

Planning for Citizens' Health: Towards an Integrated Approach to Air and Noise Pollution in the EU

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Planning for Citizens' Health: Towards an Integrated Approach to Air and Noise Pollution in the EU

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Abstract:

The outbreak of Covid-19 Pandemic has unfolded the close relationship between good environmental quality in urban areas and public health. The abrupt closure of economic activities through lockdown measures have shown how the concentration of air pollutants and noise from different sources are long-standing, major environmental and health issues in the European Union, especially in highly populated urban areas. Scientific evidence underscores that simultaneous exposure to air pollutants and noise constitutes a mutually reinforcing threat to human health. However, the current regulatory approaches in the European legislation still fall short in addressing the issues of air and noise pollution in a comprehensive and coordinated manner. The lack of harmonized and effective planning regime for air and noise pollution runs against the objectives pursued by the European Green Deal, whereas an effective and integrated response to environmental issues should underpin EU policies in the post Covid-19 recovery. This contribution thus analyzes two key EU legal regimes addressing air and noise pollution, namely Directive 2008/50/EC and Directive 2002/49/EC, respectively, to appraise their mutual pitfalls against the said need to adopt an integrated response to air and noise pollution. Moreover, the paper sheds further light on innovative approaches, such as integrated urban planning, citizen science and Internet of Things as key means to enhance cities' resilience and support the implementation of effective legal responses to air and noise pollution.

1. Introduction

The abrupt lockdown measures adopted in all city centres due to COVID-19 have generated a surge in public awareness about air and noise quality, shaking off the musty image of air and noise quality law as the domain of technocratic assessment and practice. Lockdown measures resulted in a temporary but substantial reduction of (road) transport, aviation and international shipping. Accordingly, also emissions of air pollutants and noise pollution significantly

decreased.¹ Likewise, the increased attention for indoor ventilation has increased awareness towards the achievement of health environment.

Moreover, measures specifically aimed to decrease emissions of air pollutants may prevent the development of severe cases of COVID-19. Preliminary studies suggest that people who live in areas with poor outdoor air quality suffer from higher exposure to and mortality from COVID-19.² Hence for example, the increased use of bicycles and “light mobility” instead of combustion engine vehicles not only decreases the level of air pollutants and noise pollution, but also promotes a healthy lifestyle thus reducing individuals chances of experiencing serious complications when infected with the coronavirus.³ Additionally, the COVID-19 pandemic has made it abundantly clear that the quality of both ambient air and noise is not only of a problem of public health but also of social inequality as research has found links between poor air quality and deprived socioeconomic communities.⁴ In Europe, roughly 5 million years of life lost per year are attributable to PM_{2.5} and NO₂, while 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.⁵

With regard to both air and noise pollution, road traffic both inside and outside agglomerations, remains the most dominant source affecting human exposure. As for air pollution, road transport accounts for 39% of NO_x emissions and 11% of PM_{2.5} emissions.⁶ As for noise pollution, it accounts for an estimated total (inside and outside agglomerations) of around 100 million people (nearly 70 million inside and 30 million outside agglomerations) being exposed to road traffic noise above 55 decibels (dB).⁷ Exceedance of safe noise levels as defined by the World Health Organisation (WHO) is a major problem in the European Union as according to

¹ *European Environment Agency*, Air quality in Europe – 2020 report, p. 28. On noise exposure, see also *F. Aletta et al.*, Assessing the Changing Urban Sound Environment During the Covid-19 Lockdown Period Using Short-Term Acoustic Measurements, (2020) Noise Mapping 7:123, 123-134. Other studies have been conducted on municipal areas within and outside Europe: See, among others, *C. Asensio et al.*, Changes in noise levels in the city of Madrid during Covid-19 lockdown in 2020, (2020) The Journal of the Acoustical Society of America 148, 1748.

² *Xiao Wu et al.*, ‘Exposure to Air Pollution and COVID-19 Mortality in the United States: A Nationwide Cross-sectional Study’ (medRxiv preprint, 27 April 2020) doi: 10.1101/2020.04.05.20054502> (as quoted in *E. Scotford*, Rethinking Clear Air: Air Quality Law and Covid-19, 2020 Journal of Environmental Law, pp. 1-5).

³ One risk factor linked with severe COVID-19 manifestations is obesity. The promotion of a healthy lifestyle in form of discouraging the use of (fossil fuel) vehicles may have a preventive effect on obesity. See, among others, *M. Gao, C. Piernas, N. Astbury et al.*, ‘Associations between body-mass index and COVID-19 severity in 6.9 million people in England: a prospective, community-based, cohort study’, *Lancet Diabetes & Endocrinology* 2021 (9), pp. 350-359.

⁴ See *S. Dreger et al.*, Social Inequalities in Environmental Noise Exposure: A Review of Evidence in the WHO European Region, (2019) 16 International Journal of Environmental Research and Public Health, 1011 ff.

⁵ *European Environment Agency*, *supra* note 1 at p. 107.

⁶ *European Environment Agency*, *supra* note 1 at p. 36.

⁷ *European Environmental Agency*, Environmental Noise in Europe, 2020, 15.

the European Environmental Agency (EEA) average road noise levels affect an estimated 12 million people.⁸ Long-term exposure to day evening night traffic noise levels of at least 55 dB affects an estimated 113 million Europeans.⁹ Long-term exposure to environmental noise causes 12,000 premature deaths and contributes to 48,000 new cases of ischaemic heart disease in Europe each year.¹⁰ It is also estimated that 22 million people experience chronic high annoyance and 6.5 million experience chronic high sleep disturbance.¹¹ According to a recent study by Eurocities, more stringent targets to reduce noise pollution would prevent up to 2.4 million chronic high annoyed (-26%) European adult citizens in agglomerations.¹²

The health impact of air pollution is well documented. The broad spectrum of adverse effects of air pollutants to public health should be imagined by analogy with the healthy food pyramid, where the most dramatic but less frequent outcome – premature death – is located at the top of the pyramid, while other less severe but more common health outcomes are located at the bottom of the pyramid. In the EU, the EEA estimated that in 2016, 437,000 premature deaths were attributable to PM_{2.5} while another 55,000 premature deaths were caused by NO₂.¹³ Furthermore, air pollutants have been associated with various cardiovascular diseases such as myocardial infarction, stroke, arrhythmia and hearth failure exacerbation and increased blood pressure¹⁴ and respiratory diseases including chronic obstructive pulmonary disease (COPD), aggravation of allergies, asthma and lung cancer.¹⁵

As the global fight against Covid-19 rages on, some survey already shows potential rebound effects of the Pandemic as to the increase of urban traffic when returning to pre-Covid-19 activities.¹⁶ According to recent surveys from China, the post-confinement use of public transport has decreased substantially, while car travel has risen quickly to equal and surpass

⁸ *European Environmental Agency*, The European environment – state and outlook 2020: Knowledge for transition to a sustainable Europe, Luxembourg, 2019, 257.

