the health risks. Indeed, this is consistent with the night as defined in the Environmental Noise Directive that it shall be 8 hours, and cannot be less.

Aviation noise is affecting the over four million European citizens (see figure below)⁴, which equals the combined populations of Slovenia, Luxembourg, Malta and Cyprus. Specifically annoyance and sleep disturbance would affect even more people. It is useful in this context to investigate what kind of aviation noise pattern causes more annoyance and sleep disturbance.



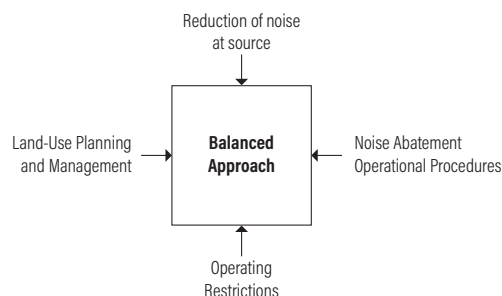
For each traffic forecast, “advanced” and “low” technology improvements rates are applied to new aircraft deliveries from 2015 onwards. The upper bound of the range reflects the “low” technology improvement rate, and the lower bound is the “advanced” technology improvement rate.

4. European Aviation Environmental Report 2016 (EASA)
www.easa.europa.eu/eaer/downloads

“The studies on the effects that sleep interruption has on the human body in the long run are still insufficient. Therefore, further research is essential.”



Aviation is an important catalyst for the wider European economy. It is a strong driver of economic growth, jobs, trade and mobility for the European Union. Growth of the EU economy is crucial from a geopolitical point of view as it reinforces the European global leadership position. The Commission, on the other hand, is well aware that aviation must grow in a sustainable manner, aiming at reducing its environmental footprint. It is a fact that the number of passengers will keep growing in the future, therefore, we must prepare for smart mobility growth of which everyone can benefit.



The booming aviation industry is a worldwide phenomenon and a direct result of globalisation, but negative impact and consequences are mainly experienced on a local level, namely by citizens living near airports. There is a growing resistance of citizens against increasing air traffic. This is one of the reasons why noise annoyance should be

handled with care and tackled as much as possible.

Legislation is key and is needed to tackle noise annoyance to the fullest, keeping in mind the importance of aviation for the European economy. Therefore, the EU is recommending to follow the so-called ICAO Balanced Approach in which both economic and social interests are being handled carefully. This concept aims to reduce noise at source, and to improve land-use planning and management, to set up noise abating operational procedures and, if necessary, operating restrictions. For this very last resource, the Regulation 598/2014 is giving Member States the necessary toolkit to consider all stakeholders interests in this process.

However, creating legislation takes time. And more specifically, environmental law is not only done at the EU level but at global level as well. The ICAO has set up technical working groups, like the Committee on Aviation Environmental Protection (CAEP) which is handling, amongst others, the topic of aviation noise to create standards proposed then to the ICAO Council for global endorsement. Europe must implement the legislation as set by ICAO, which also requires time. The development of standards, requires time and efforts, sometimes up to 10 years.

Economic benefits of aviation

A 10% increase of air connectivity stimulates the GDP growth rate by 1%

1 Euro value in the air transport sector creates 3 Euro for the overall economy

1 job in the air transport industry creates more than 3 jobs in other sectors

The overall economic impact of the aviation sector is estimated at €510bn

Negative impact of aviation on citizens

It has been estimated that air traffic noise around airports affects some 4 million citizens in Europe

Effects of air pollution are most pronounced in the vicinity of airports and can have a significant effect on human health

Forecasts of growth in air traffic may lead to an increase in populations affected by aircraft noise



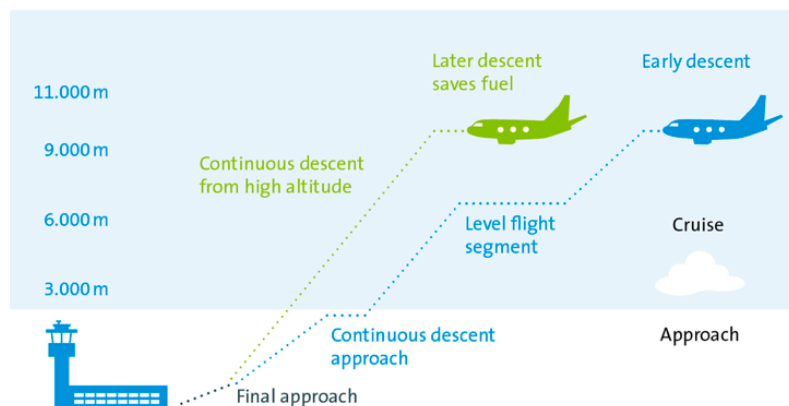
“People expect their online ordered parcel to be delivered the next day if they order before 22:00h, without realising that this requires often heavy long-haul night air traffic ”

allows pilots to gently lower/increase air speed. This eliminates the need to constantly accelerate and decelerate, which produces a lot of engine noise. Another example of a smart solution is the new way of taxing from the gate to the runway for take-off, using only one engine. However, we can not take these procedures for granted. Large amount of funding are needed for R&D projects to develop these kinds of systems.

Research and Development projects are ordered and welcomed by the European Commission. Aviation noise decreased roughly by 4% during the past decades, and it is expected to keep decreasing with 2% the following years. The Commission forecasts that aircraft noise will be lowered by 65% through new technologies and new, modern aircraft types. To match this expectation, it is crucial to invest in R&D programmes like SESAR and Clean Sky. Cooperation with EASA and EUROCONTROL is also key. The continuous climb/descent procedure is a good example of a successful piece of smart cooperation. Aircraft can now, at some airports, take-off or land in a straight pattern which

A big part of the discussion of air traffic growth is a socio-cultural paradigm. People want to travel faster, more frequently, to more destination for less money, but they do not want to pay any negative consequences. People want the best fresh sushi from Japan, or they expect their online ordered parcel to be delivered the next day if they order before 22:00h, without realising that this requires often heavy long-haul night air traffic.

