

Position Paper

Vehicle noise: Setting the appropriate limits



INTRODUCTION

As part of a renewed emphasis on environmental noise policy, the European Commission has updated the regulatory framework for vehicle sound emissions.

In 2021, the Commission adopted the EU Action Plan, 'Towards Zero Pollution for Air, Water and Soil'. This aims to reduce pollution to levels that are no longer considered harmful to health and natural ecosystems. It includes a range of key 2030 targets that are designed to cut pollution at source. One of these is to reduce the share of people who are chronically exposed to transport noise by 30%. A range of measures are currently being considered by policy makers to set targets and thus achieve the goals of the action plan.

The European Automobile Manufacturer's Association (ACEA) is committed to the objectives of this action plan. With a view to examine how transport noise pollution can be reduced, ACEA commissioned ATEEL to conduct a study on ['Future sound limit values for type approval for vehicles of category M & N'](#).

This study, published in January 2022, provides an in-depth analysis of how the goals relating to transport-related environmental noise burdens can be achieved. It examines vehicle type approval values and sets out scenarios that explore the impact and efficiency of reduced sound limit values across a wide range of environmental conditions. By extension, it also considers the introduction of alternative and complementary measures to reduce environmental noise under real traffic conditions.

SCOPE OF STUDY

- Investigation of the current sound emission levels of categories M and N vehicles (passenger cars, van, trucks, and buses).
- Assessment of the efficiency of limit value reductions in UNECE (Economic Commission for Europe of the United Nations) Regulation No 51.03 (UN R51.03) on road traffic noise (UNECE limits are equivalent to Regulation (EU) No 540/2014):
 - Assessment of the feasibility of technical progress and evaluation of necessary measures.
 - Estimation of a realistically-achievable environmental noise reduction under real road traffic conditions (transferability), based on quieter vehicles.
- Exploration of the potential of alternative measures to reduce road traffic noise:
 - Comparison of limit value reductions with reductions of noise under real traffic conditions that are efficiently achievable (phase-in of e-mobility, road quality, and transport fluidity).

OBSERVATIONS AND ASSESSMENT

The major conclusion of the study is that based on hypothetical limit reductions ('Limit Value Scenario 3' in the study), the improvement of the overall sound level (LAeq) for environmental noise in 2040 relative to the existing regulations (Scenario 2 in the study) would be 0.7dB in urban areas.

A key factor is vehicle market penetration. Variations in the market penetration rate of newer vehicles, and alternative measures such as road types and speed limits, would influence the effect on environmental noise much more significantly than a reduction in limit values in the second half of the 2020s.

The impact of M1-category pure electric vehicles is very much dependent on their market introduction speed, and also limited to a very narrow range of local environmental conditions. For areas where higher speeds are typical, such as motorways, tyre rolling noise plays a major role, and the low sound emission of the electric powertrain is not beneficial. Similarly, in residential areas with very low driving speeds (below 30km/h), mandatory acoustic vehicle alerting systems (AVAS), which alert vulnerable road users to the presence of a vehicle, counter the improvements. Pure electric city busses are a proven solution in urban and residential environments.

Recent discussions have focused more on disturbances caused by single events, such as sirens, horns, motorcycles and sports cars. This situation primarily relates to vehicles which were approved under the former legislation (Council Directive 70/157/EEC), which will completely cease to apply to M1 vehicles in 2022. The benefits of the revised sound emission regulation (Regulation (EU) No 540/2014 of the European Parliament and of the Council) applicable since 2016 are present in new products coming to the market, but are not yet fully reflected in current road traffic.

The aim of potential future reductions is to further mitigate real-world traffic noise, particularly in situations and locations where people are significantly affected by noise emissions. The study concludes that there are other options and measures with much greater potential to reduce sound levels in real-world conditions.

In areas where a more significant reduction in noise levels is required, improving the road surface can lead to a greater benefit. A complementary effect can be obtained by fitting nearby buildings with windows that have a high insulating factor. They provide dual benefits: better thermal insulation and improved sound insulation. These are two examples that would immediately reduce noise disturbances from all vehicle categories, regardless of age. A further advantage is the possibility to apply the measures locally in critical areas with acute noise emission concerns.

