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02

Special report

Urban pollution in the EU

Cities have cleaner air but are still too noisy

EUROPEAN
COURT
OF AUDITORS

Contents

Executive summary

I Air and noise pollution are recognised by the World Health Organization as two of the most significant environmental threats to human health. Polluted air and environmental noise tend to be worse in urban areas, which is where three out of four EU citizens live.

II The EU has introduced rules governing air quality and environmental noise levels that are intended to protect its citizens. The European Green Deal and the Zero Pollution Action Plan have confirmed the course of EU action by setting objectives to further reduce the impacts of polluted air and excessive noise on human health. We decided to conduct this work because the Commission is halfway through its 2030 zero-pollution targets. The EU legal framework on air is being revised to introduce stricter standards by 2030, but the EU 2002 Environmental Noise Directive has never been revised. The aim of this audit is to help policymakers take effective measures against harmful pollution.

III In our report, we checked whether the existing legal framework has been implemented properly, and whether the measures taken have been effective in improving air quality and lowering noise levels in the selected countries (Greece, Spain and Poland) and cities, i.e. Athens, Barcelona, and Kraków. The Commission estimates that the amount of EU support directed towards clean air objectives is around €46.4 billion and €185.5 billion over the 2014-2020 and 2021-2027 programming periods. We examined measures aimed at addressing air and noise pollution, including some that benefited from EU financial support. We also examined the Commission's action to enforce the implementation of the relevant EU legislation.

IV We found that, while air quality is improving in the EU, including in the cities selected, air quality standards were not always or had only recently been met. The current review of the EU ambient air quality directives, which will tighten existing air quality standards, will require the cities selected to further increase their efforts.

V It is difficult to assess the progress made in reducing noise pollution. This is mainly due to gaps and delays in assessing and reporting the scale of noise pollution by most EU member states. The gaps in noise mapping deprive the authorities of essential data on citizens' exposure to harmful noise levels.

VI In contrast with the EU rules on air quality, there are no EU limit values or reduction targets for noise. We found that actions against noise are not prioritised in the cities selected and are, at best, only partially implemented. We consider that the lack of EU noise reduction targets disincentivises member states to prioritise actions to reduce noise pollution effectively. We also note that the noise reporting thresholds only cover part of the EU population that may be exposed to harmful levels of noise.

VII Where there is a failure to comply with the relevant EU legislation, e.g. exceedance of the air quality limit values or absence of strategic tools to manage noise, the Commission may follow it up and launch an infringement procedure against the member state concerned. We found that the Commission's infringement procedures were often quite lengthy and, in some cases, partially ineffective in resolving the underlying non-compliance issue.

VIII To address air and noise pollution in urban areas effectively, regions and cities should draw up and implement action plans. On some occasions, we found that the action plans in the selected cities were either delayed or had not been drawn up at all, thereby precluding timely and effective responses to such pollution.

IX We also found that the effectiveness of the audited measures taken to combat air and noise pollution at local level was frequently diminished by inadequate planning and coordination by national and regional authorities. As a result, the planned solutions were sometimes scaled down, or deferred.

X When analysing selected projects with an EU-funding component that potentially contributed to improving air quality and reducing noise pollution, we found that it was often impossible to assess their effectiveness and therefore that of the corresponding EU financing. This was due to the absence of dedicated project indicators that allow a project's outcome to be assessed in relation to its contribution to better air quality and lower noise levels.

XI Based on our findings, we recommend that the Commission assess the feasibility of:

- introducing EU noise-reduction targets and noise limits in the Environmental Noise Directive;
- aligning the noise exposure reporting thresholds as closely as possible with those recommended by the World Health Organization.

Introduction

Urban pollution, a major health issue

01 Three out of four EU citizens live in urban areas[1] and the process of urbanisation therefore continues, often having an adverse impact on environmental quality. EU citizens are exposed to pollution from numerous sources, such as air, noise, light or wastewater. Air and noise pollution are among the pressing environmental challenges faced throughout the EU[2].

02 Air pollution is defined as a concentration of contaminants or pollutants in the air that has a negative impact on human health or causes other harmful environmental effects (see ***Box 1*** and ***Figure 2***). Various activities generate emissions that pollute the air (see ***Figure 1***).

Box 1

Main air pollutants harmful to health in 2022

Particulate matter **(PM)** is typically classified as PM_{10} or $PM_{2.5}$ according to its size. PM_{10} and $PM_{2.5}$ are emitted mainly following the combustion of solid fuels for domestic heating (domestic heating is responsible for 43 % of PM_{10} and 62 % of $PM_{2.5}$). In those parts of Europe where homes often still use solid fuel for heating, air pollutant emissions, particularly of PM, tend to increase when winters are more severe. Some PM emanates from natural sources, such as sea salt, Saharan dust and volcanoes, whereas other types (termed secondary PM) result from chemical reactions that take place in the atmosphere.

Nitrogen dioxide (NO_2) is a pollutant gas of reddish-brown colour. It is one of the nitrogen oxides **(NO_x)**. The main source of NO_x is road transport, accounting for 49 % of such emissions.

Sulphur dioxide (SO_2) is a colourless polluting gas with a sharp odour. The energy supply sector is the principal source of SO_2 emissions, accounting for 44 %.

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1 Urban-rural Europe, Eurostat, accessed in March 2024.

2 Air and noise pollution, EP, 2024; Air pollution and health, EEA, 2022.

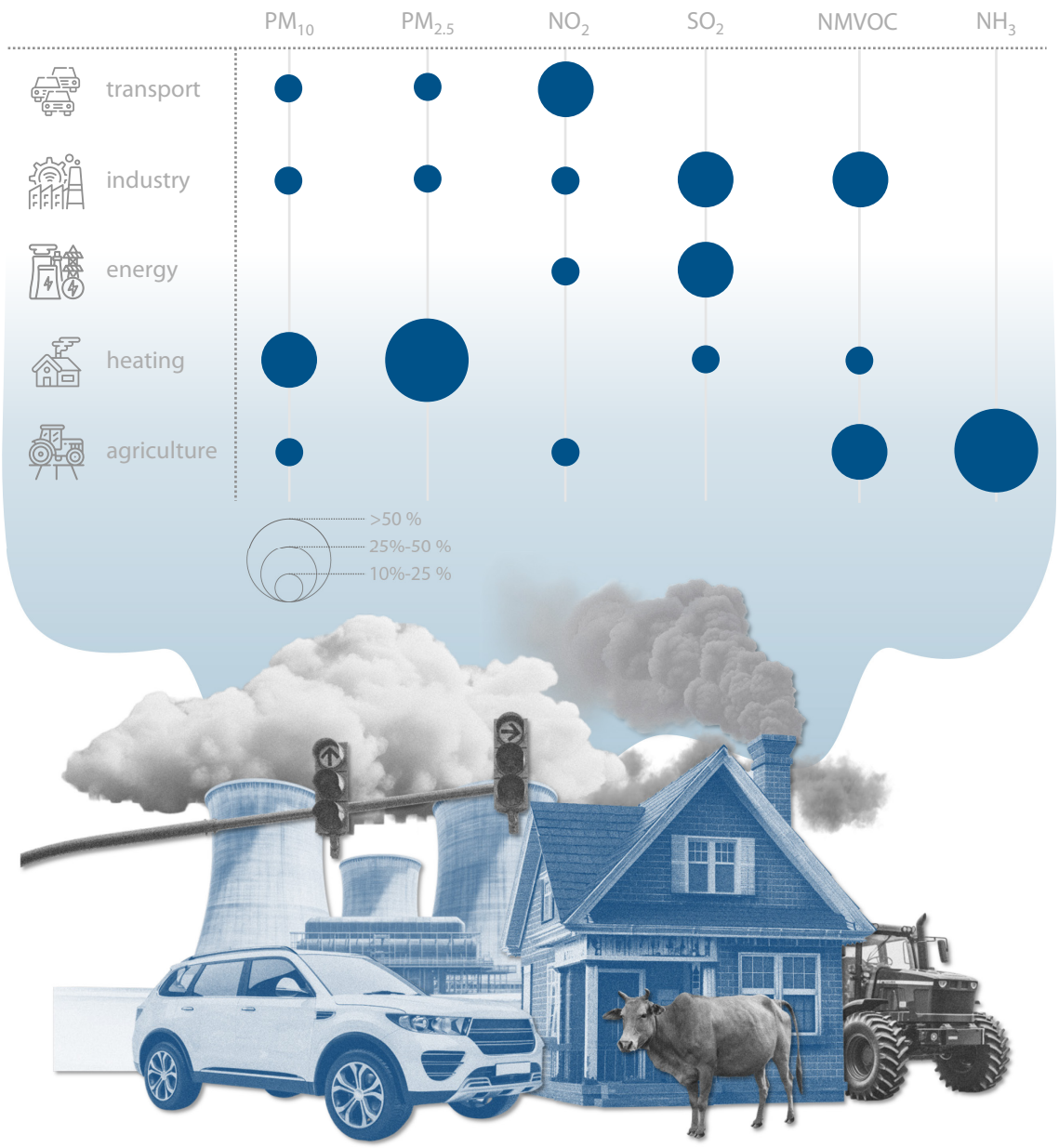
Ground-level ozone (O_3) is a colourless gas formed close to the ground by chemical reactions of pollutants, such as (NO_x), that take place in sunlight. Ozone is also transported to Europe from other parts of the northern hemisphere and from the upper atmosphere.

Non-methane volatile organic compounds (NMVOCs) comprise a mixture of organic compounds with different chemical compositions. The main sources are the manufacturing and extractive industries, which emit 46 % of such pollutants.

Ammonia (NH_3) is a colourless gas emanating mainly from the agricultural sector, which is responsible for 93 % of such emissions. Ammonia contributes significantly to $PM_{2.5}$ formation in the atmosphere.

Source: European Environment Agency (EEA).

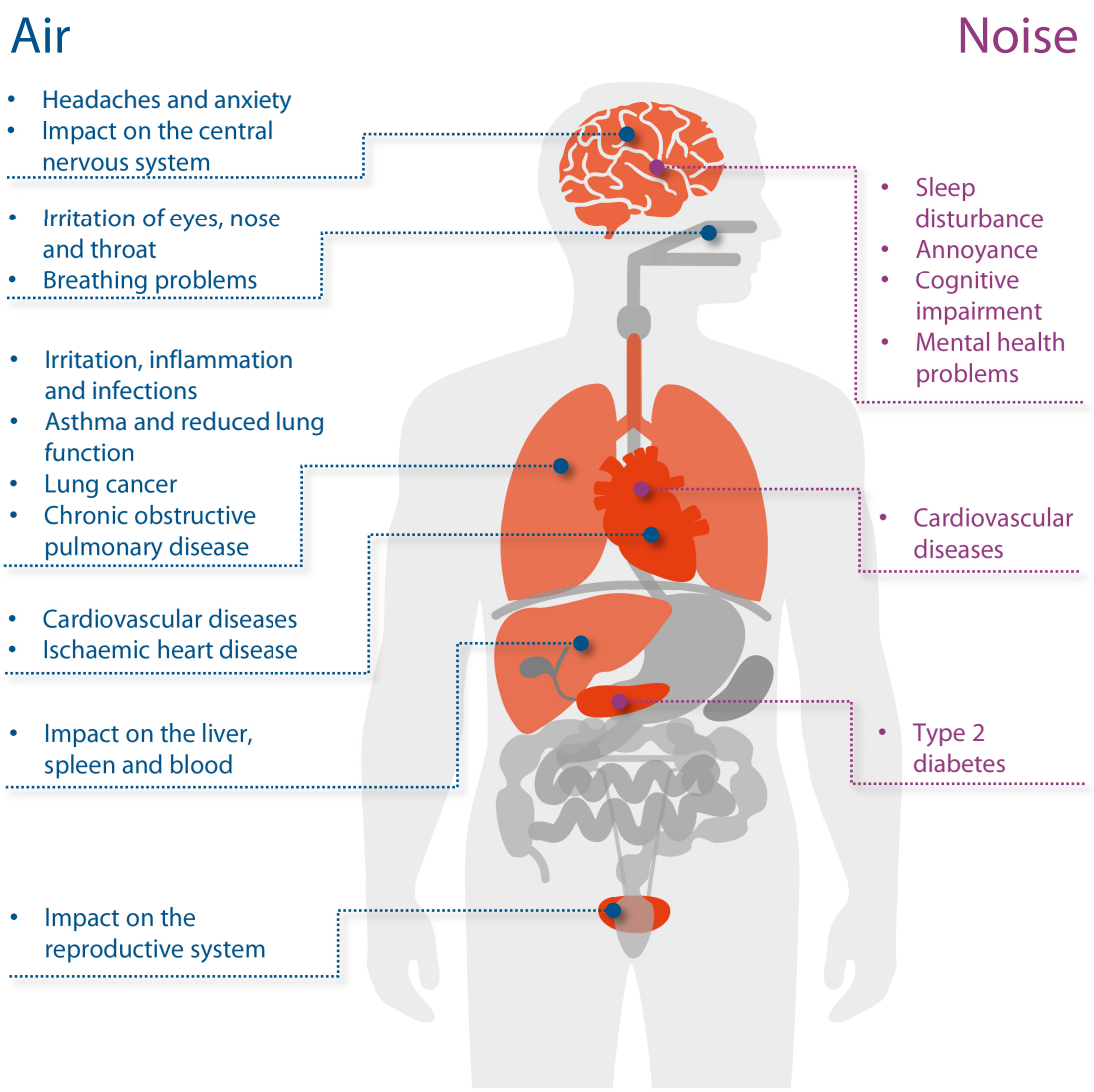
Figure 1 – Share of a pollutant in emissions from a given source, 2022



Source: ECA, based on EEA data.

