



Environmental
Noise

Adverse health effects of noise are numerous and diverse, ranging from a mere annoyance or discomfort to permanent damage, including hearing loss, cognitive impairment, mental disorders and cardiovascular effects.

The aim of Directive 2002/49/EC (Environmental Noise Directive - END) is to define a common approach intended to avoid, prevent or reduce, on a prioritised basis, the harmful effects, including annoyance, due to exposure to environmental noise.



In Greece, the END is transposed by the Common Ministerial Decision (CMD) 13586/724/2006, while CMD 211773/2012 sets the time periods to be used for noise mapping (day time: 07:00 to 19:00, evening time: 19:00 to 23:00, night time: 23:00 to 07:00) and thresholds for the environmental noise from the operation of transportation projects: $L_{den} = 70$ dB(A) and $L_{night} = 60$ dB(A). It is noted that the 7th European Environmental Action Plan and generally all recent documents of the EU and the European Environmental Agency, consider as high noise levels the values of $L_{den} = 55$ dB and $L_{night} = 50$ dB. However, in the absence of a downward trend in urban population exposure to high noise levels, the objective of reducing noise pollution below the aforementioned thresholds by 2020 is not foreseen.

Moreover, the proposed guidelines of the World Health Organization (WHO) are even more stringent aiming at the highest possible level of human health protection. For example, based on studies, during nighttime, outdoor noise levels even lower than $L_{night} = 40$ dB may cause sleep disturbances like body movements and awakenings, while cardiovascular effects are likely for levels over 55 dB. These effects can contribute to increased premature mortality. WHO has published a guideline of $L_{night} = 40$ dB aiming at the protection of public health, including sensitive subgroups such as the children, the chronically ill and the elderly. A limit value of $L_{night} = 55$ dB is suggested as an intermediate target for countries where the night guideline can't be achieved in the short term.

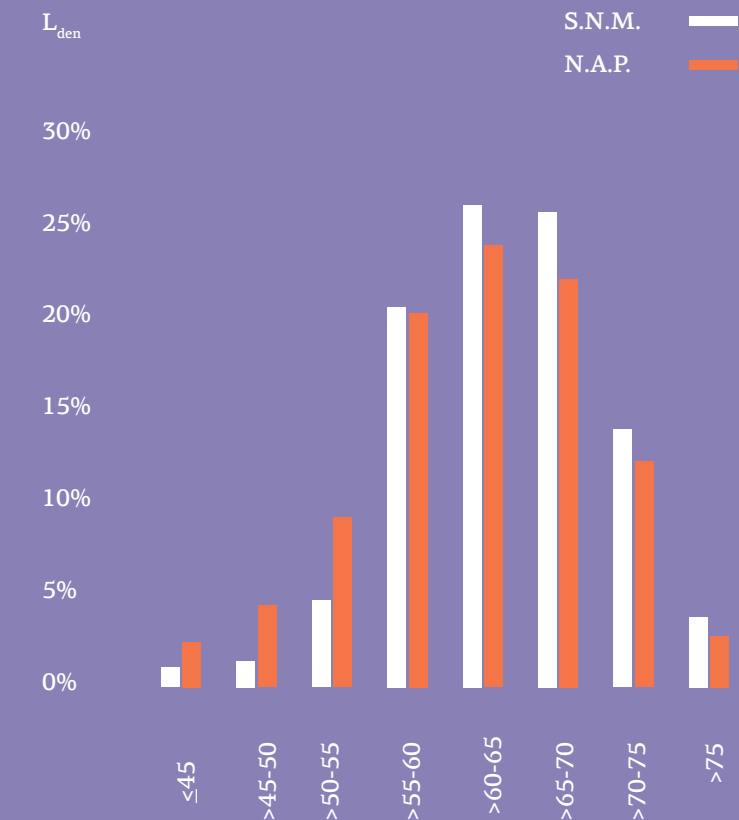
The present report summarizes the results of all Strategic Noise Mapping (S.N.M.) studies and Noise Action Plans (N.A.P.) up to now, in the framework of the END, for Greek Agglomerations, major roads and the “Eleftherios Venizelos” Athens International Airport. A synthetic evaluation of mapping data is presented and summary descriptions of indicative action plan proposals for each agglomeration are provided as an annex.

Strategic Noise Mapping and Noise Action Plans have been completed in most of the Greek Agglomerations with population > 100,000 (an exception being the Western and Eastern part of the Athens Agglomeration), for the reporting year 2013 (in the general case; studies span from 2012 to 2015). The results of Strategic Noise Mapping for 16 Greek Agglomerations (counting 3 separate studies for Athens: Southern, Northern and Centre), totalling a population of approx. 3.14 million people, which are presented in Graph 3.1, show that the majority of the population is exposed to road noise levels above the thresholds $L_{den} = 55$ dB(A) (92% of the population, 2,893,099 people) and $L_{night} = 50$ dB(A) (75% of the population, 2,353,598 people). Of these, 574,429 people (18%) are exposed to $L_{den} > 70$ dB(A) and 812,376 people (26%) are exposed to $L_{night} > 60$ dB(A). Less than 5% of the population resides in zones with $L_{night} < 40$ dB(A).