⁹ *Id.* Furthermore, 22 million Europeans are subjected to high levels of noise from railways, 4 million to high levels of aircraft noise, and fewer than 1 million to high levels of noise from industries.

¹⁰ *European Environmental Agency*, *supra* note 5, at 45.

¹¹ *Ibid.*

¹² *Eurocities*, The future of road noise policy in Europe, September 2020. Available at the following link: https://eurocities.eu/wpcontent/uploads/2020/09/EUROCITIES_statement_noise_policy_in_Europe_2020.pdf

¹³ *European Environment Agency*, *supra* note 1, at p. 4.

¹⁴ *R. Brook et al.*, Particulate Matter Air Pollution and Cardiovascular Disease. An update to the Scientific Statement from the American Heart Association, 2004, 2331-2378.

¹⁵ *A. Faustini et al.*, Air pollution and multiple acute respiratory outcomes, *European Respiratory Journal* 2013 p. 304; *X. Jiang*, Air pollution and chronic airway diseases: what should people know and do?, *Journal of Thoracic Disease* 2016, at p. 31.

¹⁶ See *Air Quality Consultants Ltd.*, Covid-19, Air Quality and Mobility Policies: Potential Rebound Effects, London October 2020, available at the following link: <https://www.transportenvironment.org/sites/te/files/J4178%20Covid19%20rebound%20traffic%20analysis%20FINAL.pdf>. Accordingly, such “rebound” effects can have significant impacts on the emissions of NO_x and PM_{2.5}, where it is unlikely that such impacts will be spread evenly across cities.

pre-Covid levels in large cities once travel restrictions were lifted.¹⁷ Amidst this context, as demonstrated by several studies, general indices of deprivation and less advantageous socio-economic conditions are associated with higher environmental noise exposure.¹⁸

Whilst the two existing EU legal regimes mandating for air quality and acoustic planning largely operate in silos, the European Commission has recognised the importance of an effective and comprehensive response to air and noise pollution. The cornerstone of such paradigm shift can be found in the 2021 Net-zero pollution Action Plan. The Net-zero pollution Action Plan has been adopted to implement the European Green Deal's objectives.¹⁹ Among the key targets adopted by the Commission under the Action Plan, it is envisaged to reduce by 2030:

- The health impacts (premature deaths) of air pollution by more than 55%;
- The share of people chronically disturbed by transport noise by 30%.²⁰

To this end, the Commission envisages to address air and noise pollution from transport while better tackling noise at source, notably by securing proper implementation on the ground and improving the EU regulatory framework on traffic noise.²¹ More generally, however, a rethinking of the approach to fight noise and air pollution requires a substantial modification not only of the relevant legal frameworks, but a radical change as to the programmatic approach that underpins the response to such threats. This contribution looks into such direction by analysing the legal regimes addressing air pollutants and noise exposure in the EU, the Ambient Air Quality Directive (AAQD) and the Environmental Noise Directive (END) in order to pinpoint their pitfalls against an affective and coordinated response to air and noise pollution in urban areas. The legal analysis of the AAQD and the END will focus on the following criteria: a) the conceptual approach to air pollutants and noise levels as relevant environmental pressures; b) the material scope of application of the planning regimes for air and noise pollution; c) the presence or lack of coordination provisions between the regimes for air and noise pollution.

The contribution is structured as follows. Section 2 analyses the AAQD with a focus on the planning requirements and obligations. Section 3 purports the same aim with a focus on the

¹⁷ International Transport Forum, Covid-19 Transport Brief: Re-spacing Our Cities for Resilience, 3 May 2020. Available at this link: <https://www.itf-oecd.org/sites/default/files/respacing-cities-resilience-covid-19.pdf>.

¹⁸ *S. Dreger et al.*, supra note 2.

¹⁹ Commission Communication COM(2021) 400 final, Pathway to a Healthy Planet for All – EU Action Plan: Towards Zero Pollution for Air, Water and Soil.

²⁰ *Id.*, at 3.

²¹ *Id.*, at 5. In particular, the Commission stresses the intention to “review progress in 2022 and consider whether there is a need to set noise reduction targets at EU level” under the Environmental Noise Directive (see also Section 3 below).

END. Both sections specifically focus on road traffic as a major common source of pollution in urban areas. Section 4 dissects the differences between the AAQD and END regimes, paving the way to a more integrated planning regime to address both pollution sources. Section 5 provides an overview of existing solutions and initiatives directed to enhance protection against air pollutants and noise, which deserve further attention in the context of the Covid-19 recovery. Section 6 concludes.

2 *Ambient Air Quality Directive*

The cornerstone of the EU's air quality legislation is the Ambient Air Quality Directive 2008/50/EC (AAQD).²² This Directive defines and establishes objectives for ambient air quality designed to avoid, prevent and reduce harmful effects on human health and the environment as a whole.²³ For the purpose of protecting public health, several types of quality objectives can be distinguished: limit values, target values and alert thresholds. Limit values are the most stringent quality objectives and can be defined as levels of pollution which have to be attained within a given period and not to be exceeded once attained.²⁴ Target values have to be attained "where possible" over a given period by all necessary measures "not entailing disproportionate costs".²⁵ Alert thresholds are the levels beyond which there is a risk to human health from brief exposure for the population as a whole and which obliges the Member States to immediately take action.²⁶

In order to achieve compliance with these air quality objectives, the Directive sets up a common system to assess and manage air quality. Member States shall establish zones and agglomerations throughout their territory.²⁷ Additionally, the Directive provides that limit values shall be respected in each zone,²⁸ which exceptions can be invoked by the Member States to justify exceedances of the limit values,²⁹ whether modelling techniques suffice in order to assess air quality or in accordance with which criteria sampling points should be located in case fixed measurements shall be used, etc.³⁰

²² Directive 2008/50/EC on ambient air quality and cleaner air for Europe, OJ 2008, L 152/1.