03 The World Health Organization (WHO) considers air pollution one of the greatest environmental risks to health[3]. The European Environment Agency (EEA) estimates that in 2021, 253 000 people died prematurely in the EU as a result of air polluted by particulate matter ($PM_{2.5}$), 52 000 by nitrogen dioxide (NO_2) and 22 000 by ozone (O_3)[4]. Exposure to high levels of air pollution contributes to other negative health issues, such as asthma, stroke, ischaemic heart disease and lung cancer (see ***Figure 2***)[5].

Figure 2 – Major health issues caused by air and noise pollution



Source: ECA, based on WHO data.

[3] Ambient (outdoor) air pollution, WHO, accessed in March 2024.

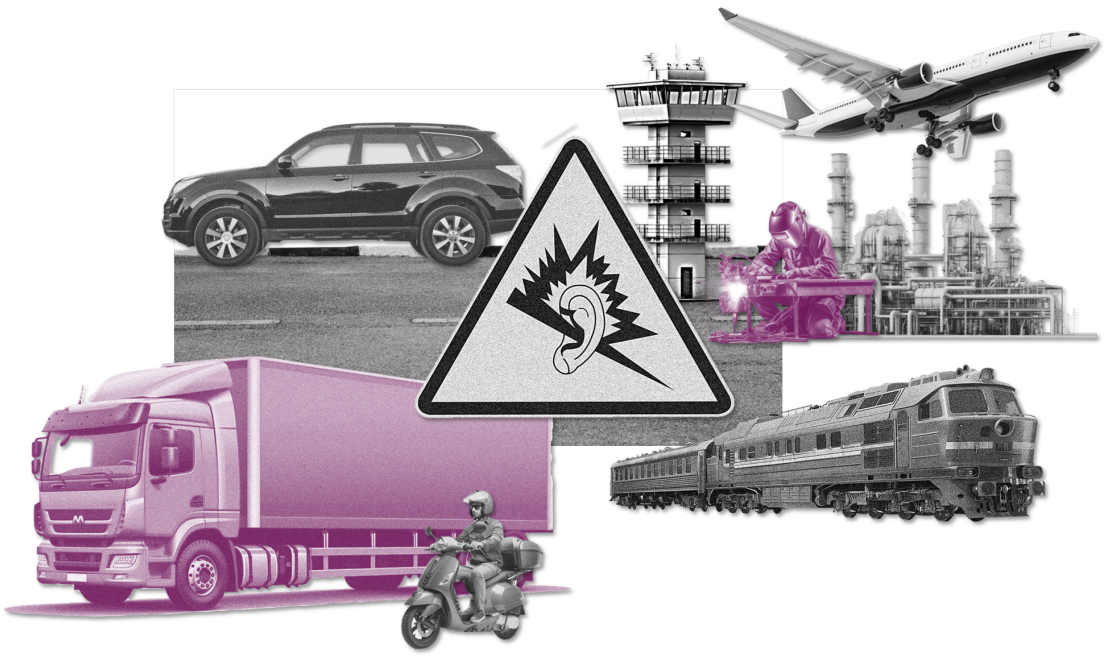
[4] Harm to human health from air pollution in Europe: burden of disease 2023, EEA.

[5] Health impact of air pollution, WHO, accessed in March 2024.

04 Environmental noise means unwanted or harmful outdoor sound created by human activities. Road traffic is the principal source of harmful environmental noise, i.e. noise pollution, followed by railways and aircraft. The WHO considers environmental noise to be the second greatest environmental contributor to the burden of disease in the EU after air pollution[6]. Long-term exposure to environmental noise contributes to 48 000 new cases of heart disease and 12 000 premature deaths in Europe every year[7].

05 The EEA estimates that at least one in five people in the EU are exposed to harmful noise levels[8]. Long-term exposure to excessive noise can result in adverse health effects, such as sleep disturbance, cardiovascular disease, annoyance, cognitive impairment, and mental health problems (see ***Figure 2***). Road noise has been identified as the main source of noise pollution in all EU cities (see ***Figure 3***).

Figure 3 – Main sources of noise pollution reported in accordance with the EU legislation



Source: ECA.

[6] Burden of disease from environmental noise, 2011, WHO and JRC.

[7] Applicable to 33 EEA partner countries, excluding Turkey, Health risks caused by environmental noise in Europe, EEA.

[8] Noise pollution and health, EEA, accessed in March 2024.

EU rules

06 The legal basis for the EU acting on air quality and noise lies in Articles 191 and 192 of the Treaty on the Functioning of the European Union (TFEU). These articles empower the EU to act to preserve, protect and improve the quality of the environment, and protect human health.

Air

07 The two Ambient Air Quality Directives (AAQDs)[9] are a cornerstone of EU clean air policy. They set legal standards to prevent or reduce the harmful effects of air pollution on human health and the environment. They also fix limit values and target values for concentration levels of the most harmful pollutants in the air. Member states are required to monitor air quality and develop air quality plans when EU limit values and target values are exceeded.

08 The National Emission reduction Commitments Directive (NECD) regulates air pollutant emissions in the EU. It imposes country-level emission reduction commitments in respect of five transboundary air pollutants, namely sulphur dioxide (SO_2), nitrogen oxides (NO_x), non-methane volatile organic compounds (NMVOCs), ammonia (NH_3) and particulate matter ($PM_{2.5}$). These pollutants, which overlap partly with those regulated under the AAQDs, contribute to poor air quality that affects human and ecosystem health.

09 The EU has also defined emissions standards for key sources of pollution, such as the energy, transport, and industrial sectors. Its directives and regulations focus on specific sources of pollution, such as residential combustion appliances, industrial emissions (including intensive livestock farming), exhaust emissions (covered by road-worthiness testing), and off-road vehicle emissions, as well as fuel quality standards[10].

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[9] Directive 2004/107/EC and Directive 2008/50/EC.

[10] Air pollution from key sectors, European Commission.

Noise

10 The EU rules aimed at protecting human health from the effects of environmental noise are embedded in the 2002 Environmental Noise Directive (END). The directive requires member states to produce strategic noise maps to assess the population's exposure to environmental noise. Information on environmental noise and its effects should be made available to the public. Member states are also required to develop action plans to reduce noise pollution.

11 Moreover, EU legislation addresses the key sources of noise pollution by imposing various requirements, including limits on road, aircraft and railway noise, and that caused by outdoor equipment.

Zero pollution action plan

12 More recently, in 2021, as part of the European Green Deal, the Commission set specific targets for reducing polluted air and harmful noise by 2030[11]. The aim is to reduce the impact of air pollution on health (premature deaths) by more than 55 % compared to 2005 and its threat to biodiversity in EU ecosystems by 25 %, as well as to reduce the number of people chronically disturbed by transport noise by 30 %. These EU targets are not binding on member states, however.

Roles and responsibilities

13 The Commission's Directorate-General for Environment (DG ENV) is primarily responsible for oversight and enforcement of the implementation of the air and noise directives, while the European Environment Agency (EEA) provides information and manages data on air quality and noise. The role of the EEA includes providing support to the Commission in implementing the directives, and to member states in meeting their reporting requirements. Sectoral DGs are usually responsible for source legislation.

[11] Zero pollution action plan, COM/2021/400.

14 The national authorities, with the Commission's support, are responsible for incorporating the provisions of the directives into national law and implementing them. Member states, in line with the principle of subsidiarity, decide upon measures specific to their national, regional and local circumstances. They are responsible for monitoring, assessing and reporting on air and noise pollution, and drawing up plans to improve air quality and reduce environmental noise. Many responsibilities are delegated to regional and local authorities, including cities' representatives, as they are best able to identify and address residents' needs.

EU budget

15 Actions contributing to clean air policy can be supported using various sources of EU funding, e.g. the Recovery and Resilience Facility (RRF), the European Structural and Investment Funds (ESIF), Horizon 2020/Horizon Europe, the Connecting Europe Facility (CEF). The Commission created a clean-air tracking methodology that is used to estimate the amount of EU support directed towards clean air objectives, which stands at around €46.4 billion and €185.5 billion for the 2014-2020 and 2021-2027 programming periods, respectively. However, the Commission has no such estimate of the EU funds that contribute to noise-reduction objectives.

Audit scope and approach

16 This audit covered EU policies addressing air and noise pollution in urban areas. It provides an insight into the actions undertaken by the Commission, the member states and the cities selected to prevent and reduce polluted air and excessive noise levels. This is our second report addressing air pollution; the first was published in 2018[12].

17 We decided to carry out this work because both air and noise pollution have significant adverse effects on human health and the environment. The Commission is almost halfway through implementing its zero pollution action plan with its specific targets for air and noise pollution reduction by 2030. Both AAQDs have been revised and were merged in October 2024, introducing, among other things, stricter air quality standards that member states must meet by 2030. In contrast, the Environmental Noise Directive has never been revised, except for its annexes. Our conclusions and recommendation could contribute to better implementation of the revised EU rules on air quality and the assessment of the current rules on noise exposure.

18 We examined whether the Commission and member states' actions have been effective in protecting citizens and the environment from air and noise pollution. To answer the main audit question, we assessed whether:

- the Commission and the member states implemented the EU legislation properly;
- the selected measures, including those funded by the EU, contributed effectively to reducing air and noise pollution.

19 Our audit focused on the EU legislation for protecting citizens from the most harmful air pollutants and excessive noise, namely the 2008 Ambient Air Quality Directive (AAQD), the National Emission reduction Commitments Directive (NECD) and the Environmental Noise Directive (END). We analysed the Commission's actions in enforcing the implementation of the EU legislation up to July 2024. We did not examine the implementation of EU sectoral legislation covering air and noise emissions at source.

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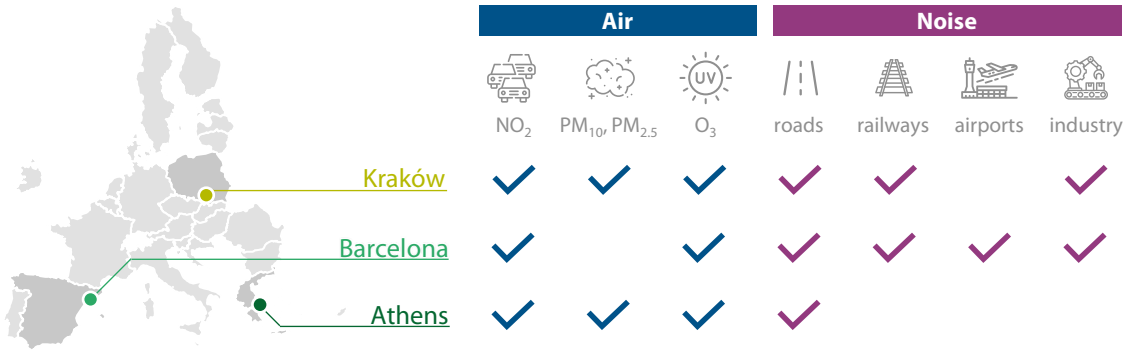
[12] Special report 23/2018.

20 To assess the effectiveness of national and local actions aimed at achieving the objectives set by the EU legislation, we selected three member states and cities: i.e. Athens in Greece, Barcelona in Spain and Kraków in Poland. For the purposes of the audit, we selected the urban areas for air and noise pollution managed by a single authority. This selection allowed us to cover urban areas that suffer from various sources of air pollution, combined with elevated noise levels (see ***Figure 4***). We examined the measures taken to address air and noise pollution, including those supported by EU-funded projects over the 2014-2020 and 2021-2027 programming periods (13 projects in total, with 4 in Barcelona, 4 in Kraków and 5 in Athens). Neither the Commission's clean-air tracking methodology nor the resulting estimated amounts were examined during the audit.