MAIN FINDINGS

1. Sound emissions of all vehicle categories have decreased in the last 10 years:
 - This is due to a range of factors, including emission standards, technology, more representative testing methods, additional sound emission provisions (ASEP), and limit values.

2. A slow improvement in environmental noise is expected in the coming years as a result of EU 540/ 2014 & UN R51.03 Phase 2 and Phase 3 limits (from July 2020 and July 2024 respectively):
 - There will be a delayed effect due to limited market penetration rates of new vehicles replacing older, louder vehicles (less than 5% per year).
 - Combined with former regulatory measures, the impact of Phase 2 and Phase 3 limits (Scenario 2) is forecasted to lead to an improvement of 2.1 dB by 2040, without any further improvements to vehicles or tyres.

3. Based on current technology, a reduction beyond Phase 3 is not considered feasible (on the basis of market demand for today's products) and thus the theoretical benefit is forecast to be insignificant:
 - ATEEL scenario 3 is expected to bring an additional improvement of 0.7dB in 2040. Compared to a 2dB limit value reduction for passenger cars, the efficiency is less than 35%.
 - Under type-approval conditions, tyres are increasingly becoming the dominant partial sound source for the majority of M1 and N1 vehicles.
 - No improvement is expected from tyres to reach limits beyond Phase 3 levels because of increasing conflicts with safety and other environmental challenges. Further noise reduction efforts for tyres would have a negative impact on other key tyre performance characteristics.
 - No improvement to the powertrain is expected from vehicles tested in accordance with the 'passenger car principle' (as set out in sub-paragraph 3.1.3.1. of the regulation).
 - Slight ASEP-related improvements for passenger cars are limited to niche segments and are insignificant in terms of environmental noise and single events.
 - Slight improvements to the powertrain are expected for vehicles tested in accordance with paragraph 3.1.3.2 (truck principle).

4. Relative benefits of electric vehicles compared with internal combustion engine (ICE) vehicles:
 - The biggest benefits from electric vehicles are expected in residential areas (at lower driving speeds, minimising powertrain dominance), but primarily for vehicle categories other than passenger cars.
 - The AVAS configuration will counter the benefits at low driving speeds especially for M1 category vehicles.
 - There are low/no improvements at higher driving speeds (no difference in tyre rolling noise).
 - Electric vehicles are a proven solution in urban and residential environments, particularly for commercial vehicles, such as city buses and vans.
 - There is no immediate solution for vehicles operating mainly on motorways, eg long-distance buses and heavy commercial vehicles.

CONCLUSION

1. Reducing the environmental noise burden for European citizens is a long-term process, and a clear roadmap has been set out through the Zero Pollution Action Plan.
2. Taking into account the time for market penetration of new vehicles, environmental noise will continue to drop, even without further legislation.
3. The positive impact of new vehicles can be further increased by additional measures:
 - Low-noise road surfaces, especially for hotspot areas.
 - Incorporation of other elements such as windows offering sound and thermal insulation.
4. E-mobility will have a positive effect, but mainly for single-event noises.
5. A reduction in single-event noise peaks, including consistent control of illegal modifications of vehicles and/or their components, and of antisocial driving is necessary.
6. Measures that reduce environmental noise should be reflected in environmental noise assessment tools (noise mapping).
7. Progress in technology towards quieter vehicles is not considered in EU noise mapping tools. As a result, noise maps tend to estimate the sound sources as louder than they are in reality.

8. This affects market penetration and growth calculations, leading to the incorrect assumption that growing traffic will always lead to noisier traffic.

Automobile manufacturers and their suppliers take their responsibility to reduce transport noise seriously. Support from other stakeholders, particularly policymakers, is also needed to maximise the impact of quiet vehicles in everyday road traffic, and to make progress in noise abatement perceivable to European citizens.



ABOUT THE EU AUTOMOBILE INDUSTRY

- 12.7 million Europeans work in the auto industry (directly and indirectly), accounting for 6.6% of all EU jobs
- 11.5% of EU manufacturing jobs – some 3.5 million – are in the automotive sector
- Motor vehicles are responsible for €374.6 billion of tax revenue for governments across key European markets
- The automobile industry generates a trade surplus of €79.5 billion for the European Union
- The turnover generated by the auto industry represents more than 8% of the EU's GDP
- Investing €58.8 billion in R&D per year, automotive is Europe's largest private contributor to innovation, accounting for 32% of the EU total

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