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NOTE

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Subject:	Proposal for a Directive of the European Parliament and of the Council on ambient air quality and cleaner air for Europe (recast) - Mandate for negotiations with the European Parliament

Delegations will find attached the mandate for negotiations with the European Parliament on the above proposal, as agreed following the meeting of the Permanent Representatives' Committee on 8 November 2023[1].

[1] Changes to the Commission proposal are underlined, ~~strikethrough~~ indicates deletions.

ANNEX

Proposal for a

DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

on ambient air quality and cleaner air for Europe

(recast)

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty on the functioning of the European Union, and in particular Article 192(1) thereof,

Having regard to the proposal from the European Commission,

After transmission of the draft legislative act to the national parliaments,

Having regard to the opinion of the European Economic and Social Committee[2],

Having regard to the opinion of the Committee of the Regions[3],

Acting in accordance with the ordinary legislative procedure,

[2] OJ C […], […], p. […].
[3] OJ C […], […], p. […].

Whereas:

(1) Directive No 2004/107/EC of the European Parliament and of the Council[4] and Directive 2008/50/EC of the European Parliament and of the Council[5] have been substantially amended. Since further amendments are to be made, those Directives should be recast in the interest of clarity.

(2) In December 2019, the European Commission set out in its Communication 'The European Green Deal'[6] an ambitious roadmap to transform the Union into a fair and prosperous society, with a modern, resource-efficient and competitive economy, aiming to protect, conserve and enhance the Union's natural capital, and to protect the health and well-being of citizens from environment-related risks and impacts. Specifically on clean air, the European Green Deal committed to further improving air quality and to aligning EU air quality standards more closely with the recommendations of the World Health Organization (WHO). It also announced a strengthening of provisions on air quality monitoring, modelling and planning.

(3) In May 2021, the Commission adopted a Communication establishing a 'Zero Pollution Action Plan'[7] that inter alia addresses pollution aspects of the European Green Deal and further commits to reducing, by 2030, the health impact of air pollution by more than 55% and the EU ecosystems where air pollution threatens biodiversity by 25%.

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4 Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2004 relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air (OJ L 023, 26.1.2005, p. 3).

5 Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe (OJ L 152, 11.6.2008, p. 1).

6 Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions The European Green Deal; COM(2019) 640 final.

7 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Pathway to a Healthy Planet for All EU Action Plan: 'Towards Zero Pollution for Air, Water and Soil' COM(2021) 400 final.

(4) The Zero Pollution Action Plan also sets out a vision for the year 2050, where air pollution is reduced to levels no longer considered harmful to health and natural ecosystems. To move closer to this objective ~~end~~, a staged approach towards setting current and future EU air quality standards should be pursued, establishing ~~intermediate~~ air quality standards for the year 2030 and beyond, and developing a perspective for alignment with the WHO Air Quality Guidelines by the year 2050 at the latest based on a regular review mechanism to take into account the latest scientific understanding. Given the links between pollution reduction and decarbonisation, the long-term objective to achieve the zero pollution ambition should be pursued hand in hand with reduction of greenhouse gas emissions as set by Regulation (EU) 2021/1119 of the European Parliament and of the Council[8].

(5) In taking the relevant measures at Union and national level to achieve the zero pollution objective for air pollution, Member States, the European Parliament, the Council and the Commission should be guided by the 'precautionary principle' and the 'polluter pays principle' established in the Treaty on the Functioning of the European Union (TFEU), and the 'do no harm' principle of the European Green Deal. They should, inter alia, take into account: the contribution of improved air quality to public health, the quality of the environment, the well-being of citizens, the prosperity of society, employment and the competitiveness of the economy; the energy transition, strengthened energy security and the tackling of energy poverty; food security and affordability; the development of sustainable and smart mobility and transport solutions; the impact of behavioural changes; fairness and solidarity across and within Member States, in light of their economic capability, national circumstances, such as the specificities of islands, and the need for convergence over time; the need to make the transition just and socially fair through appropriate education and training programmes; best available and most recent scientific evidence, in particular the findings reported by the WHO; the need to integrate air pollution related risks into investment and planning decisions; cost-effectiveness and technological neutrality in achieving air pollutant emission reductions; and progression over time in environmental integrity and level of ambition.

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[8] Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law') (OJ L 243, 9.7.2021, p. 1–~~17~~).

(6) The 'Eighth General Union Environment Action Programme to 2030' adopted by Decision (EU) 2022/591 of the European Parliament and of the Council on 6 April 2022[9] establishes the objective to achieve a non-toxic environment protecting the health and well-being of people, animals and ecosystems from environment-related risks and negative impacts, and, for that purpose, stipulates that further improvement of monitoring methods, better information to the public and access to justice are needed. This guides the objectives set in this Directive.

(7) The Commission should regularly review the scientific evidence related to pollutants, their effects on human health and the environment and technological development. Based on the review, the Commission should assess whether applicable air quality standards are still appropriate to achieve the objectives of this Directive. The first review should be carried out by 31 December 2030~~28~~ to assess whether air quality standards need to be updated based on the latest scientific information, whether additional air pollutants should be covered or whether additional postponement of attainment deadlines or adjustments to transboundary air provisions should be considered. Following the review, the Commission should be able to present a proposal to revise air quality standards or to include other air pollutants. Whenever necessary, the Commission should revise any relevant source of legislation to contribute to achieve air quality standards and should be able to propose further actions to be taken at Union level.

(8) A common approach to the assessment of ambient air quality should be followed by applying common assessment criteria. When assessing ambient air quality, account should be taken of the size of populations and ecosystems exposed to air pollution. It is therefore appropriate to classify the territory of each Member State into zones and average exposure territorial units reflecting the population density.

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[9] Decision (EU) 2022/591 of the European Parliament and of the Council of 6 April 2022 on a General Union Environment Action Programme to 2030 (OJ L 114, 12.4.2022, p. 22~~–36~~).

(9) Fixed measurements should be mandatory in zones where assessment thresholds are exceeded. Modelling applications and indicative measurements, in addition to information from fixed measurements, enable point data to be interpreted in terms of geographical distribution of concentrations. The use of such supplementary techniques of assessment should also allow for reduction of the required minimum number of ~~fixed~~ sampling points for fixed measurements in zones where limit values or target values are met but the assessment threshold~~s, but not the limit values or ozone target values, are~~ is ~~not~~ exceeded. In zones where limit values or target values are exceeded, ~~both fixed measurements and~~ it should be possible to ~~the~~ use ~~of~~ modelling applications or indicative measurements ~~should be mandatory~~ in addition to mandatory fixed measurements to assess the ambient air quality. Additional monitoring of background concentrations and deposition of pollutants in ambient air should also be carried out to enable better understanding of pollution levels and dispersion.

(10) It should be possible to apply modelling applications ~~should be applied~~ to enable point data to be interpreted in terms of geographical distribution of concentration, ~~to~~ which may help to detect breaches of air quality standards, and to inform air quality plans and the placement of sampling points.

In addition to the requirements for air quality monitoring defined in this Directive, for monitoring purposes, Member States are encouraged to exploit information products and supplementary tools (e.g. regular evaluation and quality assessment reports, policy online applications), provided by the Earth Observation component of the EU Space Programme, in particular the Copernicus Atmosphere Monitoring Service (CAMS).

(11) It is important that pollutants of emerging concern, such as ultrafine particles, black carbon and elemental carbon, as well as ammonia and the oxidative potential of particulate matter, be monitored in both rural and urban supersites in order to support scientific understanding of their effects on health and the environment, as recommended by the WHO. For Member States whose territory is less than 10 000 $km^{2,}$, monitoring in supersites at urban locations would be sufficient as the levels measured could be considered as representative of the highest exposure of the population in the territory of such Member States.

(12) Detailed measurements of fine particulate matter at r~~ural background locations~~ should be made in order to understand better the impacts of ~~this~~ that pollutant and to develop appropriate policies. Such measurements should be made in a manner consistent with those of the cooperative programme for monitoring and evaluation of the long range transmission of air pollutants in Europe (EMEP) set up under the 1979 United Nations Economic Commission for Europe (UNECE) Convention on Long-range Transboundary Air Pollution approved by Council Decision 81/462/EEC of 11 June 1981[10] and its Protocols, including the Protocol to Abate Acidification, Eutrophication and Ground-level Ozone of 1999, which was revised in 2012.

(13) In order to ensure that the information collected on air pollution is sufficiently representative and comparable across the Union, it is important that standardised measurement techniques and common criteria for the number and location of measuring stations are used for the assessment of ambient air quality. Techniques other than measurements can be used to assess ambient air quality and it is therefore necessary to define criteria for the use and required accuracy of such techniques.

(14) Providing reference measurement methods is acknowledged to be an important issue. The Commission has already mandated work on the preparation of CEN standards for the measurement of polycyclic aromatic hydrocarbons and for the evaluation of the performance of sensor systems for the determination of concentrations of gaseous pollutants and particulate matter in ambient air with a view to their early development and adoption. In the absence of CEN standard methods, the use of international, ~~or~~ national standard reference measurement methods or CEN technical specifications should be permitted.

(15) In order to protect human health and the environment as a whole, it is particularly important to combat emissions of pollutants at source and to identify and implement the most effective emission reduction measures at local, national and Union level, in particular when it comes to emissions from agriculture, industries, transport and energy generation. Therefore, emissions of harmful air pollutants should be avoided, prevented or reduced and appropriate standards set for ambient air quality taking into account relevant World Health Organization standards, guidelines and programmes.

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[10] Council Decision 81/462/EEC of 11 June 1981 on the conclusion of the Convention on long-range transboundary air pollution (OJ L 171, 27.6.1981, p. 11).

(16) Scientific evidence shows that sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter, ~~lead~~, benzene, carbon monoxide, arsenic, cadmium, lead**,** nickel, some polycyclic aromatic hydrocarbons and ozone are responsible for significant negative impacts on human health. Impact on human health and the environment occurs via concentrations in ambient air.

(17) The effects of ~~lead~~, arsenic, cadmium, lead, mercury, nickel and polycyclic aromatic hydrocarbons on human health, including via the food chain, and the environment, also occur via deposition; the accumulation of th**o**se substances in soils and the protection of ground water should be taken into account.

(18) The average exposure of the population to the pollutants with the highest documented impact on human health, fine particulate matter ($PM_{2.5}$) and nitrogen dioxide (NO_2), should be reduced ~~based on~~ in order to move closer to WHO recommendations. To this end, an average exposure reduction obligation should be introduced for those pollutants, in addition to limit values.

(19) The Fitness Check of the Ambient Air Quality Directives (Directives 2004/107/EC and 2008/50/EC)[11] has shown that limit values are more effective in bringing down pollutant concentrations than target values. With the aim of minimising harmful effects on human health, paying particular attention to vulnerable groups and sensitive populations, and the environment limit values should be set for the concentration of sulphur dioxide, nitrogen dioxide, particulate matter, ~~lead~~, benzene, carbon monoxide, arsenic, cadmium, lead, nickel and polycyclic aromatic hydrocarbons in ambient air. Benzo(a)pyrene should be used as a marker for the carcinogenic risk of polycyclic aromatic hydrocarbons in ambient air.

(20) To allow Member States to prepare for revised air quality standards set by this Directive and to ensure legal continuity, for an interim period limit values and target values should be identical to those set under the repealed Directives until the new limit values start applying.

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[11] Fitness check of the Ambient Air Quality Directives of 28 November 2019 (SWD(2019) 427 final).

(21) Ozone is a transboundary pollutant formed in the atmosphere from the emission of primary pollutants addressed by Directive 2016/2284/EU of the European Parliament and of the Council[12]. Progress towards the air quality targets and long-term objectives for ozone set in this Directive should be determined by the targets and emission reduction commitments provided for in Directive 2016/2284/EU and~~,~~ by implementing cost-effective measures and air quality plans if appropriate.

(22) The ozone target values and long-term objectives of ensuring effective protection against harmful effects on human health and vegetation and ecosystems from exposure to ozone should be updated in light of the most recent recommendations of the World Health Organization.

(23) An alert threshold for sulphur dioxide, nitrogen dioxide, particulate matter (PM_{10} and $PM_{2.5}$) and ozone, and an information threshold for ozone, should be set for the protection of the general population, vulnerable and sensitive sections, respectively, from brief exposures to elevated ~~ozone~~ concentrations. Those thresholds should trigger the dissemination of information to the public on the risks of exposure and the implementation, if appropriate, of short-term measures to reduce pollution levels where the alert threshold is exceeded.

(24) In accordance with Article 193 ~~of the Treaty~~ TFEU, Member States may maintain or introduce more stringent protective measures provided that they are compatible with the Treaty and that they are notified to the Commission. Such notification could be accompanied by an explanation of the process of how those air quality standards have been established and the scientific information used.

(25) Where air quality status ~~should be maintained where it~~ is already good, it should be maintained or improved. Where the standards for ambient air quality laid down in this Directive are at risk of not being met, or have not been met, Member States should ~~take~~ adopt ~~immediate action~~ appropriate measures in order to comply with the limit values, average exposure reduction obligations and critical levels, and where possible, to attain the ~~ozone~~ target values and ozone long-term objectives.

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[12] Directive (EU) 2016/2284/EU of the European Parliament and of the Council of 14 December 2016 on the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC (OJ L 344, 17.12.2016, p.1).

(26) Mercury is a very hazardous substance for human health and the environment. It is present throughout the environment and, in the form of methylmercury, has the capacity to accumulate in organisms, and in particular to concentrate in organisms higher up the food chain. Mercury released into the atmosphere is capable of being transported over long distances.

(27) Regulation 2017/852 of the European Parliament and the Council[13] aims to protect human health and the environment from the release of mercury, based on a life-cycle approach, and taking into account production, use, waste treatment and emissions. Provisions on monitoring mercury in this Directive complement and provide information for that Regulation.

(28) The risk**s** posed by air pollution to vegetation and natural ecosystems ~~is~~ are most important in places away from urban areas. The assessment of such risks and the compliance with critical levels for the protection of vegetation should therefore focus on places away from built-up areas. This assessment should take into account and complement requirements under Directive 2016/2284/EU to monitor the impacts of air pollution on terrestrial and aquatic ecosystems, and to report such impacts.

(29) Contributions from natural sources can be assessed but cannot be controlled. Therefore, where natural contributions to pollutants in ambient air can be determined with sufficient certainty, and where exceedances are due in whole or in part to these natural contributions, these may, under the conditions laid down in this Directive, be subtracted when assessing compliance with air quality limit values and average exposure reduction obligations. Contributions to exceedances of particulate matter limit values attributable to winter-sanding or winter-salting of roads may also be subtracted when assessing compliance with air quality limit values provided that reasonable measures have been taken to lower concentrations.

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[13] Regulation (EU) 2017/852 of the European Parliament and of the Council of 17 May 2017 on mercury, and repealing Regulation (EC) No 1102/2008 (OJ L 137, 24.5.2017, p. 1–~~21~~).

(30) For zones where conditions are particularly difficult, it should be possible to postpone the deadline for compliance with the air quality limit values in cases where, notwithstanding the implementation of appropriate pollution abatement measures, acute compliance problems exist in specific zones and agglomerations. Any postponement for a given zone or agglomeration should be accompanied by a comprehensive plan to be assessed by the Commission ~~to ensure compliance by the revised deadline~~. This air quality plan should set out appropriate measures to keep the exceedance period as short as possible. Member States should also demonstrate that the measures in the air quality plan have been implemented.

(31) Air quality plans should be developed and updated for zones or territorial units within which concentrations of pollutants in ambient air exceed the relevant air quality limit values, ~~ozone~~ target values or average exposure reduction obligations. Air quality plans should also be developed and updated for ozone target values exceedances, provided there is significant potential under the given circumstances and provided that the measures to address the exceedance do not entail disproportionate costs.

(31a) Air pollutants are emitted from many different sources and activities. To ensure coherence between different policies, such air quality plans should where feasible be consistent with plans and programmes prepared pursuant to Directive 2010/75/EU, 2001/80/EC of the European Parliament and of the Council[14], Directive (EU) 2016/2284, and Directive 2002/49/EC of the European Parliament and of the Council[15].

(32) Air quality plans should also be prepared ahead of 2030 where there is a risk that Member States will not attain the limit values or, if appropriate, ozone target values by that date in order to ensure that levels of pollutants are reduced accordingly.

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14 Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (OJ L 334, 17.12.2010, p. 17).

15 Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise (OJ L 189, 18.7.2002, p. 12.)

(33) Action plans should be drawn up indicating the measures to be taken in the short term where there is a risk of an exceedance of one or more alert thresholds in order to reduce that risk and to limit its duration. When the risk applies to one or more limit values or target values, Member States may, where appropriate, draw up such short-term action plans.

(34) As the Third Clean Air Outlook confirmed, the pollution has no boundaries and is shared across the Union. In most Member States, a significant share of pollution is generated outside their territory. Furthermore, according to the Third Clean Air Outlook, the significance of non-EU pollution sources is projected to rise. The nature of transboundary air pollution prevents Member States from addressing this pollution using local, regional or national measures; such pollution is also outside Member States' administrative powers and jurisdiction. Nevertheless, Member States should cooperate with one another if, following significant pollution originating in another Member State, the level of a pollutant exceeds, or is likely to exceed, any limit value, ~~ozone~~ target value**s**, average exposure reduction obligation or alert threshold. The transboundary nature of specific pollutants, such as ozone and particulate matter, ~~may~~ require**s** that the Member States concerned cooperate with each other to identify the sources of air pollution and the measures to be taken to address those sources and draw up coordinated activities, such as the coordination ~~between neighbouring Member States in drawing up and implementing~~ of air quality plans and short-term action plans ~~and~~, in which each Member State should address pollution sources in its territory, in order to remove such exceedances, as well as in informing the public. Where appropriate, Member States should pursue cooperation with third countries, with particular emphasis on the early involvement of candidate countries. The Commission should be ~~timely~~ informed in a timely manner of, and be invited to be present and assist in, any such cooperation, and it may provide technical support to Member States upon request where appropriate. The Commission should analyse information gathered from Member States, as well as other relevant data available, in order to determine whether transboundary air pollution significantly affects compliance with air quality standards in the Union. If this is the case, the Commission should be able to propose, if appropriate, further action to be taken at the Union level.

(35) It is necessary for the Member States and the Commission to collect, exchange and disseminate air quality information in order to understand better the impacts of air pollution and develop appropriate policies. Available up-to-date information on concentrations of all regulated pollutants in ambient air, information regarding impacts on health, as well as air quality plans and short-term action plans should also be readily available to the public.

(36) Information on the concentrations and the deposition of the regulated pollutants should be forwarded to the Commission as a basis for regular reports. In order to facilitate the handling and comparison of air quality information, data should be made available to the Commission in a standardised form.

(37) It is necessary to adapt procedures for data provision, assessment and reporting of air quality to enable electronic means and the internet to be used as the main tools to make information available, and so that such procedures are compatible with Directive 2007/2/EC of the European Parliament and the Council[16].

(38) It is appropriate to provide for the possibility of adapting the criteria and techniques used for the assessment of the ambient air quality to scientific and technical progress ~~and adapting thereto the information to be provided~~.

[16] Directive 2007/2/EC of the European Parliament and the Council of 14 March 2007 establishing an infrastructure for spatial information in the European Community (INSPIRE) (OJ L 108, 25.4.2007, p. 1).

(39) As clarified by the case-law of the Court of Justice[17], Member States may not restrict legal standing to challenge a decision of a public authority to those members of the public concerned who participated in the preceding administrative procedure to adopt that decision. ~~As also clarified by the case-law of the Court of Justice[18], effective access to justice in environmental matters and effective remedies requires inter alia that members of the public concerned should have the right to ask the court or a competent independent and impartial body to order interim measures to prevent a given instance of pollution. Therefore, it should be specified that legal standing should not be made conditional on the role that the concerned member of the public played during a participatory phase of the decision-making procedures under this Directive.~~ In addition, any review procedure should be fair, equitable, timely and not prohibitively expensive, and provide for adequate and effective redress mechanisms, including injunctive relief as appropriate. Furthermore, the Court of Justice[19] has ruled that natural or legal persons directly concerned by the limit values being exceeded must be in a position to require the competent authorities, if necessary by bringing an action before the courts having jurisdiction, to establish an air quality plan where a Member State has failed to secure compliance with the limit values and has not applied for a postponement of the deadline.

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17 Case C–826/18, Judgment of the Court (First Chamber) of 14 January 2021; LB and Others v College van burgemeester en wethouders van de gemeente Echt-Susteren; paragraphs 58 and 59.

18 Case C-416/10 Judgment of the Court (Grand Chamber), 15 January 2013; Jozef Križan and Others v Slovenská inšpekcia životného prostredia. Križan, paragraph 109.