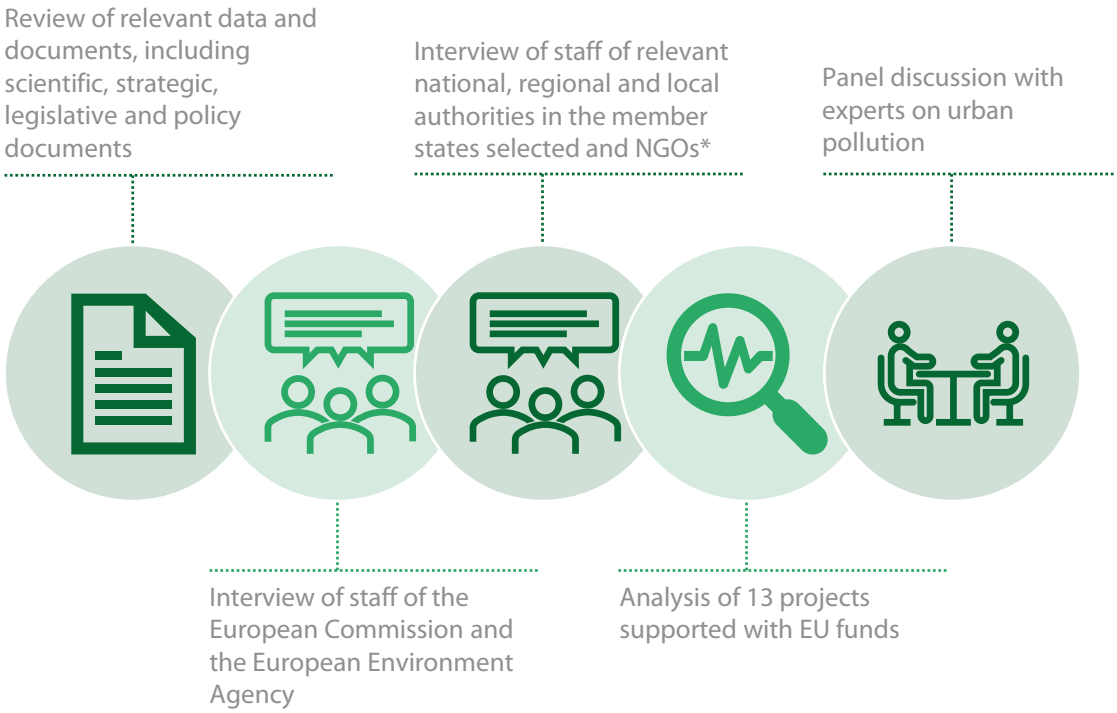
Figure 4 – Criteria for city selection



Source: ECA.

21 *Figure 5* shows how we collected the evidence.

Figure 5 – Audit evidence



* Ecologistas en Acción, Eixample Respira, Plataforma per la Qualitat de l'Aire, Krakowski Alarm Smogowy, and Elliniki Etairia (Society for the Environment and Cultural Heritage).

Source: ECA.

Observations

Achievements and gaps in the implementation of the EU legislation

Despite improvements, EU air quality standards are consistently not met in the cities selected

22 The AAQD requires member states to monitor and assess air quality in urban areas. National authorities must also report air quality data to the Commission annually[13]. In turn, the NECD obliges member states to reduce national emissions of the main air pollutants[14]. We examined the member states' compliance with the reporting obligations. We also analysed the data on air quality in the three cities selected to assess the trend in air pollution in recent years, as well as the progress made in meeting the national emission reduction commitments.

Ambient Air Quality Directive

23 In line with the Ambient Air Quality Directive, member states must delimit air quality zones and assess the quality of the air within them[15]. Air quality in the EU is monitored and assessed against the air quality standards established per pollutant in the AAQD. These standards allow assessment of the concentration of various air pollutants, particularly in the places where most citizens live.

24 The AAQD standard values are decided by the European Parliament and the Council, based on a Commission proposal, and are legally binding on the member states. They take into account the WHO's evidence-based air quality guidelines[16], which establish a link between air pollution and its impact on health. The WHO guidelines state that features other than solely scientific evidence and public health considerations may be taken into account when standards are set (see ***Box 2***).

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[13] Articles 1.1, 4 and 27.2 of the AAQD.

[14] Article 1.1 of the NECD.

[15] Article 4 of the AAQD.

[16] Global air quality guidelines, WHO, 2021.

Box 2

Air quality standards and goals as defined by the WHO

“Air quality standards may be based solely on scientific evidence and public health considerations. However, other features such as legal aspects, cost-benefit or cost-effectiveness may also be examined. In practice, there are generally several opportunities within a legal framework to address economic issues, as well as issues related to technological feasibility, infrastructural measures and sociopolitical considerations. These can be considered during the standard-setting process or when designing appropriate measures to control emissions".

"While achievement of the air quality guidelines levels should be the ultimate goal of actions to implement the guidelines, this might be a difficult task for many countries and regions struggling with high air pollution levels. Therefore, gradual progress in improving air quality, marked by the achievement of interim targets, should be considered a critical indicator of improving health conditions for populations".

Source: Global air quality guidelines, WHO, 2021.

25 The 2008 EU air quality standards are less stringent than those recommended by the WHO in 2005. In our 2018 special report, we recommended that the Commission update the EU limit and target values in line with the WHO’s most recent guidance[17]. The 2024 revision of the AAQD sets revised air quality standards to be met by 2030 that are closer to the WHO’s recommendations (see ***Figure 6***), with the option of aligning with them by 2050[18].

[17] Special report 23/2018, recommendation 2(a).

[18] P9_TA(2024)0319, EP.

Figure 6 – Air quality standards

to be attained by 2030 ⋯▼ ☆ new limit 👍 increase in ambition ↔ limit remains the same

	Current EU limit values	New EU limit values	WHO's 2021 Air quality guidelines	Averaging period	
NO_2	200 Max. 18x	200 Max. 3x	N/A	one hour (µg/m³) Exceedances permitted per year	
	N/A	50 Max. 18x	25 Max. 4x*	one day (µg/m³) Exceedances permitted per year	
	40	20	10	In a calendar year (µg/m³)	
PM_{10}	50 Max. 35x	45 Max. 18x	45 Max. 4x*	one day (µg/m³) Exceedances permitted per year	
	40	20	15	In a calendar year (µg/m³)	
$PM_{2.5}$	N/A	25 Max. 18x	15 Max. 4x*	one day (µg/m³) Exceedances permitted per year	
	25	10	5	In a calendar year (µg/m³)	
SO_2	350 Max. 24x	350 Max. 3x	N/A	one hour (µg/m³) Exceedances permitted per year	
	125 Max. 3x	50 Max. 18x	40 Max. 4x*	one day (µg/m³) Exceedances permitted per year	
	N/A	20	N/A	In a calendar year (µg/m³)	
O_3	120 Max. 25 days	120 Max. 18 days	N/A	target value	daily max. eight-hour mean (µg/m³) Exceedances permitted per year averaged over 3 years
	120**	100***	100 Max. 4x*	long-term objective	daily max. eight-hour mean (µg/m³) within a calendar year
	N/A	N/A	60	peak season	average of daily max. eight-hour mean concentration (µg/m³) in the six consecutive months with the highest six-month running-average concentration

* 3 to 4 days in a year correspond to the 99th percentile of daily measurements in 1 year.

** Long-term objective with no fixed deadline.

*** To be attained by 2050.

Source: ECA, based on WHO and Commission data.

26 We found that, in general, all member states regularly report data on air quality (collected through a network of measuring stations[19]) to the EEA. The completeness of the data reported allows the EU air quality trend to be assessed.

27 The data available indicate that air quality in the EU has actually improved overall. In 2013, according to the EEA, and the member states that reported on compliance with the EU standards, 6 member states had breached the EU's annual PM_{10} limit and 19 had exceeded its annual NO_2 limit. We reported a similar number of breaches in our 2018 special report[20]. In 2022, 4 member states breached the EU's annual PM_{10} limit and 10 exceeded its annual NO_2 limit values[21].

28 The Commission is making headway in meeting its zero-pollution target (see paragraph ***12***), which requires it to reduce the impact of air pollution on health in terms of the number of premature deaths by more than 55 % by 2030 compared to 2005. In 2005, there were 431 114 premature deaths in the EU due to exposure to $PM_{2.5}$. In 2021, this figure fell to 253 305, which represents a reduction of 41 % with respect to 2005.

29 The concentration of air pollution in the three cities selected has also dropped over the years, but they have only recently been able to approach some of the current EU limits and will need to step up their efforts to meet the EU's forthcoming stricter 2030 standards (see ***Figure 7*** and ***Annex I***). NO_2 pollution generated by the transport sector presents a challenge common to all three cities. Athens still struggles with overly high levels of ozone, as does Kraków with particulate matter.

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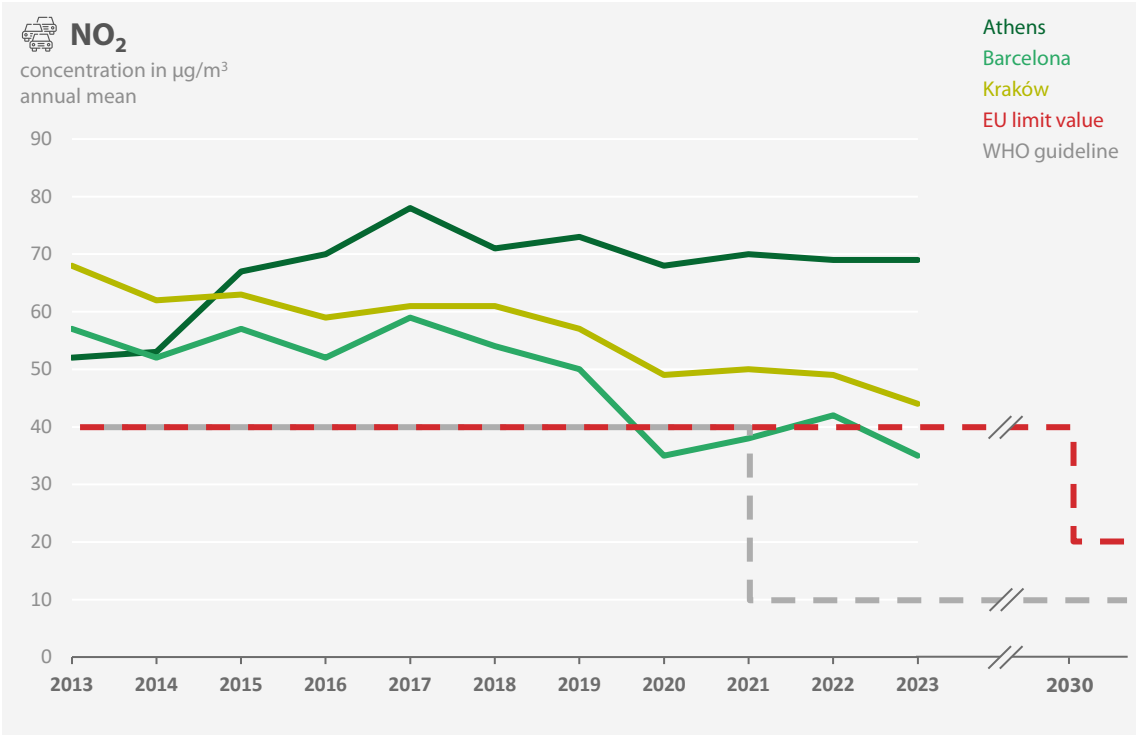
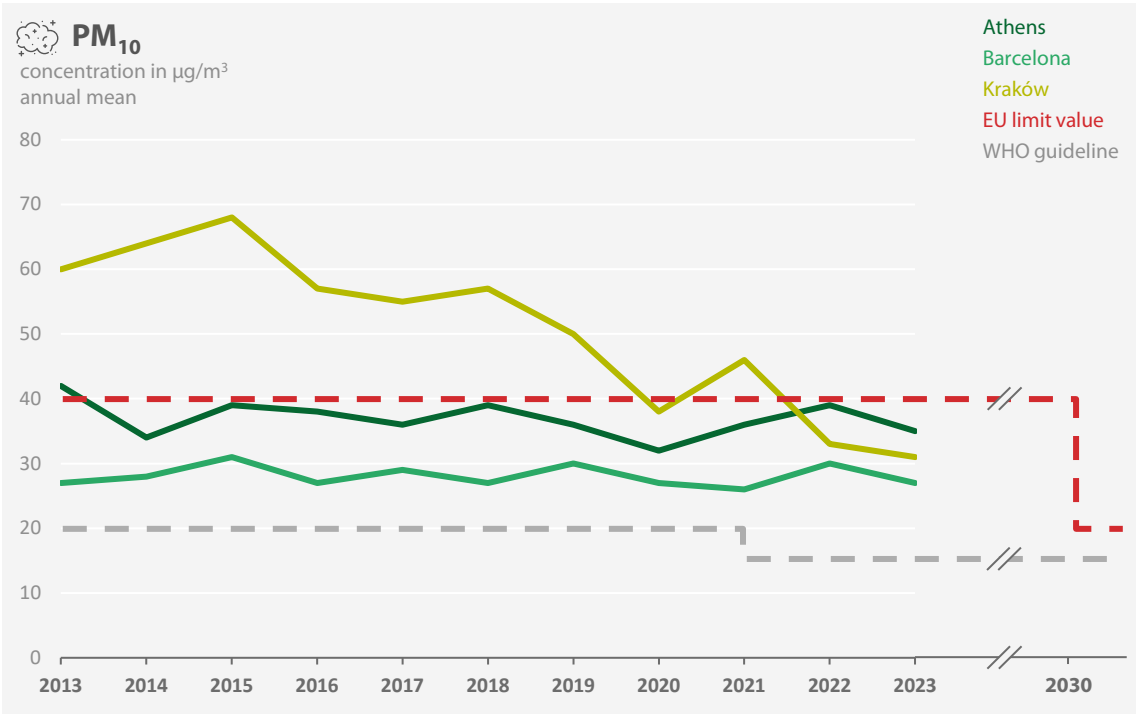
[19] Central Data Repository, European Environment Information and Observation Network, accessed in June 2024.

