



Revision of the Ambient Air Quality

Directive

EU clean air laws must accelerate transition to zero emission mobility

April 2023

Summary

Although improving, air pollution remains the biggest environmental threat to human health: a silent killer that causes more than 300,000 premature deaths a year in addition to causing various illnesses such as lung cancer, strokes, asthma, and is suspected to damage every organ in the human body. Transport is a major culprit and specific action is needed to tackle a sector which accounts for almost half of all toxic emissions of Nitrogen Oxides (NO_x) in Europe.

The Ambient Air Quality Directive (AAQD) - with the existing Directive dating back to 2008 - sets concentration limits for certain pollutants that are considered harmful, including Nitrogen Dioxide (NO₂) and PM₁₀ and PM_{2.5} (particles less than 10 µm in diameter and those less than 2.5 µm) - all originating from the combustion of gasoline, oil, diesel fuel - and sets instructions for member states on how to reduce concentrations if the standards are not complied with. Although this legislation has contributed to reducing air pollution compared to 2005, concentrations of air pollution in Europe are still way above what is considered healthy by the World Health Organization (WHO). With 89% of European city dwellers considered to be breathing dangerous levels of NO₂, and 96% of them breathing dangerous levels of PM_{2.5}, a revision of the Directive and its pollution limits are long overdue.

The European Commission published its proposal for a revised AAQD in October 2022, which proposes aligning the EU's standards more closely with the recommendations of the WHO. Overall, it is a step forward towards cleaner air in cities, but there is still much room for improvement and, as it stands, the proposal is a missed opportunity to incentivise tried and tested policies such as low-emission zones and ultimately drive the uptake of zero-emission zones - which only allow zero-emission mobility options such as electrified public transport, freight, private or shared vehicles and active mobility - by 2030.

Firstly, **T&E calls on policymakers to align the new Directive with the most recent WHO air quality guidelines.** The WHO is the most recognised institution when it comes to air pollution

health effects assessment and its 2021 guidelines derive from the most robust health assessment conducted in 15 years. Although the Commission suggests reducing limit values for NO₂ from 40µg/m³ to 20µg/m³ and for PM2.5 from 25µg/m³ to 10µg/m³, **the proposed limit values would still allow concentrations twice as high as the health-based recommendations of the WHO.** Failure to align with the WHO is estimated to amount to 114,000 additional premature deaths a year in European cities.

As it stands, **the Commission's proposal would mainly benefit the last generation of diesel vehicles** (Euro 6d), as compliance with the Commission's proposed new limit values for NO₂ would be possible by 2030 under a baseline scenario - i.e. without having to introduce more ambitious changes than the ones currently planned and with the expected uptake of new diesel and petrol cars into the fleet.

Aligning the EU's new air quality standards with the WHO guidelines, however, is not only cost effective and, according to the European Commission's own Impact Assessment, would lead to a "significantly positive benefit-to-cost ratio" amounting to net benefits of around €38 billion, but it is also feasible. One of the most effective ways to reduce air pollution in cities is by setting low-emission zones (LEZs) that regulate access to urban areas based on the emissions of motorised vehicles. Still, even ambitious LEZs allow the circulation of harmful petrol and diesel vehicles and should only be a transitional measure towards the introduction of zero-emission zones (ZEZs) that will truly benefit air quality.

LEZs and ZEZs are increasingly common measures (325 cities had an LEZ at the end of 2022 and at least 35 ZEZs are to be set up by 2030) and have been shown to deliver significant air pollution reduction. For example the Ultra-Low Emission Zone in Central London has delivered a 44% reduction in NO₂, whilst ZEZs planned in Oxford and Amsterdam are projected to reduce traffic-related nitrogen oxides (NO_x) emissions by more than 95%. Despite this, the European Commission failed to model their impact when assessing the feasibility of different targets, including WHO alignment, a serious missed opportunity given all the air quality benefits they offer.

Secondly, **Air Quality Plans (AQPs) - a key pillar of the AAQD - should also be strengthened.** Timelines for preparing them should be brought forward (in Article 19) and financial penalties put in place to ensure authorities who fail to comply with the limit values are incentivised to act and put in place tried and tested effective measures. To ensure effective measures are included in AQPs, the list of recommended pollution reduction measures should be expanded in Annex VIII Part B, and **competent authorities should be required to assess the potential impact of all relevant policies and justify decisions not to implement policies, such as zero-emission zones, that would achieve greater impact.** Authorities should also be required to provide evidence that the measures they have selected will achieve at least an equivalent reduction in pollution concentrations.

EU clean air laws have been the main driver for reductions in urban air pollution but cities now need up-to-date and science-based targets from the EU to be able to further implement tried and tested policies that accelerate the uptake of zero emissions mobility and deliver cleaner air. T&E calls on policymakers to ensure the new Directive is aligned with the latest scientific evidence and incentivises authorities to implement ambitious and effective policies that have been shown to reduce emissions from transport. Getting to truly clean and healthy air in cities will require a full and accelerated shift to zero emission mobility.

Introduction

Despite a marked improvement over the past decade, air pollution remains the biggest environmental threat to human health:¹ a silent killer that causes more than 300,000 premature deaths a year² in addition to causing various illnesses such as lung cancer, strokes, asthma, and is suspected to damage every organ in the human body.³ It also has dramatic effects on the environment and ecosystems. According to the European Environment Agency (EEA), Nitrogen Oxides (NO_x) and ammonia (NH₃) contribute to eutrophication of waters, lead to biodiversity loss and derail ecosystems due to the excessive amounts of nitrogen.

Air pollution and its effects on both human health and the environment have been researched extensively over the last few decades, leading to EU policies to tackle it. The Ambient Air Quality Directive from 2008 (2008/EC/50) - complemented by Directive 2004/107/EC regulating pollutant emissions for mercury or arsenic among others - were created for this very purpose. The current AAQD sets concentration limits for certain pollutants that are considered harmful, and sets instructions on how to reduce concentrations if the standards are not complied with. Although this legislation has contributed to reducing air pollution compared to 2005 levels, as shown by Figure 1, concentrations of air pollution in Europe are still way above the most recent World Health Organization (WHO) recommendations.