19 Case C-404/13, Judgment of the Court (Second Chamber) of 19 November 2014; Client Earth v the Secretary of State for the Environment, Food and Rural Affairs; paragraph 56.

(40) This Directive respects the fundamental rights and observes the principles recognised in particular by the Charter of Fundamental Rights of the European Union. Where damage to human health has occurred as a result of a violation of the national rules transposing Articles 19(1), 19(3), 19(4), 20 (1) and 20(2) ~~21~~ of this Directive that has been committed intentionally or negligently, Member States should ensure that the individuals affected by such violations ~~are able~~ have the right to claim and obtain compensation for that damage from the relevant competent authority. The rules on compensation, access to justice and penalties set in this Directive have the objective to avoid, prevent and reduce harmful effects on human health and the environment from air pollution, in line with Article 191(1) TFEU. They thus seek~~s~~ to integrate into the policies of the Union a high level of environmental protection and the improvement of the quality of the environment in accordance with the principle of sustainable development as laid down in Article 37 of the Charter, and put~~s~~ into concrete terms the obligation to protect the right to life and to the integrity of the person laid down in Articles 2 and 3 of the Charter. ~~It~~This Directive also contributes to the right to an effective remedy before a tribunal as laid down in Article 47 of the Charter, in relation to the protection of human health. The penalties provided for in this Directive should be effective, proportionate and dissuasive.

(41) In order to ensure uniform conditions for the implementation of this Directive, implementing powers should be conferred on the Commission as regards further technical details for modelling applications; for determining the spatial representativeness of sampling points; on the demonstration and substraction of exceedances attributable to natural sources; for determination of contributions from the resuspension of particulates following winter-sanding or winter-salting; and ~~In order to ensure uniform conditions for the implementation of the Member States' on~~ requirements ~~on~~ for transmitting information and reporting on air quality ~~under this Directive, implementing powers should be conferred on the Commission~~ as regards (i) the establishment of rules relating to information on ambient air quality to be made available by Member States to the Commission as well as timescales in which that information is to be communicated and (ii) to the streamlining of the way data are reported and the reciprocal exchange of information and data from networks and individual sampling points measuring ambient air pollution within Member States. Those powers should be exercised in accordance with Regulation (EU) No 182/2011 of the European Parliament and of the Council[20].

(42) In order to ensure that this Directive continues meeting its objectives, in particular to avoid, prevent and reduce harmful effects from ambient air quality on human health and the environment, the power to adopt acts in accordance with Article 290 ~~of the Treaty on the Functioning of the European Union~~ TFEU should be delegated to the Commission in respect of amending ~~the~~ Annexes III to VII to this Directive to take account of technical and scientific developments related to air pollutants, their assessment and management and their impacts on human health and the environment ~~and to appropriate information of the public~~. It is of particular importance that the Commission carry out appropriate consultations during its preparatory work, including at expert level, and that those consultations be conducted in accordance with the principles laid down in the Interinstitutional Agreement of 13 April 2016 Better Law Making[21]. In particular, to ensure equal participation in the preparation of delegated acts, the European Parliament and the Council receive all documents at the same time as Member States' experts, and their experts systematically have access to meetings of Commission expert groups dealing with the preparation of delegated acts.

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20 OJ L 55, 28.2.2011, p. 13–18

21 OJ C 321, 31.12.2003, p. 1.

(43) The obligation to transpose this Directive into national law should be confined to those provisions which represent a substantive amendment as compared to the earlier Directives. The obligation to transpose the provisions which are unchanged arises under the earlier Directives.

(44) This Directive should be without prejudice to the obligations of the Member States relating to the time-limits for the transposition into national law of the Directives set out in Part B of Annex X.

(45) Since the objective of this Directive, namely to set out air quality provisions to move the Union closer to a zero pollution objective for air quality so that within the Union air quality is progressively improved to levels no longer considered harmful to human health and natural ecosystems, cannot be sufficiently achieved by the Member States by reason of the transboundary nature of air pollutants and can therefore be better achieved at Union level, the Union may adopt measures, in accordance with the principle of subsidiarity as set out in Article 5 of the Treaty on European Union. In accordance with the principle of proportionality, as set out in that Article, this Directive does not go beyond what is necessary in order to achieve that objective.

HAVE ADOPTED THIS DIRECTIVE:

CHAPTER I

GENERAL PROVISIONS

Article 1

Objectives

1. This Directive sets out air quality provisions to move the Union closer to a zero pollution objective ~~for air quality~~, so that within the Union air quality is progressively improved to levels no longer considered harmful to human health and natural ecosystems, as defined by scientific evidence, thus contributing to a toxic-free environment at the latest by 2050.

2. This Directive ~~sets~~ lays down ~~intermediate~~ limit values, ~~ozone~~ target values, average exposure reduction obligations, average exposure concentration objectives, critical levels, information thresholds, alert thresholds and long-term objectives ('air quality standards') with the aim of providing a staged approach to improve air quality ~~to be met by the year 2030, and~~. These air quality standards set out in Annex I shall be regularly reviewed ~~thereafter~~ in accordance with Article 3 to move the Union closer to the zero pollution objective.

3. Furthermore, this Directive contributes to achieving~~:~~ the Union's pollution-reduction, biodiversity and ecosystem objectives in accordance with the 8th Environment Action Programme, as set out in Decision (EU) 2022/591 of the European Parliament and of the Council[22].

Article 2

Subject matter

This Directive lays down provisions related to the following ~~measures~~:

1. ~~measures~~ defining and establishing objectives for ambient air quality designed to avoid, prevent or reduce harmful effects on human health and the environment;

2. ~~measures~~ setting common methods and criteria to assess the ambient air quality in Member States;

3. ~~measures for~~ monitoring current ambient air quality and long-term trends ~~and~~ as well as impacts of Union and national measures on ambient air quality;

4. ~~measures~~ ensuring that the information on ambient air quality is made available to the public;

5. ~~measures~~ maintaining air quality where it is good and improving it in other cases;

6. ~~measures~~ promoting increased cooperation between Member States in reducing air pollution.

[22] Decision (EU) 2022/591 of the European Parliament and of the Council of 6 April 2022 on a General Union Environment Action Programme to 2030 (OJ L 114, 12.4.2022, p. 22).

Article 3

Regular review

1. By 31 December 2030~~28~~, and as frequently as necessary ~~every 5 years~~ thereafter~~, and more often if substantial new scientific findings point to the need for it~~, the Commission shall review the scientific evidence related to air pollutants and their effects on human health and the environment relevant to achieving the objective set in Article 1 and present a report with the main findings to the European Parliament and to the Council.

2. The review shall assess whether applicable air quality standards are still appropriate to achieve the objective of avoiding, preventing or reducing harmful effects on human health and the environment and whether additional air pollutants should be covered or whether additional postponement of attainment deadlines or adjustments to transboundary air provisions should be considered.

   In order to achieve the objectives set in Article 1, the review shall assess whether this Directive needs to be revised with a view to ~~ensuring~~ taking into account alignment with the World Health Organization (WHO) Air Quality Guidelines and the latest scientific information.

   For the purposes of the review, the Commission shall take into account, inter alia, the following:

   (a) latest scientific information from WHO and other relevant organisations, such as the UNECE Convention on Long-range Transboundary Air Pollution.

   (b) technological developments impacting air quality and its assessment,

   (c) air quality situations and associated impacts on human health and the environment, including the effects of ozone on ecosystems, as well as the nature and socio-economic impacts of complementary actions to be implemented to achieve new objectives in Member States,

   (d) progress made in implementing national and Union reduction measures for pollutants and improving air quality.~~,~~

(e) relevant source legislation at Union level for sectors and activities that contribute to air pollution,

(f) relevant information submitted for this purpose to the Commission by the Member States.

3. The European Environment Agency shall assist the Commission in carrying out the review.

4. Where the Commission considers it appropriate, as a result of the review, it shall present a proposal to revise air quality standards or to cover other air pollutants. Furthermore, where the Commission deems it necessary, it shall also present proposals to introduce or revise any relevant source legislation in order to contribute to achieving the proposed revised air quality standards at Union level.

5. If during the review the Commission identifies that further measures are needed to achieve ~~non-compliance with~~ applicable air quality standards in ~~persists and is affecting~~ a significant area of the Union territory, the Commission may propose further action to be taken at Union level.

Article 4

Definitions

For the purposes of this Directive, the following definitions apply:

(1) 'ambient air' means outdoor air in the troposphere, excluding workplaces as defined in Article 2 of Council Directive 89/654/EEC[23] where provisions concerning health and safety at work apply and to which members of the public do not have regular access;

(2) 'pollutant' means any substance present in ambient air and likely to have harmful effects on human health or the environment;

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[23] Council Directive 89/654/EEC of 30 November 1989 concerning the minimum safety and health requirements for the workplace (first individual directive within the meaning of Article 16 (1) of Directive 89/391/EEC) (OJ L 393, 30.12.1989, p. 1). Directive as amended by Directive 2007/30/EC of the European Parliament and of the Council (OJ L 165, 27.6.2007, p. 21).

(3) ‘level’ means the concentration of a pollutant in ambient air or the deposition thereof on surfaces in a given time;

(4) ‘total deposition’ means the total mass of pollutants which is transferred from the atmosphere to surfaces, such as soil, vegetation, water, buildings, in a given area within a given time;

(5) ‘PM_{10}’ means particulate matter which passes through a size-selective inlet as defined in the reference method for the sampling and measurement of PM_{10}, EN 12341, with a 50 % efficiency cut-off at 10 μm aerodynamic diameter;

(6) ‘$PM_{2.5}$’ means particulate matter which passes through a size-selective inlet as defined in the reference method for the sampling and measurement of $PM_{2.5}$, EN 12341 ~~14907~~, with a 50 % efficiency cut-off at 2,5 μm aerodynamic diameter;

(7) ‘oxides of nitrogen’ means the sum of the volume mixing ratio (ppbv) of nitrogen monoxide (nitric oxide) and nitrogen dioxide expressed in units of mass concentration of nitrogen dioxide (μg/m^3);

(8) ‘arsenic’, ‘cadmium’, ‘lead’, ‘nickel’ and ‘benzo(a)pyrene’ mean the total content of these elements and compounds in the PM_{10} fraction;

(9) ‘polycyclic aromatic hydrocarbons’ means those organic compounds, composed of at least two fused aromatic rings made entirely from carbon and hydrogen;

(10) ‘total gaseous mercury’ means elemental mercury vapour (Hg^0) and reactive gaseous mercury, i.e. water-soluble mercury species with sufficiently high vapour pressure to exist in the gas phase;

(11) ‘volatile organic compounds’ (VOC) means organic compounds from anthropogenic and biogenic sources, other than methane, that are capable of producing photochemical oxidants by reactions with nitrogen oxides in the presence of sunlight;

(12) ‘ozone precursor substances’ means substances which contribute to the formation of ground-level ozone;

(13) ‘black carbon’ (BC) means ~~equivalent black carbon (eBC) derived from optical methods~~ carbonaceous aerosol measured by light absorption;

(14) ‘ultrafine particles’ (UFP) means ~~the~~ particles ~~number concentrations in~~ with a diameter less than or equal to 100 nm; UFP are measured as the particle number concentrations per cubic centimetre (cm^3) for a size range with a lower limit of ≤ [*symbol deleted*]10 nm and for a size range with no restriction on the upper limit;

(15) ‘zone’ means part of the territory of a Member State, as delimited by that Member State for the purposes of air quality assessment and management;

(16) ‘agglomeration’ means a conurbation with a population in excess of 250 000 inhabitants or, where the population is 250 000 inhabitants or fewer, with a given population density per km^2 to be established by the Member States;

(17) ‘assessment’ means any method used to measure, calculate, predict or estimate levels;

(18) ‘assessment threshold’ means the level that determines the required assessment regime to be used to assess ambient air quality;

(19) ‘fixed measurements’ means measurements taken at sampling points, either continuously or by random sampling, at constant locations for at least 1 calendar year to determine the levels in accordance with the relevant data quality objectives;

(20) ‘indicative measurements’ means measurements ~~which meet data quality objectives that are less strict than those required for fixed measurements~~, taken either at regular intervals during a calendar year or by random sampling, to determine the levels in accordance with data quality objectives that are less strict than those required for fixed measurements;

(21) ‘objective estimation’ means ~~an assessment method to obtain quantitative or qualitative~~ information on the concentration or deposition level of a specific pollutant obtained through expert analysis ~~judgement~~ ~~which~~ and may include use of statistical tools~~,~~ ~~remote sensing, and in-situ sensors~~;

(21a) ‘modelling application’ means application of a modelling system; the modelling system is a chain of models and sub-models, including all necessary input data, and any post-processing;

(22) ‘spatial representativeness’ means an assessment approach whereby the air quality metrics observed at a sampling point are representative for an explicitly delineated geographical area to the extent that air quality metrics within that area do not differ from the metrics observed at the sampling point by more than a pre-defined tolerance level;

(23) ‘urban background locations’ means places in urban and suburban areas where levels are representative of the exposure of the general urban population;

(24) ‘rural background locations’ means places in rural areas with low population density where levels are representative of the exposure of the general rural population, vegetation and natural ecosystems;

(25) ‘monitoring supersite’ means a monitoring station at an urban background or rural background location that combines multiple sampling points to gather long-term data on several pollutants;

(26) ‘limit value’ means a level which is not to be exceeded and which is fixed on the basis of scientific knowledge, with the aim of avoiding, preventing or reducing harmful effects on human health or the environment;

(27) ‘~~ozone~~ target value’ means a level fixed on the basis of scientific knowledge, with the aim of avoiding, preventing or reducing harmful effects ~~from ozone~~ on human health or the environment ~~vegetation~~, to be ~~complied with~~ attained where possible over a given period;

(28) ‘average exposure indicator’ means an average level determined on the basis of measurements at urban background locations throughout the average exposure territorial unit ~~at NUTS 1 level as described in Regulation (EC) No 1059/2003,~~ or, if there is no urban area located in that territorial unit, at rural background locations, and which reflects population exposure, used to check whether the average exposure reduction obligation and the average exposure concentration objective for that territorial unit have been met;

(29) ‘average exposure reduction obligation’ means a percentage reduction of the average exposure of the population, expressed as average exposure indicator, of an average exposure territorial unit ~~at NUTS 1 level as described in Regulation (EC) No 1059/2003 of the European Parliament and of the Council~~ set for the reference year with the aim of reducing harmful effects on human health, to be attained over a given period;

(29a) ‘average exposure territorial unit’ means a territorial unit at NUTS 1 level or a part thereof as described in Regulation (EC) No 1059/2003 of the European Parliament and of the Council, used to determine the average exposure indicator, or where the average exposure indicator in a NUTS 1 territorial unit is shown to be influenced by other NUTS 1 territorial units within a Member State, a larger territorial unit covering the related units, provided that it is below the NUTS 0 unit for that Member State;

(30) ‘average exposure concentration objective’ means a level of the average exposure indicator to be attained, with the aim of reducing harmful effects on human health;

(31) ‘critical level’ means a level above which direct adverse effects may occur on some receptors, such as trees, other plants or natural ecosystems but not on humans;

(32) ‘information threshold’ means a level beyond which there is a risk to human health from brief exposure for particularly sensitive population and vulnerable groups and for which immediate and appropriate information is necessary;

(33) ‘alert threshold’ means a level beyond which there is a risk to human health from brief exposure for the population as a whole and at which immediate steps are to be taken by Member States;

(34) ‘long-term objective’ means a level to be attained in the long-term, save where not achievable through proportionate measures, with the aim of providing effective protection of human health and the environment;

(35) ‘contributions from natural sources’ means emissions of pollutants not caused directly or indirectly by human activities, including natural events such as volcanic eruptions, seismic activities, geothermal activities, wild-land fires, high-wind events, sea sprays or the atmospheric re-suspension or transport of natural particles from dry regions;

(36) ‘air quality plans’ means plans that set out measures in order to comply with limit values, ~~ozone~~ target values or average exposure reduction obligations;

(37) ‘short-term action plans’ means plans that set out emergency measures to be taken in the short term to reduce the immediate risk or the duration of the exceedance of the alert thresholds;

(38) ‘the public concerned’ means the public affected or likely to be affected by ~~exceedances of air quality standards~~, or having an interest in, ~~the decision-making procedures related to~~ the implementation of the obligations ~~under this Directive~~ laid down in Articles 19 and 20; for the purposes of this definition, ~~including~~ non-governmental organisations promoting the protection of human health or the environment and meeting any requirements under national law shall be deemed to have an interest;

(39) ‘sensitive population and vulnerable groups’ means those population groups that are more vulnerable to air pollution exposure than the average population, because they have a higher sensitivity or a lower threshold for health effects or have a reduced ability to protect themselves;

(40) ‘oxidative potential of particulate matter’ means a measure of the capacity of particulate matter to oxidize potential target molecules in abiotic assays.

Article 5

Responsibilities

Member States shall designate at the appropriate levels the competent authorities and bodies responsible for the following:

(a) assessment of ambient air quality;

(b) approval of measurement systems (methods, equipment, networks and laboratories);

(c) ensuring the accuracy of measurements;

(d) ~~ensuring~~ promoting the accuracy of modelling applications;

(e) analysis of assessment methods;

(f) coordination on their territory if Union-wide quality assurance programmes are being organised by the Commission;

(g) cooperation with the other Member States and the Commission, including on transboundary air pollution;

(h) establishment of air quality plans;

(i) establishment of short-term action plans.

Article 6

Establishment of zones and territorial units

Member States shall establish zones throughout their territory, including, where appropriate for the purposes of air quality assessment and management, at the level of agglomerations. Air quality assessment and air quality management shall be carried out in all zones and territorial units.

CHAPTER II

ASSESSMENT OF AMBIENT AIR QUALITY AND DEPOSITION RATES

Article 7

Assessment regime

1. The assessment thresholds specified in Annex II shall apply to sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter (PM_{10} and $PM_{2.5}$), ~~lead,~~ benzene, carbon monoxide, arsenic, cadmium, lead, nickel, benzo(a)pyrene and ozone in ambient air.

   Each zone shall be classified in relation to those assessment thresholds.

2. Member States shall review the classification referred to in paragraph 1 at least every 5 years in accordance with the procedure laid down in ~~this~~ paragraph 3. However, classifications shall be reviewed more frequently in the event of significant changes in activities ~~emitting air pollutants and modifying the result~~ relevant to the ambient concentrations of sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter (PM_{10} and $PM_{2.5}$), ~~lead,~~ benzene, carbon monoxide, arsenic, cadmium, lead, nickel, benzo(a)pyrene or ozone.

3. Exceedances of the assessment thresholds shall be determined on the basis of concentrations during the previous 5 years where sufficient data are available. An assessment threshold shall be deemed to have been exceeded if it has been exceeded during at least 3 separate years out of those previous 5 years.

   Where data are available for less than 5 years, Member States may combine measurement campaigns of short duration during the period of the year and at locations likely to be typical of the highest pollution levels, with results obtained from information, from emission inventories and modelling applications to determine exceedances of the assessment thresholds.

Article 8

Assessment criteria

1. Member States shall assess ambient air quality with respect to the pollutants referred to in Article 7 in all their zones, in accordance with the criteria laid down in paragraphs 2 to 6 of this Article and in accordance with Annex IV.

2. In all zones classified as over the assessment thresholds ~~but below the respective limits values where the level of pollutants exceeds the assessment threshold~~ established for those pollutants, fixed measurements shall be used to assess the ambient air quality. Those fixed measurements may be supplemented by modelling applications ~~and~~ or indicative measurements to assess air quality and to provide adequate information on the spatial distribution of air pollutants and on the spatial representativeness of fixed measurements.

3. ~~In all zones where the level of pollutants exceeds a limit value established for those pollutants in Table 1 of Section 1 of Annex I or an ozone target value established in Section 2 of Annex I, modelling applications shall be used in addition to fixed measurements to assess the ambient air quality.~~

   ~~Those modelling applications shall also provide information on the spatial distribution of pollutants and on the spatial representativeness of fixed measurements.~~

4. In all zones classified as below the assessment thresholds ~~where the level of pollutants is below the assessment threshold established~~ for those pollutants, modelling applications, indicative measurements, objective estimations ~~techniques~~, or a combination thereof shall be sufficient for the assessment of the ambient air quality.

5. The results of modelling applications undertaken in accordance with paragraph 4 of this Article or paragraph 3 of Article 9 or indicative measurements shall be taken into account for the assessment of air quality with respect to the limit values and target values.

If fixed measurements are available with an area of representativeness covering the area of exceedance calculated by the modelling application, a Member State may choose not to report the modelled exceedance as an exceedance of the relevant limit values and target values.

