Urban Agenda for the EU – Partnership for Air Quality

Position Paper: Fitness Check of the EU Ambient Air Quality Directives

Recommendations to Improve the Implementation of Air Quality Legislation and Identify Regulation Gaps in the Urban Environment

This document was prepared by Partners of the Partnership for Air Quality

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- Cities: Helsinki/HSY[a] (FI), London (UK), Utrecht (NL), Milan (IT)', Constanta (RO), Duisburg (DE) - representing the Consortium Clean Air Ruhr Area
- Stakeholders: EUROCITIES, HEAL[b]

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The Partnership for Air Quality

The aim of the Partnership on Air Quality is to improve air quality in European cities and to bring the concept of the 'Healthy City' to local, national and EU agendas as part of the *Urban Agenda for the EU*. In support of this, the Partnership have reviewed the interaction between different regulations and the implementation of air quality legislation including funding mechanisms and knowledge sharing.

European cities are growing, with over sixty percent of the EU population living in urban areas increasing to around eighty percent by 2050. Expansion at such a rapid pace will be accompanied by a range of challenges that include achieving and maintaining healthy air for all citizens to breathe. The Partnership recommends a considered and innovative approach to address these emerging challenges and to ensure a safe and healthy environment for all EU citizens.

Introduction

Clean air is essential to the health of people and the environment and exposure to air pollutants is regarded as an ongoing threat to public health[1]. Poor air quality is linked to an estimated 400,000 premature deaths in the EU each year[2] and addressing this issue involves acknowledging the unique impact of different pollutants and emission sources as well as accounting for atmospheric chemistry and transboundary effects. Air quality is therefore a complex issue that depends on accurate monitoring, relevant legislation and effective controls and enforcement.

Concerns have been raised over air quality in the EU for some time and the first major legislative instrument aimed at improving air quality was introduced in 1996[3]. Since then, significant reductions in pollutant emissions and concentrations have been observed[4], but there is still some way to go until all EU citizens live in areas where the WHO guideline values are met.

Of those pollutants routinely monitored, particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), nitrogen dioxide (NO_2) and ozone (O_3) have been identified as particularly harmful to human health across the EU. The importance of polyaromatic hydrocarbons (PAH) is increasing as is the role of specific components of particulate matter such as black carbon, either directly or as indirect indicators of other harmful pollutants. Both ambient and short-term peak exposure to these pollutants can adversely impact health with susceptible populations such as children, the elderly and those with pre-existing respiratory or heart conditions at increased risk of experiencing harmful effects.

Given the complexity and evolving nature of the issues affecting air quality, the European Union has introduced a series of legislative controls intended to reduce emissions and improve air quality. These currently include the Ambient Air Quality Directive (AAQD)[5], the National Emission Ceilings Directive[6] and a series of source-specific regulatory instruments such as the Industrial Emissions Directive[7], the Medium Combustion Plant Directive[8] and EURO standards for road transport[9].

The AAQD defines[c] the primary mechanism for determining whether air quality is harmful to health or the environment by introducing a series of concentration limit values specific to each criteria pollutant. The premise being that if the concentration of an air pollutant is less than the limit value then the air quality is good. However, for certain pollutants, principally PM_{10} and $PM_{2.5}$, but also ozone and sulphur dioxide (SO_2) the current EU limit values are greater than the guideline values suggested by the World Health Organisation as having no or minimal risk to human health.[10]

The European Commission, in their Clean Air Policy Package for Europe have expressed a desire to achieve concentrations below the WHO guideline values across the EU.[11] This is supported by a number of studies including the Aphekom project which have performed quantitative analyses of the gains in life expectancy in European cities if they were to comply with the WHO guideline concentrations.[12]

In summary the Partnership would like to highlight the following issues:

- Poor air quality has a serious impact on the health of EU citizens with susceptible groups at special risk. Currently, the air quality regulations direct member states and cities towards a focus on meeting air quality limit values. The Partnership would like to see this approach complemented by a focus on health improvement.

- As poor air quality in our cities and member states is caused by local, national and transboundary emissions, improvement requires action at all levels. There is a need for co-operation at all levels of authority, including an exchange of knowledge and experience.

- The current EU legislation is lacking in certain areas, including regulation of increasingly dominant emission sources, such as automotive brake and tyre wear and limits on pollutants, such as black carbon. A consideration of emissions under realistic use scenarios would also be beneficial to be take effective measures from a cost perspective and a health perspective.

- The impact on air quality and health should be evaluated at the early stages of any activity that may have a negative impact on these criteria. Measures to reduce the negative impact on air quality are often more effective and less burdensome when introduced early in the process.