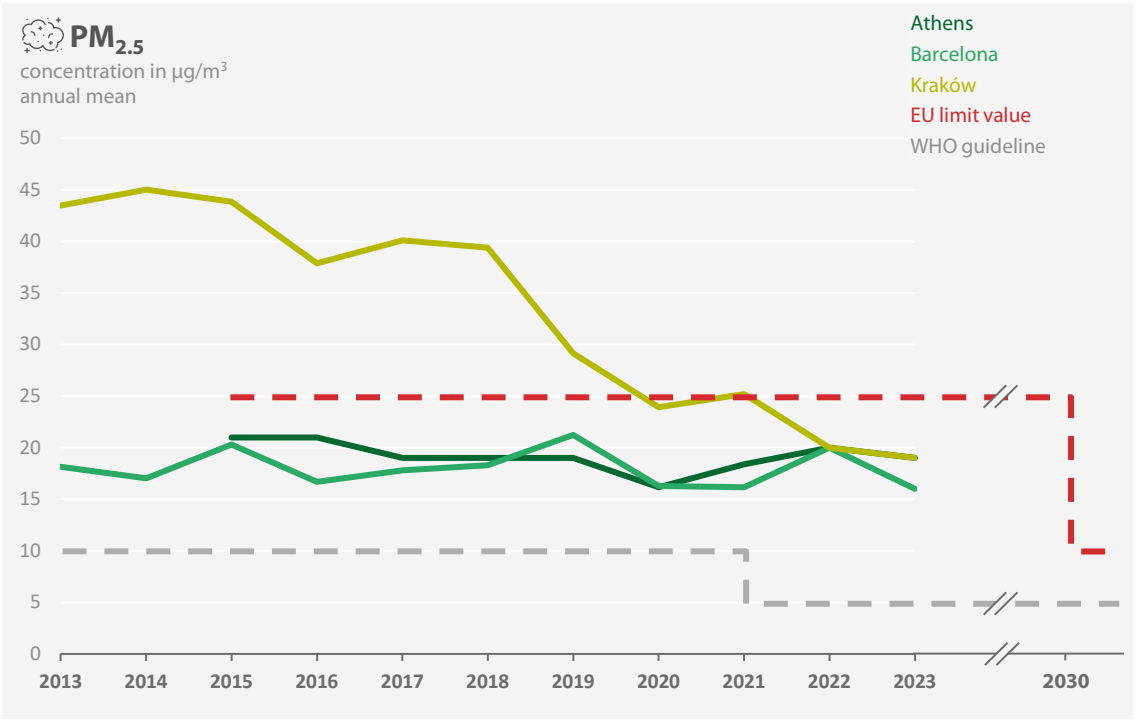
[20] Special report 23/2018, paragraph 28.

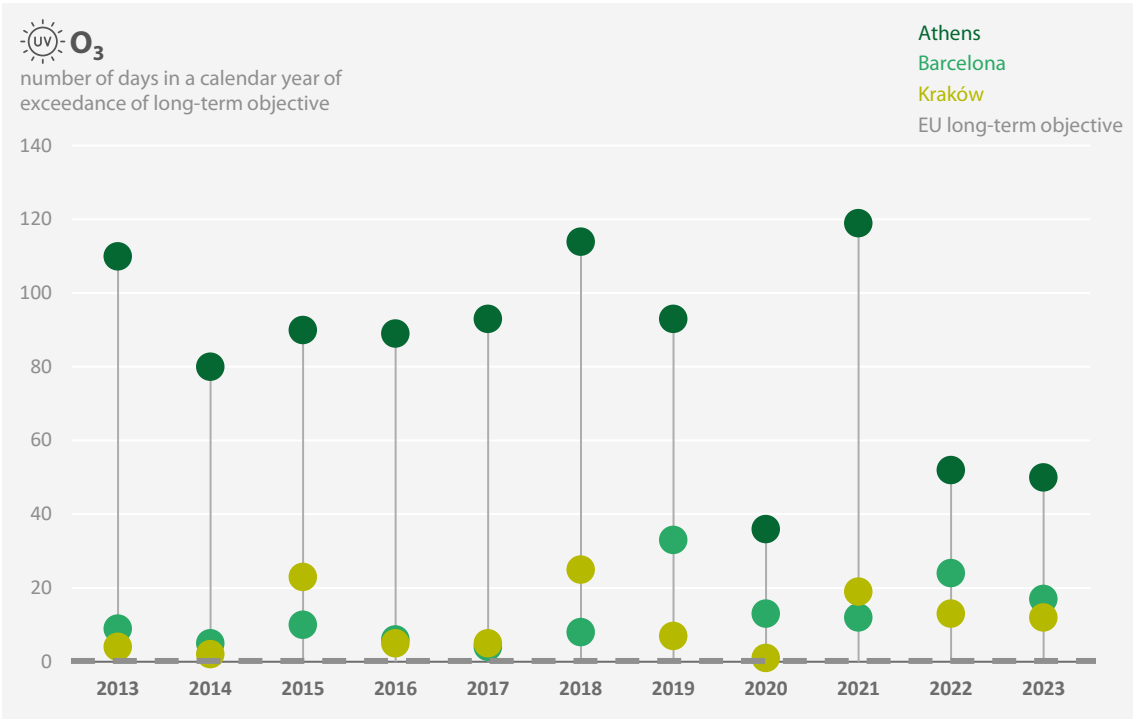
[21] Attainment Summary, EEA, accessed in July 2024.

Figure 7 – Trends in air quality in Athens, Barcelona and Kraków









*Note on **Figure 7***: the values shown for NO_2, PM_{10} and $PM_{2.5}$ represent the city's highest annual mean concentration as reported by its measuring stations, net of any contribution from natural sources. The Kraków NO_2 value for 2022 is based on modelling. No $PM_{2.5}$ values are available for Athens for 2014. The O_3 values represent the number of days in exceedance of the long-term objective laid down in the AAQD, though there is no deadline by which the long-term objective is to be met.

Source: ECA, based on EEA data as reported by member states.

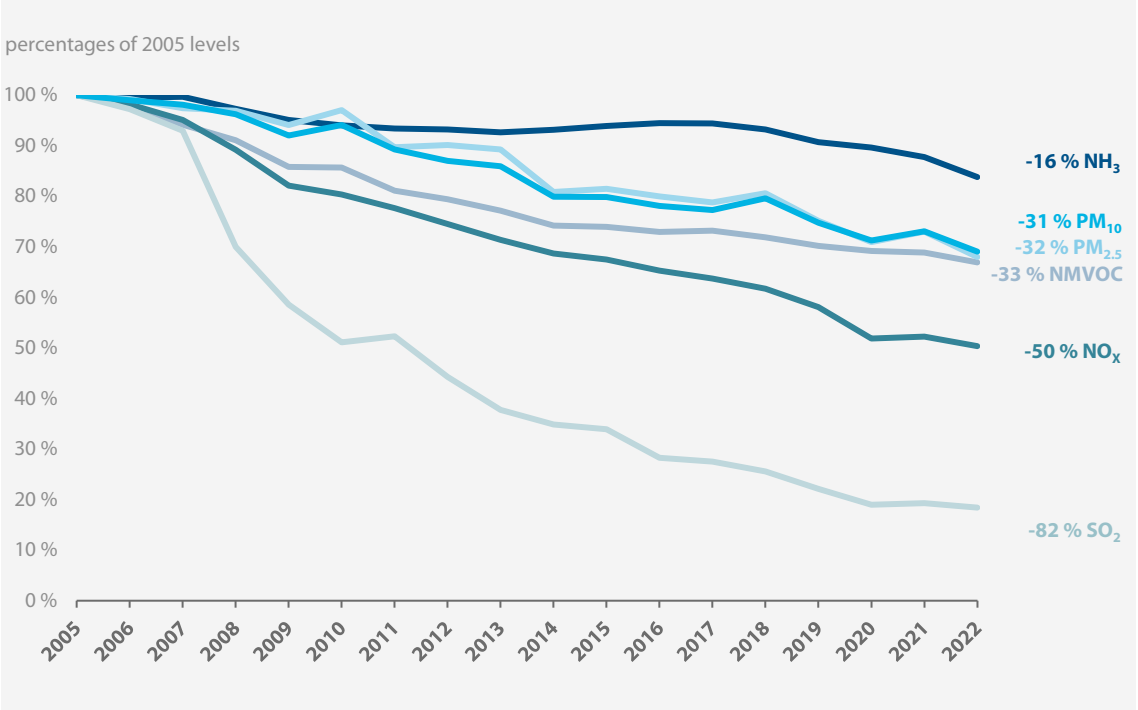
National Emission reduction Commitments Directive

30 The National Emission reduction Commitments Directive (NECD) focuses on emissions of various harmful air pollutants, whereas the AAQD regulates their concentrations. Under the NECD, each member state must meet its national reduction commitments for the five main pollutants (see ***Box 1***), namely sulphur dioxide (SO_2), nitrogen oxides (NO_x), non-methane volatile organic compounds (NMVOCs), ammonia (NH_3), and fine particulate matter ($PM_{2.5}$). To meet their national reduction commitments, member states are obliged to draw up and implement National Air Pollution Control Programmes (NAPCPs) that include measures to reduce emissions from polluting sectors.

31 The emissions reduction commitments specify the minimum emission reduction to be attained in the calendar year concerned compared to the level of emissions in 2005. They have been set for the 2020-2029 period, and from 2030 onwards. Compliance with the reduction commitments is assessed on the basis of national emissions inventories. Progress in relation to targets is assessed using national emissions projections. Two scenarios are considered in the emissions projections: one in which the impact of existing measures is predicted and another in which measures are added to ensure the target is met. National emissions projections are based on the assumption that all existing and additional measures will be fully implemented and effective.

32 Overall, emissions of the main air pollutants are steadily declining in the EU (see ***Figure 8***). Reducing ammonia emissions constitutes the greatest challenge, as they decreased only slightly (by 16 %) between 2005 and 2022. It should also be noted that, owing to the complex chemical reactions that produce certain pollutants in the atmosphere, a reduction in emissions does not automatically result in lower concentrations of those pollutants.

Figure 8 – Trends in EU emissions of main pollutants, 2005-2022



Source: ECA, based on EEA data as reported by member states.

33 According to the national inventories[22], Greece, Spain and Poland have already met their respective 2020-2029 emission reduction commitments for each of the NECD air pollutants (in 2022). In all three member states visited, the projected emission reduction commitments for 2030 onwards are expected to be met for all pollutants, except for NMVOCs in Spain[23].

34 In the cases of Poland, this will be subject to the national authorities taking additional measures to address the sources of emissions. For example, in order for the Polish authorities to meet their projected ($PM_{2.5}$) reduction commitment, they will have to significantly limit the emissions of various sectors, including that of energy supply. The additional measures planned by the authorities are long-term and ambitious, and include the development of, among other things, the nuclear and offshore renewable energy sectors[24]. Further additional measures are needed to sufficiently reduce NMVOC emissions in Spain in 2030 in line with the reduction commitment.

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[22] Air pollution in Europe: 2024 reporting status under the National Emission reduction Commitments Directive, based on 2022 data reported in 2024, EEA, accessed in July 2024.

[23] National Air Pollution Control Programmes and Projections, Commission.

[24] Update of the National Programme on reducing air pollution,2023, p. 77.