If modelling applications shows an exceedance of any limit value or ~~ozone~~ target value in an area of the zone not covered by fixed measurements and their area of spatial representativeness, additional fixed or indicative measurements ~~shall~~ may be used. Where additional fixed or indicative measurements are used, these measurements shall be conducted within ~~during at least 1~~ 2 calendar years after the exceedance was recorded and shall cover at least 1 calendar year in accordance with the minimum data coverage requirements set out in Point B of Annex V, to assess the concentration level of the relevant pollutant.

Where a Member State chooses not to conduct any additional fixed or indicative measurements**,** the exceedance shown by modelling applications shall be used for air quality assessment.

5a. The Commission shall provide, by means of implementing acts, further technical details for:

(a) Modelling applications, including how results from modelling applications and indicative measurements shall be taken into account when assessing air quality and how potential exceedances that are identified by these assessment methods can be verified;

(b) determining the spatial representativeness of sampling points;

(c) modelling applications as performed for the purposes of Article 18, in order to attain the limit values specified in Table 1 of Section 1 of Annex I, which shall include reasonable and proportionate measures.

Those implementing acts shall be adopted [by date] in accordance with the examination procedure referred to in Article 26(2).

~~6. To assess the contribution of benzo(a)pyrene in ambient air, each Member State shall monitor other relevant polycyclic aromatic hydrocarbons at a limited number of sampling points. These compounds shall include at least: benzo(a)anthracene, benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene, indeno(1,2,3-cd)pyrene, and dibenz(a,h)anthracene. Sampling points for these polycyclic aromatic hydrocarbons shall be~~

~~co-located with sampling points for benzo(a)pyrene and shall be selected in such a way that geographical variation and long-term trends can be identified.~~ *[moved to Art. 9(8)]*

~~7. In addition to monitoring required under Article 10, Member States shall, where applicable, monitor ultrafine particles levels in accordance with Point D of Annex III and Section 3 of Annex VII.~~ *[moved to Art. 9(9)]*

8. The use of bio indicators ~~shall~~ may be considered where regional patterns of the impact on ecosystems are to be assessed, including in accordance with the monitoring undertaken under Directive (EU) 2016/2284.

Article 9

Sampling points

1. The location of sampling points for the measurement of sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter (PM_{10} and $PM_{2.5}$), ~~lead,~~ benzene, carbon monoxide, arsenic, cadmium, lead, nickel, benzo(a)pyrene and ozone in ambient air shall be determined in accordance with Annex IV.

~~The location of sampling points for the measurement of ozone shall be determined in accordance with Annex IV.~~

2. In each zone where the level of pollutants exceeds the assessment threshold specified in Annex II, the number of sampling points for each pollutant shall not be less than the minimum number of sampling points specified in Tables 1 ~~3~~ and 2 ~~4~~ of Point~~s~~ A and Point C~~,~~ of Annex III.

3. For zones where the level of pollutants exceeds the relevant assessment threshold specified in Annex II, but not the respective limit and target values specified in ~~Table 1 of~~ Section 1 of Annex I, ozone target values specified in Section 2 of Annex I or critical levels specified in Section 3 of Annex I, the minimum number of sampling points for fixed measurements may be reduced by up to 50 %, in accordance with Tables 3 and 4 of Point~~s~~ A and Point C of Annex III provided that the following conditions are met:

(a) indicative measurements ~~and~~ or modelling applications provide sufficient information for the assessment of air quality with regard to limit values, ~~ozone~~ target values, critical levels, information thresholds and alert thresholds, as well as adequate information for the public, in addition to the ~~one~~ information provided by the ~~fixed~~ sampling points for fixed measurements;

(b) the number of sampling points to be installed and the spatial resolution of indicative measurements and modelling ~~techniques~~ applications are sufficient for the concentration of the relevant pollutant to be established in accordance with the data quality objectives specified in Points A and B of Annex V and enable assessment results to meet the requirements specified in Point D of Annex V;

(c) the number of indicative measurements is the same as the number of fixed measurements that are being replaced ~~and the indicative measurements have a minimum duration of 2 months per calendar year~~;

(d) for ozone, nitrogen dioxide is measured at all remaining sampling points measuring ozone except at rural background locations for ozone assessment as referred to in Point B of Annex IV.

4. One or more sampling points adapted to the monitoring objective specified in Section 2, Point A of Annex VII, shall be installed in a Member State's territory to supply data on concentrations of the ozone precursor substances listed in Point B of that Section at locations determined in accordance with Point C of that Section.

4a. Nitrogen dioxide shall be measured at a minimum of 50% of the ozone sampling points required under Table 2 of Section A of Annex III. That measurement shall be continuous except at rural background stations, as referred to in Section B of Annex IV, where other measurement methods may be used.

5. Each Member State shall, in accordance with Annex IV, ensure that the distribution of sampling points used for the calculation of the average exposure indicators for $PM_{2.5}$ and nitrogen dioxide (NO_2), reflect the general population exposure adequately. The number of sampling points shall be no less than that determined by application of Point B~~,~~ of Annex III.

6. ~~The results of modelling applications and indicative measurements shall be taken into account for the assessment of air quality with respect to the limit values and ozone target values.~~

7. Sampling points at which exceedances of ~~any~~ a relevant limit value specified in Tables 1 and 2 of Section 1 of Annex I were recorded within the previous 3 years shall not be relocated, unless a relocation is necessary due to special circumstances, including spatial development. Relocation of such sampling points shall, wherever possible, be done within their area of spatial representativeness and be based on modelling results. A detailed justification of any relocation of these sampling points shall be fully documented in accordance with the requirements set out in Point D of Annex IV.

8. To assess the contribution of benzo(a)pyrene in ambient air, each Member State shall monitor other relevant polycyclic aromatic hydrocarbons at a limited number of sampling points. These compounds shall include at least: benzo(a)anthracene, benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene, indeno(1,2,3-cd)pyrene, and dibenz(a,h)anthracene. Sampling points for these polycyclic aromatic hydrocarbons shall be co-located with sampling points -for benzo(a)pyrene and shall be selected in such a way that geographical variation and long-term trends can be identified. *[moved from Art. 8(6)]*

9. In addition to monitoring required under Article 10, Member States shall monitor ultrafine particles levels in accordance with Point D of Annex III and Section 3 of Annex VII. Monitoring of black carbon concentrations may be undertaken at the same locations. *[moved from Art. 8(7)]*

Article 10

Monitoring supersites

1. Each Member State shall establish at least one monitoring supersite per 10 million inhabitants at an urban background location. Member States that have fewer than 10 million inhabitants shall establish at least one monitoring supersite at an urban background location.

Each Member State whose territory is over 10 000 km^2 shall establish at least one monitoring supersite per 100 000 km^2 at a rural background location. Member States whose territory is over 10 000 km^2 but less than 100 000 km^2 shall establish at least one monitoring supersite at a rural background location.

2. The siting of monitoring supersites shall be determined for urban background locations and rural background locations in accordance with Point B of Annex IV.

3. All sampling points that fulfil the requirements laid down in Point B and C of Annex IV and which are installed at monitoring supersites may be taken into account for the purpose of meeting the requirements on the minimum number of sampling points for the relevant pollutants as specified in Annex III.

4. A Member State may establish,~~set up in agreement~~ with one or more neighbouring Member States, ~~to establish~~ one or more joint monitoring supersites to meet the requirements set out in paragraph 1. This does not affect the obligation of each Member State to establish at least 1 monitoring supersite at an urban background location and the obligation of each Member State whose territory is over 10 000 km^2 to establish at least 1 monitoring supersite at a rural background location.

4a. Measurements at monitoring supersites at urban background locations and rural background locations shall include the pollutants listed in Tables 1 and 2 of Section -1 of Annex VII and may also include the pollutants listed in Table 3 of Section -1 of Annex VII.

A Member State may choose not to measure at urban background stations pollutants that are below their respective assessment threshold set in Annex II. The levels of pollutants that are not measured shall be assessed at such supersite at least every 5 years. A Member State may choose not to measure black carbon, ultrafine particles or ammonia in half of its rural background supersites if the number of its rural background supersites exceeds the number of its urban background supersites by at least a ratio of 2:1 between rural and urban supersites, as long as the selection of sites is representative for the three pollutants.

5. ~~Measurements at all monitoring supersites at urban background locations shall include fixed or indicative measurements of size distribution of ultrafine particles and particulate matter oxidative potential.~~

6. ~~Measurements at all monitoring supersites at urban background locations and rural background locations shall include at least the following:~~

~~(a) fixed measurements of particulate matter (PM_{10} and $PM_{2.5}$), nitrogen dioxide (NO_2), ozone (O_3), black carbon (BC), ammonia (NH_3) and ultrafine particles (UFP).~~

~~(b) fixed or indicative measurements of fine particulate matter ($PM_{2.5}$) for the purposes of providing, as a minimum, information on their total mass concentration and their chemical speciation concentrations on an annual average basis in accordance with Section 1 of Annex VII;~~

~~(c) fixed or indicative measurements of arsenic, cadmium, nickel, total gaseous mercury, benzo(a)pyrene and the other polycyclic aromatic hydrocarbons referred to in Article 8(6), and of the total deposition of arsenic, cadmium, mercury, nickel, benzo(a)pyrene and the other polycyclic aromatic hydrocarbons referred to in Article 8(6), irrespective of concentration levels.~~

~~7.~~ ~~Measurements of particulate and gaseous divalent mercury may also be undertaken at monitoring supersites at urban background locations and rural background locations.~~

8. Where appropriate, monitoring shall be coordinated with the monitoring strategy and measurement programme of the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP), the Aerosol, Clouds and Trace Gases Research Infrastructure (ACTRIS), and the monitoring of air pollution impacts undertaken under Directive (EU) 2016/2284.

Article 11

Reference measurement methods, modelling applications and data quality objectives

1. Member States shall apply the reference measurement methods specified in Points A and C of Annex VI.

   However, other measurement methods may be used subject to the conditions set out in Points B, C, and D and E of Annex VI.

   Member States shall apply air quality modelling applications subject to the conditions set out in Point E of Annex VI.

2. Air quality assessment data shall meet the data quality objectives laid down in Annex V.

CHAPTER III

AMBIENT AIR QUALITY MANAGEMENT

Article 12

Requirements where levels are lower than the limit values, ozone target values and average exposure concentration objectives, but above the assessment thresholds

1. In zones where the levels of sulphur dioxide, nitrogen dioxide, particulate matter (PM_{10} and $PM_{2.5}$), lead, benzene, carbon monoxide, arsenic, cadmium, lead, nickel and benzo(a)pyrene in ambient air are below the respective limit values specified in Tables 1 and 2 of Section 1 of Annex I, Member States shall maintain the levels of those pollutants below the limit values.

2. In zones in which ozone levels are below the target values, Member States shall take necessary measures to maintain those levels below the target values and endeavour to attain the long-term objectives specified in Section 2 of Annex I, in so far as factors including the transboundary nature of ozone pollution, volatile organic compounds from biogenic sources and meteorological conditions so permit, and provided that any necessary measures do not entail a disproportionate cost.

3. In ~~given~~ average exposure territorial units ~~at NUTS 1 level as described in Regulation (EC) No 1059/2003~~ where the average exposure indicators for $PM_{2.5}$ and NO_2 are below the respective value of the average exposure concentration objectives for those pollutants as laid down in Section 5 of Annex I, Member States shall maintain the levels of those pollutants below the average exposure concentration objectives.

4. Member States shall endeavour to achieve and preserve the best ambient air quality and a high level of environmental and human health protection, in ~~line with~~ order to move closer to a zero pollution objective as referred to in Article 1 paragraph 1 taking into account the air quality guidelines published by the WHO and below the assessment thresholds laid down in Annex II.

Article 13

Limit values, target values and average exposure reduction obligation for the protection of human health

1. Member States shall ensure that, throughout their zones, levels of sulphur dioxide, nitrogen dioxide, particulate matter (PM_{10} and $PM_{2.5}$), ~~lead,~~ benzene, carbon monoxide, arsenic, cadmium, lead, nickel and benzo(a)pyrene in ambient air, do not exceed the limit values laid down in Tables 1 and 2 of Section 1 of Annex I.

2. ~~For ozone,~~ Member States shall ensure, by taking all necessary measures not entailing disproportionate costs, that throughout the zone levels do not exceed the ~~ozone~~ target values, as laid down in Table 2a, Section 1 and Section 2, Point B, of Annex I.

3. Member States shall ensure that the average exposure reduction obligations for $PM_{2.5}$ and NO_2 laid down in Section 5, Point B, of Annex I, are met throughout their average exposure territorial units ~~at NUTS 1 level~~, where they exceed the average exposure concentration objectives set out in Section 5, Point C, of Annex I.

4. Compliance with paragraphs 1, 2 and 3 shall be assessed in accordance with Annex IV.

5. The average exposure indicators shall be assessed in accordance with Section 5, Point A, of Annex I.

6. The deadline for attaining the limit values laid down in Table 1 of Section 1 of Annex I may be postponed in accordance with Article 18.

7. Member States ~~that~~ may maintain or introduce more protective measures, including more stringent air quality standards than those referred to in this Article, in accordance with Article 193 TFEU. These shall be notified ~~them~~ to the Commission within 3 months after their adoption. ~~Such notification shall be accompanied by an explanation on the process of how those air quality standards have been established and the scientific information used.~~

Article 14

Critical levels for the protection of vegetation and natural ecosystems

Member States shall ensure compliance with the critical levels specified in Section 3 of Annex I as assessed in accordance with Point A and B.3, of Annex IV.

Article 15

Exceedances of alert or information thresholds

1. The alert thresholds for concentrations of sulphur dioxide, nitrogen dioxide, and particulate matter (PM_{10} and $PM_{2.5}$) in ambient air shall be those laid down in Section 4, Point A of Annex I.

2. The alert threshold and information threshold for ozone shall be that laid down in Section 4, Point B, of Annex I.

3. Where any alert threshold or any information threshold laid down in Section 4 of Annex I is exceeded or, when appropriate, if it is predicted to be exceeded based on modelling applications or other forecasting tools, Member States shall take the necessary steps to inform the public within ~~a few hours at the latest~~ the shortest possible timeframe, in accordance with point 2 and 3 of Annex IX, making use of different media and communication channels and ensuring broad public access.

~~4. Member States shall ensure that information about actual or predicted exceedances of any alert threshold or information threshold is provided to the public as soon as possible in accordance with, points 2 and 3 of Annex IX.~~ *[merged with paragraph 3]*

5. Member States may maintain or introduce more protective measures, including more stringent alert or information thresholds, in accordance with Article 193 TFEU. These shall be notified to the Commission within 3 months after their adoption.

Article 16

Contributions from natural sources

1. Member States may, for a given year, identify:

(a) zones where exceedances of limit values for a given pollutant are attributable to natural sources; and

(b) ~~NUTS 1 Given~~ average exposure territorial units, where exceedances of the level determined by the average exposure reduction obligations are attributable to natural sources.

2. Member States shall provide the Commission with lists of any such zones and ~~NUTS 1~~ average exposure territorial units, as referred to in paragraph 1, together with information on concentrations and sources and the evidence demonstrating that the exceedances are attributable to natural sources.

3. Where the Commission has been informed of an exceedance attributable to natural sources in accordance with paragraph 2, that exceedance shall not be considered as an exceedance for the purposes of this Directive.

4. The Commission shall provide, by means of implementing acts, further technical details on the demonstration and subtraction of exceedances attributable to natural sources.

Those implementing acts shall be adopted [by date] in accordance with the examination procedure referred to in Article 26(2).

Article 17

Exceedances attributable to winter-sanding or winter-salting of roads

1. Member States may, for a given year, identify zones within which limit values for PM_{10} are exceeded in ambient air due to the re-suspension of particulates following winter-sanding or winter-salting of roads.

2. Member States shall provide the Commission with lists of any such zones, as referred to in paragraph 1 together with information on concentrations and sources of PM_{10} in such zones.

   Member States shall also provide the evidence demonstrating that any exceedances are due to re-suspended particulates and that reasonable measures have been taken to lower such concentrations.

3. Without prejudice to Article 16, in the case of zones referred to in paragraph 1 of this Article, Member States need to establish the air quality plan provided for in Article 19 only in so far as exceedances are attributable to PM10 sources other than winter-sanding or winter-salting of roads.

4. The Commission shall provide, by means of implementing acts, further technical details/methodology for determination of contributions from the resuspension of particulates following winter-sanding or winter-salting of roads.

   Those implementing acts shall be adopted [by date] in accordance with the examination procedure referred to in Article 26(2).

Article 18

Postponement of attainment deadline and exemption from the obligation to apply certain limit values

1. Where, in a given zone, conformity with the limit values for particulate matter (PM_{10} and $PM_{2.5}$), ~~or~~ nitrogen dioxide, benzo(a)pyrene or benzene cannot be achieved by the deadline specified in Table 1 of Section 1 of Annex I, because of site-specific dispersion characteristics, orographic boundary conditions, adverse climatic conditions, ~~or~~ transboundary contributions, a high share of low-income households in the air quality zone concerned if the Member State in question has a national GDP per capita lower than the EU average, or if modelling applications results, as performed for the purposes of Annex VIII, Section A, point 6(d), show that the limit values cannot be attained within the attainment date specified in Table 1 of Section 1 of Annex I, a Member State may postpone that deadline ~~once by a maximum of 5 years~~ for that particular zone by the period justified in the air quality plan to be established by the Member State, which shall not extend beyond 1 January 2040, including when the air quality plan established in accordance with Article 19(4) indicates that more time is needed, if the following conditions are met:

   (a) an air quality plan is established in accordance with Article 19(4), and meeting the requirements listed in Article 19(5) to (7) for the zone to which the postponement would apply;

   (b) the air quality plan referred in point (a) is supplemented by the information listed in Point B of Annex VIII related to the pollutants concerned and demonstrates how exceedance periods above the limit values will be kept as short as possible;

   (c) the air quality plan referred to in point (a) outlines how the public and, in particular, sensitive population and vulnerable groups will be informed about the consequences of the postponement for human health and the environment;

   (d) the air quality plan referred to in point (a) outlines how additional funding, including via relevant national and Union funding programmes, will be mobilised to accelerate the improvement of air quality in the zone to which the postponement would apply;

Member States must show that the measures in the air quality plan referred in point (a) of the first subparagraph of this paragraph have been implemented.

2. Member States shall notify the Commission where, in their view, paragraph 1 is applicable, and shall communicate the air quality plan referred to in paragraph 1 and all relevant information necessary for the Commission to assess whether the invoked reason for postponement and the conditions set out in that paragraph are satisfied. In its assessment, the Commission shall take into account estimated effects on ambient air quality in Member States, at present and in the future, of measures that have been taken by Member States as well as estimated effects on ambient air quality of Union measures.

Where the Commission has raised no objections within 9 months of receipt of that notification, the relevant conditions for the application of paragraph 1 shall be deemed to be satisfied.

If objections are raised, the Commission may require Member States to adjust or provide new air quality plans.

CHAPTER IV

PLANS

Article 19

Air quality plans

1. Where, in given zones the levels of pollutants in ambient air exceed any limit value or target value, laid down in Section 1 of Annex I, Member States shall establish air quality plans for those zones as soon as possible and no later than ~~2~~ 3 years after the calendar year during which that exceedance of any limit value or target value was recorded. Those air quality plans shall set out appropriate measures to achieve the concerned limit value or target value and to keep the exceedance period as short as possible, and in any case no longer than 6 years from the end of the calendar year in which the first exceedance was recorded ~~reported~~.

   Where exceedances of any limit value~~s~~ or target value persist during the ~~third~~ sixth calendar year after the exceedance of the limit value or target value was recorded ~~establishment of the air quality plan~~, Member States shall update the measures contained in the air quality plan ~~and the measures therein,~~ and take additional and more effective measures, in the subsequent calendar year to keep the exceedance period as short as possible.

2. Where in a ~~given NUTS 1~~ territorial unit covering at least one air quality zone, the levels ~~of pollutants~~ in ambient air exceed the ozone target value, laid down in Section 2 of Annex I, Member States shall establish air quality plans for those ~~NUTS 1~~ territorial units, as soon as possible and no later than 3 ~~2~~ years after the calendar year during which the exceedance of the ozone target value was recorded. Those air quality plans shall set out appropriate measures in order to achieve the ozone target value and to keep the exceedance period as short as possible.

However, Member States may refrain from establishing such air quality plans for ozone when there is no significant potential, considering national geographical and meteorological conditions and provided that its measures do not entail disproportionate costs, to address the exceedance. Where an air quality plan is not established, Member States shall inform the Commission.

Where exceedances of the ozone target value persist during the ~~fifth~~ sixth calendar year after the ~~establishment of the air quality plan in the relevant NUTS 1 territorial unit~~ exceedance of the ozone target value was recorded, Member States shall update the measures contained in the air quality plan ~~and the measures therein,~~ and take additional and more effective measures, in the subsequent calendar year to keep the exceedance period as short as possible.

