The future of road noise policy in Europe

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Key messages:

- Over 1.6 million healthy years of life are lost each year due to noise pollution - the second biggest environmental disease burden in Europe after air pollution
- European noise levels far exceed those recommended by the WHO, with no significant progress made in the last 10 years and noise levels expected to increase
- Shifting focus from measures that mitigate excessive noise to those that prevent noise altogether, such as supporting sustainable modes of transport like walking and cycling, is crucial to realise the significant and long-term noise reduction that is necessary
- A noise reduction target of 3dB by 2032 would reduce by 2.4 million the number of chronic high annoyed people and by nearly 800,000 those who are high sleep deprived

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Executive summary

Over 1.6 million healthy years of life are lost each year due to ill health, disability or early death caused by traffic-related noise[1]. With more than 7 out of 10 Europeans living in cities and as hubs for road, rail, ports and air transport, cities have a central role in reducing noise pollution to improve quality of life for people. However, action is needed at the European level to support local efforts. To achieve this, the following measures for reducing noise pollution from roads – the main source of pollution - are crucial to tackling this growing public health concern:

- Revise European noise legislation to lower reporting thresholds
- Set a noise reduction target of 3dB by 2032 to reduce by 1⁄4 the number of chronic high annoyed and by 1⁄3 those chronic high sleep deprived
- Ensure better implementation and enforcement of the mapping and reporting requirements of the Environmental Noise Directive (END)
- Revise the recently adopted Alternative Vehicle Alerting System (AVAS) technology for electric vehicles with a view to avoid obsolete increases in noise emission
- Develop Green Public Procurement criteria for road surfaces with co-benefits for noise and air pollution
- Propose a regulation for road surface labelling highlighting the possible co-benefits for noise and air pollution
- Stimulate systematic renewal of tyres and road surfaces at the end of their service life with silent and sustainable alternatives, to speed-up benefits of noise reducing technologies
- Speed-up the designation of quiet areas in agglomerations
- Develop guidelines for the integration of local noise action plans into SUMPs
- Ensure that green recovery measures contribute to preventing and reducing noise pollution by promoting sustainable modes of transport

Introduction

Environmental noise in Europe leads to a disease burden that is second in magnitude only to that from air pollution. At least 113 million Europeans are exposed to harmful traffic-related noise above 55dB L_{den} (EU indicator that corresponds to the average noise level throughout the day, evening and night) costing the EU an estimated €57.1 billion each year[2].An additional 22 million people are exposed to harmful railway noise, 4 million to aircraft and almost 1 million to industrial noise. This exposure to noise pollution causes a disease burden resulting in over 1.6 million healthy years of life lost annually. It causes an estimated 12,000 premature deaths and contributes to 48,000 new cases of ischemic heart disease[3]. High levels of noise not only increase the risk of heart attacks but is also proven to cause tinnitus and learning disabilities among children. An estimated 22 million people suffer chronic high

[1] http://www.euro.who.int/__data/assets/pdf_file/0008/383921/noise-guidelines-eng.pdf
[2] Adding together road passenger and road freight costs, p.98: CE Delft Handbook on External Costs of Transport 2019; https://www.cedelft.eu/en/publications/download/2750
[3] https://www.eea.europa.eu/highlights/number-of-europeans-exposed-to

annoyance and 6.5 million people suffer chronic high sleep disturbance[4]. While these figures are already a cause for concern, they are likely an underestimate and expected to increase[5].

During the COVID-19 crisis, our cities have seen a huge and welcome reduction in noise pollution due to reduced road traffic, but this is temporary. The European Green Deal and post-COVID recovery provides opportunities for reflection at both local and European level on noise pollution policies across Europe and future opportunities for change. A target of improving acoustic quality by 3dB by 2032 – corresponding to mandatory Environment Noise Directive (END) reporting cycles and the end of the sixth reporting period – should be in line with the Commission's broader aims to protect the health and well-being of citizens. According to calculations made by EUROCITIES, this would prevent up to 2.4 million chronic high annoyed (-26%) and nearly 800,000 chronic high sleep disturbed (-32%) European adult citizens in agglomerations[6], dramatically reducing the significant and growing disease burden caused by noise pollution.