With 89% of European city dwellers considered to be breathing dangerous levels of Nitrogen Dioxide (NO₂), and 96% of them breathing dangerous levels of PM_{2.5},⁴ a revision of the Directive and its pollution limits are long overdue. Transport is a major culprit and specific action is needed to tackle a sector which accounts for 44% of NO_x emissions in Europe (37% for road transport alone), 23% of Black Carbon (BC) emissions and 11% of both PM₁₀ and PM_{2.5} emissions (9% for road transport alone).⁵ In many cities, the share of NO_x (nitrogen oxides) emissions from road traffic is even higher; it is 47% on average and can even amount to 70% in cities like Milan or Athens.⁶ Even if the 2008 AAQD was successful in curbing levels of air

¹ World Health Organization. (2021). *WHO global air quality guidelines: particulate matter (PM_{2.5} and PM₁₀), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide*. [Link](#).

² European Environment Agency. (2021). *Health impacts of air pollution in Europe, 2021*. [Link](#).

³ The Guardian. (2021). *Revealed: air pollution may be damaging 'every organ in the body'*. [Link](#).

⁴ European Environment Agency. (2022). *Urban air quality*. [Link](#).

⁵ European Environment Agency. (2022). *Sources and emissions of air pollutants in Europe*. [Link](#).

⁶ Joint Research Centre. (2019). *Urban NO₂ Atlas*. [Link](#).

pollution, the EU still has a long way to go before it can meet its own Zero Pollution ambition and guarantee clean air to its citizens.

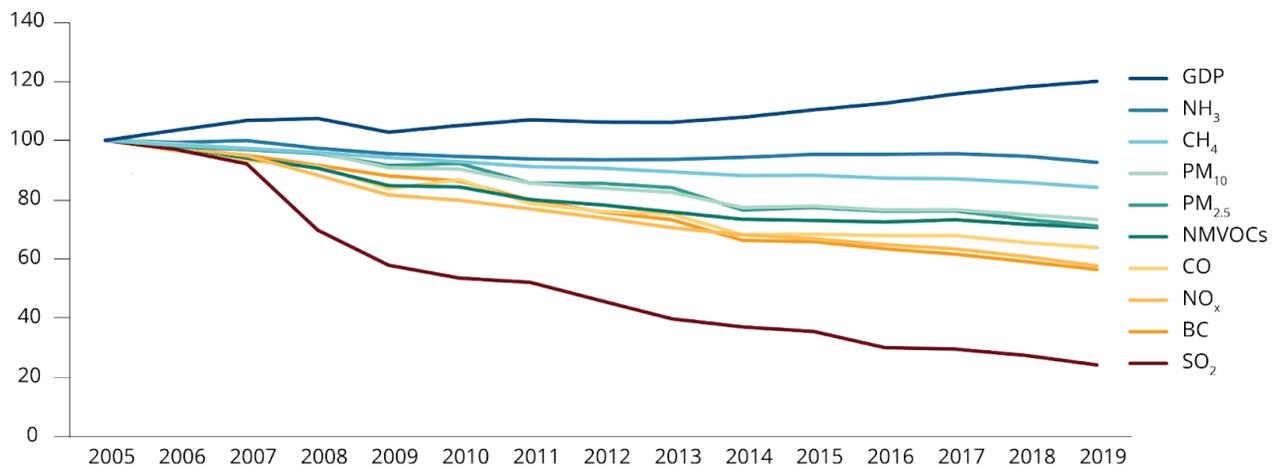


Figure 1: Emission trends of main air pollutants, 2005 to 2019.

Source: European Environment Agency, 2021

The European Commission published its proposal for a revised AAQD in October 2022,⁷ which proposes aligning the EU’s standards more closely with the recommendations of the WHO. Overall, it is a step forward towards cleaner air in cities, but there is still much room for improvement and, as it stands, is a missed opportunity to incentivise tried and tested policies such as low-emission zones and ultimately zero-emission zones. With the European Parliament and national governments now preparing their positions, T&E calls on policymakers to ensure the new Directive is aligned with the latest scientific evidence and incentivises authorities to implement ambitious and effective policies that have been shown to reduce emissions from transport. This position paper aims to provide some recommendations to this end.

1. New European standards should be aligned with the 2021 WHO air quality guidelines

The European Union regulates the concentration levels of air pollutants through the Ambient Air Quality Directives 2004/107/EC and 2008/050/EC. Although these Directives have been somewhat effective in reducing air pollution levels, they are based on scientific evidence from almost twenty years ago (see table 1 for more information on the previous WHO guidelines from 2005). Consequently, a revision of these rules, in accordance with the evolution of science, was long overdue. As part of its Zero Pollution ambition,⁸ the European Commission promised to review the AAQD in order to align European legislation closer to the

⁷ European Commission. (2022). *Proposal for a Directive on ambient air quality and cleaner air for Europe (recast)*. [Link](#).

⁸ European Commission. (2021). *Zero Pollution Action Plan*. [Link](#).

most recent scientific evidence. The Commission published its proposal on 26th October 2022.⁹ One of the main improvements proposed is the revised air quality standards (see summary in table 1 below for values). Article 13 and Annex I of the proposal set out the pollution limit values that must be attained by 2030 for a number of harmful pollutants including NO₂ and PM. However, they fail to align with the latest WHO recommendations and will fall short in truly protecting people's health if left unchanged.

Limit values are the main tool used to set air pollution concentration limits in the AAQD. These values are thresholds of air pollution concentration expressed in micrograms per cubic metre (µg/m) and each pollutant has a limit value, which is legally binding and must not be exceeded on a yearly and/or daily basis. Another way used to assess air pollution is through setting average exposure indicators, which are estimates of the proportion of the population exposed to given levels of air pollution. Although this approach can be a useful complement to binding limit values, relying solely or primarily on exposure reduction targets could result in authorities accepting significant exceedances in pollution hotspots if they are able to comply with the average target by taking action in areas where reductions are more easily achieved. Average exposure obligations and reduction targets are also much harder to monitor, communicate and hence to enforce for both authorities and civil society. Furthermore, the Commission's Fitness Check on the AAQD found that "limit values have been more effective in facilitating downward trends than other types of air quality standards".¹⁰ Therefore, exposure reduction targets can only be complementary to ambitious and legally binding limit values.

1.1. Alignment with WHO guidelines is necessary to protect Europeans' health

The World Health Organization (WHO) is the most recognised institution when it comes to air pollution health effects assessment. Guidelines - or recommendations - on air pollution concentration levels for each main pollutant were last published in 2005. These guidelines are meant to inform policy-makers on what concentration levels of pollutants should not be exceeded. Staying below these levels is supposed to avoid air pollution's negative effects on human health. Since then, however, the science around air pollution has evolved and produced a more precise assessment of its health and environmental effects. In 2021, the WHO updated its guidelines, which have become much stricter than the 2005 ones, as shown by summary table below.

