

**THE PHENOMENA PROJECT - ASSESSMENT OF
POTENTIAL HEALTH BENEFITS OF NOISE ABATEMENT
MEASURES IN THE EU**

POLICY DOCUMENTS:
Legislations, Noise Action Plans
LIMIT VALUES
ABATEMENT MEASURES
BENEFIT-TO-COST-RATIO

MAIN MESSAGES FROM THE PRESENTATION(S) AND REPORT

Long-term exposure to environmental noise from road traffic, railways and aircraft can lead to serious health effects, such as sleep disturbance, cardiovascular diseases, annoyance, cognitive impairment and mental health problems.

The European Environment Agency (EEA) estimates (2017-19 data) that 109 million people in the EU-28 are exposed to average road traffic noise levels (day-evening-night weighted – L_{den}) of 55 dB(A) and higher.

The objective of the Phenomena study was to support the European Commission in defining the potential of measures capable of delivering significant reductions (20%-50%) of health burden due to environmental noise from roads, railways and aircraft by 2030, and to assess how relevant noise related legislation could enhance the implementation of measures, while considering the constraints and specificities of each transport mode.

The Noise policy should be integrated into a wider range of EU and national policy areas, while it interacts with climate targets, energy saving, vehicle and traffic safety, mobility, etc. to secure a holistic dimension and outcome likely to be more effective/efficient across the EU.

SUMMARY

NB: Please note that paragraph references below are coming from the report of Phenomena.

The report addresses traffic noise from road, rail and aircraft. The TF-VS is in particular interested in the road traffic noise. This is reflected in the summary.

A literature study summarized the history of the regulatory tools as well as their development. It assessed the progress and efficiency of EU as well as national regulations and Noise Action Plans, which revealed the need for alignment of the various assessment methods and also improvement of the EU method – END/CNOSSOS – since the interpretation varies over member states. (§.2.2.2.2).

The literature study also looked at various abatement measures, whereas in particular the EU Commission (2011) “Report on the implementation of the Environmental Noise Directive in accordance with Article 11 of Directive 2002/49/EC” suggests that “EU ‘noise-at-source’ legislation provides the most effective combination of measures for reducing noise impact”, however the EEA report from 2020 suggests that combining solutions that affect source as well as the transfer through air will be the most cost efficient approach (§.2.2.3).

PHENOMENA recognizes/anticipates a gap between the END/CNOSSOS methodology and the TA test and real traffic noise. Since tyres that combine good safety and low noise exist, tighter limits and introduction of incentives targeting both OE as well as aftermarket tyres are expected to result in quieter tyres on the vehicle fleet. PHENOMENA recommends introducing a road surface indicator for noise and a corresponding label as well as guidelines on surface degradation and maintenance.

Regarding **road noise solutions** (§.2.3.1.), the consortium presented improvements on EU legislation for road vehicle noise limits, tyre noise limits, and road infrastructure. The main points for **road vehicle noise limit legislation** is that there is room for targeted **tightening of limits** for **louder vehicles** in order to affect Lden levels and L_{max} levels as well as **for powered two-wheelers** (PWT). Furthermore, it was suggested that the whole speed and rpm range must be covered to achieve reductions in real world noise exposure. Therefore, **the gap** between **real-world** noise, type tests and **noise mapping** must be addressed. Additionally, in synergy with the Green Deal, propulsion noise should be reduced since electrification does not occur as fast as foreseen (or does not have a fast enough effect) .

Regarding **tyre noise limits**, the consortium highlighted that there seems to be room for further noise reduction based on tyre label statistics. If this reduction is feasible, it would have an EU-wide benefit within several years. Moreover, the consortium also recommended providing more (financial) incentives in addition to tightening noise limits. Finally, better information on the tyre fleet and its full reduction potential should be provided to improve tyre-related policies.

Noise abatement scenarios have been defined (see table below). The baseline assumes no change or improvement of the vehicle fleet sound emission linked to the introduction of step 1 and 2 of the Vehicle Sound Emission Regulation, but a stable deterioration as a result of increased people and goods transport.