While noise pollution is a major problem caused by multiple sources including road, rail, aviation and industry, we mainly focus here on measures for reducing road noise, as it is by far the greatest cause of noise related disease burden in Europe.

Revise European noise legislation

Both the Environment Noise Directive (END) and the Seventh Environment Action Programme (7th EAP) aimed to significantly reduce noise pollution in Europe. Despite these ambitions, there has been no improvement in reducing harmful noise levels over the last 10 years. The WHO recommends reducing noise exposure to levels below those associated with adverse health effects, providing limits for road (53dB L_{den}, 45dB L_{night})[7], rail (54dB L_{den}, 44dB L_{night}), and aviation (45dB L_{den}, 40dB L_{night}), as well as conditional limits for wind turbines and leisure noise[8]. These WHO guidelines have been developed based on our growing understanding of the health impact of exposure to environmental noise and provide recommendations for protecting human health from exposure to environmental noise.

Based on these recommendations, the European Commission should:

- revise the END reporting threshold in accordance with WHO recommended noise limits

The WHO recommends that for road traffic we reduce noise pollution levels to 53dB during the daytime (L_{den}) and 45dB during the night (L_{night}). However, the END currently sets mandatory reporting for noise exposure at 55dB L_{den} and 50dB L_{night} and above, with reporting submitted in bands of 5dB. This means that we do not yet have an accurate understanding of the true number of people exposed to harmful noise levels as defined by the WHO[9]. New lower reporting bands should be established to

[4] http://www.euro.who.int/__data/assets/pdf_file/0008/383921/noise-guidelines-eng.pdf
[5] https://www.eea.europa.eu/publications/environmental-noise-in-europe
6 A reduction of 3 dB LDEN would avoid 2.4 million chronic high annoyed and nearly 0.8 million chronic high sleep disturbed European adults, calculated for EU27; Working Group Noise (Eurocities) estimations on reported EEA data, 2012 END report, END_DF4_DF8_Results_2012_190101.xls
[7] Lnight is the standard EU indicator that corresponds to the average noise level throughout the night
[8] https://www.euro.who.int/en/health-topics/environment-and-health/noise/publications/2018/environmental-noise-guidelines-for-the-european-region-2018
[9] Already at the current threshold limits, the EEA has found that we underestimate exposure rates as not all roads and areas are covered.

facilitate our understanding starting from 50dB L_{den} and 45dB L_{night}; this lower band would better account for the recommended limits set by the WHO for all sources, not just road.

- ensure noise pollution is calculated for all roads in agglomerations

The END requires member states to report data in agglomerations in relation to the population exposed to noise and 'major roads' with more than 3 million vehicle passages a year[10]. However, it seems data for minor roads is sometimes lacking. In the upcoming revision of annex II, the Commission must clarify that mapping applies to all roads. If only a subset of roads is mapped, we risk both underestimating population exposure to noise pollution and developing non-comparable datasets between countries as different types of roads are mapped. This must be addressed.

- differentiate population exposure between adults and children in the next END annex revisions

Current calculations for population exposure to noise pollution include one overall figure without giving details of how many adults or children are exposed. However, health impacts of noise exposure differ between adults and children[11]. In order to be able to compare datasets for population exposure to the corresponding health impacts, we must revise the END annex to provide this differentiated information.

- set a legally binding noise reduction target of 3dB by 2032 to reduce by ¼ the number of chronic high annoyed and by ⅓ those chronic high sleep deprived

The European Union far exceeds the safe noise levels as defined by the WHO with the latest EEA report showing that average road noise levels in excess of 70dB L_{den} affect an estimated 12 million people[12]. The number of people exposed is moreover expected to increase due to urban growth and increased demand for mobility[13]. A target of improving acoustic quality by 3dB by 2032 – in line with the mandatory Environment Noise Directive (END) reporting cycles and the end of the sixth reporting period – should be set in-line with the Commission's broader aims to protect the health and well-being of citizens. According to calculations made by EUROCITIES, this target would prevent up to 2.4 million chronic high annoyed (-26%) and nearly 800,000 chronic high sleep disturbed (-32%) European adult citizens in agglomerations[14], dramatically reducing the significant and growing disease burden caused by noise pollution.