²³ Article 1 AAQD.

²⁴ Article 2 (5) AAQD.

²⁵ Article 2 (9) AAQD.

²⁶ Article 2 (10) AAQD.

²⁷ Article 4 Directive AAQD. In each zone air quality shall be assessed and managed in accordance with the provisions found in chapter II and III and the different annexes of the AAQD.

²⁸ Article 12 AAQD.

²⁹ Article 20-22 AAQD.

³⁰ Article 5-6 AAQD.

The AAQD distinguishes two types of plans: Air quality plans (article 23), and short-term action plans (article 24).

Air quality plans must be adopted in case of exceedance in a zone or agglomeration of any limit or target value, plus any relevant margin of tolerance in each case. Member States shall ensure that air quality plans are established for those zones and agglomerations in order to achieve the related limit or target value. Air quality plans shall set out appropriate measures, so that the exceedance period can be kept “as short as possible”.³¹ Such plans may include specific measures aiming at the protection of sensitive population groups, including children, also in the short-term.³² Accordingly, the plan “may” include, depending on the individual case, effective measures to control and, where necessary, suspend activities which contribute to the risk of the respective limit values, target values or alert thresholds being exceeded. Those action plans may include measures in relation to motor-vehicle traffic, construction works, ships at berth, and the use of industrial plants or products and domestic heating. Finally, the legislator has listed out two situations where integrated plans can be useful. First, where air quality plans must be prepared or implemented in respect of several pollutants, Member States shall prepare integrated air quality plans covering all pollutants concerned. Second, consistency with other plans under Directive 2001/80/EC on the limitation of emissions of certain pollutants from large combustion plants, Directive 2001/81/EC on national emission ceilings for certain atmospheric pollutants³³ and, importantly, with the Environmental Noise Directive (Directive 2002/49/EC) shall be ensured “to the extent feasible”.

Short-term action plans must be drawn when there is the mere risk of exceeding one or more of the alert thresholds, to reduce the risk or duration of such an exceedance. However, with regard to the alert threshold for ozone, Member States shall only draw up short-term action plans when in their opinion there is a significant potential, taking into account national geographical, meteorological and economic conditions, to reduce the risk, duration or severity of such an exceedance. In the short-term plans, specific actions aiming at the protection of sensitive population groups, including children, may be considered. Finally, Member States must share the results of their investigations on the feasibility and the content of short-term

³¹ For a discussion of this concept, see *L. Krämer*, 480.000 Dead per Year are Enough: the CJEU Opens a New Way to Better Enforce Air Quality Law, *JEEPL* 2018 (15), pp. 111–121.

³² Section A of Annex XV AAQD details the information that must be included in the plan. This includes for example information on the location of excess pollution, the nature and origin of pollution, details of the measures adopted to reducing the pollution, a timetable for implementation, and estimate of the improvement of air quality planned and of the expected time required to attain these objectives.

³³ Repealed by Directive (EU) 2016/2284.

action plans, as well as information on the implementation of these plans with appropriate organisations, other relevant health-care bodies and the relevant industrial federations.

As with other pieces of environmental legislation, the AAQD is not devoid of implementation and enforcement issues. Since its adoption and up until today, most Member States have encountered difficulties to comply with the limit values set in the Directive. Hence, the Commission was forced to launch infringement proceedings against most Member States³⁴, resulting in a judgment by the Court of Justice.³⁵ At the time of submission of this contribution, open infringement proceedings against Slovakia, France and Greece can be reported.³⁶

Moreover, strategic litigation started by citizens and NGO's in national courts has been an essential driver to flesh out the provisions of the AAQD, as some of these cases have prompted judges to request a preliminary ruling by the Court of Justice. As a result, the Court of Justice has built an important body of case law in which the legal boundaries of the AAQD are further elaborated. As MISONNE observed: "Decisive advances ... would never have been achieved without the decision of a few citizens and associations to test the essentials of what the directive was actually capable of embracing and triggering".³⁷

A first landmark case was *Janecek*, in which the Court ruled that where there is a risk that the limit values or alert thresholds may be exceeded, persons directly concerned must be in a position to require the competent national authorities to draw up an action plan.³⁸ However, the Court also added that Member States enjoy a large amount of discretion since they are only obliged to take such measures as are capable of reducing to a minimum the risk that the values or alert thresholds may be exceeded and of ensuring a gradual return to a level below those values or thresholds, taking into account the factual circumstances and all opposing interests. As a result, the Court of Justice has recognized article 13 and 23 of the AAQD as obligations of result, which can be relied upon directly in national courts. In effect, individuals have been granted the right to breathe air which does not exceed the limit values, and the right to have an air quality plan drawn up by the competent authorities.

³⁴ In April 2018, 16 Member States were subject to infringement proceedings for PM₁₀, 13 for NO₂ and 1 for SO₂, and two for non-compliance of air pollution monitoring requirements. For an overview see Annex III of European Court of Auditors, Air pollution: Our health still insufficiently protected, Special Report NO 23, 2018.

³⁵ Examples of recent cases include: Case C-664/18, *European Commission v United Kingdom of Great Britain and Northern Ireland* [2021], ECLI:EU:C:2021:171; C-644/18, *Commission v Italy* [2020], ECLI:EU:2020:895; C-638/18, *Commission v Romania* [2020], ECLI:EU:C:2020:334.

³⁶ Case C-342/21, *Commission v. Slovakia*; Case C-286/21, *Commission v France*; Case C-70/21, *Commission v Greece*.