For ~~NUTS 1~~ territorial units where the ozone target value is exceeded, Member States shall ensure that the relevant national air pollution control programme prepared pursuant to Article 6 of Directive (EU) 2016/2284 includes measures addressing ~~those exceedances~~ ozone precursors covered by that Directive.

3. Where in a given ~~NUTS 1~~ average exposure territorial unit~~,~~ the average exposure reduction obligation laid down in Section 5 of Annex I is ~~exceeded~~ not achieved, Member States shall establish air quality plans for those ~~NUTS 1~~ average exposure territorial units as soon as possible and no later than ~~2~~ 3 years after the calendar year during which the exceedance of the average exposure reduction obligation was recorded. Those air quality plans shall set out appropriate measures to achieve the average exposure reduction obligation and to keep the exceedance period as short as possible.

Where exceedances of the average exposure reduction obligation persist during the ~~fifth~~ sixth calendar year after the ~~establishment of the air quality plan~~ exceedance of the average exposure reduction obligation was recorded, Member States shall update the air quality plan and the measures therein, and take additional and more effective measures, in the subsequent calendar year to keep the exceedance period as short as possible.

4. Where from [insert year 2 years after entry into force of this Directive], until 31 December 2029 in a zone or ~~NUTS 1~~ territorial unit, the levels of pollutants are above any limit value or ozone target values ~~to be attained by 1 January 2030~~ as laid down in Table 1 of Section 1 and Table 1 of part B of Section 2 of Annex I, Member States shall establish an air quality plan for the concerned pollutant as soon as possible and no later than ~~2~~ 3 years after the calendar year during which the exceedance ~~of the~~ was recorded to attain the respective limit values or ozone target value~~s~~ ~~by the expiration of the attainment deadline~~, without prejudice to the second subparagraph of paragraph 2 as regards ozone plans. The air quality plan shall set out appropriate measures to keep the exceedance period as short as possible.

   Where, for the same pollutant, Member States are required to establish an air quality plan in accordance with this paragraph as well as an air quality plan in accordance with Article 19(1), they may establish a combined air quality plan in accordance with Article 19(5), (6) and (7) and provide information on the expected impact of measures to reach compliance for each limit value it addresses, as required by in Annex VIII, points 5 and 6. Any such combined air quality plan shall set out appropriate measures to achieve all related limit values and to keep all exceedance periods as short as possible.

5. Air quality plans shall contain at least the following information:

   (a) the information listed in Point A, points 1 to 6 of Annex VIII;

   (b) where applicable, the information listed in Point A, points 7 and 8, of Annex VIII;

   (c) where appropriate, information on abatement measures listed in Point B, Point 2 of Annex VIII.

   Member States shall consider including measures referred to in Article 20(2) and specific measures aiming at the protection of sensitive population and vulnerable groups, including children in their air quality plans.

   Regarding the pollutants concerned, when preparing air quality plans, Member States shall assess the risk of exceeding the respective alert thresholds. That analysis shall be used for establishing short-term action plans where applicable.

Where air quality plans shall be established in respect of several pollutants or air quality standards, Member States shall, where appropriate, establish integrated air quality plans covering all pollutants and air quality standards concerned.

Member States shall, to the extent feasible, ensure consistency of their air quality plans with other plans that have a significant impact on air quality, including those required under Directive 2010/75/ EU of the European Parliament and of the Council[24], Directives (EU) 2016/2284 and 2002/49/EC and under climate, energy, transport and agriculture legislation.

6. Member States shall consult the public, in accordance with Directive 2003/35/EC of the European Parliament and of the Council[25], and the competent authorities, which, by reason of their responsibilities in the field of air pollution and air quality, are likely to be concerned by the implementation of the air quality plans, on draft air quality plans and any significant updates of air quality plans prior to their finalisation.

When preparing air quality plans, Member States shall ensure that stakeholders whose activities contribute to the exceedance situation are encouraged to propose measures they are able to take to help end the exceedances and that non-governmental organisations, such as environmental organisations, consumer organisations, organisations representing the interests of sensitive population and vulnerable groups, other relevant health-care bodies and the relevant industrial federations are allowed to take part in those consultations.

7. Air quality plans shall be communicated to the Commission within 2 months after their adoption.

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[24] Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (OJ L 334, 17.12.2010, p. 17).

[25] Directive 2003/35/EC of the European Parliament and of the Council of 26 May 2003 providing for public participation in respect of the drawing up of certain plans and programmes relating to the environment and amending with regard to public participation and access to justice Council Directives 85/337/EEC and 96/61/EC (OJ L 156, 25.6.2003, p. 17).

Article 20

Short-term action plans

1. Where, in a given zone, there is a risk that the levels of pollutants will exceed one or more of the alert thresholds specified in Section 4 of Annex I, Member States shall establish ~~draw up~~ short-term action plans indicating the emergency measures to be taken in the short term in order to reduce the risk or duration of such an exceedance.

   However, where there is a risk of exceedance of ~~that~~ the alert threshold for ozone or particulate matter (PM_{10} and $PM_{2.5}$), Member States may refrain from ~~drawing up~~ establishing such short-term action plans when there is no significant potential, taking into account national geographical, meteorological and economic conditions, to reduce the risk, duration or severity of such an exceedance. Where a short-term action plan is not established, Member States shall inform the Commission**.**

2. When ~~drawing up~~ establishing the short-term action plans referred to in paragraph 1 Member States may, depending on the individual case, provide for effective measures to control and, where necessary, temporarily suspend activities which contribute to the risk of the respective limit values or ozone target values or alert threshold being exceeded. Depending on the share of the main pollution sources to the exceedances to be addressed, those short-term action plans shall consider including, where appropriate, measures in relation to activities such as transport, construction works, industrial installations, agriculture and the use of products and domestic heating. Specific actions aiming at the protection of sensitive population and vulnerable groups, including children, shall also be considered in the framework of those plans.

3. Member States shall consult the public in accordance with Directive 2003/35/EC, and the competent authorities, which, by reason of their responsibilities in the field of air pollution and air quality, are likely to be concerned by the implementation of the short-term action plan, on draft short-term action plans and any significant updates thereof prior to their finalisation.

4. When Member States have drawn up a short-term action plan, they shall make available to the public and to appropriate organisations such as environmental organisations, consumer organisations, organisations representing the interests of sensitive population and vulnerable groups, other relevant health-care bodies and the relevant industrial federations both the results of their investigations on the feasibility and the content of specific short-term action plans as well as information on the implementation of these plans.

5. ~~Member States shall submit~~ Short-term action plans shall be communicated to the Commission within ~~2 months after~~ a year of their adoption in the framework of the annual reporting pursuant to Article 23.

Article 21

Transboundary air pollution

1. Where transboundary transport of air pollution from one or more Member State contributes significantly to the exceedance of any limit value, ozone target value, average exposure reduction obligation or alert threshold in another Member State, the latter shall notify the Member States from which the air pollution originated and the Commission thereof.

1a. Member States may, for a given year, identify:

(a) zones where exceedances of limit values and/or target values are attributable to contribution of transboundary sources.

(b) average exposure territorial units, where exceedances of the level determined by the average exposure reduction obligations are attributable to contribution of transboundary sources

Member States may provide the Commission with the lists of any such zones and average exposure territorial units together with information on concentrations and the evidence demonstrating that the exceedances are attributable to transboundary sources which are out of the influence of the Member State affected.

Where the Commission has been informed of an exceedance attributable to transboundary sources in accordance with the second subparagraph, this may be taken into consideration as indicated in Article 18(1).

1b. The Member States concerned shall cooperate with each other, with the technical support of the Commission to identify the sources of air pollution and the measures to be taken to address those sources, and draw up coordinated ~~joint~~ activities, such as the ~~preparation of joint or coordinated~~ coordination of air quality plans pursuant to Article 19, in which each Member State shall address pollution sources located in its territory, in order to remove such exceedances.

Member States shall respond to each other in a timely manner, and inform the Commission, ~~and~~ no later than 3 months after being notified by another Member State in accordance with the first subparagraph.

2. The Commission shall be informed of, and invited to be present and to assist in any cooperation referred to in paragraph 1 of this Article. Where appropriate, the Commission shall, taking into account the reports established pursuant to Article 11 of Directive (EU) 2016/2284, consider whether further action shall be taken at Union level in order to reduce precursor emissions responsible for transboundary pollution.

3. Member States shall, if appropriate pursuant to Article 20, prepare and implement coordinated ~~joint~~ short-term action plans covering neighbouring zones in other Member States. Member States shall ensure that neighbouring zones in other Member States receive all appropriate information regarding these short-term action plans without undue delay.

4. Where the information threshold or alert thresholds are exceeded in zones close to national borders, information on these exceedances shall be provided as soon as possible to the competent authorities in the neighbouring Member States concerned. That information shall also be made available to the public.

5. In drawing up plans as provided for in paragraphs 1 and 3 and in informing the public as referred to in paragraph 4, Member States shall, where appropriate, endeavour to pursue cooperation with third countries, and in particular with candidate countries. Member States may request technical support from the Commission where appropriate.

CHAPTER V

INFORMATION AND REPORTING

Article 22

Public information

1. Member States shall ensure that the public as well as appropriate organisations such as environmental organisations, consumer organisations, organisations representing the interests of sensitive populations and vulnerable groups, other relevant health-care bodies and the relevant industrial federations are informed, adequately and in good time, of the following:

   (a) air quality in accordance with ~~Annex~~ points 1 and 3 of Annex IX;

   (b) any postponement decision pursuant to Article 18;

   (c) air quality plans as provided for in Article 19;

   (d) short-term action plans as provided for in Article 20;

   (e) the effects of exceedances of limit values, ~~ozone~~ target values, average exposure reduction obligations, information thresholds and alert thresholds in a summary assessment; the summary assessment shall include, where appropriate, further information and assessments on ~~forest protection~~ the environment as well as information on pollutants covered by Article 10 and Annex VII.

2. Member States shall ~~establish~~ make available through a public source an air quality index covering hourly updates on at least sulphur dioxide, nitrogen dioxide, particulate matter (PM_{10} and $PM_{2.5}$) and ozone, ~~and make it available through a public source providing an hourly update,~~ provided that according to this Directive there is an obligation to monitor these pollutants. The index may include additional pollutants, when considered relevant. The air quality index shall consider the recommendations by the WHO and build on the air quality indices at European scale provided by the European Environmental Agency, including the information regarding impacts on health. Alternatively, Member States may use the air quality index provided by the European Environmental Agency to fulfil the requirements of this provision.

3. Member States shall inform the public of the competent authority or body designated in relation to the tasks referred to in Article 5.

4. The information referred to in this Article shall be made available to the public free of charge by means of easily accessible media and communication channels in accordance with Directive 2007/2/EC[26] and Directive (EU)2019/1024[27] of the European Parliament and of the Council.

Article 23

Transmission of information and reporting

1. Member States shall ensure that information on ambient air quality is made available to the Commission within the required timescale in accordance with the implementing acts referred to in paragraph 5, and irrespective of compliance with data quality objectives for data coverage laid down in Annex V, section B.

[26] Directive 2007/2/EC of the European Parliament and the Council of 14 March 2007 establishing an infrastructure for spatial information in the European Community (INSPIRE) (OJ L 108, 25.4.2007, p. 1).

[27] Directive (EU) 2019/1024 of the European Parliament and of the Council of 20 June 2019 on open data and the re-use of public sector information (OJ L 172, 26.6.2019, p. 56).

2. For the specific purpose of assessing compliance with the limit values, ~~ozone~~ target values, average exposure reduction obligations and critical levels, the information referred to in paragraph 1 shall be made available to the Commission no later than ~~4~~ 9 months after the end of each calendar year and shall include:

   (a) the changes made in that year to the list and delimitation of zones established under Article 6 or any ~~NUTS 1~~ average exposure territorial unit;

   (b) the list of zones and ~~NUTS 1~~ average exposure territorial units and the levels of pollutants assessed. For zones in which the levels of one or more pollutants are higher than the limit values, target values or critical levels, as well as for ~~NUTS 1~~ territorial units where the levels of one or more pollutants are higher than the ozone target values or average exposure reduction obligations:

      (i) the dates and periods when such levels were observed;

      (ii) if appropriate, an assessment on contributions from natural sources and from re-suspension of particulates following winter sanding or winter salting of roads to the levels assessed, as declared to the Commission under Articles 16 and 17.

3. Member States shall report to the Commission in accordance with paragraph 1 information concerning the levels recorded and the duration of the periods during which the alert threshold or information threshold was exceeded.

4. Member States shall provide information listed in Point D of Annex IV to the Commission within 3 months of being requested to do so.

5. The Commission shall adopt, ~~as appropriate,~~ by means of implementing acts, measures:

   (a) ~~determining~~ specifying the ~~additional~~ information to be made available by Member States pursuant to this Article as well as the timescales in which such information is to be communicated;

(b) identifying ways of streamlining the way data are reported and the reciprocal exchange of information and data from networks and individual sampling points measuring ambient air pollution within Member States.

Those implementing acts shall be adopted in accordance with the examination procedure referred to Article 26(2).

CHAPTER VI

DELEGATED AND IMPLEMENTING ACTS

Article 24

Amendments to Annexes

The Commission is empowered to adopt delegated acts in accordance with Article 25 amending Annexes ~~II~~ III to VII ~~IX~~ to take account of technical and scientific developments regarding assessment of ambient air quality~~, information to be included in air quality plans, and public information~~.

However, the amendments may not have the effect of directly or indirectly modifying either of the following:

(a) the limit values, ~~ozone~~ target values and ozone long-term objectives, critical levels, alert and information thresholds, average exposure reduction obligations and average exposure concentration objectives specified in Annex I

(b) the dates for compliance with any of the parameters referred to in point (a).

Article 25

Exercise of delegation

1. The power to adopt delegated acts is conferred on the Commission subject to the conditions laid down in this Article.

2. The power to adopt delegated acts referred to in Article 24 shall be conferred on the Commission for a period of five years ~~an indeterminate period of time~~ from … [date of entry into force of this Directive]. The Commission shall draw up a report in respect of the delegation of power not later than nine months before the end of the five-year period. The delegation of power shall be tacitly extended for periods of an identical duration, unless the European Parliament or the Council opposes such extension not later than three months before the end of each period.

3. The delegation of power referred to in Article 24 may be revoked at any time by the European Parliament or by the Council. A decision to revoke shall put an end to the delegation of the power specified in that decision. It shall take effect the day following the publication of the decision in *the Official Journal of the European Union* or at a later date specified therein. It shall not affect the validity of any delegated acts already in force.

4. Before adopting a delegated act, the Commission shall consult experts designated by each Member State in accordance with the principles laid down in the Interinstitutional Agreement on Better Law-Making.

5. As soon as it adopts a delegated act, the Commission shall notify it simultaneously to the European Parliament and to the Council.

   A delegated act adopted pursuant to Article 24 shall enter into force only if no objection has been expressed either by the European Parliament or by the Council within a period of 2 months of notification of that act to the European Parliament and to the Council or if, before the expiry of that period, the European Parliament and the Council have both informed the Commission that they will not object. That period shall be extended by 2 months at the initiative of the European Parliament or of the Council.

Article 26

Committee procedure

1. The Commission shall be assisted by 'the Ambient Air Quality Committee'. That committee shall be a committee within the meaning of Regulation (EU) No 182/2011.

2. Where reference is made to this paragraph, Article 5 of Regulation (EU) 182/2011 shall apply. Where the Committee delivers no opinion, the Commission shall not adopt the draft implementing act and the third subparagraph of Article 5(4) of Regulation (EU) No 182/2011 shall apply.

CHAPTER VII

ACCESS TO JUSTICE, COMPENSATION AND PENALTIES

Article 27

Access to justice

1. Member States shall ensure that, in accordance with their national legal system, members of the public concerned have access to a review procedure before a court of law, or another independent and impartial body established by law, to challenge the substantive or procedural legality of all decisions, acts or omissions concerning air quality plans referred to in Article 19, and short term action plans referred to in Article 20, of the Member State, provided that any of the following conditions is met:

   (a) ~~the members of the public understood as one or more natural or legal persons and, in accordance with national law or practice, their associations, organisations or groups~~ they have a sufficient interest;

(b) ~~where the applicable law of the Member State requires this as a precondition, the members of the public maintain the impairment of a right~~ they maintain the impairment of a right, where administrative procedural law of a Member State requires this as a precondition.

Member States shall determine what constitutes a sufficient interest and impairment of a right consistently with the objective of giving the public concerned wide access to justice.

To this end, the interest of any non-governmental organisation promoting environmental protection and meeting any requirements under national law ~~which is a member of the public concerned~~ shall be deemed sufficient for the purposes of the first subparagraph, point (a). Such organisations shall also be deemed to have rights capable of being impaired for the purposes of the first subparagraph, point (b).

2. ~~To have standing to participate in the review procedure shall not be conditional on the role that the member of the public concerned played during a participatory phase of the decision-making procedures related to Article 19 or 20.~~

3. The review procedure shall be fair, equitable, timely and not prohibitively expensive, and shall provide adequate and effective redress mechanisms, including injunctive relief as appropriate.

3a. Member States shall determine at what stage the decisions, acts or omissions may be challenged.

4. This Article does not prevent Member States from requiring a preliminary review procedure before an administrative authority and does not affect the requirement of exhaustion of administrative review procedures prior to recourse to judicial review procedures, where such a requirement exists under national law.

5. Member States shall ensure that practical information is made available to the public on access to administrative and judicial review procedures referred to in this Article.

Article 28

Compensation for damage to human health

1. Member States shall ensure that, natural persons who suffer damage to human health caused by a violation of the national rules transposing the provisions of the of Articles 19(1), 19(3), ~~to~~ 19(4), 20(1) and 20(2)~~, 21(1) second sub-paragraph and 21(3)~~ of this Directive that has been committed intentionally or negligently by the competent authorities~~, are entitled to~~ have the right to claim and obtain compensation for that damage ~~in accordance with this article~~.

2. ~~Member States shall ensure that non-governmental organisations promoting the protection of human health or the environment and meeting any requirements under national law are allowed to represent natural persons referred to in paragraph 1 and bring collective actions for compensation. The requirements set out in Article 10 and Article 12(1) of Directive (EU) 2020/1828 shall mutatis mutandis apply to such collective actions.~~

3. ~~Member States shall ensure that a claim for compensation for a violation can be pursued only once by a natural person referred to in paragraph 1 and by the non-governmental organisations representing the person referred to in paragraph 2. Member States shall lay down rules to ensure that the individuals affected do not receive compensation more than once for the same cause of action against the same competent authority.~~

4. ~~Where a claim for compensation is supported by evidence showing that the violation referred to in paragraph 1 is the most plausible explanation for the occurrence of the damage of that person, the causal link between the violation and the occurrence of the damage shall be presumed.~~

   ~~The respondent public authority shall be able to rebut this presumption. In particular, the respondent shall have the right to challenge the relevance of the evidence relied on by the natural person and the plausibility of the explanation put forward.~~

~~5. Member States shall ensure that national rules and procedures relating to claims for compensation, including as concerns the burden of proof, are designed and applied in such a way that they do not render impossible or excessively difficult the exercise of the right to compensation for damage pursuant to paragraph 1.~~

6. Member States ~~shall ensure that~~ may establish ~~the~~ limitation periods for bringing actions for compensation as referred to in paragraph 1 ~~are not less than 5 years~~. Such periods shall not begin to run before the violation has ceased and the person claiming the compensation knows, or can reasonably be expected to know, that he or she suffered damage from a violation as referred to in paragraph 1.

Article 29

Penalties

1. Without prejudice to the obligations of Member States under Directive 2008/99/EC of the European Parliament and of the Council[28], Member States shall lay down the rules on penalties applicable to infringements ~~violations by natural and legal persons~~, of the national provisions adopted pursuant to this Directive and shall take all measures necessary to ensure that they ~~those rules~~ are implemented. The penalties provided for shall be effective, proportionate and dissuasive. ~~Member States shall notify the Commission without undue delay of those rules and of any amendment thereof.~~

~~2. The penalties referred to in paragraph 1 shall include fines proportionate to the turnover of the legal person or to the income of the natural person having committed the violation. The level of the fines shall be calculated in such a way as to make sure that they effectively deprive the person responsible for the violation of the economic benefits derived from that violation. In the case of a violation committed by a legal person, such fines shall be proportionate to the legal person's annual turnover in the Member State concerned, taking account, inter alia, the specificities of small and medium-sized enterprises (SMEs).~~

[28] Directive 2008/99/EC of the European Parliament and of the Council of 19 November 2008 on the protection of the environment through criminal law (OJ L 328, 6.12.2008, p. 28).