This target should be binding for member states and set with the year 2012 as a reference baseline. It should be integrated into local level noise action plans to ensure that citizens see the real benefit of this reduction with additional capacity building and support provided, for example, through the Green City Accord[15]. The upcoming Eighth Environment Action Programme (8th EAP) should include this noise reduction target making the reduction of noise pollution across Europe a priority, while ensuring better implementation and enforcement of the END. This overall ambition should be defined and implemented in the upcoming Zero Pollution Strategy – which should include noise as a priority -

[10] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32002L0049&from=EN
[11] https://www.euro.who.int/__data/assets/pdf_file/0008/383921/noise-guidelines-eng.pdf
[12] https://www.eea.europa.eu/publications/environmental-noise-in-europe
[13] https://www.eea.europa.eu/publications/environmental-noise-in-europe
14 A reduction of 3 dB LDEN would avoid 2.4 million chronic high annoyed and nearly 0.8 million chronic high sleep disturbed European adults, calculated for EU27; Working Group Noise (Eurocities) estimations on reported EEA data, 2012 END report, END_DF4_DF8_Results_2012_190101.xls
[15] https://ec.europa.eu/environment/urban/green_city_accord.htm

providing an action plan to achieve this by tackling areas and populations affected by high levels of noise pollution.

Improve and reinforce implementation of the END

The 2016 REFIT evaluation of the END found that it has potential for EU added value, but delayed implementation of mapping requirements and subsequent action plans is preventing the realisation of this potential[16]. Moreover, as methods of calculating noise levels have changed, guidance is needed to interpret these changes. To ensure effective implementation of the END, the European Commission should:

- speed up and enforce implementation of the END mapping and action plan requirements

The latest report from the EEA found significant delays and the poor quality of action plans to suggest that "countries may not have taken the necessary steps to address noise pollution"[17]. Better implementation of the END, in particular to complete its data sets, is needed to protect the health of Europeans[18].

- provide guidance for the interpretation of data resulting from different noise-calculating methods

In 2015, an update to the END Annex II was published requiring all member states to use 'Common NOise aSSessment methOdS in the EU' (CNOSSOS-EU) from 31 December 2018 onwards[19]. The new methodology ensures that noise in each member state is measured in a harmonised way, providing a consistent and comparable picture of the acoustic situation in the EU. However, it means data gathered using this new method is not directly comparable with data gathered under the old methodology. It is vital, therefore, that clear analysis and guidelines are produced to ensure correct interpretation of the data resulting from past and future changing methods of calculation, including methods for estimating population exposure to noise. Without such guidance, we risk losing the link between these datasets and delaying further our full understanding of the health implications of noise pollution across Europe. Moreover, we will not be able to compare those datasets between 2012 and 2032, necessary for the monitoring of our proposed noise reduction target above.

Speed-up the designation of quiet areas in agglomerations

The END recognises the importance of preserving so-called quiet areas of good acoustic sound quality, leaving the definition of these areas open to member states. While a recent EEA survey of 21 countries found that 85% have developed criteria for designating quiet areas, such criteria vary hugely between

[16] https://ec.europa.eu/environment/noise/pdf/staff_working_doc_refit_evaluation_environmental_noise.pdf
[17] Action plans for the 2017 round of noise mapping in accordance with the END were to be concluded by 18 January 2019. However, as of April 2019, there were a significant number of countries — 14 in total — for which such plans were missing; https://www.eea.europa.eu/publications/environmental-noise-in-europe/at_download/file
[18] https://www.eea.europa.eu/publications/environmental-noise-in-europe
[19] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32015L0996&from=EN

member states. While some member states use the 7th EAP defined 'high' noise limit of 55dB Lden to designate quiet areas, others do not use acoustic criteria at all. The health and well-being impact of quiet areas on reduced annoyance and recovery times is well evidenced[20]. Indeed, cities are taking clear action to ensure spaces of good acoustic quality are preserved through parks, forests and public gardens; however, the lack of common definition of 'quiet area' and criteria is problematic. The European Commission should propose a common definition and improved guidance for their designation in agglomerations, including a selection of appropriate designation criteria. This should include the following:

- criteria should focus on accessibility as a core factor

While the integration of quiet areas with Natura 2000 areas should be encouraged, it is also important to prioritise more immediate access to quiet, green and blue areas for citizens within cities. The COVID-19 crisis in particular highlights the importance of walkable access for the health and well-being of all[21].