³⁷ D. Misonne, The emergence of a right to clean air: Transforming European Union law through litigation and citizen science, RECIEL 2021 30(1), 36.

³⁸ Case C-237/07, *Janecek* [2008] ECR I-6221.

Yet notably, the discretion of decision-makers bears flexible limits as highlighted by the CJEU. In *ClientEarth*, the Court stated that merely adopting “a” plan is not enough: plans should be “appropriate and effective”.³⁹ Member States shall also proceed with caution when the rules on free movement come into play, as proven by *Commission v Austria*. In this case, the prohibition for lorries of over 7.5 tonnes carrying certain goods from using a section of the A 12 motorway in the Inn Valley was at stake. This prohibition was introduced with a view of reducing transport emissions, but the Court ruled that such sectoral measures must comply with the rules on free movement. In this case, Austria breached the rules on the free movement of goods by introducing a traffic ban.⁴⁰ In *Commission v Italy*, the Court once again held that the duty to comply with limit values is an obligation of result. It is irrelevant whether the failure to fulfil obligations is the result of intention or negligence on the part of the Member State, or of technical difficulties it encountered.⁴¹ Recently, in another case between the Commission and Italy, the Court also emphasized that the discretion of the Member State to not only adopt but also implement appropriate measures is limited by the requirement of keeping the period of exceedance “as short as possible”.⁴² With regard to the meaning of this concept, little guidance is provided by the Court of Justice. In any case, it is clear that this requirement is assessed in a case-by-case basis. Additionally, in *Commission v Bulgaria*, exceedances of limit values for several years which were “systemic and persistent”, were considered in itself as a failure to comply with the obligation to implement appropriate measures to keep the period of exceedance as short as possible.⁴³ Exceeding the limit values over longer periods of time, also provides strong evidence that the Member State has not limited the exceedance to a period that is as short as possible, the Court ruled in *Commission v Poland*. The duration of the future estimated exceedance can also be considered when assessing air quality plans.⁴⁴ In a case between the Commission and Italy, adopting an air quality plan ten years after the detection of exceedances of the daily limit value for PM10, not including a deadline for attaining the objectives in a plan, or setting out a time frame for implementation that may last for several years or even two decades after the entry into force of a limit value, were all indications that led the Court of Justice to conclude that Italy did not keep the exceedance of limit values as short as possible.⁴⁵

³⁹ Case C-404/13, *ClientEarth* [2014] ECLI:EU:C:2014:2382.

⁴⁰ Case C-28/09, *European Commission v Republic of Austria* [2011] ECR I-13525.

⁴¹ Case C-68/11, *Commission v Italy* [2012] ECLI:EU:C:2012:815.

⁴² Case C-644/18, *Commission v Italy* [2020] ECLI:EU:C:2020:895, para. 50.

⁴³ Case C-488/15, *Commission v Bulgaria* [2017] ECLI:EU:C:2017:267, para. 115 to 117.

⁴⁴ Case C-336/16, *Commission v Poland* [2018] ECLI:EU:C:2018:94, para. 99.

⁴⁵ Case C-644/18, *Commission v Italy* [2020] ECLI:EU:C:2020:895, para 138 to 145.

Moreover, the issue as to citizens participation in the development and implementation of air quality plans is of utmost importance. The Court of Justice has recognized the role of citizens in the enforcement of the provisions on assessment and management of air quality in the *Craeynest* case.⁴⁶ Accordingly, a national judge hearing an application from individuals that are directly affected by the exceedance of limit values has to verify whether the sampling points located in a zone have been established in accordance with the criteria found in the Annex of the Directive. In case they were not, the national judge must take “all necessary measures” to ensure compliance. Last, in *Deutsche Umwelthilfe*, the question whether coercive detention shall be imposed on political representatives in case of non-compliance with the provisions of the AAQD.⁴⁷ The court ruled affirmatively by stating that where a national authority persistently refuses to comply with a judicial decision enjoining it to perform a clear, precise and unconditional obligation flowing from the AAQD, the national court having jurisdiction shall order the coercive detention of office holders where provisions of domestic law contain a legal basis for such detention where this provision is sufficiently accessible, precise and foreseeable in its application. However, where no such basis exists in domestic law, EU law does not empower that court to have recourse to such a measure.

3 *Environmental Noise Directive*

The *Environmental Noise Directive* (END) is the main EU legal instruments directly addressing noise pollution and directing Member States’ action to duly manage exposure to environmental noise, with particular focus on built-up areas.⁴⁸ For the purposes of the END environmental noise comprises all noise generated by human activities, including that generated by road, rail and air traffic.⁴⁹ To this end, the END pursues a threefold aim:

- a) To map and detect the sources of environmental noise and the exposure thereto through noise mapping, by common methods of assessment across Member States;
- b) To enhance information about the state of environmental noise available to the public;

⁴⁶ Case C-723/17, *Craeynest* [2019] ECLI:EU:C:2019:533. On this judgement: *K. Pedrosa*, The Decentralised Enforcement of the Provisions on Measurement and Assessment of Air Quality under Directive 2008/50/EC. Comment on CJEU Case C-723/17 of 26 June 2019, *Craeynest*, *JEEPL* 2020 (2), pp. 247-261; *U. Taddei*, Case C-723/17 *Craeynest*: New Developments for the Right to Clean Air in the EU, *Journal of Environmental Law* 2020 (1), pp. 151-160.

⁴⁷ Case C-752/18, *Deutsche Umwelthilfe eV v Freistaat Bayern* [2019], ECLI:EU:C:2019:1114.

⁴⁸ Parliament and Council Directive 2002/49/EC relating to the assessment and management of environmental noise, OJ L189, 18.7.2002, 12-25.

⁴⁹ Moreover, by explicit reference, the END shall not apply to noise that is caused by the exposed person himself, noise from domestic activities, created by neighbors, noise at workplace, noise inside transport means and noise from military activities (art. 2(2) END).

- c) To foster the adoption of domestic action plans to prevent and reduce environmental noise where possible, with a particular focus on exposure levels harmful for human health.

