PE2123: Update air quality standards in Scotland to align with 2021 World Health Organisation guidelines

Submission from Environmental Standards Scotland (ESS), 30 June 2025

Environmental Standards Scotland (ESS) welcome the opportunity to contribute to the Committee's consideration of Petition PE2123: Update air quality standards in Scotland to align with 2021 World Health Organisation guidelines. This letter sets out ESS' response to the Committee's questions sent to ESS on 03 June 2026.

Question 1: Do you support amending the Air Quality Standards (Scotland) Regulations 2010 to align with the 2021 WHO air quality guidelines? Please explain your reasoning.

ESS supports amending the Air Quality Standards (Scotland) Regulations 2010 ("the 2010 Regulations") to align with the 2021 WHO air quality guidelines.

In 2024, ESS published its assessment of particulate matter in Scotland and recommended that the Scottish Government should, as soon as possible, bring forward proposals for new statutory standards for particulate matter currently set as limits under the Air Quality Standards (Scotland) Regulations 2010 (as amended)[1], in recognition of the 2021 WHO Air Quality Guidelines. Our recommendation reflected the strengthened evidence base, which demonstrates the impact of particulate matter on human health and the environment. It also reflected the Scottish Government's commitment to maintain alignment with European Union environmental standards.

The revised EU Ambient Air Quality Directive entered into force in December 2024 and set reduced limit values for key air pollutants including $PM_{2.5}$, PM_{10} and NO_2 to be achieved by 2030. The revised EU limits for 2030 are more stringent than the limit values currently set in the Air Quality Standards (Scotland) Regulations 2010

ESS' own analysis of automatic monitoring air quality data found that between 2018-2024, statutory annual mean concentration limit values set under the Air Quality Standards (Scotland) Regulations 2010 were breached twelve times for NO_2.

Amending the Air Quality Standards (Scotland) Regulations 2010 to align with the 2021 WHO air quality guidelines should result in a clear statutory obligation to achieve new limit values and ensure that the legal framework is robust, enforceable and capable of delivering the necessary improvements to Scotland's air quality. ESS notes that the Air Quality (Scotland) Regulations 2000 provide a complementary regime to the 2010 Regulations by placing separate obligations on local authorities in terms of local air quality management (LAQM). The 2000 Regulations set air quality objectives (including for PM_{10}, $PM_{2.5}$ and

[1] These Regulations place legal responsibility for meeting limit values on Scottish Ministers

NO2). However, the duties under the 2000 Regulations only require local authorities to demonstrate that they are taking all reasonable steps to work towards the objective value. They do not place a duty on local authorities to achieve the objective value. ESS' Air Quality Investigation in 2021 found a number of local authorities in Scotland had at least one Air Quality Management Area – almost of which included exceedances of PM10 – demonstrating that these objective values were not being met in reality. The Scottish Government has since responded to ESS' 2021 investigation with an improvement plan, which was approved by the Scottish Parliament in March 2023.

Question 2. What progress has been made in reducing nitrogen dioxide and fine particulate matter in Scotland since 2022/23, when we last sought views on this?

ESS' most recent analysis of trends in particulate matter pollution was published in December 2024. ESS has not specifically analysed trends in NO2 since 2022.

In 2023, 98.7% of monitoring sites (where data capture > 75%) recorded annual mean concentrations of PM10 below the 2021 WHO guidelines of 15 µg m^{-3}. This compares to 97.4% in 2022. In 2023, one site (Perth Atholl Street) exceeded the Scottish annual mean concentration objective of 18 µg m^{-3} for PM10 set under the Air Quality (Scotland) Regulations 2000 (as amended). This compares to zero exceedances in 2022 and represents the first exceedance of the PM10 objective since 2018. In 2023, 42.1% of monitoring sites (where data capture > 75%) recorded annual mean concentrations of PM2.5 equal to or below the 2021 WHO guidelines of 5 µg m^{-3}. This is a marked improvement on the figure of 10.7% in 2022. There were no exceedances in 2023 of the Scottish annual mean objective of 10 µg m^{-3} for PM2.5 set under the Air Quality (Scotland) Regulations 2000 (as amended).