- criteria that reflects the differing impacts of noise from a range of sources

Criteria for quiet areas should address the need to differentiate limit values to reflect the fact that people are more annoyed and sleep disturbed by aircraft noise than by road and rail noise at the same decibel level[22].

Improve efforts to reduce noise pollution at source

A package of new standards and regulations for noise reduction at source is urgently needed to reach a target of reduction of 3dB by 2032, including for quieter and cleaner vehicles, tyres and road surfaces to be included as part of the Strategy for Sustainable and Smart Mobility. This package should include:

- a revision of the recently adopted AVAS technology for electronic vehicles

The EEA suggests that the increasing trend of electric vehicles (EVs) is one among several societal changes that could lead to reduced noise. This benefit should be considered carefully, however. For light motor vehicles, when travelling at speeds below 30 km/h, the noise generated by the engine tends to be the dominant source (while at speeds above this, the noise generated by the tyres in combination with the road becomes the dominant source)[23]. The recently adopted regulations concerning the Acoustic Vehicle Alerting System (AVAS) technology for EVs mandates noise levels up to and including those of internal combustion engines (ICEs) for the speed ranging from start up to 20 km/h[24]. This suggests that the transition to EVs will not automatically result in a reduced impact of noise exposure on communities. The Commission should consider revising this regulation to consider the safety standards required for vulnerable users with a view to avoiding obsolete increases in noise

[20] https://www.eea.europa.eu/publications/good-practice-guide-on-quiet-areas
[21] The EEA found that in most cities, between 65%-85% of the population have no access to potential quiet areas of green/blue land cover within a 10-minute walk; https://www.eea.europa.eu/highlights/number-of-europeans-exposed-to
[22] This should of course also be a consideration for Noise Action Plans in general: https://www.eea.europa.eu/publications/quiet-areas-in-europe/at_download/file
[23] https://www.cedelft.eu/en/publications/download/571
[24] https://eur-lex.europa.eu/eli/reg_del/2017/1576/oj

emissions. Such a revision is essential to fully capture the potential of this low-hanging fruit and fully exploit the possible co-benefits EVs present in tackling air and noise pollution at source.

- Green Public Procurement criteria for road surfaces with co-benefits for noise and air pollution

Research and innovation practices show promising results in designing road surfaces that provide co-benefits for reducing noise and air pollution, while helping reduce waste through the reuse of asphalt, rubber, fibres and polymers[25]. Indeed, the EEA highlights that co-benefit estimations for mitigation measures can be more favourable if the positive impacts of addressing both air quality and noise are taken into account. We call on the European Commission to develop Green Public Procurement criteria for road surfaces promoting the highest co-benefits. Such guidelines would not only help our cities to choose more environmentally friendly road surfaces but would also help stimulate the market for more sustainable and environmentally friendly road surface products.

- A proposal for a regulation for road surface labelling highlighting the possible co-benefits for noise and air pollution

In addition, the Commission should propose a regulation on road surface labelling focused on road surfaces with good air and noise pollution qualities[26]. Such a regulation in combination with guidelines for Green Public Procurement would help truly optimise noise reduction through tyre-road interaction, which could result in up to 9 dB noise reduction[27].

- Systematic renewal of tyre and road surfaces to speed-up benefits of noise reducing technologies

Our cities are developing ambitious roadmaps for reducing noise between tyres and road; support for a systematic renewal of tyres and road surfaces at the end of their service life with silent and sustainable alternatives would improve the acoustic performance of existing vehicles while also benefiting the introduction of lower emission vehicles. Furthermore, member states should be encouraged to adopt relevant existing Green Public Procurement criteria through their National Green Public Procurement Action Plans.