35 Air pollution also has a direct adverse effect on the environment. EU legislation specifically requires monitoring of the impact of polluted air on vegetation. However, the impact of air pollution on urban ecosystems is not reported, as monitoring is only required outside urban areas.

Gaps and delays in reporting noise pollution make it difficult to assess progress

36 The END tackles environmental noise caused by roads, railways, airports and industries both in and outside urban areas. In contrast with the AAQD and the NECD, the END does not include any EU limit values or reduction targets. The noise limits may be established by each individual member state. The END instead requires member states to determine noise levels and assess the number of people exposed to them in all agglomerations with more than 100 000 inhabitants. This is to be done by carrying out strategic noise mapping, the results of which must be reported to the Commission via the data repository within 6 months of completion[25]. We checked whether the three cities we visited had carried out strategic noise mapping as required. We also examined the member states' compliance with the reporting obligations.

37 When conducting strategic noise mapping, member states should measure and report the number of people exposed to noise levels against two thresholds: Lden and Lnight. Lden is a long-term descriptor of averaged noise levels measured over all days, evenings and nights in a year; Lnight covers the night period.

38 We noticed that the END reporting thresholds require measurement of exposure to noise levels starting at 55dB (Lden) and 50dB (Lnight), levels that are less stringent than the WHO's recommendations on noise exposure limits (see ***Table 1***). This means that the Commission's assessment, which is based on the END thresholds, takes into consideration only part of the population exposed to harmful noise levels[26]. A recent report[27] assessed what proportion of the EU population was exposed to potentially harmful noise levels, i.e. above the maximum levels recommended by the WHO (Lden), in 2017. It indicated that this was the case for some 200 million citizens because of

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[25] Articles 7 and 10 of the END.

[26] Implementation of the Environmental Noise Directive, COM(2023) 139.

[27] Blanes et al. (2022). Projected health impacts from transportation noise – Exploring two scenarios for 2030 (European Environment Information and Observation Network Report – ETC/HE 2022/5).

road, rail and aircraft noise. The same report also stated that the number of people exposed to noise levels meeting the END reporting thresholds was around 117 million.

Table 1 – END reporting thresholds vs WHO recommended levels

		Lden day, evening, night		Lnight night	
		WHO	EU	WHO	EU
Road	dB	53	55	45	50
Railway	dB	54		44	
Aircraft	dB	45		40	

Source: ECA, based on the END and WHO guidelines.

39 The Commission should use the information in strategic noise maps to make a global assessment of noise exposure across the EU. Since June 2007, member states have been obliged to produce strategic noise maps for agglomerations every 5 years. The fourth and most recent round of reporting was due to take place in June 2022 and the results should have been reported to the Commission by the end of the same year.

40 In Kraków, the strategic noise mapping of the agglomeration was carried out in all four rounds, albeit with slight delays. The latest data (2022) indicate that more than 243 000 citizens out of over 800 000 (30 %) were exposed to traffic noise levels that met the END reporting threshold (Lden).

41 There have been three rounds of reporting in Barcelona, following 2-to-3-year delays. As the fourth round has not yet been approved, the latest data available is from 2017[28], which shows that over 1 089 000 residents out of over 1 657 000 (66 %) were exposed to traffic noise levels that exceeded the END reporting threshold (Lden).

42 We found that the Greek national authorities had not carried out the first round of strategic noise mapping for the agglomeration of Athens. The only noise data currently available for the agglomeration dates back to 2014 and was compiled in the second round. This data indicated that 1 309 000 people out of over 1 336 000 (98 %) were exposed to traffic noise levels above the reporting threshold (Lden). Greece did not conduct the third round of noise mapping. At the time of the audit, the Greek

[28] Strategic noise map, Agglomeration of Barcelonés I, Government of Catalonia.

authorities were still updating the strategic noise map for the agglomeration as part of the fourth round, which should have been completed by the end of 2022.

43 We noted that the Commission had updated the Annex to the END with respect to common noise assessment methods in 2020[29], the aim of which was to harmonise member states' future noise assessments. According to the Polish and Spanish authorities, however, the change has made it impossible to compare the noise pollution trends indicated by the third and fourth rounds of mapping.

44 We also found considerable gaps in the reporting of most member states. At the time of the audit, 15 member states had not yet provided all the data required, including Spain and Poland (see ***Figure 9***). Greece has never reported information on strategic noise mapping in the data repository, as the END requires, and the national authorities have not explained the reasons for their non-compliance.

Figure 9 – Status of member states' reporting under the 2022 noise mapping exercise (phase IV, as of May 2024)

Source: ECA, based on EEA data as reported by member states.

45 Due to the gaps in member states' reporting and the most recent changes in methodology, it is not possible to map the EU noise pollution trend of recent years, including in the three cities selected. According to the Commission and the EEA, however, it seems unlikely that the zero-pollution noise target (see paragraph ***12***) of reducing the number of people harmed by transport noise by 30 % by 2030 will be achieved. The Commission's current estimates show that the number will not decline

[29] Commission Delegated Directive (EU) 2021/1226.

by more than 19 % by 2030 and, under the pessimistic scenario, the overall number of people chronically disturbed by transport noise may even increase by 3 %[30].

46 Noise pollution adversely affects urban biodiversity, and urban bird populations in particular. The documented effects primarily hamper birds' ability to communicate and force behavioural changes, which often drive many species out of built-up areas. The END does not require monitoring of the impact of noise pollution on biodiversity in the EU, and none of the member states visited assesses this phenomenon.

Action plans are not used as effective management tools

47 Action plans are strategic tools that serve to manage air and noise pollution in cities[31]. EU legislation requires that they be drawn up to address the main problems caused by air and noise pollution. In our 2018 report, we stated that air quality plans had not been up to ensuring compliance with the AAQD[32]. We checked whether plans had been drawn up in the cities selected within the specified time limit. We also verified whether their implementation had been monitored[33] to ensure that the plans were providing a satisfactory response to the evolving situation with regard to air and noise pollution. The results of our examination of the effectiveness of the selected measures embedded in the action plans are set out in the second part of this report (see paragraphs ***64-90***).

Air

48 When the concentration of a pollutant subject to monitoring exceeds the EU limit or target value, the relevant authorities are required to adopt an air quality plan (AQP). In all three cities, exceedance of certain air pollutants was recorded over many years (see ***Figure 7***). The AQP should contain appropriate measures to ensure that the duration of such exceedances is as short as possible.

49 The Kraków regional authorities had drawn up the AQPs and updated them regularly. Where the authorities fail to implement them satisfactorily, the Voivodeship inspectorate of environmental protection may impose financial penalties. The most

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30 Implementation of the Environmental Noise Directive, COM(2023) 139.

31 Article 23 of the AAQD and Article 8 of the END.

32 Special report 23/2018, paragraph 47.

33 Annex XV, section A, point 8c of the AAQD.

recent report[34] concluded that the city had implemented the planned measures on time and that they had led to tangible improvements in the city's air quality, as demonstrated by the data on PM concentrations.

50 In Barcelona, AQPs were adopted in 2007 and 2014, but the 2014 plan had to be extended pending the adoption of a new plan, which was still outstanding at the time of the audit. While the implementation of the measures in the 2014 plan is followed up, we found that the latest draft of the updated action plan did not contain a comprehensive assessment of the effectiveness of measures already implemented, and that most had been rolled over in the absence of a quantifiable examination of the rationale for doing so.

51 In Athens we found that, despite the exceedance of EU limits over many years, the relevant authorities had not yet drawn up an AQP. The draft AQP, the outcome of an EU-funded project completed in September 2022, had not yet been adopted at the time of the audit. Against this backdrop, we noted overlapping actions and limited cooperation between the various authorities at central level and with city representatives (see paragraphs ***84*** and ***85***).

Noise

52 To manage noise-related issues, including noise-level reduction, member states are obliged[35] to draw up action plans, for places near sources of noise within agglomerations and close to major roads, railways and airports. The first action plan was supposed to be ready by 2008 and should have been revised every 5 years.

53 In Kraków, we found that the action plans for the agglomeration had been adopted and updated with slight delays. The latest plan (2019-2023) not only contains a list of the measures planned to address noise pollution in the city but also provides an analysis of measures carried out under the previous plan. Only some measures had been implemented, and the city pointed to budgetary constraints as the main reason for this. In the context of analysis of the effectiveness of the measures for addressing noise pollution, the Polish authorities stated that full alignment with the national noise limits in a large city such as Kraków was neither feasible nor achievable.

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[34] Inspection report WIOS-KRAK 309/2023.

[35] Article 8 of the END.

54 In Barcelona, action plans for the agglomeration had been adopted after delays of several years. The revised plans did not contain an analysis of the impact of measures already implemented, as was also the case with the air quality plans (see paragraph ***50***).

55 In Athens, an action plan for the agglomeration had been drawn up only once, in 2014. At the time of the audit, the Greek authorities had not yet updated it.

Commission enforcement was neither timely nor fully effective in the cities selected

56 The Commission should enforce EU-law implementation effectively[36]. The Commission has discretionary power to launch infringement proceedings against member states that it deems have breached EU law[37]. The infringement procedure consists of various steps and may ultimately result in a member state being referred to the Court of Justice of the EU (CJEU). According to the CJEU's settled case law, the burden of proof for the alleged infringement lies with the Commission. Infringements of EU law should be dealt with promptly[38]. In the cities selected, we examined the Commission's enforcement efforts aimed at bringing member states into compliance with the EU legislation on air and noise pollution in a timely and effective manner (see also our special report on enforcing EU law[39]).

57 Infringements of environmental law account for the largest number of cases dealt with by the Commission at around 20 % of the total[40]. Since the AAQD, the NECD and the END entered into force, the Commission has launched 106 infringement cases[41] against member states for failure to comply with the directives[42]. Of the 106 procedures launched, 51 % (54 cases) have been closed and the remainder are still

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36 Article 17(1), TEU.

37 Article 258, TFEU.

38 "EU law: Better results through better application", 2017/C 18/02.

39 Special report 28/2024 "Enforcing EU law: The Commission has improved its management of infringement cases, but closing them still takes too long".

40 Environmental Implementation Review, Commission.

41 Infringement procedures, Commission, accessed on 25 July 2024.

42 This number includes cases of incorrect implementation and failure to comply but has excluded non-communication infringements since 25 July 2024.

ongoing. 25 of the 106 procedures were referred to the CJEU, which has delivered judgments in respect of 22 of them.

58 If a member state fails to comply with a judgment, the Commission can refer the case back to the CJEU and ask it to impose financial penalties in the form of a lump sum and/or a daily penalty payment[43]. The Commission has asked for financial penalties to be imposed on one member state (Bulgaria) in 2021 and issued letters of formal notice based on Article 260 TFEU to France, Italy, Hungary and Poland.

59 The timeliness of the completion of an infringement procedure is key to ensuring that the process is effective. In 2010, the Commission undertook to conclude infringement procedures within 3 years of their launch. In our 2018 special report[44] we concluded that the Commission's lengthy enforcement procedure has not yet ensured compliance with the AAQD and recommended that the Commission actively manage each stage of the infringement procedure to shorten the period before cases are resolved or submitted to the CJEU.

60 We examined in detail eight infringement cases that concerned the AAQD and the END in the cities selected (see ***Figure 10***). We found two unresolved cases that had been open for over a decade. Furthermore, in five other cases reviewed, the length of the procedure exceeded the Commission's internal 3-year benchmark.