The END pursues a programmatic approach based on a step wise process.⁵⁰ The END largely overlaps with the AAQD in this respect. Other legislations address noise knock-on effects, albeit with a specific and limited reach.⁵¹

More specifically, the END mandates for the drafting and implementation of the following planning instruments:

- Noise maps (Article 7):
- Noise management action plans (Article 8).

Both noise maps and noise management action plans should address the major sources of environmental noise, namely agglomerations, major roads, railways, and airports.⁵²

Whilst Article 5 END mandates for the use of common noise indicators for the drafting of the noise maps by Member States, no specific limit values are set for the noise management plans. Such values (in decibels) shall nevertheless be expressed in terms of L_{den} and L_{night} and, where appropriate, L_{day} and $L_{evening}$, for road-traffic noise, rail-traffic noise, aircraft noise around airports and noise on industrial activity sites, together with explanations about the implementation of the limit values.⁵³

Special noise indicators (and related values) may also be relied upon, depending on the need to ensure protection against environmental noise under certain circumstances. Such circumstances include the need for extra protection during the day/evening period, at the weekend or a specific part of the year, a context-specific combination of noises from different sources, the presence of strong tonal components, the noise's impulsive character.⁵⁴

⁵⁰ K. Pouikli, Noise Pollution in Europe: Unpacking a Worryingly “Quiet” Regulatory and Policy Issue, JEEPL 2019 (16), p. 6.

⁵¹ Regulation (EU) No 540/2014 on the sound level of motor vehicles, Regulation (EU) No 168/2013 on the approval and market surveillance of two- or three-wheel vehicles and quadricycles, Commission Regulation (EU) No 1304/2014 on the technical specification for interoperability relating to the subsystem “rolling stock noise” and Regulation (EU) No 598/2014 on the establishment of rules and procedures with regard to the introduction of noise-related operating at Union airports with a Balances approach.

⁵² More specifically, the plans should be drawn for: agglomerations with more than 100,000 inhabitants major roads (more than 3 million vehicles a year); major railways (more than 30.000 trains a year); major airports (more than 50.000 movements a year, including small aircrafts and helicopters).

⁵³ Art. 5 (4) END. All limit levels shall be set according to the methodology laid down in Annex I to the END.

⁵⁴ Annex II END indicates the criteria for assessment of noise for the purposes of planning. In this regard, computation and measurement should be used.

Furthermore, when assessing noise exposure specific elements should be taken into consideration, with a specific focus on dose-effect relations.⁵⁵

Similar to the AAQD, the END does not set specific levels for noise concentration in densely populated areas. In this regard, the general added value of the END consists in aligning how transport and industry infrastructure operators across the EU manage noise and in creating a level playing field for them.⁵⁶

As mentioned above, however, Article 8 END does not mandate for specific measures to be adopted under the noise management action plans. Ample room for discretion is thus left to the Member States as to the specific measures to be adopted under the noise management action plans. The action plans must include, among other things, the noise limit values, as well as all noise-reduction measures already in force and those in preparation in the relevant planning period (five years).⁵⁷ Noise management measures indicated by Member States should contain estimates in terms of the reduction of the number of people affected (annoyed, sleep disturbed, or other). Such actions, by express reference of the END, may include:

- Traffic planning;
- Land-use planning;
- Technical measures at noise sources;
- Selection of quieter sources;
- Reduction of sound transmission;
- Regulatory or economic measures or incentives.⁵⁸

Relevant, further guidance on the noise management action plans is provided for by WHO guidelines. WHO has released such guidelines with regard to the European geographic region in 2018.⁵⁹ Overall, the WHO guidelines recommend to reduce noise exposure to levels below those associated with adverse health effects, providing limits for road (53dB L_{den} , 45dB L_{night}), 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. The 2018 WHO guidelines include pointed recommendations to address road traffic noise in the EU.

Against this backdrop, three major pitfalls can be identified in the END regime.

⁵⁵ Annex III END. Accordingly, specific dose-effect relations could be presented for different climates/different cultures AND vulnerable groups of the population.

⁵⁶ *K. Pouikli*, supra note 41.

⁵⁷ Annex V ELD, which also provides for the extensive list of specific information to be included action plans.

⁵⁸ Actions under Annex V END, each action plan should contain estimates in terms of the reduction of the number of people affected (annoyed, sleep disturbed, or affected in other ways).

⁵⁹ *World Health Organisation*, Environmental noise guidelines for the European region, 2018.

First, the END should set more stringent targets for noise pollution reduction. As stressed by Eurocities, a legally binding noise reduction target of 3 dB by 2032 to reduce by $\frac{1}{4}$ the number of chronic high annoyed and by $\frac{1}{3}$ those chronic high sleep deprived, in line with WHO guidelines and EEA findings.⁶⁰

Second, 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.

Third, the END requires member states to report data in agglomerations in relation to the population exposed to noise and major roads (i.e., with more than 3 million vehicle passages a year). However, data for minor roads is often lacking. With such a narrow scope for noise mapping for roads, there is a concrete risk of underestimating population exposure to noise pollution and developing non-comparable datasets between countries as different types of roads are mapped. Relevant, unlike in the AAQD setup, strategic litigation has played barely any role throughout the implementation of the END.

4 Finding the Missing Link in EU's Air and Noise Pollution Policies

As mentioned above, air pollution and noise pollution constitute the two most dangerous environmental hazards for public health. At the European level, planning requirements usually target single environmental issues. There has been growing interest for a more integrated approach which coordinates different policies and measures.⁶¹ However, and more generally, to reconcile top-down environmental norms and objectives on the one hand, and local governance driven by spatial planning on the other may well lead to occasional clashes. Conflicts between local planning and environmental overarching regimes thus concern questions of scale, which lead to rescaling issues arising across multiple authorities.⁶² The development of EU environmental policies such as in the field of air and noise quality has brought a new dimension to the tension between planning and environmental regulation as it has enlarged the distance between local planning practice and the norm-setting bodies.

⁶⁰ *Eurocities*, supra note 10.

⁶¹ *M. Boeve & G. van den Broek*, *The Programmatic Approach; a Flexible and complex Tool to Achieve Environmental Quality Standards*, *Utrecht Law Review* 2012 (8), p. 77.