Scenario	Highly annoyed persons (%)	Highly sleep-disturbed persons (%)	DALYs (%)	Monetized health burden (method 1 / 2) (%)
A quiet roads	0.6	0.4	0.5	1.0 / 0.5
B quiet tyres	14.0	11.8	12.8	17.6 / 12.8
C vehicle limits	2.0	1.9	2.0	2.7 / 1.9
D electrification	1.5	1.5	1.5	2.1 / 1.5
E barriers	1.1	0.8	0.9	1.6 / 0.9
F speed restriction	10.5	8.9	9.6	13.3 / 9.6
G car-free zones	1.5	1.5	1.5	1.5 / 1.5
H quiet facades	3.1	2.8	3.0	3.8 / 2.9
I dwelling insulation	2.3	2.1	2.2	2.6 / 2.2
J reception limits	11.1	3.2	6.9	19.3 / 7.7
ABC combined	17.2	14.8	15.9	21.5 / 15.8
ABCD combined	19.2	16.7	17.9	24.0 / 17.8
FGHI combined	16.6	14.9	15.7	20.0 / 15.7

The Benefit-to-Cost Ratio (BCR) – the efficiency – of various measures and combinations of measures have been estimated with two methodologies, revealing that the more measures the better health improvement, however not consistently supported by the BCR. For example, only the EC 2019 Handbook for BCR, but not the HEIMSTA estimate positive BCR of the combined measures ABCD (source improvements) and none of the methodologies support FGHI (Traffic flow/access restrictions and building improvements).

PHENOMENA recommends the combination of assumingly individually independent measures ABCDFGHI, but not E (erection of noise barriers) since the efficiency can be low or the solution is impossible in city environments. However, the latter measure is popular in the national and local Noise Action Plans. On the other hand, the favourable BCR of scenario B is diluted by in the linear combination of scenarios by the much poorer BCR:s of the other scenarios.

An overview of recommendations as presented to the TF-VS embracing the scope of GRBP.

VEHICLE SOUND RECOMMENDATIONS (§.8.3.3. & §.2.3.1. & Annex 2 – Poll results):

- Reduced vehicle sound limits should focus on:
 - o Available space for new limits derived from type test databases;
 - o Available technical potential for further reduction;
 - o Potential of electric and hybrid vehicles; and
 - o Potential of the reduced tyre contribution, especially in combination with road surfaces.
- 1-2 dB beyond Phase 3 limits expected to be feasible, but also L_{WOT} besides L_{urban}
- The full speed/acceleration/rpm range must be covered to achieve reductions in real world noise exposure (gap between real noise, type test and mapping)
- In synergy with the Green Deal, propulsion noise should be reduced even if electrification is not as fast as foreseen
- More detailed analysis in parallel study on M and N category vehicle sound limits

TYRE ROLLING SOUND LIMITS RECOMMENDATIONS (§.8.3.2. & Annex 2 – Poll results):

- Further reduction from stage 2 limits in UN Regulation 117 and referred to by EU Regulation 2019/2144 regular review for potential reduction
- Better information on tyre fleet required, and full reduction potential
- Tyre limits also include aftermarket (replacement) tyres
- There seems to be room for further reduction based on the label statistics and research
- Besides tighter limits also incentives required (financial)
- Noise vs safety: take existing quiet tyres as a starting point
- Better models and test procedures for tyre noise required, include various road surfaces

ADDITIONAL POINTS FROM DISCUSSIONS IN THE TF-VS

Concerns were raised about the traffic noise model used for the CBA relied on an average estimation of the traffic flow – vehicle speeds, number of passages, etc.

The year-by-year introduction of new vehicles is considered in the study based on new vehicles sold. This could be more accurate when the annual mileage of the vehicles would be available.

REFERENCES

- [TFSL-03-04](#) (TNO): THE PHENOMENA PROJECT - Assessment of Potential Health Benefits of Noise Abatement Measures in the EU
- [TFSL-05-03](#) (EC DG/ENV.): Noise policy update & PHENOMENA
- - Official report: [Assessment of potential health benefits of noise abatement measures in the EU - Publications Office of the EU \(europa.eu\)](#)
- END/CNOSSOS Directive [2002/49/EC](#)
- WHO (2018) Environmental Noise Guidelines for the European Region. Regional Office for Europe. Available at: http://www.euro.who.int/__data/assets/pdf_file/0008/383921/noise-guidelines-eng.pdf
- WHO (2011) Burden of disease from environmental noise http://www.euro.who.int/__data/assets/pdf_file/0008/136466/e94888.pdf