Develop guidelines for the integration of Noise Action Plans into SUMPs

Reducing noise from source (i.e. from tyres, engines or road surfaces) is fundamental to preventing excessive noise pollution in cities and has a vital role in a coherent European strategy to reduce noise pollution. However, to achieve the significant noise reductions needed in line with the WHO recommendations, we must move beyond prevention measures to look at those that mitigate noise pollution altogether. We must consider alternative modes of transport that would have a much lower

[25] TyRec4LIFE LIFE10 ENV/IT/000390, LIFE- SOUNDLESS LIFE14 ENV/ES/000708, NEREiDE LIFE15 ENV/IT/000268;
CEDR Technical Report 2017-01
EAPA position statement on the use of secondary materials, by-products and waste in asphalt mixtures

[26] See for example:
https://workinggroupnoise.files.wordpress.com/2013/03/leafletlayout_v2_simplecover_final.pdf; https://uk-air.defra.gov.uk/assets/documents/reports/cat09/1907101151_20190709_Non_Exhaust_Emissions_typeset_Final.pdf; https://www.eea.europa.eu/themes/transport/speed-limits-fuel-consumption-and/speed-limits

[27] https://www.unece.org/fileadmin/DAM/trans/doc/2017/wp29grb/GRB-65-22e-Add.1.pdf

impact on both noise and air pollution. Yet managing and reducing noise through land use and urban planning remains a very small percentage of the measures member states employ to reduce noise pollution[28].

We need a fundamental shift in the manner in which Europe – the EU institutions, national governments and cities together - address noise pollution. In particular, local Noise Action Plans – including plans for the designation of quiet areas - should actively be encouraged to be integrated into Sustainable Urban Mobility Plans (SUMPs) and specific guidance for such integration provided by the European Commission.

While Europe's main observatory on urban mobility, ELTIS, has recently released guidelines on linking transport and health in Sustainable Urban Mobility Plans (SUMPs), these guidelines are don't include noise pollution and don't mention the WHO's recommended noise levels. Indeed, the WHO strongly recommends reducing noise both at source and *on the route between source and the affected population by changes in infrastructure*. The European Commission should make it a priority to focus on encouraging greater use of sustainable modes of transport as a key measure to reduce noise pollution. This should involve the development of guidelines specifically for the integration of local Noise Action Plans into SUMPs as a means to reduce noise pollution through urban planning. Such guidelines should make reference to the following:

- reduce speed to reduce noise and air pollution

The Common Noise Assessment Methods in Europe highlight that a reduction in noise emission from engines – both ICE and EV - will not be enough to significantly reduce noise in cities because rolling noise will continue to play a dominant role at average speeds reached on main urban roads, during the day and at night[29]. However, reducing speeds by 10 km/h in urban areas could cut noise levels by 2-3dB[30]. At the same time, reducing speed brings a range of additional benefits[31]. Findings from the EEA show that reducing speed can drastically reduce the production of the most dangerous NOX pollutants in diesel cars, and lead to a significant drop in fuel consumption ranging from 12% - 18%[32]. According to the European Transport Safety Council, reducing speed by even just 1km/h would save 2,100 lives a year[33]. In addition to reducing the real-term dangers, reducing vehicle speed can also reduce the perceived threat that would-be cyclists feel[34]. Reducing speed should therefore be encouraged to increase the uptake of more sustainable modes of transport, which in itself would further reduce noise pollution.

[28] https://www.eea.europa.eu/publications/quiet-areas-in-europe
[29] Directive 2002/49/EC, Annex II
[30] http://www.ukna.org.uk/uploads/4/1/4/5/41458009/speed_and_road_traffic_noise.pdf;
see also: https://www.sciencedirect.com/science/article/pii/S0048969714001934
see also: https://www.dora.lib4ri.ch/empa/islandora/object/empa%3A13382/datastream/PDF2/Heutschi-2016-Options_for_reducing_noise_from-%28accepted_version%29.pdf
[31] NICE suggests reducing speed to 20mph, or the equivalent of 30km/h: https://ecf.com/news-and-events/news/nice-recommends-speed-limits-20mph-improve-air-quality
[32] https://www.eea.europa.eu/themes/transport/speed-limits-fuel-consumption-and/speed-limits
[33] https://etsc.eu/reducing-speeding-in-europe-pin-flash-36/
[34] https://ecf.com/what-we-do/road-safety/reducing-vehicle-speeds

- consider and mitigate secondary effects of policies for noise reduction through SUMPs

A growing number of cities are making the decision to pedestrianise parts of their city centres for better quality of life for people. This trend is vital to reducing air and noise pollution caused by transport and creating quiet areas. However, this can have the unintended consequence of increasing noise pollution from other sources. Increased economic activities in pedestrianised areas, such as restaurants, cafes and concerts venues, can lead to high levels of annoyance and sleep deprivation. The WHO guidelines are clear that overall reduction of exposure from all noise sources should be promoted[35]. It is vital therefore that this is included within the Commission's guidelines and taken into consideration when planning pedestrianised areas with appropriate mitigation and adaptation measures implemented.