⁶² In this respect, the broad scope of the END has been underscored as a cause of implementation challenges and delays by Member States: see European Commission Report COM(2017) 151 final, *On the Implementation of the Environmental Noise Directive in accordance with Article 11 Directive 2002/49/EC*, p. 6.

Moreover, and importantly, the middle layer of transposition of European norms into national legislation may result in additional complexities.⁶³

Whilst integration of noise and air pollution comes with additional specific challenges, this Section discusses the main similarities and differences, and the associated opportunities and pitfalls, between the two separate legal regimes.

The European legislator has explicitly recognized the benefits of aligning the actions to tackle air and noise pollution by stating in the AAQD that consistency of air quality plans with environmental noise management plans shall be ensured “to the extent feasible”.⁶⁴ Yet, this obligation is only included in the AAQD and a similar, reciprocal duty is not to be found in the END. Thus, on paper it may seem like air quality plans shall be consistent with environmental noise management plans, but noise management plans can be drafted without considering issues of air quality.

However, certain differences between both directives should be considered when advocating for an integrated approach.

First, the AAQD sets limit values for several pollutants on the European level, whereas the END requires limit values to be adopted at the national level. In the absence of cross-border effects, the principle of subsidiarity was used as an argument against the adoption of noise limit values on the European level.⁶⁵ The existence or absence of EU limit values yields important consequences for the purpose of planning, since the AAQD requires air quality plans to be adopted following an exceedance of EU limit values. Conversely, in the END the adoption of action plans is not necessarily linked to specific standards being exceeded.⁶⁶ The exceedance of noise limit values only causes competent authorities to “consider or enforce mitigation measures”.⁶⁷ Since Member States are allowed to adopt noise limit values at the national level, standards may differ across Member States, while different thresholds may cause the Member States to consider taking measures under the AAQD. Furthermore, the AAQD obliges Member States to communicate the plans to the Commission without delay, but no later than two years after the end of the year the first exceedance was observed. A similar provision is missing in

⁶³ See, among others, E. van Rij & W.K. Korthis Altes, *Integrated air quality and land use planning in The Netherlands*, *International Journal of Law in the Built Environment* 2014 (1-2), pp. 194-195.

⁶⁴ Article 23 (2) Directive 2008/50/EC.

⁶⁵ *Boeve*, *supra* note 52, at p. 75; At the same time, it has been argued that precisely the health impact of noise pollution warrants the adoption of European standards.

⁶⁶ *Ibid.*

⁶⁷ Article 3 (s) Directive 2002/49/EC.

the END, which in turn diminishes the imperative nature of the END and hampers full enforcement by the Commission.⁶⁸

Second, the AAQD sets limit values for specific pollutants without special regard for specific sources of pollution, whereas the END is clearly source-oriented. This becomes apparent from the definition of environmental noise, which mentions specific sources such as road traffic or railway transport, but also from Article 8 END, whereby action plans should notably address major roads, large agglomerations and railways. A similar narrow view concerning the sources of air pollution that should be tackled is completely absent in the AAQD.

Third, as to the content of the plans, both the END noise action plans and the AAQD air quality plans merely suggest some measures which can be included without making the inclusion compulsory, thus leaving ample room for flexibility to Member States.

Yet as seen above, Member States' flexibility as to the measures in air quality plans has been restricted by the CJEU. In fact, such measures must respect the fundamental rules on free movement and be appropriate and effective. Relevant, similar arguments have not been raised with respect to the END. Moreover, the AAQD suggests targeting sensitive population groups, particularly children. A similar suggestion is lacking in the END.

Fourth, the territorial scope of air quality plans and noise action plans do not necessarily coincide under the current regimes. Article 4 AAQD requires Member States to divide the territory into zones and agglomerations for the purpose of assessing and managing air quality. Air quality plans concern specific zones, although the same AAQD does not provide any guidance with respect to the precise criteria for the division of such zones and agglomerations. This suggests the existence of a wide, discretionary competence of the Member States to decide how the territory will be divided and the accompanying possibility to significantly influence the assessment and management of air quality. In the END regime, Member States are not required to divide their territory into zones and agglomerations. Conversely, Member States shall adopt action plans for specific areas, namely agglomerations, major roads, major railways and airports. However, confusion concerning crucial concepts such as "agglomeration" has been reported under the END, which only renders noise action planning more complicated.⁶⁹ Fifth and last, an equivalent for short-term action plans in the AAQD does not exist in the END.

a. Lessons Learned Towards an EU Integrated Regime for Air and Noise Pollution

⁶⁸ As noted by the same Commission in its END implementation reviews, a still relevant share of the required noise maps (20%) and action plans (50%) have not yet been reported by Member States. See European Commission Report *supra* note 56, at 4-5.

⁶⁹ K. Pouikli, *supra* note 41, at 8.

The above setup unfolds an array of pitfalls, which runs against the achievement of a comprehensive and truly complementary approach to air and noise pollution from specific sources, in particular from road traffic in urban areas. We will address them in turn below.

The first issue pertains to the scope of noise pollution monitoring under the END. The current END regime addresses however only noise emissions from specific roads. At the same time, AAQD action plans are more comprehensive, insofar as they cover large agglomerations.

Second, a remarkable loophole exists as to the scope of exposed persons. The END does not differentiate between adults and children when determining harmful effects of noise exposure (in terms of dose-effects) under Annex III pursuant to Article 6(3). Moreover, while explicitly mentioned under the AAQD, such differentiation is not mandatory and thus is left up to Member States when implementing their air quality plans. Against this backdrop, there is clear evidence as supported by the WHO guidelines and the EEA that air and noise pollution entail different impacts and effects (both in short and long-terms) on adults and children. Such differentiation should therefore be duly addressed in plans adopted both under the AAQD and the END.