The relative sectoral contributions to particulate matter emissions in 2022 were largely consistent with the (revised) contributions in 2021. The emissions from residential and other combustion, industrial combustion and energy industries were lower in 2022 than 2021. However, the emissions of PM2.5 and PM10 from industrial processes and transport increased in 2022 relative to 2021. Emissions of PM2.5 from waste also increased from 2021 to 2022. Agricultural emissions of PM10 increased to 1.81 Kt in 2022, which means that PM10 emissions from the agricultural sector were 2.3% higher than in 2005.

This reinforces the finding in ESS' report that the sectoral pattern of emissions is changing and that action by the Scottish Government across a broader range of sources is necessary if further progress is to be made in reducing emissions of particulate matter.

Question 3. To what extent has scientific and public health evidence about air quality evolved since the current standards were adopted? In your answer you could refer, for instance, to impacts on nitrogen dioxide or fine particulate matter on particular groups of people, the effect of Low Emission Zones (or other interventions of a similar nature) on air quality, or any new information or data about the effect of burning particular types of fuel.

The 2021 WHO global air quality guidelines provide a comprehensive synthesis of recent scientific and public health evidence about air quality. The guidelines recognise that there has been a marked increase in evidence on the adverse health effects of air pollution, built on advances in air pollution measurement and exposure assessments and an expanded global

database of air pollution measurements since the early 2000s. New epidemiological studies have documented adverse effects at much lower levels than had previously been studied in high-income countries with relatively clean air. Specifically, the WHO recognise four key areas of progress in scientific evidence and understanding since the early 2000s. These are:

- a significant expansion in the geographical coverage of air quality research. Studies have generally found that relationships between air pollutants and ill-health are qualitatively similar in high and low income countries, although the 'concentration-response' functions are sometimes quantitatively different

- air pollution is now implicated in the development or worsening of several health conditions not considered in previous research. These include asthma, diabetes, reproductive outcomes and several neurocognitive end-points

- increased understanding of which sources and/or physicochemical characteristics of airborne PM contribute most to toxicity, although a definitive set of particle characteristics has yet to be identified. The WHO conclude that a focus on reducing primary combustion particles, secondary inorganic aerosols and secondary organic aerosols is warranted

- the emergence of large, multi-centre research collaborations, providing time-series data on the short and long term effects of air pollution. For example, the Multi-Country Multi-City Collaborative Research Network combines multiyear data from 652 cities across the world in a single joint analysis of the short-term effects of $PM_{2.5}$, ozone, nitrogen dioxide and carbon monoxide, while an ongoing collaboration is studying the long-term health effects of low levels of air pollution in Europe

At a UK level, there is now more evidence about pathways from precursor emissions to particulate matter which are not yet accounted for in the UK's National Atmospheric Emissions Inventory. These include agricultural emissions of ammonia, and residential, commercial and public sector combustion forming primary particulate matter and contributions to the formation of secondary pollutants (e.g. sulphur dioxide). There is also now a better understanding of where people who are most vulnerable to air pollution, and who would be most disproportionately affected in terms of health outcomes, spend time.

Question 4. The Scottish Government is currently reviewing the CAFS2 strategy with the goal of establishing a long-term policy framework to replace the strategy once it expires. What practical steps can the Scottish Government set out in its new strategy to reduce nitrogen dioxide and fine particulate matter levels?

ESS' analysis on particulate matter pollution (combining sectoral contributions, the secondary contribution through key precursors and the legislative competence of the Scottish Government), suggests the Scottish Government should expand its focus to include further sectors (in addition to the transport sector) in tackling particulate matter pollution. Specifically, industrial processes, residential and other combustion and agriculture are sectors with scope for significant improvement, given their relative contributions to particulate matter pollution and the policy levers available to the Scottish Government to drive change.

ESS has also made recommendations on improving the air quality monitoring network in relation to NO_2 and particulate matter to support action that reduces harm to the environment and public health. Specifically, ESS recommended that:

- consideration is given to making the Scottish particulate matter monitoring network more responsive to the changing pattern of emissions sources
- independent assessments are made of emerging areas and sectors of concern for particulate matter that do not depend on where current monitoring infrastructure is located
- for both NO_2 and particulate matter, that the Scottish Government ensures that its ongoing review of data provision scrutinises the protocols for the siting of monitoring sites, with a view to establishing whether they provide a sufficiently comprehensive picture of the state of air quality, particularly in and around our major cities. Specific focus should be placed on areas where vulnerable groups are present, such as schools and hospitals.

I hope this information is useful in the Committee's considerations.

Yours sincerely,

Mark Roberts
Chief Executive