[c] Also defined in the 4th Daughter Directive 2004/107/EC relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air

Current Implementation Issues and Solutions

Member states are responsible for the implementation of air quality directives however the partnership notes that there is often ineffective communication between levels of governance which can impact on the uptake and success of air quality controls and action plans.

In many member states the responsibility for drafting and implementing Air Quality Action Plans (AQPs) is delegated to local authorities (regions or cities depending on national legislation). However, the measures defined in the AQP often include measures whose enforcement and implementation would be governed by urban, regional or national authorities.

A good example of this coordination is the National Air Cooperation Programme (NSL) in the Netherlands in which the national government, provinces and city regions cooperate, share investment and contribute with measures and projects.[d]

The Partnership strongly promotes coordination between each level of governance, from city to national level, by means of specific legislative instruments.

There is a lack of specific targeted EU funding for the drafting and implementation of air quality action plans or for air quality improvement in general.

The Partnership has observed that success in implementing air quality improvements is significantly influenced by the business plans of individual projects by competent authorities, primarily their organizational capacities and the availability of necessary financial resources.

There are various EU and national funds available to prepare and implement national, regional and local air pollution policies. However, the Partnership found that there is an overall lack of specific programmes dedicated to funding projects aimed at air pollution reduction, and the drafting and implementation of Air Quality Plans in particular. This is made more difficult as the funding for air quality improvement projects often compete with other societal challenges.

To obtain EU funding a knowledge of the correct procedures and eligibility criteria are necessary, and stakeholders consider the process of acquiring funding for clean air projects from EU funds difficult. In the operational programmes for the large funding mechanisms (e.g. ERDF and Cohesion Funds), air quality tends to be considered as an integrated measure with other priority areas (e.g. energy, waste, nature) rather than being targeted solely through priorities for air quality improvement and the attainment of air quality compliance.

Investment in local leadership, knowledge, capacity and resources should be increased to improve realisation of clean air quality goals.

Ensuring that there is sufficient expertise and resources available at the local level can be beneficial in the drafting of air quality plans and in improving the choice, implementation and evaluation of measures to improve air quality. One of the most straightforward ways of achieving this is ensuring that staff are made aware of the available resources. For example,

[d] https://www.rivm.nl/Onderwerpen/M/Monitoring_NSL

the Catalogue of Air Quality Measures provided by the European Commission's Joint Research Centre (JRC).[e]

At the European level, urban governance could be assisted by following the example of collaborations like the Covenant of Mayors for Climate and Energy[f] who have created an online knowledge sharing resource which details codes of best practice and new initiatives.

The Partnership suggests the creation of a registry of "best practices in urban air quality planning", the aim of this is to encourage the dissemination of knowledge of air quality measures to allow analysis of suitability and relative effectiveness. It is hoped that stakeholders and industry could also invest in utilising these resources and contribute with their own feedback. The Partnership also advises peer learning for environmental policy such as the TAIEX-EIR PEER 2 PEER programme.[g] This provides tailored support to authorities implementing environmental policy and legislation by expert missions, workshops and study visits.

Ineffective implementation of air quality related EU directives by member states coupled with a lack of public support hinders the perceived acceptability and adoption of air quality plans.

When an air quality action plan is drafted, the AAQD stipulates that air quality plans *shall set out appropriate measures, so that the exceedance period can be kept as short as possible*. There is also the threat of infringement proceedings against member states that do not achieve compliance with the EU air quality limit values. However, the effective choice and implementation of improvement measures also relies on an acceptance by the public that the measures are necessary, and in the case of "social" measures the public need to actively participate.

Raising public awareness of the health impacts of poor air quality is important to gain acceptance of measures to improve air quality. This is especially true for those measures which may be perceived as "inconvenient" or "unnecessary" for example, urban vehicle access restrictions, building restrictions or biomass burning restrictions. The scope of air quality plans also needs to be publicly acceptable, and for both practical and political reasons a focus on pollution hotspots is often seen as the most effective approach, while considerable health gain for larger populations can be expected to be reached through wider measures .

Methods to raise public awareness include:

- Citizen science, for example engaging the public to monitor air quality using low-cost sensors. A practical example of this is the CurieuzeNeuzen citizen science project in which 2,000 citizens of Antwerp measured NO_2 using passive diffusion tubes outside their homes.[h] The JRC have released a document "Measuring air pollution with low-cost sensors" which can help to evaluate this approach.[i]

[e] http://fairmode.jrc.ec.europa.eu/measure-catalogue/
[f] https://www.covenantofmayors.eu/
[g] http://ec.europa.eu/environment/eir/p2p/index_en.htm
[h] http://www.curieuzeneuzen.eu/en/
[i] http://ec.europa.eu/environment/air/pdf/Brochure%20lower-cost%20sensors.pdf

- Projects like ClairCity, in which people are involved in deciding the options for reducing air pollution and CO_2 emissions in their local environment.[j] This project receives support and funding from Horizon 2020 and the LIFE programme.