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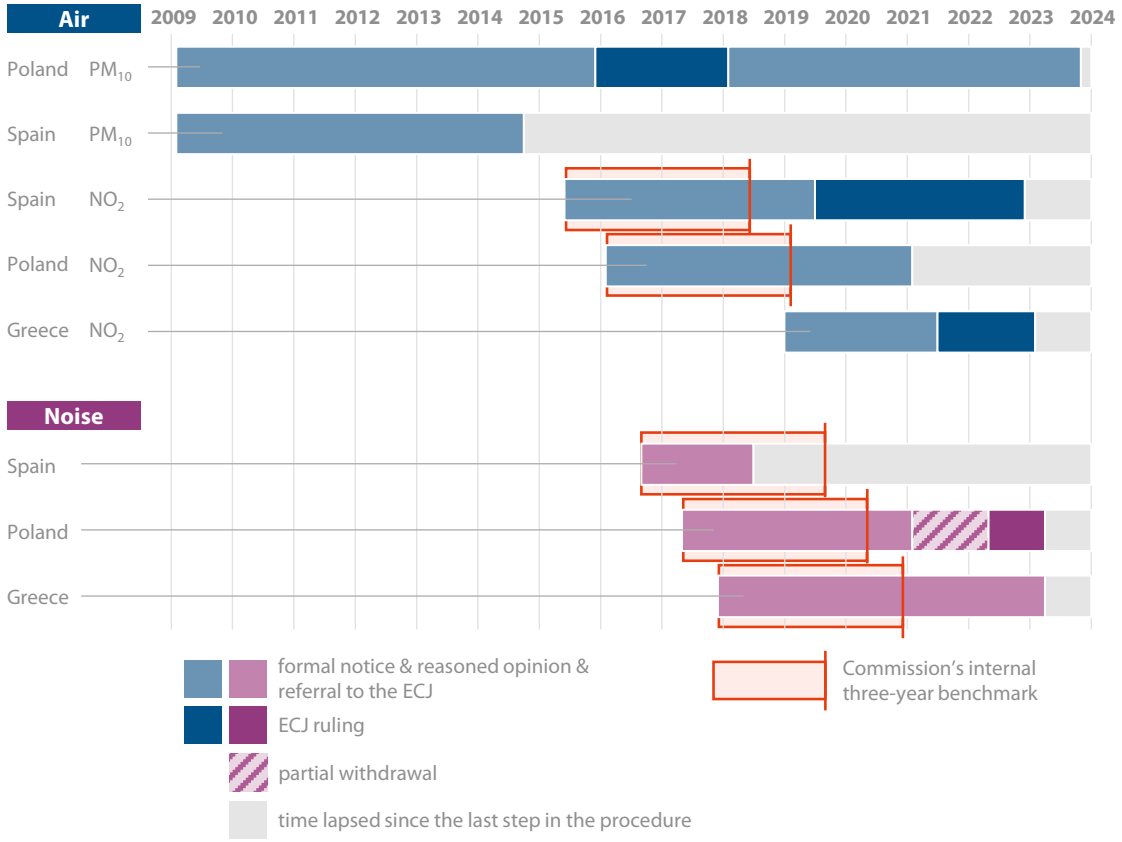
[43] Article 260, TFEU.

[44] Special report 23/2018, paragraphs 48-54.

Figure 10 – Infringement procedures vis-à-vis the Commission benchmark



Source: ECA, based on Commission data.

61 According to the Commission[45], the lack of compliance and adequate measures to meet air quality standards for key pollutants demonstrating persistent exceedances are among the main priorities with regard to air quality that should trigger the enforcement process. Our analysis indicates that in cases against Spain, Poland and Greece, the Commission launched the infringement procedures as late as 5, 6 and 9 years after it had become aware of their failure to comply with the deadline applicable to the NO_2 pollutant.

62 The Commission won in three cases brought before the CJEU against Greece, Spain and Poland on the grounds of exceedances of the concentration limit values for air pollutants beyond the AAQD deadline (see ***Table 2***). In two cases the exceedances continued even after the CJEU's ruling.

[45] A Europe that protects: Clean air for all, COM(2018) 330; exchange of information between the ECA and the Commission, May 2024.

Table 2 – Overview of infringement cases against the cities selected

Country and infringement number	Pollutant	AAQD deadline for attainment of the limit value	Year in which the infringement procedure was launched	Has the exceedance continued (2023 data)?	Year and CJEU case reference
Poland (Kraków) INFR(2008)2199	PM_{10}	2005	2009	yes	2018 C-336/16
Spain (Barcelona) INFR(2015)2053	NO_2	2010	2015	no	2022 C-125/20
Greece (Athens) INFR(2018)2361	NO_2	2010	2019	yes	2023 C- 633/21

63 Non-compliance with the END concerns the absence of strategic noise maps and action plans. It is an issue common to all three member states and cities. In the case of Poland, the infringement procedure was launched in 2017 and resulted in the CJEU's ruling made in 2023. The infringement procedures against Spain and Greece, launched in 2016 and 2017, respectively, have not yet been referred to the CJEU. At the time of the audit, and with the procedures still ongoing, none of the three countries had met the relevant END requirements.

Cities struggle to address air and noise pollution effectively

64 Member states should introduce measures to address polluted air and noise[46]. We checked the measures reviewed in the cities selected, including the ones that had an EU-financing component, to assess their contribution to reducing air and noise pollution. We also analysed the difficulties arising from their implementation and impacting their effectiveness.

[46] Article 23 of the AAQD and Article 8 of the END.

Uncertain effectiveness and societal challenges of the measures implemented

65 Road traffic is one of the major contributors to air and noise pollution in the EU's large cities, including those we selected. Consequently, the measures planned and implemented in a city should target the transport sector. We examined whether the measures applied had been effective in reducing air and noise pollution.

Low emission zones

66 A low emission zone (LEZ) is a clearly delimited area, usually a part of a city, which is subject to entry conditions that vary according to the type of vehicle (car, motorbike, bus, etc.) and its emissions. Its purpose is to restrict the circulation of the most polluting vehicles. LEZs were first established in Sweden in 1996; in May 2024 there were 873 EU cities with active LEZs, with a further 25 EU cities expected to follow suit by 2025[47].

67 LEZs are not harmonised at EU level because, in line with the principle of subsidiarity, their implementation and access schemes need to be tailored to the specific needs of the city concerned. Nevertheless, LEZs are considered to be and are supported by the Commission as potentially effective tools for addressing local air quality problems, and they are included in an indicative list of air pollution abatement measures in the updated AAQD[48].

68 The creation of a LEZ affects citizens' lives and businesses' operations and can therefore become a sensitive issue. The potential benefits of cleaner air and less noise are, for example, weighed against the need to purchase a new vehicle or change mobility habits. Following the introduction of LEZs, city authorities may face legal challenges on the grounds of discrimination, or on the limitation of access and free movement[49]. Complaints have been lodged against LEZs in national courts and, in some cases, led to their introduction being postponed or cancelled.

69 The LEZ in Athens allows private vehicles to circulate in the centre according to their Euro emission standard and the type of fuel used. However, cars that do not meet the standards can still enter the LEZ on alternate days as determined by the last

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47 Sadler Consultants Europe GmbH, www.urbanaccessregulations.eu, May 2024.

48 Annex VIII, part B, point 2, d of the updated AAQD.

49 Advocate General Bobek's Opinion in Joined Cases C-177/19 P to C-179/19 P delivered on 10 June 2021.

digit of their licence plate (odd/even system) (see ***Figure 11***).This reduces the measure's effectiveness, since the most polluting cars can still enter the zone. Furthermore, compliance checks are manual rather than automated, for example, using a camera system.

70 While Spanish legislation, in line with the Spanish Recovery and Resilience Plan (RRP), requires cities with over 50 000 inhabitants to establish LEZs by the end of 2023[50], a LEZ was introduced in Barcelona as early as 1 January 2020, with EU support of €3 million. It covers 76 % of the city and the entry restrictions were applied gradually (see ***Figure 7***).

71 According to a follow-up report[51], traffic pollution in Barcelona decreased following the introduction of the LEZ. However, the results are affected by the reduced level of traffic throughout the COVID-19 period. Our analysis also indicates that the concentration of NO_2 in Barcelona was already dropping to some degree before the LEZ was introduced (see ***Figure 7***).

72 The introduction of the LEZ in Barcelona met with problems. In March 2022, the Superior Court of Justice of Catalonia cancelled the municipal legal act establishing the LEZ due to reasons including the insufficient analysis of alternatives, its impact, and how the restrictions would affect groups of citizens with lower economic capacity. The city of Barcelona therefore had to introduce the LEZ under a new municipal legal act that took account of the court's judgment, as a result of which the LEZ would grant exemptions to vulnerable social groups. At the time of the audit, the city had not yet decided whether or how to expand the existing LEZ.

73 Kraków intended to introduce a LEZ covering the entire city as of July 2024. The entry conditions were scheduled to be implemented in two phases according to a vehicle's registration date and its Euro emission standard, and the fuel used (see ***Figure 11***). However, the resolution introducing the LEZ did not specify the boundaries of the zone and the way in which traffic was to be organised. Moreover, the city authorities did not carry out an analysis of the socioeconomic benefits or the cost of implementing the LEZ[52]. In January 2024, the Provincial Administrative Court in Kraków

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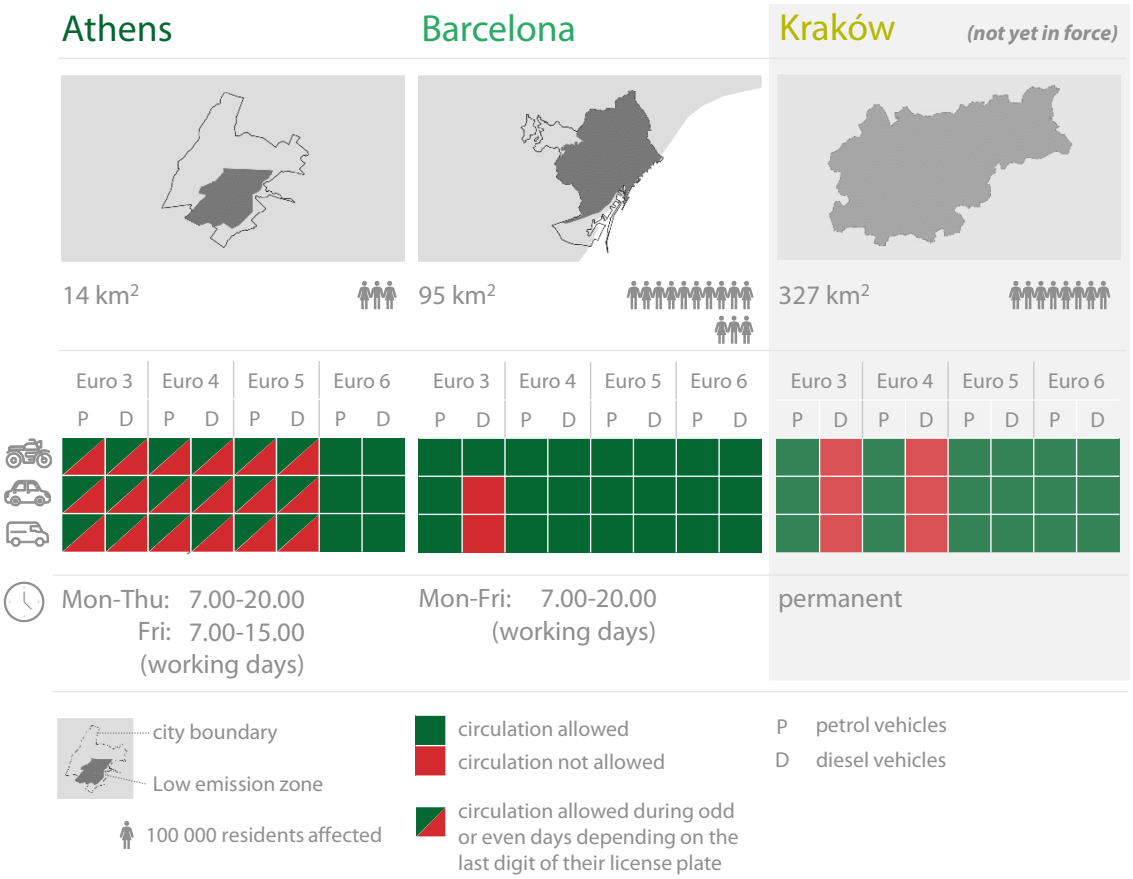
[50] Law 7/2021 of 20 May 2021 on climate change and energy transition.

[51] Low emission zone inside Barcelona's ring roads, monitoring report, 2022.

[52] Report on the measures reducing transport pollution in cities, NIK, 2024.

repealed the resolution introducing the LEZ, and it was still uncertain at the time of the audit whether or when the LEZ would be introduced.

Figure 11 – Design approaches for low emission zones



Source: ECA, based on information provided by member states and publicly available information.

Superblocks / green axes

74 A superblock is an urban concept that converts streets for motorised traffic into spaces (between block of houses) where pedestrians and cyclists have priority over cars. These superblocks are planted with vegetation to reduce air and noise pollution and lower the temperature. A 2022 study shows that, globally, 40 % of streets in some cities are potentially suitable for such a solution. The Commission views superblocks as a tool that could be effective in addressing local air quality problems and they are included in an indicative list of air pollution abatement measures in the updated AAQD[53].

[53] Annex VIII, B.2 d of AAQD.

75 The Barcelona superblock project began in 2006 and developed over time into a green axes project, i.e. the focus shifted from "blocks of houses" to a "network of green streets" throughout the city. The green axes project, supported by the EU under an RRF project that received funding of €25.9 million, was intended to create 33 km of "green streets", 14 % of which had been achieved by the time of the audit.

Picture 1 – Consell de Cent green axis in Barcelona

Source: ECA.

76 The measure has produced mixed results to date. In certain places, the positive impact on both air quality and noise levels has been proven, e.g. in the Sant Antoni superblock, where NO_2 levels dropped by 25 %, PM_{10} levels by 17 %[54], and noise levels dropped overall. In others, e.g. the Horta superblock, the impact on air quality was either marginal or the concentration of air pollution actually increased.