However, it is important to state that, as specified by the WHO itself,¹¹ even these new guidelines do not guarantee that no negative health effects will be caused by air pollution below these concentrations. In other words, there is no safe level of air pollution.

⁹ European Commission. (2022). Proposal for a Directive on Ambient Air Quality and clean air for Europe (recast). [Link](#).

¹⁰ DG ENVI. (2019). *Fitness Check of the Ambient Air Quality Directives concludes that they have been partially effective in improving air quality and achieving air quality standards*. [Link](#).

¹¹ World Health Organization. (2021). WHO global air quality guidelines: particulate matter (PM2.5 and PM10), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide. [Link](#).

The WHO recommended that air pollution concentrations do not exceed 10µg/m³ for Nitrogen Dioxide (NO₂) and 5 µg/m³ for Fine Particulate Matter (PM_{2.5}) among other pollutants. However, **the Commission’s proposal would bring the concentration limits for both of these pollutants to 20µg/m³ and 10µg/m³ respectively - twice as high as the health-based recommendations of the WHO.**

Air Pollution Maximum Levels (annual mean) Levels in micrograms per cubic metres (µg/m ³)				
	2005 WHO Guidelines	2008 AAQ directives	2021 WHO Guidelines	2022 AAQD proposal
NO ₂	40	40	10	20
PM _{2.5}	10	25	5	10
PM ₁₀	20	40	15	20
O ₃ (8-hour)	100	120	100	120

Table 1: Summary of past and future emission thresholds

These recommended concentration limits derive from the most robust health assessment conducted since 2005, and the revision of the AAQD is a once-in-a-generation opportunity to ensure that the law and the science are aligned. The failure to align with the WHO is estimated to amount to **114,000 additional premature deaths a year** in European cities.¹²

1.2. Alignment with WHO guidelines is cost-effective

In addition to the health benefits, it also makes economic sense to align the EU standards with the WHO guidelines. As assessed by the Commission itself: doing so would cost 6 billion EUR/year but save between 42 and 121 billion EUR by 2030.¹³ Figures from the 2021 Zero Pollution Action Plan convey a similar and clear message:

*“air pollution costs health and economic activities an estimated EUR 330 to 940 billion per year in the EU, including lost workdays, healthcare costs, crop yield loss and damage to buildings, whereas all the measures in the EU to improve air quality have an estimated combined cost of EUR 70 to 80 billion per year”.*¹⁴

¹² ISGlobal. (2021). *European Cities Could Avoid an Extra 114,000 Premature Deaths Every Year by Meeting the New WHO Air Quality Guidelines*. [Link](#).

¹³ European Commission. (2022). *Impact Assessment Report Proposal for a Directive of the European Parliament and of the Council on ambient air quality and cleaner air for Europe (recast) (part 1, p66)*. [Link](#).

¹⁴ European Commission. (2021). *EU Action Plan: ‘Towards Zero Pollution for Air, Water and Soil’*. [Link](#).

In both cases, the conclusion is the same, as acknowledged in the Commission's proposal - "the impact assessment shows that benefits for society far outweigh the costs".¹⁵ The Commission's impact assessment of the AAQD revision modelled several scenarios: full alignment with WHO guidelines, closer alignment and partial alignment. The results are clear: the full alignment scenario is projected to lead to a "significantly positive benefit-to-cost ratio" amounting to net benefits of around 38 billion EUR, whereas the "closer alignment" scenario - ultimately selected by the European Commission as the preferred policy option - would lead to lower net benefits of around 36 billion. Finally the "partial alignment" scenario would only lead to net benefits around 29 billion EUR.¹⁶

1.3. Alignment with WHO guidelines is feasible

Road transport is the main culprit when it comes to NO₂ pollution, and it also emits significantly Black Carbon (BC), or soot, and Particulate Matter (PM10 and PM2.5). The magnitude of this problem is even bigger in cities, as 64% of all NO₂ exceedances were linked to emissions from road traffic in urban areas.¹⁷

Fortunately, however, solutions exist and they are already being used throughout Europe. One of the most effective ways to reduce air pollution in cities is by setting low-emission zones (LEZs) and zero-emission zones (ZEZs). LEZs are zones that regulate access to urban areas based on the emissions of motorised vehicles. Conditions for accessing these zones can vary from one case to another, but these are usually designed according to Euro standards (emissions and year of production) and/or type of vehicles (cars, mopeds, trucks, vans, etc.). These have proven to significantly reduce air pollution over the last decades in various conditions, however **getting to truly clean and healthy air in cities will require a full and accelerated shift to zero emission mobility**. Zero-emission zones are even more ambitious as they only allow zero-emission mobility options such as electrified public transport (trams, metros, buses), electric mobility (private or shared zero-emission vehicles such as taxis) and active mobility (walking, cycling).

Unfortunately, the Commission's impact assessment failed to model the impact of LEZs and ZEZs, despite the former being an increasingly common measure (325 cities had one at the end of 2022)¹⁸ that have been shown to deliver significant air pollution reduction on the ground. Research published by the Clean Cities Campaign reveals LEZs reduced nitrogen dioxide (NO₂) concentrations by around 20% on average, and up to 44%, as demonstrated by the Central London Ultra low-emission zone (see Info Box below for more). Furthermore, at least 35 zero-emission zones are to be set up by 2030¹⁹. **ZEZs planned in Oxford and Amsterdam, for instance, are projected to reduce traffic-related nitrogen oxides (NO_x) emissions by more than 95% and can bring NO₂ levels to around 14µg/m³.**²⁰

¹⁵ See page 9 of: European Commission. (2022). *Proposal for a Directive - COM(2022)542*. [Link](#).

¹⁶ European Commission. (2022). *Impact assessment report accompanying the document Proposal for a Directive on ambient air quality and cleaner air for Europe (recast)*. [Link](#).

¹⁷ European Environment Agency. (2022). *Managing Air Quality in Europe*. [Link](#).

¹⁸ Updated figures in January 2023 from: Clean Cities Campaign. (2022). *The development trends of low- and zero-emission zones in Europe*. [Link](#).

¹⁹ Clean Cities Campaign. (2022). *The development trends of low- and zero-emission zones in Europe*. [Link](#).

²⁰ City of Amsterdam. (2019). *Clean Air Action Plan*. [Link](#).