Optimised Profile Descent



Source: German air traffic control (DFS) www.bdl.aero

Mrs Dominique LAZARSKI

President of UECNA (Union Européenne Contre les Nuisances Aériennes)

Mrs Dominique Lazarski is the president of UECNA, the European Union Against Aircraft Nuisance, an umbrella organisation gathering the interest of people overflown by aircraft and suffering from aircraft noise and emissions with members from all over Europe.

UECNA states that noise coming from low overflying aircraft affects not only grown human beings, but also impacts children and animals. Lazarski gives the example of the oyster which, if affected by noise, refuses to open its shell and has thus difficulties growing. Children have problems learning at school due to a lack of quality sleep and may experience tiredness at home or at school, when exposed to noise.

Aviation noise is one of many aviation related causes of annoyance. Aviation activities cause poor air quality in airport regions and it scares people as they do not know what impact emissions will have on their health. "Aviation noise, with the emission of toxic pollutants, is one of the leading environmental causes of cardiovascular diseases", Lazarski stays.

Noise near airports also has economic consequences, one of which is linked to tiredness which impacts the working capabilities of people. This has an economic impact which lowers productivity of the employee, as well as social impacts such as higher risks for the employee to be made redundant and of work related injuries.

It is important that airport operators, airlines and governments provide citizens overflown by aircraft at low altitude, with sufficient information and transparency.

Supplying information could remove the lack of trust in the system, which is important to generate public acceptance when airports are expanded or new aircraft are built. It should become clear for residents what the advantages and disadvantages of these actions are.



Any new action aiming at reducing noise should be explained and the reduction objectives clearly stated. The action should later be evaluated with the assessment of the actually achieved noise reduction.

Lazarski finds the term “annoyance” a little too weak in the researched on how to tackle aviation noise. It impacts public health of European citizens, which is more than just annoying. “Calling noise ‘a nuisance’ is like calling smog ‘an inconvenience’. Noise must be considered a hazard to the health of people everywhere”, she says, referring to the American Surgeon General William Stewart (1978).



“Any new action aiming at reducing noise should be explained and the reduction objectives clearly stated”

Mrs Raquel SANCHEZ JIMENEZ
Mayor, Municipality of Gavà, Spain

With its 30,75 km² Gavà is the fourth largest city in the metropolitan area of Barcelona. The city has 46.532 inhabitants and is located 15 minutes from the centre of Barcelona and 10 minutes away from the Barcelona Airport in El Prat de Llobregat. Gavà is divided into five different areas with a different socio-cultural identity and function. The beach together with a residential, seaside neighbourhood which is used for tourism, the agricultural area, the industrial zones, the residential areas and nature are all gathered on the territory of the municipality.

The local government at Gavà, led by Mayor Mrs Raquel Sánchez Jiménez, is aware of the economic importance of the airport to the wider Barcelona (and Catalonia) Region. A transparent and respectful cooperation between the involved governments on all levels when airport activities are being expanded is very important. Airport growth is necessary and good for the region, however, clear communication between planners and citizens, who will be affected because of expansion, is crucial as it brings more noise.

In 2004, a new terminal (T1) and a new runway (07R/25L) was built. A master plan, designed in 1999, to plan the expansion of Barcelona Airport lacked attention to acoustic sensitivity. This generated new flight paths and consequently more traffic over the city of Gavà, which caused a protest of nearby residents which forced the airport to interrupt operations. Until then residents' concerns and complaints had not been taken seriously or were not even heard by the several responsible authorities. This gave residents a wry feeling of helplessness. To cope with this problem and to make residents' concerns to be taken into account, the City of Gavà worked together with other public authorities and administrations (the working group depending on the environmental Commission) to set up a system that requested information and figures related to airport operations and to transmit them to the citizens. In order to service the citizens of Gavà to the fullest, the city council created a separate department dedicated to transmitting information to its citizens.



Thanks to the efforts of the working group, flight paths of climbing aircraft were relocated over the Mediterranean Sea and ordered to avoid the City of Gavà as much as possible, while always guaranteeing safe air operations.

Recently, the city council and the citizens of Gavà were informed about the new master plan for Barcelona and Girona via a press release, instead of in person by the existing working group. This has led the local government to be suspicious as they have to fight for basic information that should be directed to them automatically.

Mayor Sánchez Jiménez stressed the importance of clear communication between all involved stakeholders when it comes to airport operations. "Citizens should never feel helpless, and their complaints must be heard and treated. The economy is one thing that must be taken into account when planning airport growth, public health is another. Europe can help in this process by standardising acoustic indicators to compare noise

impacts on EU level, which is still today not the case. Non-acoustical annoyance must be measured as well because this harms citizens' health. This is why the city of Gavà welcomes the H2020 ANIMA project with open arms and encourages the EU to keep investing in similar programs".

"Citizens should never feel helpless, and their complaints must be heard and treated. The economy is one thing that must be taken into account when planning airport growth and public health is another

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The texts published in this document are opinions and visions of guest speakers that cannot be considered as official ANIMA statements. ANIMA Project and all the partners involved find it necessary and useful to have a dialogue with stakeholders of all kinds of backgrounds that are involved in this topic. All speakers have been given the opportunity to check their contribution before publishing.

Any queries related to the ANIMA project can be directed to Mrs Alexandra Covrig, Project and Communication Officer at Airport Regions Conference (ARC) via alexandra.covrig@airportregions.org

For further information about ANIMA, take a look at www.anima-project.eu



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