[54] Results report on the environmental and health effects of the superblock model in Barcelona, Salut Als Carrers (SAC) Project, Agència de Salut Pública de Barcelona, Barcelona, 2021.

77 The entire project is expected to achieve an environmental result in terms of NO_2 concentrations, with a reduction of around 30 % by 2030[55]. This will depend on the green axes being implemented as planned, which might prove challenging, as the city authorities halted the development of new sections of the green axes at the end of 2022.

78 Furthermore, at the time of the audit the local administrative litigation court had ruled[56] that, due to the significance of the creation of green axes, the city should first have amended its strategic planning documents. If the rulings are upheld, the green axes concerned will have to be restored to their original state.

79 The implementation of the measure also gave rise to other challenges. Traffic limitations led to a 33 % increase in commercial activities within one of the superblocks, e.g. bars and restaurants became new sources of noise, especially at night. While calming the streets within the project area brought benefits to the locals in terms of cleaner air and less noise, air quality and noise levels became worse in the surrounding streets[57].

Electromobility

80 In Athens, the authorities focus on measures aimed at addressing transport pollution because Greece has one of the oldest vehicle fleets in the EU, with the average age of its cars being 17 years. The city authorities drew up a 2021 urban mobility plan for Athens, the objectives of which included improved public transport and increased electromobility. The planned measures involve creating bus and bicycles lanes, installing electric vehicle charging points, developing clean means of public transport, and encouraging greater use of electric bikes. We noticed little interest in some of the planned measures, reflecting the struggle the city faces in implementing them (see ***Box 3***).

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[55] Assessment report on the environmental effects of the Barcelona's superblock in the Eixample district, ERF, 2022.

[56] Judgement No. 233/2024 of 5 September 2023, Judgement No. 142/2024 of 30 April 2024, and Judgement No. 151/2024 of 19 April 2024

[57] Results report on the environmental and health effects of the superblock model in Barcelona, Salut Als Carrers (SAC) Project, Agència de Salut Pública de Barcelona, 2021.

Box 3

Greece – little interest in the EU-funded electromobility project

The RRF-funded project managed by the Greek Ministry of Infrastructure and Transport aims to promote electromobility. The project began in 2021 and is scheduled to be completed by the end of 2025.

One of the sub-project's objectives was to install 4 500 publicly accessible charging points by the end of 2025 (EU contribution of €79.8 million). By mid-April 2024, requests had been submitted for just 459 charging points, representing only 10 % of the final target.

Another sub-project objective targeted the renewal of the taxi fleet (EU contribution of €40 million). The objective was to replace old taxis with 1 770 electric vehicles. By mid-April 2024, only 110 applications had been submitted, representing just 6 % of the final target.

For both subprojects, the timeframe for meeting the objectives is tight, as the project applications can only be submitted until 31 August 2025.

Picture 2 – Taxis in Athens

Actions' effectiveness hampered by poor coordination

81 Air pollution is transboundary in nature. Emissions of certain air pollutants, such as PM or ozone precursors, in one region or country may have an adverse impact on air quality in another, which is why the measures undertaken should be coordinated with the relevant authorities in neighbouring areas[58]. The coordination of measures at the various administrative levels is also a prerequisite for the measures being effective. In the cities selected, we checked whether the authorities cooperate with each other to enhance the effectiveness of their actions.

82 In Kraków, the main source of PM_{10} and $PM_{2.5}$ pollution is solid fuel combustion for domestic heating. For many years the local authorities have run a programme (see ***Box 4***) to reduce such emissions in the city, offering various types of financial incentives to persuade citizens to replace polluting heating devices with cleaner ones. As a result, 45 000 old heating systems had been replaced within the city and only 200 remained. To maximise the impact, in 2019 Kraków introduced a ban on solid fuel heating (e.g. coal and wood) throughout the city.

Box 4

Less polluting boilers in Kraków

The EU-funded PONE ZIT project (EU contribution of €0.7 million), a small component of the city programme, supported the exchange of domestic, solid-fuel heating devices for more ecological ones. Over the life of the project (from October 2016 to March 2020), 334 old heating devices were replaced and the ecological impact in terms of PM reductions allowed the target to be met.

83 As a result of the measures taken, PM_{10} and $PM_{2.5}$ concentrations have dropped significantly in Kraków over the past few years, yet the city still struggles to meet the EU limit values for PM (see ***Figure 7*** and ***Annex I***). This is also due to the impact of pollution generated by neighbouring municipalities and regions that have not taken similar measures. For example, the level of $PM_{2.5}$ in air pollutants originating outside Kraków accounts for approximately 50 % of the limit value concentration[59].

[58] Article 25 of the AAQD.

[59] Air Quality Plan for Malopolska Region, 2023.

Picture 3 – Smog in Kraków

Source: ECA, 2023.

84 In Athens, it is not the city authorities that are directly responsible for the management and improvement of air quality but the Ministry of the Environment and Energy. Other central authorities, such as the Ministry of Infrastructure and Transport, also take measures to address air pollution.

85 We observed both a lack of coordination and a lack of clear distribution of tasks between the ministries and the city's representatives. This is demonstrated by the fact that the city and the Ministry drew up plans to implement the measure for the installation of electrical charging points in Athens (see ***Box 3*** and paragraph ***80***) in the absence of any cooperation or coordination.

86 In Barcelona, the challenge of reducing private car traffic in favour of less polluting modes of transport (underground train, bus, bicycle) is related to the lack of interconnectivity of alternative means of transport across the municipalities. While the transport infrastructure within Barcelona is quite developed and used extensively, commuters from the metropolitan area (Greater Barcelona) often still rely on private car use.

87 The importance of coordination across the various administrative levels is also demonstrated by the high ozone values recorded on the Vic Plain (located 65 km north of Barcelona) in Catalonia, where the highest number of Spain's annual exceedances of the ozone threshold is recorded. Research[60] has indicated that, in order to considerably reduce the concentration of ozone on the Vic Plain, the city of Barcelona needs to take abatement measures to reduce the ozone precursors.

Inadequate assessment of the outcome of EU-funded projects

88 EU-funded projects should achieve their planned and measurable objectives. We examined the projects selected (see ***Annex II***) to check whether they were delivered and how they contributed to reducing air and noise pollution.

89 All three cities we selected use various EU funds to address air and noise pollution. Most of the audited mobility and infrastructure projects addressed pollution sources and, while their main objectives might not have been linked directly to air and noise pollution, both the national authorities and the Commission recognised their relevance in this regard (see paragraph ***15***).

90 Despite the projects' potential conduciveness to reduced air and noise pollution, we found that in 9 out of the 11 cases, their tangible impact was not measured (see ***Box 5***). This means that these measures' effectiveness in reducing air and noise pollution cannot be assessed, thus potentially leading to gaps when planning actions to ensure the attainment of the goals to improve air quality and reduce noise levels.

[60] Massagué et al., 2005–2017 ozone trends and potential benefits of local measures as deduced from air quality measurements in the north of the Barcelona metropolitan area, Atmos. Chem. Phys., 19, 7445–7465, 2019.

Box 5

Unplanned and unmeasured impact

In Kraków, the EU-funded project (EU contribution of €28.8 million at current prices) related to the development of Trasa Łagiewnicka, one of the biggest infrastructure investments in Kraków. The project consisted of constructing a 2.6 km tram line, including underground tram stations and acoustic screens. However, the ecological effect in terms of reduced NO_2 emissions or lower noise levels due to reduced traffic was neither planned nor measured and thus cannot be demonstrated.

Conclusions and recommendation

91 EU policy pursues the reduction of air and noise pollution. We found that despite the EU rules having been in force for many years, the actions undertaken by the Commission and the member states selected were still insufficiently effective in protecting citizens and the environment from air and noise pollution.

92 We found both achievements and gaps in the implementation of the EU legislation on air and noise pollution in the three EU cities selected (see paragraphs ***22***-***63***). Air quality is improving but EU air quality standards are consistently not met in the three cities selected. They have only recently been approaching the EU limit values, which will soon become more stringent, as they move closer to the evidence-based levels recommended by the World Health Organization. This means these cities will need to increase their efforts to meet the new EU standards in the coming years (see paragraphs ***23***-***29***).

93 The emissions of air pollutants are decreasing in the member states visited but they are unlikely to meet future reduction commitments unless all measures, both existing and additional, are fully implemented and effective (see paragraphs ***30***-***34***).

94 We also note that the noise reporting thresholds only cover part of the EU population that may be exposed to harmful levels of noise. In contrast with the EU rules on air quality, there are no EU limit values or reduction targets for noise (see paragraphs ***36***-***38***).

95 It is difficult to assess the progress made in reducing noise pollution. This is mainly due to gaps and delays in assessing and reporting the scale of noise by most EU member states. The lack of regular noise mapping deprives the authorities of knowledge of the scale of the problem and, in consequence, of citizens' exposure to harmful noise levels (see paragraphs ***40***-***44***). The European Environment Agency's estimates indicate that it is unlikely that the 2030 zero-pollution target for noise reduction will be met, and the number of people chronically disturbed by transport noise may even increase (see paragraph ***45***).

96 Cities are required by the EU legislation to establish plans and undertake various measures to address air and noise pollution. We found that on some occasions the action plans were either delayed or not drawn up. Ineffective action plans impede timely and effective response to air and noise pollution and the absence of an action plan may result in uncoordinated or even overlapping measures (see paragraphs ***47***-***55***).

97 We found that actions against noise are not prioritised in the cities selected and are, at best, only partially implemented (see paragraphs ***41***-***42***, ***44*** and ***53***-***55***). We consider that the lack of EU noise reduction targets disincentivises member states to prioritise actions to reduce noise pollution effectively. After comparing the effectiveness of the Ambient Air Quality and the National Emission reduction Commitments Directives with the Environmental Noise Directive, we concluded that the existence of air quality standards and national emissions reduction targets at EU level has produced positive effects in terms of better air quality (see paragraphs ***27***-***29*** and ***32***).

Recommendation – Prioritising actions against noise pollution

The Commission should assess the feasibility of:

(a) introducing EU noise-reduction targets and noise limits in the Environmental Noise Directive;

(b) aligning the noise exposure reporting thresholds as closely as possible with those recommended by the World Health Organization.

Target implementation date: 2029

98 The Commission is required to actively monitor and act upon all member state failures to comply with the EU legislation. We found that the Commission's strategic tool, namely the infringement procedure, is a lengthy process that is not always effective in making the cities selected comply with the EU's rules on air and noise pollution. Member states' lack of compliance with the EU legislation means that the efforts to mitigate air and noise pollution and therefore reduce the corresponding negative impact on the health of EU citizens in the cities selected were not fully effective (see paragraphs ***56***-***63***).

99 We observed that the cities selected struggle with implementing effective measures (see paragraphs ***64***-***90***). Some solutions resulted in partially reduced air and noise pollution. In other cases, the problem is addressed locally but air and noise pollution increase in adjacent areas (see paragraphs ***71***, ***77***-***79***). The long-term effectiveness is uncertain, as their implementation was hampered by inadequate planning, leading to either lack of acceptance by part of the population or a very low level of interest. This often results in scaling down or, sometimes, postponing the measures (see paragraphs ***73***, ***78*** and ***80***).

100 We also observed a lack of regional coordination, which is required to address transboundary flows of air pollutants effectively (such as ozone precursors or particulate matter) and ensure that the measures produce the desired results. This considerably hampers the effectiveness of measures taken within a city's administrative boundaries, as the cities themselves cannot address pollution generated elsewhere (see paragraphs ***81***-***87***).

101 Lastly, we noticed that EU-funded projects with elements aimed at addressing air and noise pollution often omit indicators that would allow their contribution to resolving these problems to be assessed (see paragraphs ***88***-***90***).