3. Member States shall ensure that the penalties ~~referred to in paragraph 1~~ established pursuant this article give due regard to the following circumstances, as applicable:

(a) the nature, gravity, extent and duration of the ~~violation~~ infringement;

~~(b) the intentional or negligent character of the violation ;~~

(c) the population, including sensitive population and vulnerable groups, or the environment affected by the ~~violation~~ infringement bearing in mind the impact of the infringement on ~~taking into account~~ the objective of achieving a high level of protection of human health and the environment;

(d) the repetitive or singular character of the ~~violation~~ infringement.

Member States shall without undue delay notify the Commission of the rules and measures referred to in paragraph 1 and of any subsequent amendment affecting them.

CHAPTER VIII
TRANSITIONAL AND FINAL PROVISIONS

Article 30

Repeal and transitional provisions

1. Directives 2004/107/EC and 2008/50/EC, as amended by the Directives listed in Part A of Annex X, are repealed with effect from [insert date 1 day after end of transposition deadline], without prejudice to the obligations of Member States relating to the time-limits for the transposition into national law of the Directives set out in Part B of Annex X.

2. References to the repealed Directives shall be construed as references to this Directive and shall be read in accordance with the correlation table in Annex XI.

Article 31

Transposition

1. Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with Articles 1, 2 and 3, Article 4, points (2), (13), (14), (16), (18), (19), (21), (22), points (24) to (30), points (36), (37), (38) and (39), Articles 5 to 12, Article 13(1), (2), (3), (6) and (7), Article 15, Article 16(1) and (2), Articles 17 to 21, Article 22(1), (2) and (4), Articles 23 to 29 and Annexes I to IX by [insert date : two years after entry into force] at the latest.

   When Member States adopt the ~~measures~~ provisions referred to in this paragraph, they shall contain a reference to this Directive or shall be accompanied by such reference on the occasion of their official publication. They shall also include a statement that references in existing laws, regulations and administrative provisions to the Directives repealed by this Directive shall be construed as references to this Directive. Member States shall determine how such reference is to be made and how that statement is to be formulated.

2. Member States shall communicate to the Commission the text of the main ~~measures~~ provisions of national law which they adopt in the field covered by this Directive.

Article 32

Entry into force

This Directive shall enter into force on the twentieth day following that of its publication in the *Official Journal of the European Union*.

Article 4(1), (3) to (12), Article 4(15), (17), (20), (23) and (31) to (35), Article 13(4) and (5), Article 14, Article 16(3) and Article 22(3) shall apply from [the day after the date in the first subparagraph of Article 31(1)].

Article 33

Addressees

This Directive is addressed to the Member States.

Done at Brussels,

For the European Parliament	*For the Council*
The President	*The President*

ANNEX I

AIR QUALITY STANDARDS

SECTION 1 - LIMIT VALUES FOR THE PROTECTION OF HUMAN HEALTH

Table 1 – Limit values for the protection of human health to be attained by 1 January 2030

Averaging period	**Limit value**	
$PM_{2.5}$		
1 day	25 μg/m^3	not to be exceeded more than 18 times per calendar year
Calendar year	10 μg/m^3	
PM_{10}		
1 day	45 μg/m^3	not to be exceeded more than 18 times per calendar year
Calendar year	20 μg/m^3	
Nitrogen dioxide (NO_2)		
1 hour	200 μg/m^3	not to be exceeded more than ~~once~~ 3 times per calendar year
1 day	50 μg/m^3	not to be exceeded more than 18 times per calendar year
Calendar year	20 μg/m^3	
Sulphur dioxide (SO_2)		
1 hour	350 μg/m^3	not to be exceeded more than ~~once~~ 3 times per calendar year
1 day	50 μg/m^3	not to be exceeded more than 18 times per calendar year
Calendar year	20 μg/m^3	
Benzene		
Calendar year	3,4 μg/m^3	

Carbon monoxide (CO)		
maximum daily 8-hour mean (1)	10 mg/m^3	
1 day	4 mg/m^3	not to be exceeded more than 18 times per calendar year
Lead (Pb)		
Calendar year	0,5 µg/m^3	
Arsenic (As)		
Calendar year	6,0 ng/m³	
Cadmium (Cd)		
Calendar year	5,0 ng/m³	
Nickel (Ni)		
Calendar year	20 ng/m³	
Benzo(a)pyrene		
Calendar year	1,0 ng/m³	

(1) The maximum daily 8-hour mean concentration will be selected by examining 8-hour running averages, calculated from hourly data and updated each hour. Each 8-hour average so calculated will be assigned to the day on which it ends i.e. the first calculation period for any 1 day will be the period from 17.00 on the previous day to 1.00 on that day; the last calculation period for any 1 day will be the period from 16.00 to 24.00 on that day.

Table 2 – Limit values for the protection of human health to be attained by [INSERT TRANSPOSITION DEADLINE]

Averaging period	**Limit value**	
$PM_{2.5}$		
Calendar year	25 µg/m³	
PM_{10}		
1 day	50 µg/m^3	not to be exceeded more than 35 times per calendar year
Calendar year	40 µg/m^3	

Nitrogen dioxide (NO_2)		
1 hour	200 µg/m^3	not to be exceeded more than 18 times per calendar year
Calendar year	40 µg/m^3	
Sulphur dioxide (SO_2)		
1 hour	350 µg/m^3	not to be exceeded more than 24 times per calendar year
1 day	125 µg/m^3	not to be exceeded more than 3 times per calendar year
Benzene		
Calendar year	5 µg/m^3	
Carbon monoxide (CO)		
maximum daily 8-hour mean (1)	10 mg/m^3	
Lead (Pb)		
Calendar year	0,5 µg/m^3	
~~**Arsenic (As)**~~		
~~Calendar year~~	~~6,0 ng/m^3~~	
~~**Cadmium (Cd)**~~		
~~Calendar year~~	~~5,0 ng/m^3~~	
~~**Nickel (Ni)**~~		
~~Calendar year~~	~~20 ng/m^3~~	
~~**Benzo(a)pyrene**~~		
~~Calendar year~~	~~1,0 ng/m^3~~	

(1) The maximum daily 8-hour mean concentration will be selected by examining 8-hour running averages, calculated from hourly data and updated each hour. Each 8-hour average so calculated will be assigned to the day on which it ends i.e. the first calculation period for any 1 day will be the period from 17.00 on the previous day to 1.00 on that day; the last calculation period for any 1 day will be the period from 16.00 to 24.00 on that day.

Table 2a – Target values for the protection of human health to be attained by [INSERT TRANSPOSITION DEADLINE]

Arsenic (As)	
Calendar year	6,0 ng/m³
Cadmium (Cd)	
Calendar year	5,0 ng/m³
Nickel (Ni)	
Calendar year	20 ng/m³
Benzo(a)pyrene	
Calendar year	1,0 ng/m³

SECTION 2 - OZONE TARGET VALUES AND OZONE LONG-TERM OBJECTIVES

A. Definitions and criteria

The 'Accumulated Ozone exposure over a Threshold of 40 parts per billion' (AOT40), expressed in '($\mu g/m^3$) × hours', means the sum of the difference between hourly concentrations greater than 80 $\mu g/m^3$ (= 40 parts per billion) and 80 $\mu g/m^3$ over a given period using only the 1-hour values measured between 8.00 and 20.00 ~~Central European Time (CET)~~ local time zone each day.

B. Ozone target values

Table 1 – Ozone target values to be attained by 1 January 2030

Objective	**Averaging period**	**Target value**	
Protection of human health	Maximum daily 8-hour mean (1)	120 $\mu g/m^3$	not to be exceeded on more than 18 days per calendar year averaged over 3 years (2)
Protection of ~~the environment~~ vegetation	May to July	AOT40 (calculated from 1-hour values)	18 000 $\mu g/m^3$ × h averaged over 5 years (2)

(1) The maximum daily 8-hour mean concentration shall be selected by examining 8-hour running averages, calculated from hourly data and updated each hour. Each 8-hour average so calculated shall be assigned to the day on which it ends. i.e. the first calculation period for any 1 day will be the period from 17.00 on the previous day to 1.00 on that day; the last calculation period for any 1 day will be the period from 16.00 to 24.00 on the day.

(2) If the 3- or 5-year averages cannot be determined on the basis of a full and consecutive set of annual data, the minimum annual data required for checking compliance with the ozone target values will be as follows:
- for the target value for the protection of human health: valid data for 1 year,
- for the target value for the protection of vegetation: valid data for 3 years.

Table 2 – Ozone target values to be attained by [INSERT TRANSPOSITION DEADLINE]

Objective	Averaging period	Target value	
Protection of human health	Maximum daily 8-hour mean (1)	120 μg/m³	not to be exceeded on more than 25 days per calendar year averaged over 3 years (2)
Protection of vegetation	May to July	AOT40 (calculated from 1-hour values)	18 000 μg/m³ × h averaged over 5 years (2)

(1) The maximum daily 8-hour mean concentration shall be selected by examining 8-hour running averages, calculated from hourly data and updated each hour. Each 8-hour average so calculated shall be assigned to the day on which it ends. i.e. the first calculation period for any 1 day will be the period from 17.00 on the previous day to 1.00 on that day; the last calculation period for any 1 day will be the period from 16.00 to 24.00 on the day.

(2) If the 3- or 5-year averages cannot be determined on the basis of a full and consecutive set of annual data, the minimum annual data required for checking compliance with the target values will be as follows:
- for the ozone target value for the protection of human health: valid data for 1 year,
- for the ozone target value for the protection of vegetation: valid data for 3 years.

C. **Long-term objectives for ozone (O_3) to be attained by 1 January 2050**

Objective	**Averaging period**	**Long-term objective**
Protection of human health	Maximum daily 8-hour mean within a calendar year	100 μg/m³ (1)
Protection of vegetation	May to July	AOT40 (calculated from 1 h values) 6 000 μg/m³ × h

(1) 99th percentile (i.e. 3 exceedance days per year).

SECTION 3 - CRITICAL LEVELS FOR THE PROTECTION OF VEGETATION AND NATURAL ECOSYSTEMS

Averaging period	**Critical level**
Sulphur dioxide (SO_2)	
Calendar year and winter (1 October to 31 March)	20 µg/m^3
Oxides of nitrogen (NO_x)	
Calendar year	30 µg/m^3 NO_x

SECTION 4 - ALERT AND INFORMATION THRESHOLDS

A. Alert thresholds for pollutants other than ozone

To be measured over 3 consecutive hours in the case of sulphur dioxide and nitrogen dioxide, and over three consecutive days or less for PM_{10} and $PM_{2.5}$, at locations representative, of air quality over at least 100 km^2 or an entire zone, whichever is the smaller.

Pollutant	**Alert threshold**
Sulphur dioxide (SO_2)	500 µg/m^3
Nitrogen dioxide (NO_2)	400 µg/m^3
$PM_{2.5}$	50 µg/m^3
PM_{10}	90 µg/m^3

B. Information and alert thresholds for ozone

Purpose	**Averaging period**	**Threshold**
Information	1 hour	180 µg/m^3
Alert	1 hour (1)	240 µg/m^3

(1) For the implementation of Article 20, the exceedance of the threshold is to be measured or predicted for 3 consecutive hours.

SECTION 5 - AVERAGE EXPOSURE REDUCTION OBLIGATION FOR $PM_{2.5}$ AND NO_2

A. Average exposure indicator

The Average Exposure Indicator expressed in μg/m^3 (AEI) shall be based upon measurements in urban background locations in average exposure territorial units ~~at NUTS 1 level~~ throughout the territory of a Member State. It shall be assessed as a 3-calendar-year running annual mean concentration averaged over all sampling points of the relevant pollutant established pursuant to Point B of Annex III in each average exposure territorial unit. The AEI for a particular year shall be the mean concentration of that same year and the preceding 2 years.

Where Member States identify exceedances attributable to natural sources, contributions from natural sources shall be deducted before calculating the AEI.

The AEI is used for the examination of whether the average exposure reduction obligation is met.

B. Average exposure reduction obligations

As from 2030, the AEI shall not exceed a level that is:

1. for $PM_{2.5}$,

(a) When the AEI for a particular year is <12 μg/m^3, 15 ~~25~~% lower than the AEI was 10 years before, unless it is already no higher than the average exposure concentration objective for $PM_{2.5}$ defined in Section C.

(b) When the AEI for a particular year is ≥12 μg/m^3, 25 % lower than the AEI was 10 years before.

2. for NO_2,

(a) When the AEI for a particular year is <20 μg/m^3, 15 ~~25~~% lower than the AEI was 10 years before, unless it is already no higher than the average exposure concentration objective for NO2 defined in Section C.

(b) When the AEI for a particular year is ≥ 20 μg/m^3, 25 % lower than the AEI was 10 years before.

When calculating the levels for the years 2030, 2031 and 2032, Member States may exclude the year 2020 from the calculation of the AEI for the base year.

C. Average exposure concentration objectives

The average exposure concentration objective shall be the following level of the AEI.

Pollutant	**Average exposure concentration objective**
$PM_{2.5}$	AEI = 5 µg/m^3
NO_2	AEI = 10 µg/m^3

ANNEX II

ASSESSMENT THRESHOLDS

SECTION 1 - ASSESSMENT THRESHOLDS FOR HEALTH PROTECTION

Pollutant	**Assessment threshold (annual mean, unless specified)**
$PM_{2.5}$	5 µg/m^3
PM_{10}	15 µg/m^3
Nitrogen dioxide (NO_2)	10 µg/m^3
Sulphur dioxide (SO^2)	40 µg/m^3 (24-hour mean)(1)
Benzene	1,7 µg/m^3
Carbon monoxide (CO)	4 mg/m^3 (24-hour mean)(1)
Lead (Pb)	0,25 µg/m^3
Arsenic (As)	3,0 ng/m^3
Cadmium (Cd)	2,5 ng/m^3
Nickel (Ni)	10 ng/m^3
Benzo(a)pyrene	~~0,12~~ 0,30 ng/m3
Ozone (O_3)	100 µg/m^3 (maximum 8-hour mean)(1)

(1) 99th percentile (i.e. 3 exceedance days per year).

SECTION 2 - ASSESSMENT THRESHOLDS FOR THE PROTECTION OF VEGETATION AND NATURAL ECOSYSTEMS

Pollutant	**Assessment threshold (annual mean, unless specified)**
Sulphur dioxide (SO2)	8 $\mu g/m^3$ (average between 1 October and 31 March)
Oxides of nitrogen (NOx)	19,5 $\mu g/m^3$

ANNEX III

MINIMUM NUMBERS OF SAMPLING POINTS FOR FIXED MEASUREMENT

A. Minimum number of sampling points for fixed measurement to assess compliance with limit values and target values for the protection of human health, ozone target values, long-term objectives, information thresholds and alert thresholds

1. Diffuse sources

Table 1 - Minimum number of sampling points for fixed measurement to assess compliance with limit values or target values for the protection of human health and alert thresholds ~~in zones where fixed measurement is the sole source of information~~ (for all pollutants except ozone)

Population of zone (thousands)	**Minimum number of sampling points if concentrations exceed the assessment threshold**					
	NO_2, SO_2, CO, benzene	**~~Sum PM~~** [1] *[column deleted]*	**~~Minimum~~ PM_{10}, ~~$PM_{2.5}$~~**	**~~Minimum~~ $PM_{2.5}$**	**Pb, Cd, As, Ni in PM_{10}**	**Benzo(a)pyrene in PM_{10}**
0 - 249	2	~~4~~	2	2	1	1
250 - 499	2	~~4~~	2	2	1	1
500 - 749	2	~~4~~	2	2	1	1
750 - 999	3	~~4~~	2	2	2	2
1 000 - 1 499	4	~~6~~	~~2~~3	~~2~~ 3	2	2
1 500 - 1 999	5	~~7~~	3	~~3~~ 4	2	2
2 000 - 2 749	6	~~8~~	~~3~~4	~~3~~ 4	2	3
2 750 - 3 749	7	~~10~~	~~4~~5	~~4~~ 5	2	3
3 750 - 4 749	8	~~11~~	~~4~~5	~~4~~ 6	3	4
4 750 - 5 999	9	~~13~~	5 6	~~5~~ 7	4	5
6 000+	10	~~15~~	~~5~~7	~~5~~ 8	5	5

(1) ~~The number of $PM_{2.5}$ and NO_2 sampling points in the urban background locations of urban areas shall meet the requirements set out in Point B.~~

Table 2 - Minimum number of sampling points for fixed measurement to assess compliance with ozone target values, long-term objectives and information and alert thresholds ~~where such measurements are the sole source of information~~ (for ozone only)

Population of zone **(thousands)**	**Minimum number of sampling points ~~if the number of sampling points is reduced by up to 50%~~ (1)**
< 250	1
< 500	2
< 1 000	2
< 1 500	3
< 2 000	4
< 2 750	5
< 3 750	6
≥ 3 750	1 additional sampling point per 2 million inhabitants

(1) At least 1 sampling point in areas where exposure of the population to the highest concentrations of ozone is likely to occur. In agglomerations, at least 50 % of the sampling points shall be located in suburban areas.

Table 3 - Minimum number of sampling points for fixed measurement to assess compliance with limit values or target values for the protection of human health and alert thresholds in zones where a 50% reduction of such measurements applies (for all pollutants except ozone)

Population of zone (thousands)	**Minimum number of sampling points if the number of sampling points is reduced by up to 50%**					
	NO_2, SO_2, CO, benzene	~~**Sum PM** (1)~~ *[column deleted]*	~~**Minimum** PM_{10}, $PM_{2.5}$~~	~~**Minimum** $PM_{2.5}$~~	**Pb, Cd, As, Ni in PM_{10}**	**Benzo(a)pyrene in PM_{10}**
0 - 249	1	~~2~~	1	1	1	1
250 - 499	1	~~2~~	1	1	1	1
500 - 749	1	~~2~~	1	1	1	1
750 - 999	2	~~2~~	1	1	1	1
1 000 - 1 499	2	~~3~~	1	~~1~~ 2	1	1
1 500 - 1 999	3	~~4~~	2	2	1	1
2 000 - 2 749	3	~~4~~	2	2	1	2
2 750 - 3 749	4	~~5~~	2	~~2~~ 3	1	2
3 750 - 4 749	4	~~6~~	~~2~~ 3	~~2~~ 3	2	2
4 750 - 5 999	5	~~7~~	3	~~3~~ 4	2	3
6 000+	5	~~8~~	~~3~~ 4	~~3~~ 4	3	3

~~(1) The number of $PM_{2.5}$ and NO_2 sampling points in the urban background locations of urban areas shall meet the requirements set out in Point B.~~

Table 4 - Minimum number of sampling points for fixed measurements to assess compliance with ozone target values, long-term objectives and information and alert thresholds in zones where a 50% reduction of such measurements applies (for ozone only)

Population of zone (thousands)	**Minimum number of sampling points if the number of sampling points is reduced by up to 50% (1)**
< 250	1
< 500	1
< 1 000	1
< 1 500	2
< 2 000	2
< 2 750	3
< 3 750	3
≥ 3 750	1 additional sampling point per 4 million inhabitants

(1) At least 1 sampling point in areas where exposure of the population to the highest concentrations of ozone is likely to occur. In agglomerations, at least 50 % of the sampling points shall be located in suburban areas.

For each zone, the minimum number of sampling points for fixed measurements set out in ~~the~~ Tables 1 - 4 in this point shall include at least 1 background location sampling point and 1 sampling point in the area with the highest concentrations according to Point B, of Annex IV provided this does not increase the number of sampling points. For nitrogen dioxide, particulate matter~~,~~ and benzene ~~and carbon monoxide~~, this shall include at least 1 sampling point focused on measuring contribution from transport emissions. However, in the cases where there is only 1 sampling point required, this shall be in the area with the highest concentrations to which the population is likely to be directly or indirectly exposed.

For each zone, for nitrogen dioxide, particulate matter, benzene and carbon monoxide, the total number of urban background location sampling points and the total number of sampling points where the highest concentrations occur required shall not differ by more than a factor of 2. The number of $PM_{2.5}$ and nitrogen dioxide sampling points at urban background locations shall meet the requirements set out in Point B.

2. Point sources

For the assessment of pollution in the vicinity of point sources, the number of sampling points for fixed measurement shall be calculated taking into account emission densities, the likely distribution patterns of ambient-air pollution and the potential exposure of the population. ~~Such~~ sampling points shall be sited such that the application of BAT (Best Available Techniques) as defined by Directive 2010/75/EU can be monitored.~~.~~

B. Minimum number of sampling points for fixed measurement to assess compliance with the $PM_{2.5}$ and NO_2 average exposure reduction obligations for the protection of human health

For $PM_{2.5}$ and NO_2 each, one sampling point per ~~NUTS 1 region~~ average exposure territorial unit ~~as described in Regulation (EC) No 1059/2003~~, and at least 1 sampling point per million inhabitants calculated over urban areas in excess of 100 000 inhabitants shall be operated for this purpose. Those sampling points may coincide with sampling points under Point A.