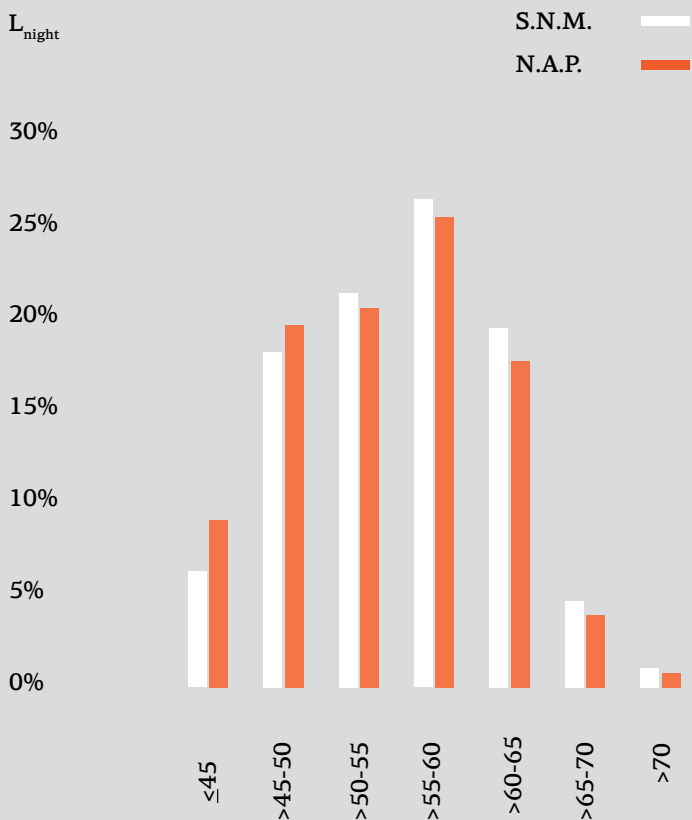
Graph 3.1.
Distribution of exposed people to noise bands (dB), for L_{den} and L_{night} , in 16 Greek agglomerations, based on S.N.M.



Graph 3.2.
Percentage of total population in agglomerations exposed to noise bands (db), based on Strategic Noise Mapping and after Noise Action Plans



Based on the estimates of the studies, the implementation of the Noise Action Plans should result in a 3% reduction of the population in noise zones above national thresholds (15% and 23% of the population will be exposed to $L_{den} > 70$ dB and $L_{night} > 60$ dB, respectively). The results are summarized in Graph 3.2.