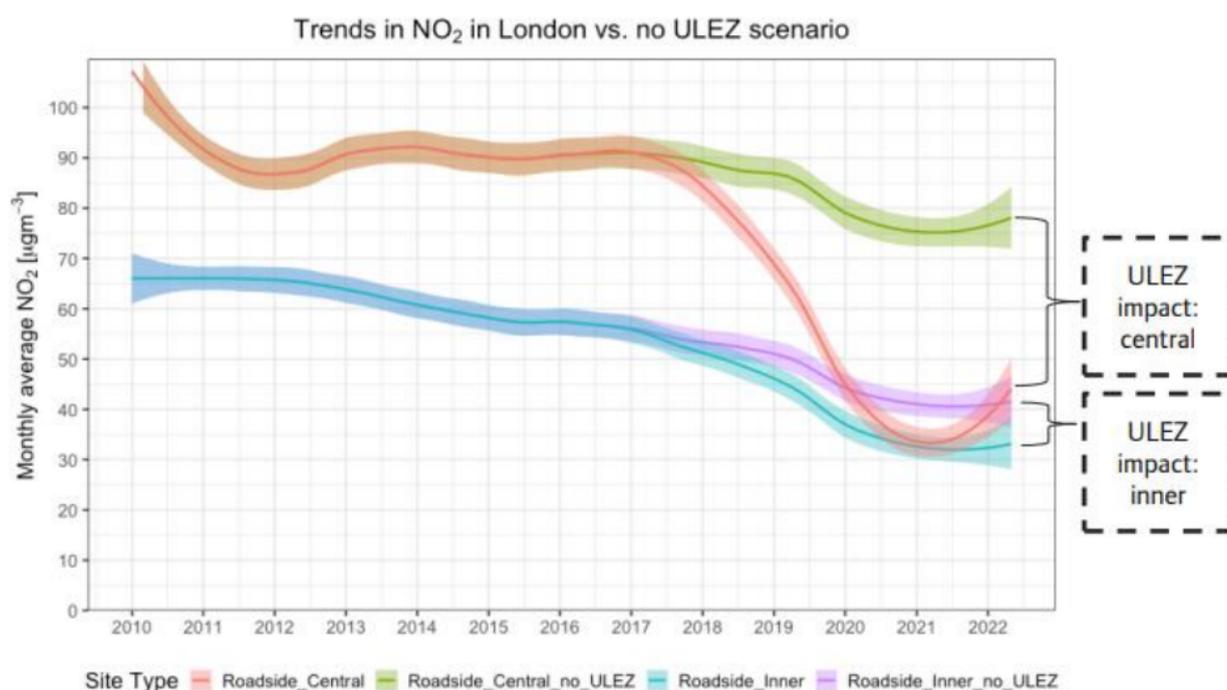


Figure 2: Impact of ULEZ in London on NO₂ concentrations

Source: Mayor of London²¹

INFO BOX: Low- and zero-emission zones - an untapped potential

There are currently **325 LEZs in Europe** (+42% since 2019); with **507 LEZs planned by 2025** (+58% compared to June 2022).

LEZs have been found to achieve concentration reductions in NO₂ of up to **44% in London, 32% in Madrid**,²² and on average lead to a 20% reduction of NO₂ levels in cities.²³

Zero-emission zones (**ZEZs**) go even further as they will only allow zero-emission transport modes such as walking, cycling, or ZEVs to circulate. Amsterdam's ZEZ modelling predicts a 96% drop in NO_x levels from traffic between 2020 and 2030 (and CO₂ emissions from traffic by 95%). NO₂ levels are also expected to drop to **14µg/m³** as a result, while PM_{2.5} are projected to be **below 10µg/m³**.

Coupled with appropriate measures such as scrappage schemes or shared mobility hubs, ZEZs can deliver significant air pollution reduction while promoting clean alternative modes of transport.

²¹ Mayor of London. (2022). *Expanded Ultra low-emission zone - six months report*. [Link](#).

²² Transport & Environment. (2019). *Low-Emission Zones are a success - but they must now move to zero-emission mobility*. [Link](#).

²³ Clean Cities Campaign. (2022). *Quantifying the effects of low- and zero-emission zones*. [Link](#).

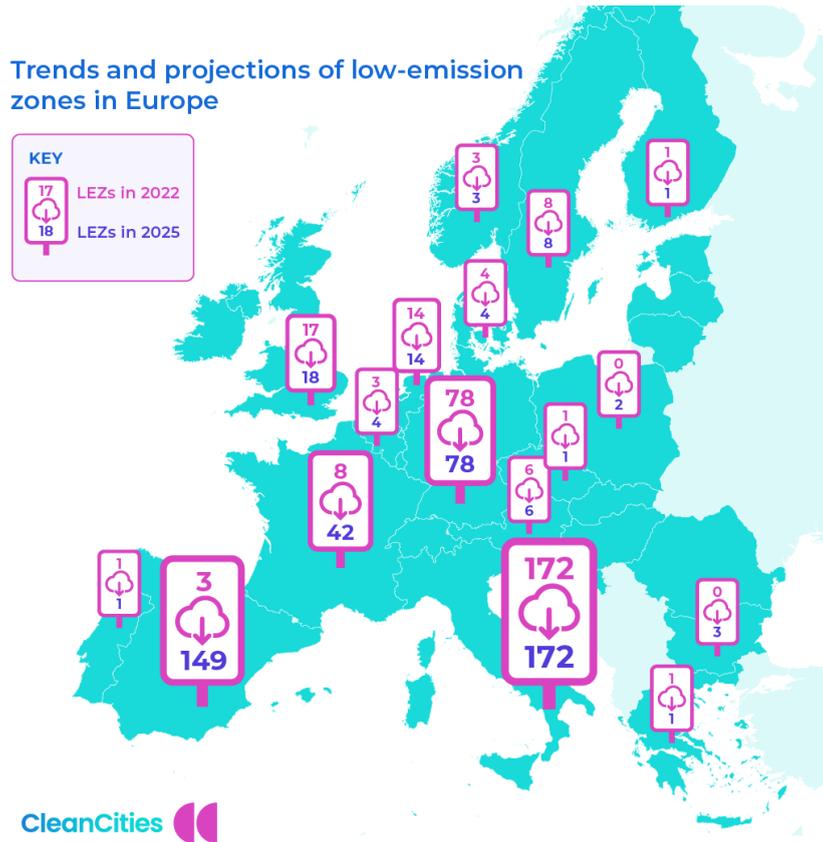


Figure 3: Trends and projections of LEZs in Europe

Source: Clean Cities Campaign (2022).