C. Minimum number of sampling points for fixed measurements to assess compliance with critical levels for SO_2 and NO_x, and with long-term objectives for ozone

1. Critical levels for the protection of vegetation and natural ecosystems

If maximum concentrations exceed the critical levels	1 sampling point every 20 000 km^2
If maximum concentrations exceed the assessment threshold	1 sampling point every 40 000 km^2

In island zones the number of sampling points for fixed measurement shall be calculated taking into account the likely distribution patterns of ambient air pollution and the potential exposure of vegetation.

2. Long–term objective for the protection of human health and ~~the environment~~ vegetation for ozone

For rural background measurement Member States shall ensure at least 1 sampling point per 50 000 km^2 as an average density over all zones per country. For complex terrain 1 sampling point per 25 000 km^2 is recommended.

D. Minimum number of sampling points for fixed measurements of ultrafine particles where high concentrations are likely to occur

Ultrafine particles shall be monitored at selected locations in addition to other air pollutants. Sampling points to monitor ultrafine particles shall coincide, where appropriate, with sampling points for particulate matter or nitrogen dioxide referred to in Point A, and be sited in accordance with Section 3 of Annex VII. For this purpose, at least 1 sampling point per 5 million inhabitants shall be established at a location where high UFP concentrations are likely to occur. Member States that have fewer than 5 million inhabitants shall establish at least 1 ~~fixed~~ sampling point for fixed measurements at a location where high UFP concentrations are likely to occur.

For Member States with more than 2 million inhabitants, monitoring supersites at urban background or rural background locations established in accordance with Article 10 shall not be included for the purpose of meeting the requirements on the minimum number of sampling points for UFP set here.

ANNEX IV

ASSESSMENT OF AMBIENT AIR QUALITY AND LOCATION OF SAMPLING POINTS

A. General

Ambient air quality shall be assessed in all zones as follows:

1. Ambient air quality shall be assessed at all locations except those listed in paragraph 2.

Points B and C shall apply to the location of sampling points. The principles established by Points B and C shall also apply in so far as they are relevant in identifying the specific locations in which concentration of the relevant pollutants are established where ambient air quality is assessed through indicative measurements or modelling applications.

1. Compliance with the limit values and target values directed at the protection of human health shall not be assessed at the following locations:

(a) any locations situated within areas where members of the public do not have access and there is no fixed habitation;

(b) in accordance with Article 4(1), on factory premises or at industrial sites to which all relevant provisions concerning health and safety at work apply;

(c) on the carriageway of roads; and on the central reservations of roads except where there is normally pedestrian access to the central reservation.

B. Macroscale siting of sampling points

1. Information

The siting of sampling points shall take into account national gridded data of emissions reported under Directive (EU) 2016/2284 of the European Parliament and of the Council[29], ~~and~~ emission data reported under the European Pollutant Release and Transfer Register and, where available, local emission inventories.

2. *Protection of human health*

(a) Sampling points directed at the protection of human health shall be sited in such a way as to provide data on all of the following:

(i) concentration levels in the areas within zones with the highest concentrations to which the population is likely to be directly or indirectly exposed for a period which is significant in relation to the averaging period of the limit value(s),

(ii) concentration levels in other areas within the zones which are representative of the exposure of the general population, ~~and~~

(iii) for arsenic, cadmium, lead, mercury, nickel and polycyclic aromatic hydrocarbons, the deposition rates representing the indirect exposure of the population through the food chain;

(b) sampling points shall in general be sited in such a way as to avoid measuring micro-environments in the immediate vicinity of the sampling point, which means that a sampling point must be sited in such a way that the air sampled is representative of air quality for a street segment no less than 100 m in length at locations measuring the contribution of road traffic and at least 250 m × 250 m at locations measuring the contribution from industrial sites or other sources such as ports or airports, where feasible;

[29] Directive (EU) 2016/2284 of the European Parliament and of the Council of 14 December 2016 on the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC (OJ L 344, 17.12.2016, p. 1).

(ba) sampling points, where the objetive is to measure the contribution of domestic heating, must be sited in such a way that the air sampled is representative at least 25 m × 25 m.

(c) urban background locations shall be located so that their pollution level is influenced by the integrated contribution from all sources upwind of the sampling point. The pollution level shall not be dominated by a single source unless such a situation is typical for a larger urban area. Those sampling points shall, as a general rule, be representative for several square kilometres;

(d) where the objective is to measure the contribution of domestic heating, at least one sampling point shall be installed ~~within the main wind direction~~ downwind of these sources;

(e) where the objective is to assess rural background levels, the sampling point shall not be influenced by urban areas or industrial sites in its vicinity, i.e. sites closer than 5 km;

(f) where contributions from industrial sources, ports or airports are to be assessed, at least 1 sampling point shall be installed downwind of the source in the nearest residential area. Where the background concentration is not known, an additional sampling point shall be situated ~~within the main wind direction~~ upwind of the source. The sampling points ~~shall~~ may be sited such that the application of BAT can be monitored;

(g) sampling points shall, where possible, also be representative of similar locations not in the immediate vicinity of the sampling points. In the zones where the level of air pollutants is above the assessment threshold, the area which each sampling point is representative of shall be clearly defined. The whole zone shall, where possible, be covered by the different areas of representativeness defined for these ~~each~~ sampling points. Concentrations in areas in a zone that are not covered by that zone's sampling points, shall be assessed with appropriate methods.

(h) account shall be taken of the need to locate sampling points on islands where that is necessary for the protection of human health.

(i) sampling points measuring arsenic, cadmium, lead, mercury, nickel and polycyclic aromatic hydrocarbons shall, where possible, be co-located with sampling points for PM_{10}.

[moved further down] ~~When defining the spatial representativeness area the following associated characteristics shall be considered:~~

~~(a) the geographical area may include non-contiguous domains but shall be limited in its extension by the borders of the air quality zone under consideration;~~

~~(b) if assessed via modelling, a fit-for-purpose modelling system shall be used and modelled concentrations shall be used at station location to prevent systematic model-measurement biases from distorting the assessment;~~

~~(c) other metrics than absolute concentrations can be considered (e.g. percentiles);~~

~~(d) the tolerance levels and possible cut-offs for the different pollutants may change depending on the station characteristics;~~

~~(e) the annual average of the observed pollutant concentration shall be used as the air quality metric for a specific year.~~

3. Protection of vegetation and natural ecosystems

Sampling points targeted at the protection of vegetation and natural ecosystems shall be sited more than 20 km away from urban areas or more than 5 km away from other built-up areas, industrial sites or motorways or major roads with traffic counts of more than 50 000 vehicles per day, which means that a sampling point must be sited in such a way that the air sampled is representative of air quality in a surrounding area of at least 1 000 km^2. A Member State may provide for a sampling point to be sited at a lesser distance or to be representative of air quality in a less extended area, taking account of geographical conditions or of the opportunities to protect particularly vulnerable areas.

Account shall be taken of the need to assess air quality on islands.

4. Additional criteria for ozone sampling points

The following apply to fixed and indicative measurements:

Type of sampling point	**Objectives of measurement**	**Representativeness (1)**	**Macro-scale siting criteria**
Urban background locations for ozone assessments	Protection of human health: to assess the exposure of the urban population to ozone, i.e. where population density and ozone concentration are relatively high and representative of the exposure of the general population	1 to 10 km^2	Away from the influence of local emissions such as traffic, petrol stations, etc.; vented locations where well mixed levels can be measured; locations such as residential and commercial areas of cities, parks (away from trees), wide streets or squares with very little or no traffic, open areas characteristic of educational, sports or recreation facilities.
Suburban locations for ozone assessments	Protection of human health and vegetation: to assess the exposure of the population and vegetation located in the outskirts of the urban area, with the highest ozone levels to which the population and vegetation are likely to be directly or indirectly exposed.	10 to 100 km^2	At a certain distance from the area of maximum emissions, downwind following the main wind direction/directions during conditions favourable to ozone formation; where population, sensitive crops or natural ecosystems located in the outer fringe of an urban area are exposed to high ozone levels; where appropriate, some suburban sampling points also upwind of the area of maximum emissions, in order to determine the regional background levels of ozone.

Rural locations for ozone assessments	Protection of human health and vegetation: to assess the exposure of population, crops and natural ecosystems to sub-regional scale ozone concentrations.	Sub-regional levels (100 to 1 000 km^2)	Sampling points may be located in small settlements and/or areas with natural ecosystems, forests or crops; representative for ozone away from the influence of immediate local emissions such as industrial sites and roads; at open area sites~~, but not on summits of higher mountains~~.
Rural background locations for ozone assessments	Protection of human health and vegetation: to assess the exposure of crops and natural ecosystems to regional-scale ozone concentrations as well as exposure of the population.	Regional/national/continental levels (1 000 to 10 000 km^2)	Sampling points located in areas with lower population density, e.g. with natural ecosystems, forests, at a distance of at least 20 km from urban and industrial areas and away from local emissions; avoid locations which are subject to locally enhanced formation of ground-near inversion conditions~~, also summits of higher mountains~~; coastal sites with pronounced diurnal wind cycles of local character are not recommended.

(1) Sampling points shall, where possible, be representative of similar locations not in the immediate vicinity of the sampling points.

The locations of sampling points for rural locations and rural background locations for ozone assessment shall, where appropriate, be coordinated with the monitoring requirements of Commission Regulation (EC) No 1737/2006[30].

[30] Commission Regulation (EC) No 1737/2006 of 7 November 2006 laying down detailed rules for the implementation of Regulation (EC) No 2152/2003 of the European Parliament and of the Council concerning monitoring of forests and environmental interactions in the Community (OJ L 334, 30.11.2006, p. 1).

5. Criteria for determining the spatial representativeness area of sampling points

When determining the spatial representativeness area the following characteristics shall be considered:

(a) the geographical area may include non-contiguous domains but shall be limited in its extension by the borders of the air quality zone under consideration;

(b) if assessed via modelling applications, a fit-for-purpose modelling system shall be used and modelled concentrations shall be used at station location to prevent systematic model-measurement biases from distorting the assessment;

(c) other metrics than absolute concentrations may be considered (e.g. percentiles);

(d) the tolerance levels and possible cut-offs for the different pollutants may vary depending on the station characteristics;

(e) the annual average of the observed pollutant concentration shall be used as the air quality metric for a specific year.

C. Micro-scale siting of sampling points

In so far as is practicable, the following shall apply:

(a) the flow around the sampling point inlet shall be unrestricted (in general free in an arc of at least 270°, or, for sampling points at the building line, of at least 180°) without any obstructions affecting the airflow in the vicinity of the inlet (at least 1.5 m away from buildings, balconies, trees and other, and at least 0.5 m from the nearest building in the case of sampling points representing air quality at the building line);

(b) in general, the sampling point inlet shall be between ~~0~~1.5 m (the breathing zone) and 4 m above the ground. Higher siting ~~(up to 8m)~~ may also be appropriate if the sampling point is representative of a large area ~~(a background location) or in other specific circumstances~~ and any derogations shall be fully documented;

(c) the inlet probe shall not be positioned in the immediate vicinity of sources in order to avoid the direct intake of emissions unmixed with ambient air to which members of the public are unlikely to be exposed;

(d) the sampler's exhaust outlet shall be positioned so that recirculation of exhaust air to the sampler inlet is avoided;

(e) for all pollutants, sampling probes focused on measuring contributions from road traffic shall be at least 25 m from the edge of major junctions and no more than 10 m from the kerbside; for the purposes of this point, a 'kerbside' means the line that separates motorised traffic from other areas; a 'major junction' means a junction which interrupts the traffic flow and causes different emissions (stop&go) from the rest of the road;

(f) for the deposition measurements in rural background locations, the guidelines and criteria of EMEP shall apply as far as practicable;

(g) for ozone measurement, Member States shall ensure that the sampling point is positioned well away from sources such as furnaces and incineration flues, and more than 10 m from the nearest road, with distance increasing as a function of traffic intensity;

(h) The following factors may also be taken into account:

(i a) interfering sources;

(ii b) security;

(iii c) access;

(iv d) availability of electrical power and telephone communications;

(v e) visibility of the site in relation to its surroundings;

(vi f) safety of the public and operators;

(vii g) the desirability of co-locating sampling points for different pollutants;

(viii h) planning requirements.

D. Site selection, its review and documentation

1. The competent authorities responsible for air quality assessment shall for all zones fully document the site-selection procedures and record information to support the network design and choice of location for all monitoring sites. The design of the monitoring network shall be supported at least by either modelling applications or indicative measurements.

2. The documentation shall include the location of the sampling points through spatial coordinates, detailed maps and shall include information on the spatial representativeness of all sampling points.

3. The documentations shall include any deviation from the micro-scale siting criteria, their underlying reasons and the likely impact on measured levels.

4. Where indicative measurements, modelling applications or objective estimation, or a combination thereof are used within a zone, the documentation shall include details of these methods and information on how the criteria listed in Article 9(3) are met.

5. Where indicative measurements, modelling applications or objective estimation are used, competent authorities shall use gridded data reported under Directive (EU) 2016/2284, ~~and~~ emission information reported under Directive 2010/75/EU and, where available, local emission inventories.

6. For ozone measurements, Member States shall apply proper screening and interpretation of the monitoring data in the context of the meteorological and photochemical processes affecting the ozone concentrations measured at the respective sites.

7. When applicable, the list of ozone precursors substances, the objective sought for measuring them and the methods used to sample and measure them shall be part of the documentation.

8. When applicable, information of the measurement methods used for the measurement of the chemical composition of $PM_{2.5}$ shall also be part of the documentation.

9. At least every 5 years the selection criteria, network design and monitoring site locations, defined by the competent authorities in view of the requirements of this Annex, shall be reviewed to ensure they remain valid and optimal over time. The review shall be supported at least by either modelling applications or indicative measurements.

10. The documentation shall be updated following every review and other relevant changes to the monitoring network, and shall be made public through appropriate communication channels.

ANNEX V

DATA QUALITY OBJECTIVES

A. Uncertainty of measurements and modelling applications for ambient air quality assessment

Table 1 - Uncertainty for measurement and modelling of long-term (annual mean) concentrations ~~(annual mean)~~

Air pollutant	Maximum uncertainty of fixed measurements		Maximum uncertainty of indicative measurements (1)		Maximum ratio of uncertainty of modelling applications and objective estimation over uncertainty of ~~fixed~~ measurements
	Absolute value	Relative value	Absolute value	Relative value	Maximum ratio
$PM_{2.5}$	3,0 µg/m^3	30 %	4,0 µg/m^3	40 %	1,7
PM_{10}	4,0 µg/m^3	20 %	6,0 µg/m^3	30 %	1,3
SO_2 / NO_2 / NO_x	6,0 µg/m^3	30 %	8,0 µg/m^3	40 %	1,4
Benzene	~~0,75~~ 0,85 µg/m^3	25 %	1,2 µg/m^3	35 %	1,7
Lead	0,125 µg/m^3	25 %	0,175 µg/m^3	35 %	1,7
Arsenic	2,4 ng/m^3	40 %	3,0 ng/m^3	50 %	1,1
Cadmium	2,0 ng/m^3	40 %	2,5 ng/m^3	50 %	1,1
Nickel	8,0 ng/m^3	40 %	10,0 ng/m^3	50 %	1,1
Benzo(a)pyrene	0,5 ng/m^3	50 %	0,6 ng/m^3	60 %	1,1

(1) When using indicative measurements for other purposes other than compliance assessment, such as, but not only: design or review of the monitoring network, ~~model~~ calibration and validation of modelling applications, the uncertainty may be that established for modelling applications.

Table 2 - Uncertainty for measurement and modelling of short-term (daily, 24-hour, 8-hour and hourly) mean concentrations

Air pollutant	Maximum uncertainty of fixed measurements		Maximum uncertainty of indicative measurements (1)		Maximum ratio of uncertainty of modelling applications and objective estimation over uncertainty of ~~fixed~~ measurements
	Absolute value	Relative value	Absolute value	Relative value	Maximum ratio
$PM_{2.5}$ (24-hour)	6,3 µg/m^3	25 %	8,8 µg/m^3	35 %	2,5
PM_{10} (24-hour)	11,3 µg/m^3	25 %	22,5 µg/m^3	50 %	2,2
NO_2 (daily)	7,5 µg/m^3	15 %	12,5 µg/m^3	25 %	3,2
NO_2 (hourly)	30 µg/m^3	15 %	50 µg/m^3	25 %	3,2
SO_2 (daily)	7,5 µg/m^3	15 %	12,5 µg/m^3	25 %	3,2
SO_2 (hourly)	52,5 µg/m^3	15 %	87,5 µg/m^3	25 %	3,2
CO (24-hour)	0,6 mg/m^3	15 %	1,0 mg/m^3	25 %	3,2
CO (8-hour)	1,0 mg/m^3	10 %	2,0 mg/m^3	20 %	4,9
~~Ozone (peak season): uncertainty of the 8h values~~	~~10,5 µg/m3~~	~~15 %~~	~~17,5 µg/m3~~	~~25 %~~	~~1,7~~
Ozone (8h mean)	18 µg/m^3	15 %	30 µg/m^3	25 %	2,2

(1) When using indicative measurements for other purposes other than compliance assessment, such as, but not only: design or review of the monitoring network, ~~model~~ calibration and validation of modelling applications, the uncertainty may be that established for modelling applications.

When assessing compliance with the data quality objectives in Tables 1 and 2 of this point, the uncertainty for measurements (expressed at a 95 % confidence level) of the assessment methods shall be calculated in line with the respective EN standard of each pollutant. For methods where no standard is available, the uncertainty of the assessment method shall be evaluated in accordance with the principles of the Joint Committee for Guidance in Metrology (JCGM) 100:2008 'Evaluation of measurement data - Guide to the Expression of Uncertainty in Measurement' and the methodology in Part 5 of ISO 5725:1998. For indicative measurements, in the absence of a relevant CEN standard, uncertainty shall be calculated according to the guidance on the demonstration of equivalence referred to in Point B of Annex VI.

The percentages for uncertainty in ~~the t~~Tables 1 and 2 ~~in~~ of this Section apply for all limit values (and the ozone target value) that are calculated by simple averaging of individual measurements such as hourly mean, daily mean or yearly mean values without considering the additional uncertainty for the calculation of the number of exceedances. The uncertainty shall be interpreted as being applicable in the region of the appropriate limit values (or ~~ozone~~target value**s**). The uncertainty calculation does not apply to AOT40 and values that include more than 1 year, more than 1 station (e.g. AEI) or more than 1 component. They are also not applicable for information thresholds, alert thresholds and critical levels for the protection of vegetation and natural ecosystems.

Before 2030, the relative values for maximum uncertainties in Tables 1 and 2 shall apply for all pollutants except PM2.5 and NO2/NOx in Table 1, for which the maximum uncertainties of fixed measurements shall be 25 % and 15 %, respectively. From 2030, the uncertainty of measurement data used for ambient air quality assessment shall not exceed ~~either~~ the absolute value or the relative value, whichever is higher, expressed in this Section.

The maximum uncertainty of modelling applications is set to the uncertainty for fixed measurements multiplied by the applicable maximum ratio. The modelling quality objective (i.e. a modelling quality indicator less or equal to 1) shall be verified at least at 90% of the available monitoring points, over the assessment area and period considered. At a given monitoring point, the modelling quality indicator shall be calculated as the ratio of the root mean square error(s) between modelling results and measurements over the square root of the quadratic sum(s) of the modelling application and measurement uncertainties, over an entire assessment period. Note that the sum will reduce to a single value when annual means are considered. All fixed measurements ~~meeting~~ that meet the data quality objectives (i.e. uncertainty of measurement and data coverage of measurement as specified in Sections A and B of this Annex, respectively) located in the modelling application assessment area shall be used for the evaluation of uncertainty of the modelling application. Note that the maximum ratio shall be interpreted as being applicable over the entire concentration range.

For short-term mean concentrations, the maximum uncertainty of measurement data used to assess the modelling quality objective shall be the absolute uncertainty calculated using the relative value expressed in this Section, above the limit value and shall decrease linearly from the absolute value at the limit value, to a threshold at zero concentration[31]. Both the short-term and long-term modelling quality objectives shall be fulfilled.

For modelling of annual mean concentrations of benzene, ~~lead,~~ arsenic, cadmium, lead, nickel and benzo(a)pyrene, the maximum uncertainty of measurement data used for assessing the modelling quality objective shall not exceed the relative value expressed in this Section.

