

## Technical note

## Environmental noise – ‘Forgotten’ or ‘Ignored’ pollutant?

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## ABSTRACT

It has been 20 years since the European Commission adopted the Green Paper on Future Noise Policy in 1996, taking the first comprehensive step towards the development of an EU-wide noise policy. This document envisioned a directive that would harmonise methods for the assessment of environmental noise and the dissemination of information to the public. This led to the establishment of Directive 2002/49/EC in 2002 also known as the Environmental Noise Directive (END). The END called for the development of strategic noise maps and action plans across every EU Member State in five year intervals. Two phases of noise mapping and action planning have now been completed and Member States are about to embark on the third phase of noise mapping, due in 2017. Focussing on results reported to the European Commission, this study summarises the current state of noise mapping, 20 years after the publication of the Green Paper, and identifies critical needs for future noise mapping phases.

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## 1. Introduction

It has been 20 years since the European Commission adopted the Green Paper on Future Noise Policy in 1996 [1]. This was the first comprehensive step towards the development of an EU-wide noise policy to ensure that individuals should not be exposed to noise levels that might endanger their health and quality of life, which became a core objective of the Fifth Environmental Action Program. The Green Paper led ultimately to the Environmental Noise Directive (END), issued in 2002. The END's objective is to establish a framework to assess the extent of environmental noise exposure as well as to define a common approach intended to avoid, prevent or reduce, on a prioritized basis, the harmful effects resulting from exposure [2]. The END sets out a cyclical process where strategic noise maps and noise action plans must be developed and delivered to the European Commission every five years. Two phases of noise mapping have now been completed: Phase I in 2007 and Phase II in 2012. The third phase is due to be completed in 2017.

Under the terms of the END, strategic noise maps must be developed for major agglomerations, major roads, major railways and major airports. A strategic noise map is defined within the END as ‘a map designed for the global assessment of noise

exposure in a given area due to different noise sources for overall predictions for such an area’ [1]. Thus, strategic noise mapping is concerned with the practicalities of the noise mapping exercise as well as the assessment of exposure within designated areas [3]. Estimates of the population exposed to different noise levels may then be determined from the results of these strategic noise maps. In this regard the END requires competent authorities in each Member State to provide estimates of the number of people living in dwellings in 5 dB bands of  $L_{den}$  and  $L_{night}$  separately for road, rail, air and industrial sources. Member States are also required to develop noise action plans, which, according to the END, are ‘plans designed to manage noise issues and effects, including noise reduction if necessary’ [2]. It is a requirement of the Directive that these plans are reviewed every five years once adopted and on an ongoing basis to account for major new developments in designated areas.

Completed in June 2007, Phase I of the noise mapping process involved the development of noise maps across Europe for all cities with more than 250,000 inhabitants, major roads (with more than six million vehicle passages a year), major railways (with more than 60,000 train passages a year) and major airports (with more than 50,000 movements a year). Completed in 2012, Phase II of the process witnessed a reduction in the thresholds for mapping. Cities with more than 100,000 inhabitants were required to be mapped while the thresholds for major roads and major railways were reduced to 3 million and 30,000 vehicle passages respectively. This significantly increased the extent of mapping required in each Member State.

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Overall, the END has yielded certain real benefits; it has enabled a step forward in addressing noise pollution at the EU level and has introduced a management system for environmental noise in all Member States [4]. For the first time, we have estimates of the extent of populations exposed to noise across the EU, and every Member State has developed noise action plans to control the pollutant. The END has also served to stimulate wide ranging research into noise mapping and noise pollution assessment more broadly [5]. Accuracy in results, although once listed as a desirable aim [6], is not an absolute necessity in noise mapping studies. Lictra notes that the real benefits of noise mapping are realised when viewed as a guidance tool for generating more effective noise policies, and not a prediction of total noise levels at every dwelling [7]. Thus, while accurate mapping results are desirable, the real benefits of noise mapping come about when used as a strategic tool to control and manage environmental noise, coupled with robust recommendations for action.

However, like any initiative of this magnitude, a number of studies have highlighted methodological issues concerning the implementation of the END between Phase I and Phase II [3,8,9]. The Eurocities Position paper on the END noted that, despite the successful implementation of the END and the availability of noise maps and action plans, until then (May 2009) there was little evidence that any significant progress was made in avoiding, preventing and reducing environmental noise [10]. A disconnect between policy, guidance and implementation on the ground has been observed and it has been suggested that the political agenda does not prioritise environmental noise exposure amongst the main environmental issues [11]. Thus, it seems these large scale noise assessments are often considered a duty to be accomplished rather than a real instrument to improve the quality of life for citizens.