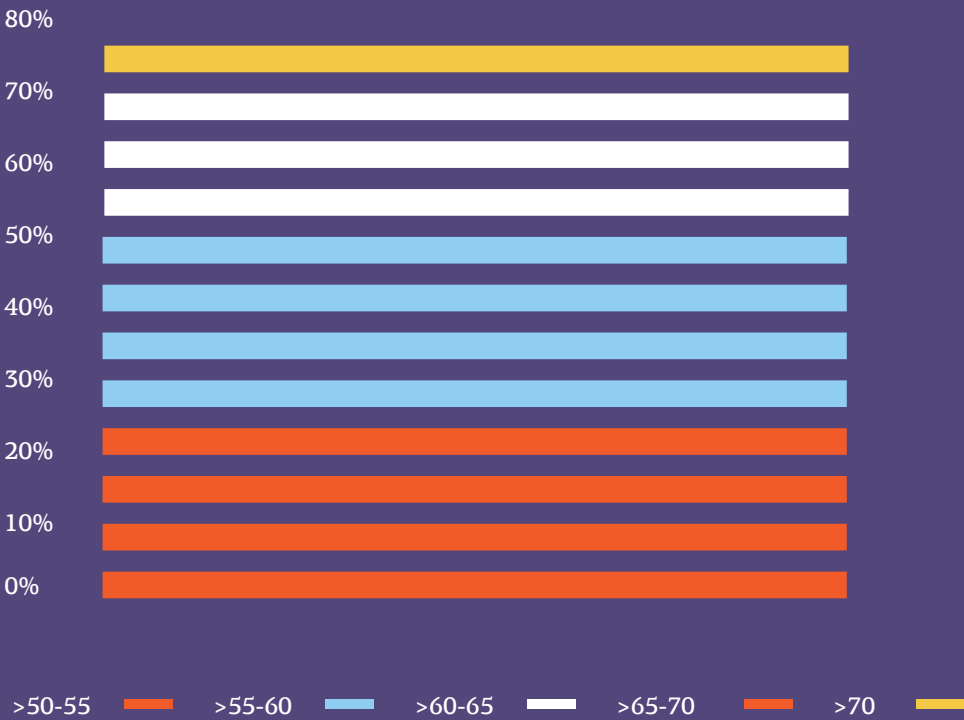


Aggregate data on noise exposure levels for agglomerations are presented in Graph 3.3. It is noted that the main noise source in all agglomerations is road noise. This is mainly due to the lack of a widespread rail network within cities and a limited number of industrial units. It is noted that industrial noise also includes noise from the harbors. However, even in the case of the three largest ports in the country (Piraeus, Thessaloniki, Patras), the estimates of the studies coincide with the fact that they do not cause population exposure to noise levels above the existing limits and that even the exposure of residents to noise levels above the limits of the 7th EU Action Plan ($L_{den} \geq 55$ dB, $L_{night} \geq 50$ dB) due to the harbor are practically negligible at the level of the agglomeration (0.2% - 0.3% of the population). The distribution of the total population exposed to night-time noise levels of $L_{night} > 50$ dB is provided in Graph 3.4.

Graph 3.3.
Percentage of population exposed to noise bands (dB)
of L_{den} and L_{night} , by agglomeration (S.N.M.)



Graph 3.4.
Fractions of urban populations exposed
to noise bands (dB) of $L_{night} > 50\text{dB}$



The operation of the Egnatia Odos major road (motorway) does not cause significant exposure to high noise levels. In the framework of the 2015 strategic noise mapping study, 24h noise measurements were carried out over three years (2013, 2014 and 2015) in various locations covering the entire length of the road, as well as along two sections of Vertical Axes; no exceedance of the national threshold values was observed, for the L_{den} and L_{night} indicators. Furthermore, according to the revised Action Plan, in 2015, only 4,292 people (26% of the 16,228 people, considered to be living within the influence zone of 200 meters on either side of the road) resided in $L_{den} > 55$ dB (A) zones, while only 1,247 people lived in $L_{night} > 50$ dB (A) zones (8% of the estimated population within the influence zone). This is mainly due to the absence of significant residential settlements within the influence zone. The operation of Attiki Odos major road, due to its passage in some parts through densely populated areas, despite the noise protection measures, causes population exposure to noise levels above the current national limits. However, according to the estimates of the 2010 Action Plan, the implementation of the 1st Action Plan led to a more than twofold decrease of the number of inhabitants in $L_{den} > 70$ dB and $L_{night} > 60$ dB zones (from 16% to 7% and 19% to 9%, respectively) and, based on the planned measures, the estimates were that in 2011, residents in $L_{den} > 70$ dB and $L_{night} > 60$ dB areas would have been reduced to 1,606 and 2,230 people, respectively (estimated total number of affected residents 25,257, based on the NSS 2001 data, then available). According to unpublished data from the competent Directorate of the Ministry of Environment and Energy, the monitoring program of Attiki Odos continues and is being implemented, submitted and updated on an annual basis and, depending on its findings, new noise barriers are put in place, to protect adjacent homes or other sensitive uses. To date, more than 125,000 m² of noise barriers have already been built since the start of the operation of Attiki Odos. However, according to the 2nd Action Plan of 2011,

only 1-in-8 residents within the influence zone was expected to live in zones of $L_{den} \leq 55$ dB (3,404 people, 12.4% of the estimated total of 25,257 people with population figures of 2001) and only 1-in-3 in zones of $L_{night} \leq 50$ dB (8,469 people, 33.5% of the estimated total in 2001). There are not yet publicly announced Strategic Noise Maps and Action Plans for the National Road Network, although noise studies for specific road sections have been carried out as part of the study, implementation and environmental licensing of major concession projects. Also, sections of the National Road Network and/or National Railways (there are no major railways falling under END in the country) have been taken into consideration in the Strategic Noise Mapping studies of agglomerations that they cross. It should be noted that almost all of the National Road Network was under (re)construction up to 2017 in the frame of major concession projects, so there are currently insufficient data on the “normal” traffic loads. Thus the sections of the National Road Network that fall under the provisions of END are still to be determined.

The operation of the Airport of Athens “Eleftherios Venizelos” does not result in the population exposure to levels above the national thresholds, while, according to the last approved Action Plan (2011), out of 64,364 inhabitants in the area, 10,925 (17%) were exposed to $L_{den} > 55$ dB (A) and 1,435 (2,2%) were exposed to $L_{night} > 50$ dB (A). According to the 2017 revision of the Action Plan (under evaluation, made public in the context of public consultation), although air traffic has increased and in 2016 had returned to the 2006 levels, the situation has not deteriorated, due to improved procedures. It was estimated that the national threshold values of L_{den} and L_{night} are only exceeded within the boundaries of the airport, while only 21% (16,641 people) and 3% (2,566 people) of the permanent population (79,487 inhabitants) lived in zones of $L_{den} > 55$ dB (A) and $L_{night} > 50$ dB (A), respectively.