For modelling of annual mean concentrations of $PM_{2.5}$, PM_{10}, and nitrogen dioxide the maximum uncertainty of measurement data used for assessing the modelling quality objective shall not exceed either the absolute value or the relative value expressed in this Section.

Where an air quality modelling application is used for assessment, references to descriptions of the modelling application and information on the calculation of the modelling quality objective shall be compiled.

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[31] The threshold shall be set to 4, 3, 10, 3 and 5 ug/m^3 for PM_{10}, $PM_{2.5}$, O_3, NO_2 and SO_2, respectively and 0.5 mg/m^3 for CO. These values represent the state of knowledge and shall be regularly updated at least every 5 years, to reflect developments in the state-of-art.

The uncertainty of objective estimation shall not exceed the uncertainty for indicative measurements by more than the applicable maximum ratio and shall not exceed 85%. The uncertainty for objective estimation is defined as the maximum deviation of the measured and calculated concentration levels, over the period considered, by the limit value (or ~~ozone~~ target value), without taking into account the timing of the events.

B. Data coverage of measurements for ambient air quality assessment

"Data coverage" refers to the proportion of the ~~measurement period~~ calendar year for which valid measurement data are available, expressed as a percentage.

Air pollutant	Minimum data coverage			
	Fixed measurements (1)		Indicative measurements (2)	
	Annual means	1-hour, 8-hour or 24-hour means ~~(1)~~	Annual means	1-hour, 8-hour or 24-hour means ~~(1)~~
SO_2, NO_2, NOx, CO~~, O_3~~	85 % ~~(2)~~	~~75~~ 85 % ~~(3)~~	13 %	50 % ~~(4)~~
O_3 and related NO and NO_2	85 % ~~(2)~~	85 % ~~(3)~~	13 %	50 % ~~(4)~~
PM_{10}, $PM_{2.5}$	85 %	~~75~~ 85 %	13 %	50 %
Benzene	85 %	-	13 %	-
Benzo(a)pyrene, polycyclic aromatic hydrocarbons (PAH), total gaseous mercury, particulate and gaseous divalent mercury	30 %	-	13 %	-
As, Cd, Ni, Pb	45 %	-	13 %	-
BC, Ammonia (NH_3), UFP, ~~particle~~ size ~~number~~ distribution of UFP	80 %	-	13 %	-

Nitric acid, levoglucosan, organic carbon (OC), elemental carbon (EC), chemical composition of $PM_{2.5}$, PM oxidative potential	45 %		13 %	
Total Deposition	-	-	30 %	-

~~(1) For O_3 and CO, the calculation of the 'maximum daily 8 hour mean' for any specific day requires a minimum 75% of the hourly running eight hour averages (i.e. 18 eight hour averages per day).~~

~~(2)~~ (1) For O_3, minimum data coverage requirements are to be met both for the full calendar year, and for the periods of April to September, and October to March, respectively.

Assessment of the AOT40 for ozone minimum data coverage requirements are to be met during the time period defined for calculating the AOT40 value.

~~(3) For the assessment of annual mean values, Member States may apply random measurements instead of continuous measurements if they can demonstrate to the Commission that the uncertainty, including the uncertainty due to random sampling, meets the quality objectives in the table and the time coverage is still larger than the minimum data coverage for indicative measurements. Random sampling must be evenly distributed over the year in order to avoid skewing of results. The uncertainty due to random sampling may be determined by the procedure laid down in ISO 11222 (2002) 'Air Quality — Determination of the Uncertainty of the Time Average of Air Quality Measurements'.~~

~~(4)~~ (2) For O_3, minimum data coverage applies for the period of April to September (no criterium of minimum data coverage is required during the winter period).

Fixed measurements of SO_2, NO_2, CO, O_3, PM_{10}, $PM_{2.5}$ and benzene are to be carried out continuously during the full calendar year.

For the other cases, measurements are to be evenly distributed over the calendar year (or over the April-September period for indicative measurements of O_3). In order to comply with these requirements and to ensure that any potential losses of data do not skew results, the minimum data coverage requirements shall be met for specific periods (quarter, month, weekday) of the whole year depending on the pollutant and measurement method/frequency.

For the assessment of annual mean values via indicative measurements and, via fixed measurements for pollutants with a minimum data coverage below 80%, Member States may apply random measurements instead of continuous measurements if they can demonstrate that the uncertainty, including the uncertainty due to random sampling, meets the required data quality objectives and minimum data coverage for indicative measurements. Such random sampling shall be evenly distributed over the year in order to avoid skewing of results. The uncertainty due to random sampling may be determined by the procedure laid down in ISO 11222 (2002) 'Air Quality — Determination of the Uncertainty of the Time Average of Air Quality Measurements'.

~~The requirements for minimum data coverage do not include loss(es) of data due to the regular calibration or the normal maintenance of the instrumentation. Such~~ Normal maintenance of instrumentation shall not take place during pollution peak periods.

Minimum 24-hour sampling is required for the measurement of benzo(a)pyrene and other polycyclic aromatic hydrocarbons. Individual samples taken over a period of up to 1 month may be combined and analysed as a composite sample, provided the method ensures that the samples are stable for that period. The three congeners benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene can be difficult to resolve analytically. In such cases, they can be reported as a sum together. Sampling must be spread evenly over the weekdays and the year. For the measurement of deposition rates monthly, or weekly, samples throughout the year are recommended.

Furthermore, those provisions on individual samples shall also apply to arsenic, cadmium, lead, nickel and total gaseous mercury. Moreover, sub–sampling of PM_{10} filters for metals for subsequent analysis is allowed, providing there is evidence that the sub-sample is representative of the whole and that the detection sensitivity is not compromised when compared with the relevant data quality objectives. As an alternative to daily sampling, weekly sampling for metals in PM_{10} is allowed provided that the collection characteristics are not compromised.

For total deposition, Member States may use wet-only sampling ~~only~~, instead of bulk sampling, if they can demonstrate that the difference between them is within 10 %. Deposition rates shall generally be given as $\mu g/m^2$ per day.

Ba. Criteria for aggregation of data for ambient air quality assessment

The following criteria shall be used for checking validity when aggregating data in order to calculate statistical parameters:

Parameter	Required proportion of valid data
One hour means	75 % (i.e. 45 minutes)
Eight hour means	75 % of values (i.e. 6 hours)
24-hour means	75 % of the one hour means (i.e. at least 18 hourly values during the day)
Maximum daily 8-hour mean	75 % of the hourly running eight-hour means (i.e. at least 18 eight-hour values during the day)

C. Methods for assessing compliance and estimating statistical parameters to account for low data coverage or significant data losses

An assessment of compliance with the relevant limit and ~~ozone~~ target values shall be carried out regardless of whether the data quality objectives for data coverage are achieved, provided the available data allows for a conclusive assessment. In cases relating to the short-term limit and ~~ozone~~ target values, measurements that only cover a fraction of the calendar year, and that have not delivered sufficient valid data as required by Point B, may still constitute non-compliance. Where this is the case, and there are no clear grounds to doubt the quality of the valid data acquired, this shall be considered an exceedance of the limit or target value and be reported as such.

D. Results of air quality assessment

The following information shall be compiled for zones where air quality modelling applications or objective estimation ~~is~~ are used:

(a) a description of assessment activities carried out,

(b) the specific methods used, with references to descriptions of the method,

(c) the sources of data and information,

(d) a description of results, including uncertainties and, in particular, the extent of any area or, if relevant, the length of road within the zone over which concentrations exceed any limit value, ~~ozone~~ target value or long-term objective, and of any area within which concentrations exceed the assessment threshold,

(e) the population potentially exposed to levels in excess of any limit value for protection of human health.

E. Quality assurance for ambient air quality assessment. Data validation

1. To ensure accuracy of measurements and compliance with the data quality objectives laid down in Point A, the appropriate competent authorities and bodies designated pursuant to Article 5 shall ensure the following:

a) that all measurements undertaken in relation to the assessment of ambient air quality pursuant to Article 8 are traceable in accordance with the requirements set out in the harmonised standard for testing and calibration laboratories;

b) that institutions operating networks and individual sampling points have an established quality assurance and quality control system which provides for regular maintenance to assure the continued accuracy of measuring devices. The quality system shall be reviewed as necessary and at least every 5 years by the relevant national reference laboratory;

c) that a quality assurance/quality control process is established for the process of data collection and reporting and that organisations appointed for this task actively participate in the related Union-wide quality assurance programmes;

d) that the national reference laboratories are appointed by the appropriate competent authority or body designated pursuant to Article 5 of this Directive and are accredited for the reference methods referred to in Annex VI to this Directive, at least for those pollutants for which concentrations are above the assessment threshold, according to the relevant harmonised standard for testing and calibration laboratories, the reference to which has been published in the *Official Journal of the European Union* pursuant to Article 2(9) of Regulation (EC) No 765/2008 of the European Parliament and of the Council[32] setting out the requirements for accreditation and market surveillance. These laboratories shall also be responsible for the coordination in Member State's territory of the Union-wide quality assurance programmes to be organised by the Commission's Joint Research Centre and shall also be responsible for coordinating, on the national level, the appropriate use of reference methods, and the demonstration of equivalence of non-reference methods. National reference laboratories organising intercomparison on the national level shall also be accredited according to the relevant harmonised standard for proficiency testing;

e) that the national reference laboratories take part at least every 3 years in the Union-wide quality assurance programmes organised by the Joint Research Centre for at least those pollutants for which concentrations are above the assessment threshold. Participation for other pollutants is recommended. If this participation produces unsatisfactory results, then the national laboratory shall demonstrate at the next participation in the intercomparison satisfactory remediation measures, and provide a report to the Joint Research Centre on these measures;

f) that the national reference laboratories support the work done by the European network of National Reference Laboratories set up by the Commission's Joint Research Centre;

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[32] Regulation (EC) No 765/2008 of the European Parliament and of the Council of 9 July 2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products and repealing Regulation (EEC) No 339/93 (OJ L 218, 13.8.2008, p. 30).

g) that the European network of National Reference Laboratories be responsible for the periodic review, at least every 5 years, of the measurement uncertainties listed in ~~the first two columns of~~ Tables 1 and 2 of this Annex and subsequent proposal of any necessary changes to the Commission.

2. All reported data under Article 23 shall be deemed to be valid except data flagged as provisional.

F. Promotion of harmonised air quality modelling approaches

1. To promote and support the harmonised use of scientifically sound air quality modelling approaches by the competent authorities with an emphasis on model application, the appropriate competent authorities and bodies designated pursuant to Article 5 shall ensure the following:

(a) that the designated reference institutions participate in the European network of air quality modelling set up by the Commission's Joint Research Centre;

(b) that best practices in air quality modelling <u>applications</u> identified by the network through scientific consensus are adopted in relevant applications of air quality modelling for the purposes of fulfilling legal requirements pursuant to Union legislation, without prejudice to model adaptations necessitated by singular circumstances;

(c) that the quality <u>criteria for</u> ~~of~~ relevant applications of air quality modelling is periodically checked and improved through intercomparison exercises organised by the Commission’s Joint Research Centre;

(d) that the European network of air quality modelling be responsible for the periodic review, at least every 5 years, of the ratio of modelling <u>application</u> uncertainties listed in ~~the final columns of~~ Tables 1 and 2 of this Annex and subsequent proposal of any necessary changes to the Commission.

ANNEX VI

REFERENCE METHODS FOR ASSESSMENT OF CONCENTRATIONS IN AMBIENT AIR AND DEPOSITION RATES

A. Reference methods for the assessment of concentrations of sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter (PM_{10} and $PM_{2.5}$), ~~lead,~~ benzene, carbon monoxide, arsenic, cadmium, lead, mercury, nickel, polycyclic aromatic hydrocarbons, ozone, ~~ammonia~~ and other pollutants in ambient air and deposition rates.

1. Reference method for the measurement of sulphur dioxide in ambient air

The reference method for the measurement of sulphur dioxide is that described in EN 14212:2012 'Ambient air — Standard method for the measurement of the concentration of sulphur dioxide by ultraviolet fluorescence'.

2. Reference method for the measurement of nitrogen dioxide and oxides of nitrogen in ambient air

The reference method for the measurement of nitrogen dioxide and oxides of nitrogen is that described in EN 14211:2012 'Ambient air — Standard method for the measurement of the concentration of nitrogen dioxide and nitrogen monoxide by chemiluminescence'.

3. Reference method for the sampling and measurement of PM_{10} in ambient air

The reference method for the sampling and measurement of PM_{10} is that described in EN12341:~~2014~~ 2023 'Ambient Air — Standard gravimetric measurement method for the determination of the PM_{10} or $PM_{2.5}$ mass concentration of suspended particulate matter'.

4. Reference method for the sampling and measurement of $PM_{2.5}$ in ambient air

The reference method for the sampling and measurement of $PM_{2.5}$ is that described in EN12341:~~2014~~2023 'Ambient Air — Standard gravimetric measurement method for the determination of the PM_{10} or $PM_{2.5}$ mass concentration of suspended particulate matter'.

5. Reference method for the sampling and measurement of ~~lead,~~ arsenic, cadmium, lead and nickel in ambient air

The reference method for the sampling of ~~lead,~~ arsenic, cadmium, lead and nickel is that described in EN 12341:~~2014~~ 2023 'Ambient Air — Standard gravimetric measurement method for the determination of the PM_{10} or $PM_{2.5}$ mass concentration of suspended particulate matter'. The reference method for the measurement of ~~lead,~~ arsenic, cadmium, lead and nickel is that described in EN 14902:2005 'Standard method for measurement of Pb/Cd/As/Ni in the PM_{10} fraction of suspended particulate matter'.

6. Reference method for the sampling and measurement of benzene in ambient air

The reference method for the sampling and measurement of benzene is that described in EN 14662, parts 1 (2005), 2 (2005) and 3 (2016) 'Ambient air quality — Standard method for measurement of benzene concentrations'.

7. Reference method for the measurement of carbon monoxide in ambient air

The reference method for the measurement of carbon monoxide is that described in EN 14626:2012 'Ambient air — Standard method for the measurement of the concentration of carbon monoxide by non-dispersive infrared spectroscopy'.

8. Reference method for the sampling and measurement of polycyclic aromatic hydrocarbons in ambient air

The reference method for the sampling of polycyclic aromatic hydrocarbons in ambient air is described in EN 12341:~~2014~~ 2023 'Ambient Air — Standard gravimetric measurement method for the determination of the PM_{10} or $PM_{2.5}$ mass concentration of suspended particulate matter'. The reference method for the measurement of benzo(a)pyrene in ambient air is that described in EN 15549:2008 'Air quality — Standard method for the measurement of concentration of benzo[a]pyrene in ambient air'. In the absence of a CEN standard method for the other polycyclic aromatic hydrocarbons referred to in Article 8(6), Member States are allowed to use national standard methods or ISO methods such as ISO standard 12884.

9. Reference method for the sampling and measurement of total gaseous mercury in ambient air

The reference method for the measurement of total gaseous mercury concentrations in ambient air is that described in EN 15852:2010 ‘Ambient air quality — Standard method for the determination of total gaseous mercury’.

10. Reference method for the sampling and analysis of the deposition of arsenic, cadmium, lead, nickel, mercury and polycyclic aromatic hydrocarbons

The reference method for the determination of the deposition of arsenic, cadmium, lead and nickel is that described in EN 15841:2009 ‘Ambient air quality — Standard method for determination of arsenic, cadmium, lead and nickel in atmospheric deposition’.

The reference method for the determination of the deposition of mercury is that described in EN 15853:2010 ‘Ambient air quality — Standard method for determination of mercury deposition’.

The reference method for the determination of the deposition of benzo(a)pyrene and the other polycyclic hydrocarbons referred to in Article 8(6) is that described in EN 15980:2011 ‘Air quality - Determination of the deposition of benz[a]anthracene, benzo[b]fluoranthene, benzo[j]fluoranthene, benzo[k]fluoranthene, benzo[a]pyrene, dibenz[a,h]anthracene and indeno[1,2,3-cd]pyrene’.

11. Reference method for the measurement of ozone in ambient air

The reference method for the measurement of ozone is that described in EN 14625:2012 ‘Ambient air — Standard method for the measurement of the concentration of ozone by ultraviolet photometry’.

12. Reference method for the sampling and measurement of volatile organic compounds that are ozone precursor substances in ambient air

In the absence of a European Committee for Standardization (CEN) standard method for sampling and measuring volatile organic compounds that are ozone precursor substances in ambient air other than benzene, Member States may choose the sampling and measuring methods they use, in accordance with Annex V and taking into account the measurement objectives set out in Section 2, Point A, of Annex VII.

13. Reference method for the sampling and measurement of elemental carbon and organic carbon in ambient air

The reference method for the sampling of elemental carbon and organic carbon is that describe in EN 12341~~:2014~~ 2023 'Ambient Air — Standard gravimetric measurement method for the determination of the PM_{10} or $PM_{2.5}$ mass concentration of suspended particulate matter'. The reference method for the measurement of elemental carbon and organic carbon in ambient air is that described in EN 16909:2017 'Ambient air - Measurement of elemental carbon (EC) and organic carbon (OC) collected on filters'.

14. Reference method for the sampling and measurement of NO_3^-, SO_4^{2-}, Cl^-, NH_4^+, Na^+, K^+, Mg^{2+}, Ca^{2+} in $PM_{2.5}$ in ambient air

The reference method for the sampling of ~~elemental carbon and organic carbon~~ NO_3^-, SO_4^{2-}, Cl^-, NH_4^+, Na^+, K^+, Mg^{2+}, Ca^{2+} in $PM_{2.5}$ is that described in EN 12341:~~2014~~ 2023 'Ambient Air — Standard gravimetric measurement method for the determination of the PM_{10} or $PM_{2.5}$ mass concentration of suspended particulate matter'. The reference method for the measurement of NO_3^-, SO_4^{2-}, Cl^-, NH_4^+, Na^+, K^+, Mg^{2+}, Ca^{2+} in $PM_{2.5}$ in ambient air is that described in EN 16913:2017 'Ambient air - Standard method for measurement of NO_3^-, SO_4^{2-}, Cl^-, NH_4^+, Na^+, K^+, Mg^{2+}, Ca^{2+} in $PM_{2.5}$ as deposited on filters'.

15. *Methods for the sampling and measurment of UFP, BC, size distribution of ultrafine particles, ammonia (NH_3), particulate and gaseous divalent mercury, nitric acid, levoglucosan and ~~PM~~ oxidate potential of particulate matter*

In the absence of a European Committee for Standardization (CEN) standard method for sampling and measuring UFP, BC, size distribution of ultrafine particles, ammonia (NH_3), particulate and gaseous divalent mercury, nitric acid, levoglucosan and oxidate potential of particulate matter, Member States may choose the sampling and measuring methods they use, in accordance with Annex V and taking into account the measurement objectives of the measurement. Where international, CEN or national standard reference measurement methods or CEN technical specifications are available, these may be used.

B. Demonstration of equivalence

1. A Member State may use any other method which it can demonstrate gives results equivalent to any of the reference methods referred to in Point A or, in the case of particulate matter, any other method which the Member State concerned can demonstrate displays a consistent relationship to the reference method, such as automatic measurement method that meets the requirements in standard EN 16450 :2017 'Ambient air - Automated measuring systems for the measurement of the concentration of particulate matter (PM10; PM2,5)'. In that event, the results achieved by such other method must be corrected to produce results equivalent to those that would have been achieved by using the reference method.

2. The Commission may require Member States to prepare and submit a report on the demonstration of equivalence in accordance with point 1.

3. When assessing the acceptability of the report mentioned in point 2, the Commission will refer to its guidance on the demonstration of equivalence. Where Member States have been using interim factors to approximate equivalence, approximate equivalence shall be confirmed or amended with reference to that guidance.

4. Member States shall ensure that whenever appropriate, the correction is also applied retroactively to past measurement data in order to achieve better data comparability.

C. Standardisation

For gaseous pollutants, the volume must be standardised at a temperature of 293 K and an atmospheric pressure of 101,3 kPa. For particulate matter and substances to be analysed in particulate matter (including ~~lead,~~ arsenic, cadmium, lead, nickel and benzo(a)pyrene), the sampling volume refers to ambient conditions in terms of temperature and atmospheric pressure at the date of measurements.

~~When demonstrating that equipment meets the performance requirements of the reference methods listed in Point A, the competent authorities and bodies designated pursuant to Article 5 shall accept test reports issued in other Member States provided that the test laboratories are accredited by the relevant harmonised standard for testing and calibration laboratories.~~

~~The detailed test reports and all the results of the tests shall be available to other competent authorities or their designated bodies. Test reports shall demonstrate that the equipment meets all the performance requirements including where some environmental and site conditions are specific to a Member State and are outside the conditions for which the equipment has been already tested and type approved in another Member State.~~

D. Mutual recognition of data

When demonstrating that equipment meets the performance requirements of the reference methods listed in Point A, the competent authorities and bodies designated pursuant to Article 5 shall accept test reports issued in other Member States provided that the test laboratories are accredited by the relevant harmonised standard for testing and calibration laboratories.