- A general raising of public awareness of the impact of air pollution on health and the environment in the media and from official information sources.

The Partnership recommends that emphasis should be placed on involving the general public in the process of drafting air quality action plans as well as providing easily accessible and readily understandable information to support air quality action plans and promote active engagement.

An integrated approach combining different policy areas can be more cost-effective than separate measures.

A synergistic approach to urban air quality is often more efficient and effective than adopting separate policies to address specific goals, for example aligning climate change policies with air quality policies.[13] The Thematic Strategy on Air Pollution[14] in 2005 issued recommendations that synergies and conflicts between air quality and climate change management policies should be considered and this is especially important where policies to address greenhouse gas emissions may contribute to poor air quality or vice versa.

Given the multi-sector, multi-governance aspect of air quality improvement policies and climate change mitigation policies it is important that there is effective national and regional cooperation and that the relative merits and of each policy are considered. At the EU level, air quality projects are often considered as an integrated measure with energy or climate policies under the large operational finds such as the ERDF and Cohesion fund. An example of this is the Madrid "Plan A" which incorporates a multi-level framework aligning climate, mobility, public transport and air quality polices for coordinated action.

The Partnership recommends that where practical an integrated approach to different environmental policies is adopted to share (economic and health) benefits and minimise conflicts.

Gaps in Regulation and Solutions

Effective regulation is required to combat poor air quality in European urban environments. To evaluate the effectiveness of existing EU air quality regulations the Partnership has studied its implementation in three Partnership cities: Milan, Warsaw and London. The studies identified gaps in the existing EU legislation and bottlenecks in national implementation that directly or indirectly regulate air quality and sources of pollution. Principle findings of the Partnership study:

Some pollutants are not currently controlled at EU level

- There is little or no regulation of the components of particulate matter, in particular black carbon which is also an important short-lived climate pollutant.

[j] http://www.claircity.eu/

- There is little regulation of ultrafine particles or recognition of the increased health hazard these may constitute.
- NO_X emissions from vehicles are regulated but there are concerns about the effectiveness of Euro 6 technologies including the proportion of NO_2 directly emitted from the tailpipe.

Legislative gaps in addressing pollution sources

- Emissions from small space heating and power plants that fall beneath the scope of the Medium Combustion Plant Directive. These sources produce a considerable high proportion of secondary particulate matter that is not controlled by the legislation.
- Emissions from brake & tyre wear in road transport.
- Emissions from construction sites that fall outside the scope of the Non-Road Mobile Machinery regulations.
- Emissions of ammonia from less intensive farming operations that fall outside the scope of the National Emissions Ceilings Directive.
- Non-Sulphur shipping emissions and a lack of international standards governing shore-side electrical power.
- Emissions from mobile refrigeration units.

National level legislation and policies that negatively impact air quality

- Increased dieselisation of the vehicle fleet has increased NO_X emissions, much of the increase in diesel fleet numbers is a result of national fiscal incentives for uptake of diesel cars to reduce CO_2 emissions.
- Increased biomass combustion in cities which have been encouraged by carbon and renewable energy targets at EU and national level.
- Congestion on urban roads increases emissions and concentrations of air pollutants, this is often a result of outdated road infrastructure and increased vehicle numbers.
- Local infrastructure developments can increase emissions and exposure to poor air quality when planning decisions fail to adequately consider air pollution. This is often due to prioritising economic development.
- Secondary particulate matter driving pollution episodes in cities can be traced to a failure of national and international measures to control secondary precursors, in particular, ammonia.

In addition to the results of the studies above, the Partnership have identified the following gaps in legislation that impact on urban environments.

Road transport emissions in the urban environment.

Reliable data on transport emissions is necessary for the effective implementation of transport related air quality measures. The widely publicised scandal surrounding cheating on diesel passenger car emission tests highlighted the difference between legislated emissions of NO_X and actual emissions from these vehicles.[15]

There are several measures that can be implemented to reduce road transport emissions, the most obvious of which are low emission zones and urban vehicle access restrictions, however active methods of transport (walking/cycling) and the deployment of Intelligent Transport

Systems are also viable options in many circumstances. Additionally, retrofit technologies are available for some vehicles and captive fleets such as urban taxis and buses lend themselves to this type of measure.

As new evidence emerges, the Partnership advises the use of current research on real driving emissions to inform the application of road transport measures and to aid in the switch to low and zero emission vehicles.

Particulate Matter in the Urban Environment

Particulate matter is comprised of primary and secondary particulates. Primary particulates are produced directly at source and the principle sources of primary particulate matter in the urban environment are road transport, road abrasion, tyre and brake wear, and biomass/coal burning stoves.