Figure 4: Projection of ZEZs in Europe in 2030

Source: Clean Cities Campaign (2022).

Not including LEZs and ZEZs in the revised AAQD impact assessment is a serious missed opportunity given all the air quality benefits they offer, in addition to their established presence all over the continent. New national laws have emerged in France, Spain and Poland in 2021, making LEZs either mandatory or facilitating their introduction - meaning that their numbers are bound to increase even further. Consequently, the Commission's Impact Assessment does not show the true picture when it comes to feasibility of meeting the proposed, or even much more ambitious, pollution limit values.

Not only does the air pollution abatement potential of both LEZs, but particularly ZEZs, demonstrate that compliance with stricter limits than proposed by the Commission for NO₂ and particulates is feasible, but the revised Directive should actually incentivise these kinds of policies (via more ambitious targets) at the local level, which would accelerate the shift to zero emission transport and clear air in cities. EU clean air laws have been the main driver for reductions in urban air pollution but cities now need up-to-date and science-based targets from the EU to be able to further implement tried and tested policies that can deliver clean air.

1.4. Commission proposal is a win for diesel cars

As it stands, the Commission's proposal would mainly benefit the last generation of diesel vehicles (Euro 6d), as compliance with the Commission's proposed new limit values for NO₂ would be possible under a baseline scenario - i.e. without having to introduce more ambitious changes than the ones currently planned excluding LEZs and ZEZs - as shown by Figure 5 below from the Commission's Impact Assessment. The graph shows that, by 2030, only a handful (5%) of monitoring stations in Europe will not be compliant with the proposed new limit value for NO₂ (20µg/m³) even without an accelerated transition to zero emission mobility and with the expected uptake of new diesel and petrol cars. In T&E's view, the new air quality directive should instead drive the uptake of zero-emission vehicles and mobility in general as these are the only solutions that can deliver truly clean air for Europeans.



Figure 5: Projections for number of EU27 airbase station sites in exceedance of annual NO₂ concentrations (2670 stations)

Source: DG ENVI (2022)

For all the reasons mentioned above, T&E recommends

- European air quality standards are **aligned with WHO guidelines by 2030 at the latest** that will incentivise the roll out of effective pollution abatement policies including zero emission zones.
- **Air quality standards should be based on binding concentration limit values**, as is already the case in the current Directive. Average exposure reduction targets should only be a complementary tool bringing additional information on the share of European citizens exposed to illegal concentrations of air pollution. Average exposure reduction targets could then be used to set additional requirements in specific zones where limit values are not complied with - the objective being to reach compliance with limit values in the entire European territory.

2. Air quality plans should be clearer and set additional recommendations

Air Quality Plans (AQPs) are a key pillar of the AAQD as they set the path authorities will follow in order to reduce pollution i.e. what measures will be adopted, by when, what impacts are expected, etc. Some parts of air quality plans are clearer in the Commission's proposal than in the current Directive, mainly by providing good practice measures under point 2 of Section B of Annex VIII. However, it is necessary to increase and clarify the guidance for competent authorities, while ensuring greater transparency and accountability on the choices made concerning the content of AQPs, and close loopholes that would otherwise allow lengthy exceedances of the limit values.

2.1. Compliance and timing currently lack clarity and too many loopholes are allowed

The proposed timeframes for the preparation and adoption of AQPs are outlined in Article 19 of the Commission's proposal. It is indicated that authorities must prepare an air quality plan if, by two years after entry into force of the new Directive (likely to be in 2027), the levels of pollutants are above any limit values (outlined in Annex I, Section I, Table I) to be obtained by 2030. In this scenario, paragraph 4 of Article 19 grants Member States two years to draw up the plan (likely deadline 2029).

If, by 2030, a Member State is still not compliant with a relevant limit value, paragraph 1 of Article 19 grants authorities an additional 2 years to draft another AQP (by end 2032) to *“to keep the exceedance period as short as possible and...no longer than 3 years from the end of the calendar year in which the first exceedance was reported”* (so, by 2033). If the exceedance persists three years after the AQP was established (end of 2035), Member States are only then required to start the same process over again, but this time with “additional” and “more effective measures”. Crucially, however, no penalties, financial or otherwise, are proposed to force authorities to take effective action even if compliance is not met after 2030.

Requiring new air quality plans indefinitely without any penalty in case of non compliance by the 2030 deadline makes this proposal similar to an empty shell as far as enforcement is concerned. There is an obvious need for clarity and stricter timelines, mainly through the introduction of sanctions that will serve as strong incentives for compliance in case it is not achieved in time. Furthermore, since all the required information on air pollution is already available, competent authorities of areas where limit values are being exceeded should be required to adopt Air Quality Plans as soon as this proposed Directive enters into force (and just one year after first exceedance is recorded).

T&E recommends that clarity be brought here by:

- Ensuring **AQPs are made mandatory in all circumstances**, instead of waiting for exceedances to happen first and putting lives at risk. AQPs should therefore be prepared by competent authorities **and maximum 1 year after the entry into force of the Directive and the first exceedance of any**

limit value is recorded. Their role must be to make sure the limit values are complied with before the 2030 deadline and should be called “preparatory plans”.

- The Air Quality Plans that aim at achieving compliance after the 2030 attainment deadline has passed should necessarily be stricter than preparatory plans, as they are a response to the failure to comply with the new limit values and should be called “remedial plans”. They should be adopted no longer than 1 year after the first exceedance after 2030 is recorded
- Adding a provision on **periodic financial sanctions** in Article 19 in case exceedances of new limit values occur after the attainment deadline - i.e. 2030 (as opposed to the mere requirement of updating the Air Quality Plan indefinitely). This **will help create an incentive for authorities to take urgent remedial action**. These financial sanctions shall continue for as long as the exceedances occur.

2.2. Consideration of low- and zero-emission zones and other effective pollution abatement measures should be required in AQPs

Annex VIII details the information to be included in, and requirements regarding the content of, air quality plans (AQPs). Even though low-emission zones (LEZs) are mentioned as a recommended air pollution abatement measure under Annex VIII - Part B, point 2(d), which is encouraging, T&E believes that authorities should be required to consider and assess the pollution reduction benefits of LEZs & ZEZs and - if not included under an AQP - provide evidence that the selected alternative measures will achieve at least an equivalent reduction in emissions and concentrations.