Third, measures envisaged and adopted by Member States under their air quality action plans pursuant to the AAQD should be assessed taking into due account the context-specific, systemic short and long-term impact of noise exposure. For example, temporary traffic bans while proving effective in reducing air pollutants concentration in the short-term – and being unfit to this purpose in the long-term – are hardly relevant to address noise concentration in the environment in the long term. Whereas other measures (e.g., a 30 km/h zones and speed limits more generally, designation of restricted access areas to combustion engine vehicles) prove certainly more effective.

5 Getting to Quiet and Healthy Cities in the Covid-19 Recovery

a. The Role of Integrated Urban Planning and Citizen Science to Foster Resilient Cities

As the European Union considers how best to help the economy recover in the wake of the Covid-19 Pandemic, the zero-pollution principle must be at the heart of all decisions. More generally, the key concept of “effective measures” as further developed by the CJEU in the context of assessing Member States air pollution action plans under the AAQD should encompass also measures aimed to tackle noise exposure. This is justified in light of the common underlying principles of the AAQD and the END, namely to both prevent

environmental harm and rectify environmental damage at the source.⁷⁰ Hence, when assessing specific measures under their action plan pursuant to the AAQD and END, Member States shall address together air and noise pollution sources as they both generate detrimental effects on human health (often in a cumulative way) while stemming from the same source such as road traffic. This approach would be in line with the general vision embraced under the European Green Deal and the EU Net-zero pollution Action Plan, while strengthening the protection of individuals against environmental risks as reaffirmed by the European Court of Human Rights.⁷¹

An additional promising avenue would be to reduce air and noise pollution through urban planning.⁷² This can be achieved by integrating the same noise action plans – including plans for the designation of quiet areas – into the local Sustainable Urban Mobility Plans (SUMPs). The European main observatory on urban mobility (ELTIS) has released guidelines on linking transport and health in SUMPs.⁷³ However, such guidelines neither include noise pollution nor mention the WHO’s recommended noise levels and guidelines. In this respect, the European Commission should prioritise encouraging greater use of sustainable modes of transport as a key measure to reduce noise pollution. Examples of measures to be adopted and strengthened are:

- a) *Reduce speed to reduce noise and air pollution.* EEA’s findings 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%.
- b) *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 to curb air pollution from road traffic. However, this can have the unintended consequence of increasing noise pollution from other sources. Increased

⁷⁰ See Recital 25 of the AAQD and Recital 7 of the END.

⁷¹ See, within the established ECtHR jurisprudence related to the protection of individuals against environmental harm, the case *Dees v. Hungary*, where the issue of noise exposure has been deemed relevant in the context of establishing positive obligations on public authorities under Article 8 of the European Convention of Human Rights. The issue has been addressed extensively by *K. Pouikli*, supra note 41, at 15.

⁷² See *Science for Environment Policy*, Links Between Noise and air pollution and socio-economic status, In-Depth Report Produced for the European Commission, DG Environment no. 13, 2016, 31-32 (stressing how urban planning meaningfully reduces inequalities as to air pollutants and noise exposure between different urban areas by steering citizens’ behaviors to protect more exposed populations), available at the following link: <http://ec.europa.eu/science-environment-policy>. For a review of the manifold relationship existing between environmental noise and urban design, see *J.M. Barrigon Morillas et al.*, Noise Pollution and Urban Planning, Current Pollution Reports 2018 (4), 208-219.

⁷³ *Rupprecht Consult*, Guidelines for Developing and Implementing a Sustainable Urban Mobility Plan, Second Edition, 2019.

economic activities in pedestrianised areas, such as restaurants, cafes, and concerts venues, can lead to high levels of annoyance and sleep deprivation.

Experimental planning addressing health effects of noise and air pollution is being conducted by local governments in the EU. For example, the city of Orbassano (Piedmont, Italy) adopted in 2007 an innovative acoustic zoning plan. This acoustic zoning plan establishes noise limit values during the day (06.00-22.00) and night (22.00-06.00) for six different land use areas (in turn classified under different acoustic classes). Such differentiation is justified by the fact that the municipality is composed by many different areas: The old town, in which are located the ancient buildings with residential areas, more recent districts with villas and multistorey houses, other old-urbanized areas located in the periphery of the city around the lines of communication, and two villages with predominantly rural and residential vocation. Differential noise limit values have been introduced, which relate to the difference between the equivalent level of ambient noise with and without selected noise sources. The acoustic zoning plan also aims to harmonise noise level limits among different zones, as well as with neighbouring cities. To this purpose, “pillow zones” have been introduced. Pillow zones aim to harmonise between both urbanised and non-urbanised area where the difference is higher than 5 dB. The pillow zones aim to mitigate the noise impact between two (or more) areas by introducing noise limit values higher than 5 dB. Importantly, road traffic under local urban planning has been reshaped to reduce concentration of vehicles to achieve the expected noise levels, thus informing the choices of specific measures (e.g., traffic bans, limited traffic areas, pedestrian zones, etc.) also directed at reducing air pollution.

Furthermore, citizen science should be fostered as an increasingly effective tool to address air and noise pollution and to support planning through reporting and measurements. The relevance of citizen science has been stressed in a recent EEA report, where different ongoing projects on air quality assessment have been analysed.⁷⁴ The advantages of citizen science are manifold. First, it relies on low-cost widely diffused monitoring techniques, which allow for a deep-rooted learning process about local or regional air pollution and its sources. Thus, it complements the regular measurements taken by official air quality monitoring networks. Second, it contributes to raise awareness of a local air quality problem to attract the attention of local or national authorities. Third, it fosters citizens’ active participation in local planning.⁷⁵ In a recent staff working document, the opportunities, challenges and obstacles, current and

⁷⁴ See EEA Report no. 19/2019, *Assessing Air Quality through Citizen Science*, EEA, Copenhagen, 2019.