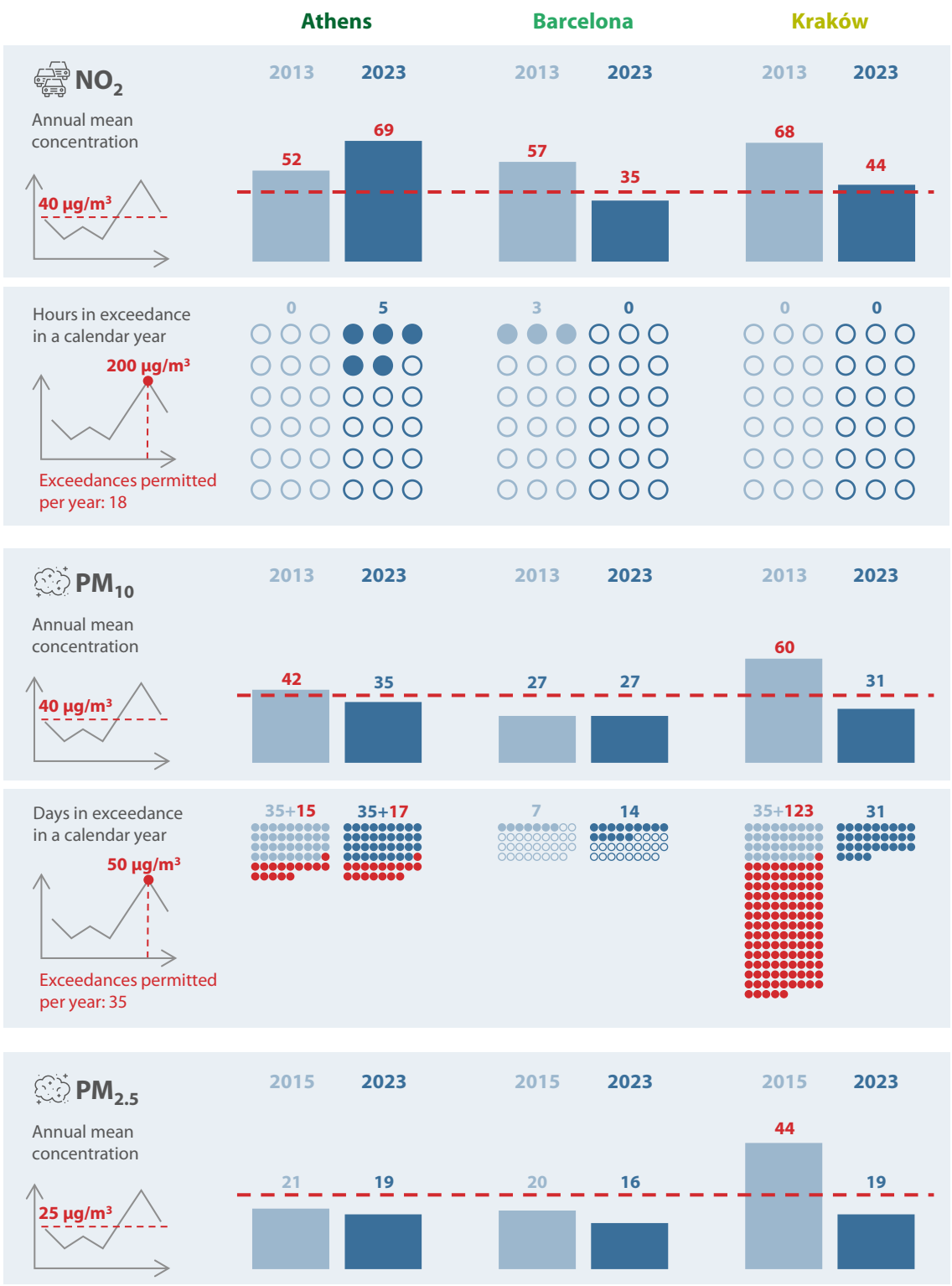
This report was adopted by Chamber I, headed by Ms Joëlle Elvinger, Member of the Court of Auditors, in Luxembourg at its meeting of 20 November 2024.

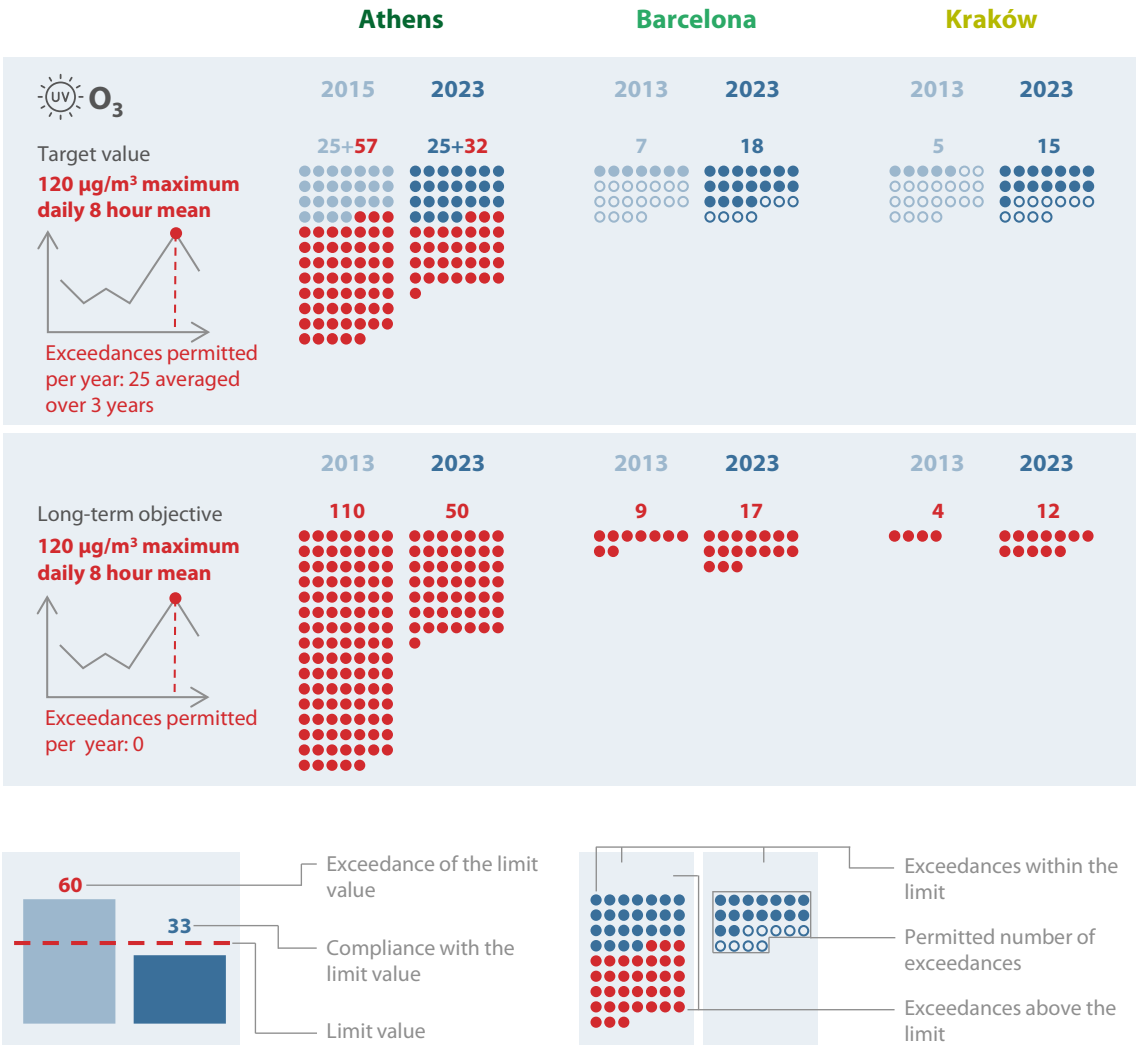
For the Court of Auditors

Tony Murphy
President

Annexes

Annex I – Cities selected vis-à-vis EU limit values





*Note on **Annex I***: the values shown for NO_2, PM_{10} and $PM_{2.5}$ represent the city's highest annual mean concentration as reported by its measuring stations, net of any contribution from natural sources. No O_3 target values are available for Athens for 2013 and 2014. The O_3 values represent the number of days in exceedance of the long-term objective laid down in the AAQD, though there is no deadline by which the long-term objective is to be met.

Source: ECA, based on EEA available data as provided by member states.

Annex II – Projects audited

Nr	City	Project title	EU contribution & source (*million euro*)	Type of project	Air & noise indicators
1	Athens	Urban redevelopment of Irinis Avenue III	0.5 (ESIF)	Green infrastructure	Yes
2	Athens	Extension of the Athens Metro, Haidari–Piraeus line	295.3 (ESIF)	Infrastructure	No
3	Athens	E-mobility, (chargers everywhere, electric city buses, electric taxis)	220.0 (RRF)	Infrastructure	No
4	Athens	LIFE Index-Air, Development of an Integrated Exposure Dose Management Tool for Reduction of Particulate Matter in Air	0.8 (LIFE)	Research	Not applicable
5	Athens	AQP and equipment and procedures for the national air quality laboratory operating in the Ministry of the Environment and Energy	0.2 (ESIF)	Plans, equipment	Not applicable
6	Barcelona	Green axes and squares in Eixample	25.9 (RRF)	Green infrastructure	No
7	Barcelona	LEZ in Barcelona	3.0 (RRF & ESIF)	Infrastructure	No
8	Barcelona	Ernest Lluch metro station	16.7 (ESIF)	Infrastructure	No
9	Barcelona	Bicivia	13.1 (ESIF)	Infrastructure	No
10	Kraków	Low emission reduction programme for the city of Krakow	0.7 (ESIF)	Heating	Yes
11	Kraków	Zabłocie Park - Wisła Station	0.3 (ESIF)	Green infrastructure	No
12	Kraków	Tram line along Trasa Łagiewnicka	28.8 (ESIF)	Infrastructure	No
13	Kraków	People-Driven: Adapting Cities for Tomorrow	0.5 (LIFE)	Green infrastructure	No
			605.8		

Source: ECA, based on data provided by member states.

Abbreviations

AAQD: Ambient Air Quality Directive

AQP: Air quality plan

EEA: European Environment Agency

END: Environmental Noise Directive

LEZ: Low emission zone

NECD: National Emission reduction Committments Directive

NH_3: Ammonia

NMVOCs: Non-methane volatile organic compounds

NO_2: Nitrogen dioxide

O_3: Ground-level ozone

PM: Particulate matter

RRF: Recovery and Resilience Facility

SO_2: Sulphur dioxide

TFEU: Treaty on the Functioning of the European Union

WHO: World Health Organization

Glossary

Agglomeration: Urban area with a high population density. In the EU context, an agglomeration has more than 250 000 inhabitants for the purposes of the Ambient Air Quality Directive or 100 000 inhabitants for the purposes of the Environmental Noise Directive.

Air quality plan: Document prepared by a member state for air quality zones in which the concentration of air pollutants exceeds the EU limit value or target value.

Air quality zone: Geographical area, such as an agglomeration, into which a member state divides its territory for the purposes of assessing and monitoring air quality.

Burden of disease: World Health Organization measure of the extent to which disease affects life in a given population, based on mortality (years lost due to premature death) and morbidity (years of life affected by disease).

Euro emission standards: Light vehicle emissions standards defined through a series of EU regulations (Euro 1 to Euro 6).

Infringement procedure: Procedure whereby the Commission takes action, in various stages, against an EU member state that fails to meet its obligations under EU law.

LIFE: Financial instrument supporting implementation of the EU's environmental and climate policy through co-financing of projects in member states.

Strategic noise map: Graphical representation of a given area’s overall exposure to noise from particular sources.

Subsidiarity: Principle whereby the EU takes action only when doing so is more effective than action taken nationally, regionally or locally.

Replies of the Commission

https://www.eca.europa.eu/en/publications/sr-2025-02

Timeline

https://www.eca.europa.eu/en/publications/sr-2025-02

Audit team

The ECA's special reports set out the results of its audits of EU policies and programmes, or of management-related topics from specific budgetary areas. The ECA selects and designs these audit tasks to be of maximum impact by considering the risks to performance or compliance, the level of income or spending involved, forthcoming developments and political and public interest.

This performance audit was carried out by Audit Chamber I – Sustainable use of natural resources, headed by ECA Member Joëlle Elvinger. The audit was led by ECA Member Klaus-Heiner Lehne, supported by Thomas Arntz, Head of Cabinet and Marc-Oliver Heidkamp, Cabinet Attaché; Emmanuel Rauch, Principal Manager; Katarzyna Radecka-Moroz, Head of Task; Milan Šmíd, Anna Zalega, Vasileia Kalafati and Jonas Kathage, Auditors. Laura Mcmillan provided linguistic support and Judita Frangež provided secretarial support.

From left to right: Judita Frangež, Jonas Kathage, Katarzyna Radecka-Moroz, Marc-Oliver Heidkamp, Klaus-Heiner Lehne, Emmanuel Rauch, Anna Zalega, Milan Šmíd and Vasileia Kalafati.

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Air and noise pollution can harm our health, particularly in urban areas, where most EU citizens live. We checked how the selected cities implement the EU rules designed to better protect our health. We found that although air quality is improving, air quality standards either are not always met, or have only recently been met. We also found that our cities are still too noisy. We consider that the lack of EU noise reduction targets disincentivises member states to prioritise actions to reduce noise pollution. We also note that the noise reporting thresholds cover only part of the EU population that may be exposed to harmful noise. We recommend actions to reduce harmful levels of noise.

ECA special report pursuant to Article 287(4), second subparagraph, TFEU.

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