Under a wide range of conditions, LEZs have been shown to reduce NO₂ levels by 20% on average. Given these figures, the more LEZs are adopted the better for air quality in Europe. Many German cities, including Berlin, were able to comply with the 2008 AAQD limit values for NO₂ because they introduced low-emission zones.²⁴ However, lack of enforcement, as was observed for Italian LEZs,²⁵ and/or lack of ambition can reduce the air pollution reduction effectiveness and potential of LEZs. This is the case for Madrid for example: after setting up one of the most effective LEZs in Europe, new mayor Almeida watered down the scheme in 2021 by setting more exemptions and less strict operating hours. Besides, frontrunner cities that have set up LEZs in addition to other complementary measures such as adapted traffic plans, lower speed limits and even tactical urban design (e.g. low-traffic neighbourhoods) showed not only improved air quality, but also better liveability.²⁶

Still, **even ambitious LEZs allow the circulation of harmful petrol and diesel vehicles. They can only be a transitional measure before the introduction of zero-emission zones (ZEZs)** that will truly benefit air quality as only zero-emission cars, taxis, buses and active mobility solutions such as cycling and walking will be allowed. The introduction of ZEZs is the only way to reach WHO guidelines levels of NO₂ and should be incentivised further via the AAQD, so as to help cities reduce their transport emissions.

²⁴ Umwelt Bundesamt. (2022). *Germany complies with air quality limit values nearly everywhere in 2021*. [Link](#).

²⁵ Clean Cities Campaign. (2022). *The 7 steps to create effective low-emission zones*. [Link](#).

²⁶ CitiesChangers. (2021). *Superblocks – the Spanish Idea That Is Conquering European Cities*. [Link](#).

In order to do so, **competent authorities should be required to assess the potential impact of all relevant policies and justify decisions not to implement air pollution abatement policies, such as LEZs and ZEZs, that would achieve greater impact.** Authorities should also be required to provide evidence that the selected measures will achieve at least an equivalent reduction in concentration.

A common argument made against LEZs and ZEZs is that they hit the poorest. However, if complemented with the right measures, LEZs can also improve social justice and health equity. Indeed, air pollution is not only a health and environmental problem, it is also a social problem: not only are lower income groups more exposed to air pollution, as demonstrated by the graph below, but they also suffer more from the health effects. Air pollution has twice the impact on lung function for members of lower-income households according to a study published in the European Respiratory Journal,²⁷ and the mortality rate has been found to be higher for this group as indicated by research in Madrid and Barcelona.²⁸

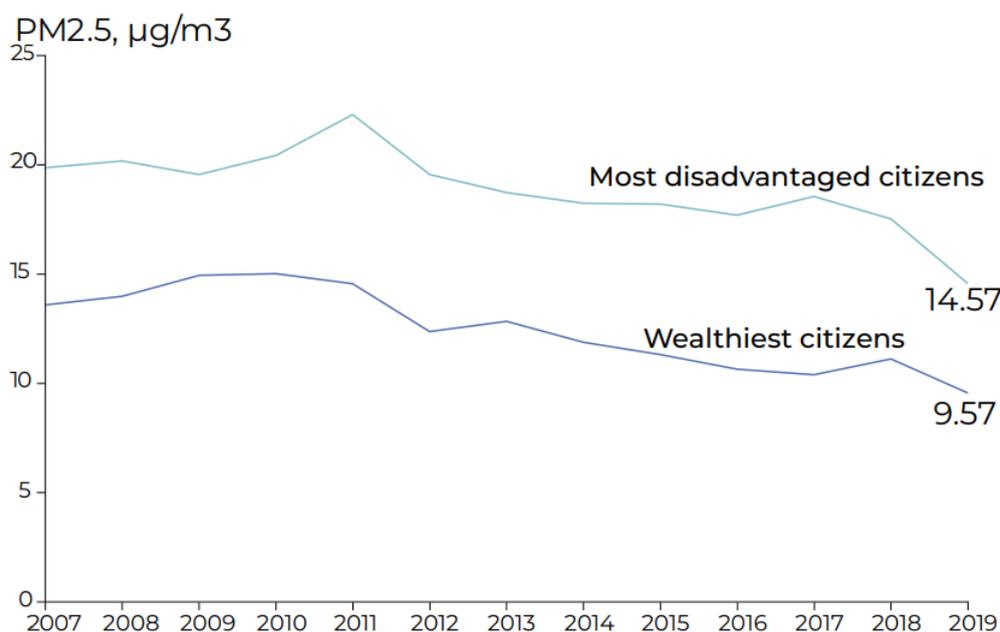


Figure 6: Unequal exposure to air pollution in Europe²⁹

Source: [European Environment Agency](#), 2022

Those most vulnerable to the effects of air pollution, such as low-income groups, must be properly considered by authorities when designing air quality measures and plans. A 2023 Clean Cities Campaign briefing lists what measures could be set up to complement LEZs in order to make them as socially fair as possible:

²⁷ Doiron et al. (2019). Air pollution, lung function and COPD: results from the population-based UK Biobank study. [Link](#).

²⁸ Tamara lungman et al. (2022). The impact of urban and transport planning on health: Assessment of the attributable mortality burden in Madrid and Barcelona and its distribution by socioeconomic status. [Link](#).

²⁹ “Most disadvantaged” designates the poorest quintile of the population while “Wealthiest” designates the richest quintile