Green recovery should reduce noise pollution by promoting sustainable modes of transport

Our cities have witnessed a welcome period of unusual quiet throughout the confinement periods due to the pandemic, but noise pollution is already rising again and in some cases even worse than the pre-crisis levels. Many of our cities are leading the way by adopting new measures[36] where they aim to capitalise on the temporary surge in the number of people cycling and walking, however, preliminary research suggests that a rebound effect could see a dramatic increase in the volume of cars in our post COVID cities[37]. We need collaboration between cities, regions, national governments and the European Union to effect long term significant change. As the European Union considers how best to help the economy recover, the 'Do No Harm' principle must be at the heart of all decisions. We have a key opportunity to boost the transition towards healthier transport options; to tackle this growing public health concern caused by harmful, underestimated and growing noise pollution.

A post-crisis green recovery must address the serious health implications of traffic-related noise pollution. The next Multiannual Financial Framework (MFF) and the Next Generation EU recovery facility should provide support for significant investment in public transport, clean and healthy mobility through:

- research and innovation to support and strengthen SUMPs

Support from national and EU levels for funding, best practice sharing, and regulatory frameworks is vital to continue advancing the progress already made at the local level to strengthen the impact of SUMPs. This support is essential to improve urban planning for alternative transport modes, preventing noise and air pollution-intensive options altogether. The development of national frameworks that reinforce governance and legal dimensions of SUMPs improve the integration between local, regional and national administrative levels to avoid fragmentation. Research and innovation (R&I) are enabling factors for sustainable modal shift. EU funding should ensure the replication of innovation between cities, bring new enabling technologies to the market and

[35] p. 105; http://www.euro.who.int/__data/assets/pdf_file/0008/383921/noise-guidelines-eng.pdf
[36] By repurposing streets 'for the people' creating the largest car-free zones in Europe and expanding city-wide cycling and walking infrastructure https://www.euractiv.com/section/economy-jobs/opinion/reclaiming-the-future-for-cities-after-covid-19/
[37] https://www.itf-oecd.org/sites/default/files/respacing-cities-resilience-covid-19.pdf

strengthen the implementation of sustainable urban mobility policies. This can be enhanced with an appropriate orientation of Cohesion Policy, which recognises the key role that urban mobility must play in sustainable development across the EU[38].

- a grant scheme to support cities in achieving targets in the Clean Vehicles Directive for zero emission vehicles

Under the European Structural and Investment Funds (ESIF) and Connecting Europe Facility (CEF) frameworks, a grant scheme should be introduced to support cities to achieve and ideally go beyond the targets set in the Clean Vehicles Directive for zero emission buses, refuse collection trucks, municipal vans, and install the required infrastructure. These zero emission vehicles would help quickly reduce noise and air pollution levels in cities.

- a grant scheme to support permanent cycling and walking infrastructure

A grant-based funding system should be made available immediately so that cities can construct permanent safe cycling infrastructure and widen footpaths as soon as possible. The EU recovery package should also boost cycling and the availability of public eBike fleets in Europe with a multi-billion euro investment commitment[39].

The European Commission, national governments and cities must use this recovery funding to kick-start the transition towards healthier and sustainable modes of transport in city planning while boosting economic growth[40].

[38] http://nws.eurocities.eu/MediaShell/media/EUROCITIES_The_path_to_sustainable_urban_mobility_FINAL.pdf

[39] http://nws.eurocities.eu/MediaShell/media/2020_05_22_EU_Recovery_Package_letter__with_logos_.pdf

[40] https://www.smithschool.ox.ac.uk/publications/wpapers/workingpaper20-02.pdf