The detailed test reports and all the results of the tests shall be available to other competent authorities or their designated bodies. Test reports shall demonstrate that the equipment meets all the performance requirements including where some environmental and site conditions are specific to a Member State and are outside the conditions for which the equipment has been already tested and type approved in another Member State.

E. Reference air quality modelling applications

In the absence of a CEN standard on modelling quality objectives, Member States may choose the modelling applications they use, in accordance with Annex V, Section F.

ANNEX VII

MONITORING AT SUPERSITES, AND OF MASS CONCENTRATION, ~~AND~~ CHEMICAL COMPOSITION OF $PM_{2.5}$, OZONE PRECURSOR SUBSTANCES AND ULTRAFINE PARTICLES

SECTION -1 – MEASUREMENTS OF POLLUTANTS AT SUPERSITES

Measurements at all monitoring supersites at urban background locations and rural background locations shall include the pollutants listed in Tables 1 and 2 of this sections respectively.

Table 1 - Pollutants to be measured at supersites at urban locations

Pollutant	Type of measurement
PM_{10}, $PM_{2.5}$, UFP, BC	Fixed measurements
NO_2, O_3	Fixed measurements
Size distrubution of UFP	Fixed or indicative measurements
Benzo(a)pyrene, polycyclic aromatic hydrocarbons (PAH)[1]	Fixed or indicative measurements
Arsenic, cadmium, lead and nickel ~~As, Cd, Ni, Pb~~	Fixed or indicative measurements
Chemical composition of $PM_{2.5}$ in accordence with Section 1 of Annex VII	Fixed or indicative measurements

[1] benzo(a)pyrene and the other polycyclic aromatic hydrocarbons referred to in Article 9(8)

Table 2 - Pollutants to be measured at supersites at rural locations

Pollutant	Type of measurement
PM_{10}, $PM_{2.5}$, UFP, BC	Fixed measurements
NO_2, O_3 and ammonia (NH_3)	Fixed measurements
Total deposition of benzo(a)pyrene, polycyclic aromatic hydrocarbons (PAH),	Indicative measurements
Total deposition of arsenic, cadmium, lead, nickel and mercury	Indicative measurements

Benzo(a)pyrene, polycyclic aromatic hydrocarbons (PAH) [1],	Fixed or indicative measurements
Arsenic, cadmium, lead and nickel	Fixed or indicative measurements
Chemical composition of $PM_{2.5}$ in accordence with Section 1 of Annex VII	Fixed or indicative measurements
Total gaseous mercury	Fixed or indicative measurements

(1) benzo(a)pyrene and the other polycyclic aromatic hydrocarbons referred to in Article 9(8)

Table 3 - Pollutants recommended to be measured at supersites at urban and rural locations if not covered by the requirements of Tables 1 and 2

Pollutant	Type of measurement
Size distrubution of UFP	Fixed or indicative measurements
Particulate matter oxidative potential	Fixed or indicative measurements
Total deposition of arsenic, cadmium, lead, nickel and mercury	Indicative measurements
Total deposition of benzo(a)pyrene, polycyclic aromatic hydrocarbons (PAH),	Indicative measurements
Ammonia (NH3)	Fixed or indicative measurements
Levoglucosan to be measured as part of the chemical composition of PM2.5	Fixed or indicative measurements
Total gaseous mercury	Fixed or indicative measurements
Particulate and gaseous divalent mercury	Fixed or indicative measurements
Nitric acid	Fixed or indicative measurements

SECTION 1 - MEASUREMENTS OF MASS CONCENTRATION AND CHEMICAL COMPOSITION OF $PM_{2.5}$

A. Objectives

The main objectives of such measurements are to ensure that adequate information is made available on levels in urban background and rural background locations. This information is essential to judge the enhanced levels in more polluted areas (such as urban background, industry related locations, traffic related locations), assess the possible contribution from long-range transport of pollutants, support source apportionment analysis and for the understanding of specific pollutants such as particulate matter. It is also essential for the increased use of modelling applications also in urban areas.

B. Substances

Measurement of $PM_{2.5}$ must include at least the total mass concentration and concentrations of appropriate compounds to characterise its chemical composition. At least the list of chemical species given below shall be included.

SO_4^{2-}	Na^+	NH_4^+	Ca^{2+}	elemental carbon (EC)
NO_3^-	K^+	Cl^-	Mg^{2+}	organic carbon (OC)

C. Siting

Measurements shall be taken in urban background and rural background locations in accordance with Annex IV.

SECTION 2- MEASUREMENTS OF OZONE PRECURSOR SUBSTANCES

A. Objectives

The main objectives of measurements of ozone precursor substances are to analyse any trend in ozone precursors, to check the efficiency of emission reduction strategies, to check the consistency of emission inventories, to support the understanding of ozone formation and precursor dispersion processes, as well as the application of photochemical models, and to help attribute emission sources to observed pollution concentrations.

B. Substances

Measurement of ozone precursor substances shall include at least nitrogen oxides (NO and NO_2), ~~and~~ appropriate volatile organic compounds (VOC) and methane, when relevant. The selection of the specific compounds to be measured ~~completed by other compounds of interest~~ will depend on the objective sought and may be complemented by other compounds of interest.

(a) Member States may use the method which it considers suitable for the objective sought;

(b) the reference method as specified under Annex VI applies for nitrogen dioxide and oxides of nitrogen;

~~(c) methods that are being standardised by the CEN shall be used once available.~~

A list of VOC recommended for measurement is given below:

Chemical family	**Substance**			
	Trivial name	**IUPAC name**	**Formula**	**CAS number**
Alcohols	Methanol	Methanol	CH_4O	67-56-1
	Ethanol	Ethanol	C_2H_6O	64-17-5
Aldehyde	Formaldehyde	Methanal	CH_2O	50-00-0
	Acetaldehyde	Ethanal	C_2H_4O	75-07-0
	Methacrolein	2-Methylprop-2-enal	C_4H_6O	78-85-3
Alkynes	Acetylene	Ethyne	C_2H_2	74-86-2
	Ethane	Ethane	C_2H_6	74-84-0
	Propane	Propane	C_3H_8	74-98-6
	n-Butane	Butane	C_4H_{10}	106-97-8
	i-Butane	2-Methylpropane	C_4H_{10}	75-28-5
	n-Pentane	Pentane	C_5H_{12}	109-66-0
	i-Pentane	2-Methylbutane	C_5H_{12}	78-78-4
	n-Hexane	Hexane	C_6H_{14}	110-54-3
	i-Hexane	2-Methylpentane	C_6H_{14}	107-83-5
	n-Heptane	Heptane	C_7H_{16}	142-82-5
	n-Octane	Octane	C_8H_{18}	111-65-9
	i-Octane	2,2,4-Trimethylpentane	C_8H_{18}	540-84-1
Alkenes	Ethylene	Ethene	C_2H_4	75-21-8
	Propene / Propylene	Propene	C_3H_6	115-07-1
	1,3-Butadiene	Buta-1,3-diene	C_4H_6	106-99-0
	1-Butene	But-1-ene	C_4H_8	106-98-9
	Trans-2-Butene	(E)-but-2-ene	C_4H_8	624-64-6
	cis-2-Butene	(Z)-but-2-ene	C_4H_8	590-18-1
	1-Pentene	Pent-1-ene	C_5H_{10}	109-67-1

	2-Pentene	(Z)-Pent-2-ene	C_5H_{10}	627-20-3 (cis-2 pentene)
		(E)-Pent-2-ene		6-04-8 (trans-pentene)
Aromatic hydrocarbons	Benzene	Benzene	C_6H_6	71-43-2
	Toluene / Methylbenzene	Toluene	C_7H_8	108-88-3
	Ethyl benzene	Ethylbenzene	C_8H_{10}	100-41-4
	m + p-Xylene	1,3-Dimethylbenzene (m-Xylene)	C_8H_{10}	108-38-3 (m-Xylene)
		1,4-Dimethylbenzene (p-Xylene)		106-42-3 (p-Xylene)
	o-Xylene	1,2-Dimethylbenzene (o-Xylene)	C_8H_{10}	95-47-6
	1,2,4-Trimethylebenzene	1,2,4-Trimethylbenzene	C_9H_{12}	95-63-6
	1,2,3-Trimethylebenzene	1,2,3-Trimethylbenzene	C_9H_{12}	526-73-8
	1,3,5-Trimethylebenzene	1,3,5-Trimethylebenzene	C_9H_{12}	108-67-8
Ketones	Acetone	Propan-2-one	C_3H_6O	67-64-1
	Methyl ethyl ketone	Butan-2-one	C_4H_8O	78-93-3
	Methyl vinyl ketone	3-Buten-2-one	C_4H_6O	78-94-4
Terpenes	Isoprene	2-Methylbut-1,3-diene	C_5H_8	78-79-5
	p-Cymene	1-Methyl-4-(1-methylethyl)benzene	$C_{10}H_{14}$	99-87-6
	Limonene	1-methyl-4-(1-methylethenyl)-cyclohexene	$C_{10}H_{16}$	138-86-3
	β-Myrcene	7-Methyl-3-methylene-1,6-octadiene	$C_{10}H_{16}$	123-35-3
	α-Pinene	2,6,6-Trimethyl-bicyclo[3.1.1]hept	$C_{10}H_{16}$	80-56-8

		-2-ene		
	β-Pinene	6,6-Dimethyl-2-methyl-enebicyclo[3.1.1] heptane	$C_{10}H_{16}$	127-91-3
	Camphene	2,2-dimethyl-3-methyl-enebicyclo[2.2.1] heptane	$C_{10}H_{16}$	79-92-5
	Δ^3-Carene	3,7,7-Trimethyl-bicyclo[4.1.0]hept-3-ene	$C_{10}H_{16}$	13466-78-9
	1,8-Cineol	1,3,3 trimethyl 2 oxabicyclo[2,2,2] octane	$C_{10}H_{18}O$	470-82-6

C. Siting

Measurements shall be taken at sampling points set up in accordance with the requirements of this Directive and considered appropriate with regards to the monitoring objectives referred to in Point A of this Section.

SECTION 3- MEASUREMENT OF ULTRAFINE PARTICULES (UFP)

A. Objectives

The objective of such measurements is to ensure that adequate information is available at locations where high concentrations of UFP occur that are mainly influenced by sources from air, water or road transport (such as airports, ports, roads), industrial sites or domestic heating. The information shall be appropriate to judge on enhanced levels of UFP concentrations from those sources.

B. Substances

UFP.

C. Siting

Sampling points shall be established in accordance with Annex IV and V down wind direction of major UFP sources at a location where high UFP concentrations are likely to occur.

ANNEX VIII

INFORMATION TO BE INCLUDED IN AIR QUALITY PLANS FOR IMPROVEMENT IN AMBIENT AIR QUALITY

A. Information to be provided under Article 19(5)

1. Localisation of excess pollution

   (a) region;

   (b) city/cities (maps);

   (c) sampling point(s) (map, geographical coordinates).

2. General information

   (a) type of zone (urban, industrial or rural area) or characteristics of ~~NUTS 1~~ the territorial unit (including urban, industrial or rural areas);

   (b) estimate of the polluted area (in km^2) and of the population exposed to the pollution;

   (c) concentrations or average exposure indicator of the relevant pollutant observed at least 5 years prior to the exceedance;

3. Responsible authorities

   Names and addresses of the competent authorities responsible for the development and implementation of air quality plans.

4. Origin of pollution taking into account reporting under Directive (EU) 2016/2284 and information provided in the national air pollution control programme

(a) list of the main emission sources responsible for pollution;

(b) total quantity of emissions from these sources (in tonnes/year);

(c) assessment of the level of emissions (e.g. city level, regional level, national level, and transboundary contributions);

(d) source apportionment according to relevant sectors that contribute to the exceedance in the national air pollution control programme.

5. Expected impact of measures to reach compliance within ~~3 years after adoption of the air quality plan~~ the timelines established in Article 19

(a) expected quantified concentration reduction (in $\mu g/m^3$) at each sampling point in exceedance of limit values, ~~ozone~~ target values or of the average exposure indicator in case of an exceedance of the average exposure reduction obligation, from the measures referred to in point 6;

(b) estimated year of compliance per air pollutant covered by the air quality plan taking into account measures referred to in point 6.

6. Annex 1: Details of measures to reduce air pollution under point 5

(a) listing and description of all the measures set out in the air quality plan, including the identification of the competent authority in charge of their implementation;

(b) quantification of emission reduction (in tonnes/year) of each measure under point (a);

(c) timetable for implementation of each measure and responsible actors;

(d) estimate of the concentration reduction as a consequence of ~~each~~ air quality measures, in relation to the exceedance concerned; concentration reductions for each measure or groups of measures shall be estimated when appropriate;

(e) list of the information (including modelling and assessment results of measures) to reach the air quality standard concerned in accordance with Annex I.

7. Annex 2: Further background information

(a) climatic data;

(b) data on topography;

(c) information on the type of targets requiring protection in the zone, (if applicable);

(d) listing and description of all additional measures, that unfold their full impact on ambient air pollutant concentrations in 3 years or more.

(e) socio-economic information on the related area, in order to promote environmental equity issues and the protection of sensitive groups.

8. Annex 3: Evaluation of measures (in case of an air quality plan update)

(a) assessment of timetable of measures from the previous air quality plan;

(b) estimate of impact on emission reduction and pollutant concentrations of measures from the previous air quality plan.

B. Indicative list of air pollution abatement measures

1. Information concerning the status of implementation of the Directives referred to in Article 14(3), point (b), of Directive (EU) 2016/2284.

2. Information on all air pollution abatement measures that have been considered at local, regional or national level for implementation in connection with the attainment of air quality objectives, including:

(a) reduction of emissions from stationary sources by ensuring that polluting small and medium-sized stationary combustion sources (including for biomass) are fitted with emission control equipment or replaced, and that the energy efficiency of buildings is improved;

(b) reduction of emissions from vehicles through retrofitting with zero emissions powertrains and emission control equipment. The use of economic incentives to accelerate take-up shall be considered;

(c) procurement by public authorities, in line with the handbook on environmental public procurement, of zero emissions road vehicles, fuels and combustion equipment to reduce emissions;

(d) measures to limit transport emissions through traffic planning and management (including congestion pricing, differentiated parking fees or other economic incentives; establishing urban vehicles access restrictions schemes, including low emission zones);

(e) measures to encourage a shift towards less polluting forms of transport;

(f) measures to encourage a shift towards zero emissions vehicles and non-road machinery for both private and commercial applications;

(g) measure to ensure that low emission fuels are given preference in small-, medium- and large-scale stationary sources and in mobile sources;

(h) measures to reduce air pollution from industrial sources under Directive 2010/75/EU, and through the use of economic instruments such as taxes, charges or emission trading, while taking into account specificities of SMEs;

(i) measures to protect the health of children or other sensitive population groups.

ANNEX IX

PUBLIC INFORMATION

1. Member States shall provide to the public at least the following information:

(a) hourly up-to-date data per sampling point of sulphur dioxide, nitrogen dioxide, particulate matter (PM_{10} and $PM_{2.5}$), carbon monoxide and ozone. This shall apply to information from all sampling points where up-to-date information is available, and at least to information from the minimum number of sampling points required under Annex III if the measurement method is appropriate for up-to-date data (UTD), notwithstanding that Member States provide to the public as much UTD information as possible and progressively adapt their measurement methods to this effect. When available, up-to-date information resulting from modelling applications shall also be provided;

(b) measured concentrations of all pollutants presented according to the appropriate periods as laid down in Annex I;

(c) information on observed exceedance(s) of any limit value, ~~ozone~~ target values, and average exposure reduction obligation, including at least:

(i) the location or area of the exceedance,

(ii) the start time and duration of the exceedance,

(iii) the measured concentration in comparison to the air quality standards, or average exposure indicator in case of an exceedance of the average exposure reduction obligation;

(d) information regarding impacts on health ~~and vegetation,~~ including at least:

(i) the health impacts of air pollution on general population,

(ii) the health impacts of air pollution on vulnerable groups,

(iii) description of likely symptoms,

(iv) recommended precautions to be taken,

(v) where to find further information;

(da) information regarding impacts on vegetation;

(e) information on preventive actions to reduce pollution and exposure to it: indication of main source sectors; recommendations for actions to reduce emissions;

(f) information on measuring campaigns or similar activities and their results where performed.

2. Member States shall ensure that timely information about actual or predicted exceedances of alert thresholds, and any information threshold, is provided to the public. Details supplied shall include at least the following information:

(a) information on observed exceedance(s):

- location or area of the exceedance,
- type of threshold exceeded (information or alert),
- start time and duration of the exceedance,
- highest one hour concentration and in addition highest eight hour mean concentration in the case of ozone;

(b) forecast for the following afternoon/day(s):

- geographical area of expected exceedances of information and/or alert threshold,
- expected changes in pollution (improvement, stabilisation or deterioration), together with the reasons for those changes;

(c) information on the type of population concerned, possible health effects and recommended behaviour:

- information on population groups at risk,
- description of likely symptoms,
- recommended precautions to be taken by the population concerned,
- where to find further information;

(d) information on preventive action to reduce pollution and/or exposure to it: indication of main source sectors; recommendations for action to reduce emissions from anthropogenic sources.

(e) in the case of predicted exceedances, Member State**s** shall take steps to ensure that such details are supplied to the extent practicable.

3. When ~~an exceedance occur or when~~ there is a risk of exceedance of any limit value, ~~ozone~~ target values, average exposure reduction obligation, alert thresholds or information thresholds, Member States shall ensure that the information referred to in this Annex is additionally promoted to the public.

ANNEX X

Part A

Repealed Directives with lists of the successive amendments thereto

(referred to in Article 30)

Directive 2004/107/EC of the European Parliament and of the Council (OJ L 23, 26.1.2005, p. 3)	
Regulation (EC) No 219/2009 of the European Parliament and of the Council (OJ L 87, 31.3.2009, p. 109)	only point 3.8 of the Annex
Commission Directive (EU) 2015/1480 (OJ L 226, 29.8.2015, p. 4)	only Article 1
Directive 2008/50/EC of the European Parliament and of the Council (OJ L 152, 11.6.2008, p. 1)	
Commission Directive (EU) 2015/1480 (OJ L 226, 29.8.2015, p. 4)	only Article 2

Part B

Time-limits for transposition into national law

(referred to in Article 30)

Directive	Time-limit for transposition
2004/107/EC	15 February 2007
2008/50/EC	11 June 2010
(EU) 2015/1480	31 December 2016

ANNEX XI

CORRELATION TABLE

This Directive	Directive 2008/50/EC	Directive 2004/107/EC
Article 1	—	—
Article 2	Article 1	Article 1
Article 3	Article 32	Article 8
Article 4	Article 2	Article 2
Article 5	Article 3	—
Article 6	Article 4	Article 4(1)
Article 7	Articles 5 and 9(2)	Article 4(2), (3) and (6)
Article 8	Articles 6 and 9(1)	Article 4(1) to (5) and 4(8)and (10)
Article 9	Articles 7 and 10	Article 4(7) and (11)
Article 10	—	Article 4(9)
Article 11	Articles 8 and 11	Article 4(12) and (13)
Article 12	Articles 12, 17(1) and (3) and Article 18	Article 3(2)
Article 13	Articles 13, 15 and 17(1)	Article 3(1) and (3)
Article 14	Article 14	—
Article 15	Article 19	—
Article 16	Article 20	—
Article 17	Article 21	—
Article 18	Article 22	
Article 19	Articles 17(2) and 23	Article 3(3)
Article 20	Article 24	—
Article 21	Article 25	—

Article 22	Article 26	Article 7
Article 23	Article 27	Article 5
Article 24	Article 28	Article 4(15)
Article 25	—	—
Article 26	Article 29	Article 6
Article 27	—	—
Article 28	—	—
Article 29	Article 30	Article 9
Article 30	Article 31	—
Article 31	—	—
Article 32	Article 33	Article 10
Article 33	Article 34	Article 11
Article 34 Annex I	Article 35 Annexes VII, XI, XII, XIII and XIV	Article 12 Annex I
Annex II	Annex II	Annex II
Annex III	Annexes V and IX	Annex III, Section IV
Annex IV	Annexes III and VIII	Annex III, Sections I to III
Annex V	Annex I	Annex IV
Annex VI	Annex VI	Annex V
Annex VII	Annexes IV and X	—
Annex VIII	Annex XV	—
Annex IX	Annex XVI	—
Annex X	Article 31	—
Annex XI	—	—