Description of the measure			
Measure	Definition	Examples	Minimum requirements & challenges
Mobility credits – also in the form of scrappage schemes 	Targeted financial schemes providing grants to specific groups to scrap or retrofit their older vehicles and use cleaner modes of transport or vehicles.*	<ul style="list-style-type: none"> United Kingdom: London, including 5,000€ for wheelchair accessible vehicles France: Greater Paris, Région Sud - free train rides (for 6 months) Belgium: Brussels Region Spain: Barcelona Germany: Berlin/Bolt campaign Finland: Premiums for EVs, (e)bikes and public transport 	<ol style="list-style-type: none"> 1. An LEZ has to be in place 2. Funding has to be made available 3. Research on targeted groups has to be made beforehand
Reduced costs for bicycle purchase 	Around 300 subsidy schemes exist across Europe that can be offered to individuals, public entities or even businesses. They can be used for buying certain types of bikes, replacing cars by bikes, etc. ³⁴	<ul style="list-style-type: none"> Finland: Scrapping premium of 1000 EUR for individuals switching from cars to EVs or e-bikes. France: subsidy of up to 300 EUR for e-bikes if the applicant meets certain income requirements Italy: up to 500 EUR help for all types of bikes. Portugal: Reduced VAT for bikes (from 23% to 6%) 	<ol style="list-style-type: none"> 1. Funding has to be available 2. Infrastructure needs to be available
Public transport – reduced fares for targeted groups in priority 	Reduced fares for at risk groups	<ul style="list-style-type: none"> Austria: Climate ticket for unlimited public transport use, prices ranging from 821 EUR (for risk groups) to 1095 EUR for a year Austria: 365 euro ticket for unlimited public transport use in Vienna Portugal, Poland: Lisbon, Warsaw: free public transport for children, students and the elderly 	<ol style="list-style-type: none"> 1. Public transport network 2. Available funding 3. Demand needs to exist
Shared mobility hubs in poorly connected areas 	Setting up multimodal hubs with shared (e)-bikes, micromobility vehicles, and (e)cars in areas where poorer people are affected by transport poverty and forced car ownership	<ul style="list-style-type: none"> Scotland: "Shared Transport for all" scheme in Edinburgh & Glasgow Germany: Bremen EU-wide: other examples 	<ol style="list-style-type: none"> 1. Political will to provide alternatives 2. Hubs have to be built and shared services bundled or made available 3. Ensure that offer matches demand
Social leasing of electric vehicles 	Long-term leasing of EVs made more accessible for low-income households	France : plans to support the social leasing of 130,000 vehicles, leasing at 100 EUR/month	<ol style="list-style-type: none"> 1. Needs political will and funds 2. Charging infrastructure needs to be present for this to be convenient

Table 2: Best practice measures for socially fair LEZs.

Source: [Clean Cities Campaign](#), 2023

T&E recommends to:

- **Require authorities drawing up AQPs to consider measures including LEZs and ZEZs** listed in Annex VIII Part B, if emissions from transport are identified as contributing to exceedances of limit values for NO₂ and/or PM;
- Expand the list of recommended air pollution abatement measures in Annex VIII Part B to include best practice measures such as zero-emission zones, congestion charges, and other Urban Vehicles Access Restrictions (UVARs) measures; low-traffic neighbourhoods; reducing speed limits to 30 km/h in cities; promoting active (walking, cycling) and shared (public transport, e-scooters, car-sharing) mobility.
- **Require authorities to provide explanations in case these measures are not included** in the final version of the plans (Article 19 & Annex VIII) and **provide evidence that the selected measures will achieve at least an equivalent reduction in concentrations.**

2.3. More ambitious emergency measures are needed to counter dangerous pollution peaks

Section 4 of Annex I sets so-called “alert thresholds” - which are air pollutants concentration levels that shouldn’t be breached even over a very short period of time (3 consecutive hours for NO₂, 3 consecutive days for PM10 and PM2.5) due to the grave health effects these concentration levels can have. When these alert thresholds are breached, Member States are required to set “short term action plans”; containing stricter measures to reduce air pollution in the short term and therefore limit the health effects on European citizens. This is a welcome provision, but it could be improved in several ways:

- A list of best practices of short-term emergency measures should be made available in the Directive - where currently none exist in the Commission’s proposal -, in addition to requiring competent authorities to consider such a list when drawing up short-term plans.
- Emergency pollution abatement policies targeted at addressing relevant sources of pollution should include, among others:
 - Restrictions on circulation of private vehicles - for example, the city of Paris sets lower speed limits in addition to more stringent standards for its low-emission zone during pollution peaks.
 - Temporary free public transport/bike share schemes during pollution peaks i.e. when alert thresholds are breached as is done in Brussels Region.
 - Introducing driving restrictions around nurseries, elementary schools, hospitals and retirement homes.

3. More effective enforcement and monitoring is needed

Enforcement is a crucial part of the puzzle, since it checks if the solutions recommended and decided upon are actually put in place and implemented on the ground. This is unfortunately the main shortcoming of the current AAQD, as many Member States do not comply with the limit values currently in force and have not taken the necessary steps in order to achieve compliance. Between 2008 and 2019, the European Commission had infringement cases concerning PM10 against 22 Member States, concerning

NO₂ against 14 Member States, and concerning SO₂ against 10 Member States.³⁰ Monitoring is an essential part of effectively tackling air pollution, as it facilitates assessing the extent of the problem, identifying what solutions are needed, and tracking progress over time. Sound and robust monitoring will lead to better awareness, knowledge and more efficient policies that will help clean up the air we breathe.

T&E welcomes the introduction of additional tools to guarantee enforcement such as an easier access to justice for citizens coupled with the right to financial compensation when harmed by air pollution will act as strong incentives for Member States to protect their citizens from air pollution. Similarly, the progress brought by the Commission's proposal in setting much clearer requirements for air pollution monitoring site placement and the methodology of monitoring, which will lead to having more precise and more reliable data.

3.1 Open the way to citizen science for better implementation

As explained in the introduction of section 3, enforcement is an essential aspect of this Directive as it ensures that the steps recommended to clean up the air are actually taken and implemented on the ground. Since the entry into force of the AAQD, the Commission has had infringement cases concerning PM10 against 22 Member States and concerning NO₂ against 14 Member States.³¹ This has been one of the main shortcomings of the 2008 AAQD, while enforcement has relied on citizen actions such as court cases brought for authorities' failure to comply and act in time.³² It should therefore be addressed more extensively under the revised Directive, notably by giving more leeway to citizens and citizen science when it comes to monitoring air quality and challenging competent authorities if reported data seems to lack robustness.

Similarly to what exists in the Real Driving Emission Regulation 4,³³ stemming from the Market Surveillance Mechanism,³⁴ citizens should be able to challenge suspicious air quality data on the basis of additional evidence (e.g. from measurement campaigns such as the CurieuzenAir project,³⁵ which showed evidence of air quality inequality in Brussels). The proposal could work as follows:

1. When a critical mass of citizen science data indicates there might be exceedances of limit values that are not captured by official monitoring sites data, and when this is reported to the Commission, action should be taken to verify the information.

³⁰ DG ENVI. (2019). Supporting the Fitness Check of the EU Ambient Air Quality Directives (2008/50/EC, 2004/107/EC). [Link](#).

³¹ DG ENVI. (2019). Supporting the Fitness Check of the EU Ambient Air Quality Directives (2008/50/EC, 2004/107/EC). [Link](#).

³² European Commission. (2019). Fitness Check of the Ambient Air Quality Directives concludes that they have been partially effective in improving air quality and achieving air quality standards. [Link](#).

³³ European Commission. (2018). Commission regulation (EU) 2018/1832. [Link](#).