Now that we are on the brink of Phase III, we assess whether the END has achieved its primary objective, which is to reduce the number of Europeans exposed to harmful levels of environmental noise. The paper also questions whether real progress in the development of noise mapping at the Member State level is being made. This study investigates the results of the first two phases of noise mapping to assess the performance of the END in terms of population exposure to noise. Emphasis is placed on data supplied by Member States under the terms of the Directive; we do not consider the secondary impacts the END may have had on national policy related to noise control in each Member State.

### 1.1. The noise observation and information service for Europe

The Noise Observation and Information Service for Europe (NOISE) contains results and data related to the END. It is maintained by the European Environment Agency and the European Topic Centre for Air Pollution and Climate Change Mitigation. The website acts as a publically accessible database containing information reported by EU member states and European Economic Area (EEA) member countries in accordance with the requirements of the END. It notes that the responsibility for the quality of source data, methodologies and models rests with the member states and member countries – thus it offers minimal (or no) quality control of results. All observations in the current article are based on data downloaded directly from NOISE. We restrict our analysis to the 28 EU Member States. Other nations, such as Iceland, Norway, Switzerland and Turkey are not EU Member States but chose to report exposure figures and these figures are available on NOISE.

## 2. Summary of exposure results

As mentioned above, the threshold for noise mapping between Phase I and Phase II changed significantly and this resulted in a

large change in the required assessment area. Table 1 summarises the overall change in assessment across the EU, as reported on NOISE. These increases approximate to a threefold increase in the number of agglomerations, a twofold increase in major roads and a fourfold increase in major railways.

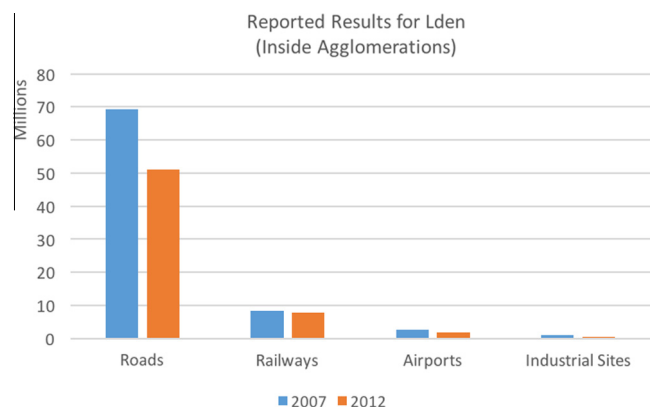
Because of the increase in mapping requirements it would be expected that the overall exposure figures from Phase I should rise. However, this was not observed in the data submitted. Figs. 1 and 2 compare the overall exposure for all Member States between 2007 and 2012 (for sources inside and outside agglomerations). If we consider major roads within agglomerations, recalling an approximate threefold increase in the number of agglomerations assessed in Phase II compared to Phase I, it can be seen that the overall population assessed (i.e. the number of people exposed to levels greater than 55 dB  $L_{den}$ ) actually fell from approximately 69.4 million to 51.0 million. This suggests a 26 per cent reduction in exposure despite a threefold increase in the number of agglomerations assessed.

It is quite clear that this level of exposure reduction has not actually been achieved given that only limited mitigation attempts have been made across the EU. However, it is not immediately obvious where these discrepancies have arisen from. It is notable that some Member States only reported partial or incomplete figures for exposure; others have used different calculation methods or different methodologies to determine population exposure from Phase I to Phase II. These discrepancies mean an overall examination of exposure trends are of little value. Instead we investigated individual Member States' exposure. As an example, Table 2 presents a summary of reported data, restricted to major roads within agglomerations, for each Member State.

The increased reporting requirements are immediately evident. Finland mapped 8 times the number of agglomerations from Phase I, while the UK mapped an additional 46 agglomerations. However, anomalies in exposure trends are also evident. Of the 28 Member States, 10 actually reported an overall reduction in population exposure in agglomerations, despite the fact that all 10 indicated an increase in the total number of cities assessed during Phase II. Six Member States including Cyprus, Greece, Hungary, Latvia,

**Table 1**  
Change in identified reporting requirements from Phase I (2007) to Phase II (2012).

Scope	2007	2012
Number of agglomerations meeting population threshold	163	468
Kms of major roads meeting passages threshold	121,288	203,833
Kms of major railway meeting passages threshold	11,625	40,136



**Fig. 1.** Summary of total number of people living within agglomerations exposed to environmental noise levels exceeding 55 dB  $L_{den}$ .

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