⁷⁵ *D. Misonne*, *supra* note 37, at 41.

potential uses as well as best practices in citizen science were discussed by the European Commission.⁷⁶

Citizen science projects are thriving in the EU. For example, the *Curieuze Neuzen Vlaanderen* (Curious Noses Flanders) project aimed to provide a detailed map of NO₂ concentrations in Flanders, both in cities and in the countryside.⁷⁷ To measure NO₂ concentrations, Flemish citizens used a simple, standardised measurement device, a passive sampler. By reaching out through local and regional newspapers, the project partners attracted almost 53,000 people. Twenty thousand participants covering the whole of Flanders were subsequently selected to measure the air quality near their homes during May 2018.⁷⁸ By developing a reliable spatial mapping of NO₂ concentrations, the project also aimed to improve the predictive capability of the existing air quality model used by the Flanders Environment Agency for assessing the air pollution situation in Flanders. The results of the project were successfully communicated through an online map viewer, in which users can see the overview and zoom in to their local area. Newspapers also helped lead an effective communication campaign, and the results were publicised across Flanders and made national and international news. The *Curieuze Neuzen Vlaanderen* project proved the huge potential of citizen science projects with regard to air quality. A comparable initiative, which maps and communicates the impact of noise pollution, a topic which is still underrated by the public opinion, may well have a similar impact.

b. Unlocking Healthy and Smart Cities in the EU: A Bundle of Solutions

As stressed by the European Commission, the fosterage of smart cities – mostly through Internet of Things infrastructures and big data – can provide the sandbox to truly achieve such integrated and far-reaching approach on the ground.⁷⁹ Instruments such as traffic control systems, smart parking solutions and sensors in residential and commercial areas would fundamentally allow for the collection of the necessary data for noise and air pollution mapping on a local-specific (even block-by-block) basis.⁸⁰ Grant schemes under the European Structural and Investment Funds (ESIF) and Connecting Europe Facility (CEF) frameworks should further support cities in achieving such transformational change by financing smart mobility

⁷⁶ *European Commission*, Commission Staff Working Document. Best Practices in Citizen Science for Environmental Monitoring, SWD(2020) 149 final.

⁷⁷ All information about the project is available at the project's official website: <https://2018.curieuzeneuzen.be>.

⁷⁸ Participants were mostly families, with 967 schools and some companies and organisations also participating.

⁷⁹ See Commission communication, *supra* note 17, at 7, which envisages practical support under the Horizon Europe Mission for Climate Neutral and Smart Cities also under the umbrella of the Year of Greener Cities initiative (to be launched in 2022).

⁸⁰ *K Pouikli*, *supra* note 41, at 18.

project. Likewise, grant schemes shall also support Member States to achieve – or even go beyond – the targets for Electric Vehicles (EVs) as set in the revised Clean Vehicles Directive for zero emission vehicles and zero emission buses.⁸¹ A grant-based funding system should also 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 e-Bike fleets in Europe with a multibillion-euro investment commitment. The EEA suggests that the increasing trend of EVs is one among several societal changes that could lead to reduced noise.⁸²

Last, existing partnerships established within the EU can prove instrumental to share information and best practices while stepping up action at the local level. For example, under the European Commission-led Green City Accord initiative, signatory cities commit to undertake actions tackling the most relevant environmental pressures, including air and noise pollution, with a view to achieve levels of pollution as close as possible to WHO's guidelines and establishing baseline levels and targets more stringent than the minimum requirements set by EU law.⁸³ Green City Accord's signatory cities have committed to implement policies and programmes in an integrated manner, to achieve their targets by 2030 and to report on implementation and progress every three years. Moreover, to monitor progress towards the Green City Accord's goals and allow for comparability across cities, a small set of mandatory indicators has been established. The indicators for air pollution include PM_{2.5} concentration levels and NO₂ concentration levels, as coupled by targeted indicators about day and night noise exposure.

6 Conclusion

The Covid-19 crisis underscored the environmental and social importance of tackling air and noise pollution. The Covid-19 response measures adopted by Member States unfolded the potential benefits that may be achieved when reducing both noise and air pollution. Air and noise pollution originate from common sources in urban areas, in particular (road) traffic, and provoke similar negative health effects, such as premature deaths and certain heart diseases.

⁸¹ Parliament and Council Directive 2019/1161/EU amending Directive 2009/33/EC on the promotion of clean and energy-efficient road transport vehicles, OJ L188/16, 12.7.2019. The Directive sets national targets (by 2025 and 2030) as a minimum percentage of light and heavy-duty clean vehicles (defined as cars, vans, trucks and buses meeting certain emission thresholds or with zero-emissions) procured through purchase, lease, rent, public service contracts for passenger and public road transport services.

⁸² *European Environmental Agency*, supra note 1, at 85.

⁸³ The Green City Accord now includes 73 European cities. All information about the Green City Accord are available at the dedicated website: https://ec.europa.eu/environment/green-city-accord_en.

Hence to ensure environmental and health protection in the Covid-19 recovery, local governments will have to strive for increasing urban resilience. Yet this will require rethinking and recalibrating the ways in which street space is allocated.

This paper has analysed how the two existing EU regimes in the Ambient Air Quality Directive and the Environmental Noise Directive aim to abate air and noise pollution, to discover both the potential and the challenges of an integrated planning approach to both environmental hazards. As shown in Section 4, the above regimes entail wide discrepancies in their objectives and planning approaches to air and noise pollution management and largely operate in silos, hence lacking coordination. While, as also highlighted in Section 4, both regimes entail legal tools that support further integration, Member States could always autonomously act to enhance approximation of the two regimes, for example by expanding the general scope of the AAQD also to the noise management plans under Article 193 TFEU while pursuing a high level of protection of the environment as mandated by Article 191 TFEU.

Moving beyond the legal framework in the AAQD and END, in Section 5 we have examined additional and mutually supporting tools to ensure quiet and healthy cities in the post-Covid era. Sustainable Urban Mobility Plans are an overlooked tool that local governments could leverage to achieve a more coordinated approach as experimental acoustic planning (such as that adopted in the city of Orbassano as discussed above) should be further pursued in the EU. Likewise, also with a view to support experimental planning, citizens engagement and awareness should be strengthened through citizen science projects on air and noise quality. At the same time, more EU funds should be directed towards investments in public transport, clean and healthy mobility also by relying on Internet of Things technologies to both devise advanced solutions and collect the necessary data needed to achieve a truly integrated approach to planning for air and noise pollution. Finally, existing partnerships established within the EU can be crucial to share information and best practices and to step up action at the local level.