³⁴ The Market Surveillance Mechanism requires Member States and the Commission to assess the compliance of vehicles with European emission limits. Provisions in RDE 4 require the Commission to take third party data into consideration when assessing compliance and decide what vehicles to test on an annual basis. This mechanism requires a certain number of vehicles to fail in order to be triggered.

³⁵ CurieuzenAir. (2022). [Link](#).

2. Under such circumstances, the Commission should be required to investigate the methodology of air pollution monitoring in the concerned area (i.e. how the monitoring stations are placed, whether there are enough of them, etc) as indicated in Annex IV - Section D point 9 of the Commission's proposal; however this review of the monitoring network should happen right after the citizens science data have been reported, instead of waiting for 5 years between reviews.

This mechanism would be complementary to the requirements in place for monitoring sites and will allow for a case-by-case approach when said requirements are not sufficient.

3.2 Air pollution monitoring requirements - better, but still room for improvement

The current AAQD is somewhat outdated when it comes to addressing pollutants that have started to be researched in the last 15 years. For instance, Black Carbon and Ultrafine Particles are not monitored whereas their harmful effects have been demonstrated since the Directive entered into force in 2008. The science and knowledge around these pollutants has evolved very rapidly and there is no reason not to monitor these pollutants anymore. There is also no clear definition of station types ("traffic", "industrial", "background") and of area classification ("urban", "suburban", "rural") in the 2008 Directive.³⁶ As a result, it is currently very difficult to ensure Member States' compliance with the minimum requirements on the ratios between station types. It is possible for them to take advantage of this lack of clarity by qualifying a station as "traffic" or "background" depending on what suits them best. The overall monitoring network should be improved, as there currently is no requirement on monitoring network density, no minimum number of monitoring stations for PM10 and PM2.5 and no clear instruction on micro scale siting i.e. how to set up monitoring devices. These elements lead to lack of consistency in the network, but more importantly data that is not robust enough.

T&E welcomes the overall positive changes brought about by the Commission's proposal. It effectively upgrades the scope of air pollution monitoring by including pollutants of emerging concern that were not taken into account in the 2008 AAQD despite being very harmful to human health - such as Black Carbon (BC) and Ultrafine Particles (UFPs). A minimum number of monitoring stations for PM10 and PM2.5 - missing from the 2008 Directive - have finally been introduced in Article 9 and Annex III. There is also net improvement in the form of more precise guidelines for monitoring station placement in Annex III that sets up a density criteria of one rural background station every 50,000 km², as well as clearer instructions for placement of monitoring devices (i.e. what distance from the road is ideal, what height is best, etc.) in Annex IV Section C. All of the above will improve the existing monitoring network and consequently lead to a more precise monitoring of these pollutants. Still, the density of sampling points should be higher in areas frequented by vulnerable groups, e.g. near schools for children, and near hospitals and homes for the elderly.

³⁶ Only urban background is defined as "places in urban areas where levels are representative of the exposure of the general urban population"

Article 8 of the proposal suggests that modelling be used in order to identify potential locations where exceedances occur. T&E believes that monitoring air pollution through the use of monitoring stations should always be the preferred option to resorting to modelling, the main reason being that modelling is based on various assumptions, meaning that the methodology can vary from one Member State to another. This would create too much uncertainty and the way air pollution is tracked will lack consistency. On the contrary, monitoring stations are more reliable since based on real life data, accessible at any time. T&E therefore recommends that monitoring stations be multiplied and more densely spread across the EU, and modelling should only be a complementary tool filling the gap where no monitoring stations exist.

Monitoring supersites are a new type of monitoring stations that combine multiple sampling points to gather long-term data on air pollutants, as well as on air pollutants of emerging concern. Article 10 of the proposal states that one supersite should be placed at least every 10 million inhabitants or 1 per Member State. Although setting up these sites is a step forward, they should be more densely spread since they offer great potential in tracking air pollution more accurately. As such it would be much more beneficial to have one supersite per NUTS 2 territorial unit (as defined in Regulation (EC) No 1059/2003), or every 250,000 inhabitants as it will allow more granular assessment of air pollution, particularly in hotspots. Each relevant local authority would therefore have access to much more precise data on every pollutant covered by the Directive, which will consequently lead to a more tailored and efficient response for reducing air pollution.

Conclusions

The Commission's proposal for a revision of the Ambient Air Quality Directive is a step in the right direction, but several key elements should be improved if truly safe levels of air quality are to be achieved, putting the EU on a feasible path to meeting its Zero Pollution Ambition by 2050. Aligning the new EU limit values with the 2021 WHO guidelines is one essential element towards achieving this. Despite the Commission's doubts that this can be achieved, the failure to include low- and zero-emission zones in the Impact Assessment is a huge missed opportunity, since LEZs can reduce NO₂ levels by more than 40%, while ZEZs are projected to reduce NO₂ levels by 95% and bring concentration levels to 14µg/m³ in Amsterdam even before any other measures are considered.

Air quality plans are the tool that ensures competent authorities take appropriate and effective measures to improve air quality and protect people's health. T&E believes that requirements under the AQPs should be much more detailed in order to give the necessary guidance to competent authorities and ensure that the best available measures are selected as part of these plans. Rigorous assessments of the air pollution abatement potential of measures selected should be conducted, while tried and tested best practice measures - such as LEZs and ZEZs - should be listed in Annex VIII and implemented at local level. If these measures are not selected, justification should be given by the Member State drafting the plan with evidence provided that the measures selected instead will lead to at least equivalent reductions in air pollution. This will guarantee that all the possible steps towards cleaning up the air are being considered by authorities. Even ambitious LEZs still allow the circulation of harmful petrol and diesel vehicles and

they can only be a transitional measure before the introduction of zero-emission zones (ZEZs) that will truly benefit air quality.

Finally, enforcement and monitoring need to be improved as these ensure that effective steps are actually taken by authorities, while tracking air pollution levels, and consequently progress, over time. European citizens are all affected by air pollution and should be able to take action against this more easily. This is why providing them with the legal tools to contest air pollution reported data when suspiciously low should be a new provision of the AAQD. If different measurements are made by citizens, similarly to what has been done in the CurieuzenAir project in Brussels, local networks of monitoring stations should be investigated by an independent third party. More generally, the densification of the monitoring network laid out in the Commission's proposal should be further enhanced, meaning that more supersites are needed as well as clearer definitions of station types and area classification to ensure consistency across the continent.

Further information

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