Secondary particulate matter is created from precursor emissions such as sulphur dioxide (SO_2), nitrogen oxides (NO_X), volatile organic compounds (VOCs) and ammonia (NH_3) undergoing chemical and mechanical processes in the atmosphere. These emissions are often from non-urban sources such as agriculture, shipping (inland and coastal), industry, non-urban transport, waste management, power production and natural sources. The impact of secondary PM can be experienced some distance from the source of emissions making abatement policies more challenging, particularly when the source is in another country.

Urban authorities are limited in the level of control they can exercise over both primary and secondary particulate emissions as in many cases they have little to no power over the source emitters. In these instances, and particularly in the cases of industrial emissions and domestic heating, national or even EU measures are fundamental to achieving reductions.

Real use conditions should be reflected in the relevant EU legislation. E.g. the ECODESIGN standards do not reflect emissions in realistic use scenarios which may be up to a factor 3 higher than according to the standards in the regulation[k]

Other sources of emissions include small diesel refrigeration units and urban activities such as the demolition and construction of buildings, roads and other infrastructure. Emissions from refrigeration units on lorries are only partly regulated[l]. Recent innovations which include the zero-emission transport refrigeration unit (TRU) developed by Dearman Hubbard in partnership with Unilever and its Sustainable Living Plan are potentially an effective solution[m]. Electric powering of tru's while waiting in urban areas. Gaining advice from other local authorities such as those provided by the Mayor of London with codes of practice already in place[n] could help combat emissions from construction and demolition.

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[k] Reichert G, Schmidl C, Haslinger W, Schwabl M, Moser W, Aigenbauer S, Wöhler M, Hochenauer C. Investigation of User Behaviour and Assessment of Typical Operation Mode for Different Types of Firewood Room Heating Appliances in Austria. Renewable Energy. August 2016;93: 245-254.

[l] See: Non-Road Mobile Machinery RL (97/68/EC)

[m] https://www.airqualitynews.com/2018/05/04/ms-leases-low-emission-refrigeration-trailer/

[n] https://www.london.gov.uk/what-we-do/planning/implementing-london-plan/supplementary-planning-guidance/control-dust-and

Codes of good conduct could be included in contracts with contractors to reduce stationary use during idle hours.

Residential Combustion and Domestic Heating in the Urban Environment

Residential wood and coal burning in stoves and boilers produces significant quantities of health and climate damaging pollutants including benzo(a)pyrene and black carbon. This is a problem of importance, particularly in those countries where dependency on these fuels is high e.g. some Eastern European countries. The EU Ecodesign directive and energy labelling legislation are intended to make many of these smaller stoves cleaner, however they are yet to come into force.

For larger installations, between 1 and 50 MW, the Medium Combustion Plant Directive sets emission limit values but in the urban environment the legislated limits may still be too high, particularly given the exemptions for district heating installations. For existing installations the limit values will only apply by 2030 (1-5 MW) and 2025 (5-50 MW).

The options available to city authorities that wish to control these emission sources are currently somewhat limited, however social measures may prove effective. For example, encouraging citizens to store and season firewood adequately prior to burning, or engaging with the operators of larger installations to voluntarily reduce emissions. Promotion of energy savings and alternative means of heating are further options, including the promotion of heat pumps and waste heat harvesting from industry.

Non-Exhaust Road Transport Emissions

As overall particulate emissions from road transport declines, the fraction emitted by vehicles from tyre, brake, clutch and road wear becomes increasingly significant. There is currently no regulation on targeting these emissions and methods of regulation at national or EU level are necessary if non-exhaust emissions are to be reduced.

The Partnership suggests research involving air quality experts specialized on tyre and brake wear technology and tyre manufacturers to formulate better regulation and knowledge on the matter.

Emissions from Shipping

Emissions from inland waterway transport (IWT), shipping and ports contribute to a decrease of the air quality of coastal and inland waterway areas. The EU regulatory framework setting emission limits for IWT has been less stringent than arrangements for road transport and in common with other sectors IWT emission standards are applicable only to new engines entering the market. IWT operators currently have little or no economic incentive to invest in after-treatment or end-of-pipe devices to reduce NO_X or PM emissions, unlike CO2 reduction strategies which can usually generate co-benefits obtained by lower fuel consumption.

Monitoring and restricting emissions could be beneficial to air quality and the Directive on Non-Road Mobile Machinery[16] emissions will regulate new vessels. In 2013 the European

Commission adopted the NAIADES II package[o] with the ambition of improving the quality of inland waterway transport.

The partnership encourages the commission to evaluate if the limits are adequate to protect citizens health and propose revised solutions accordingly.

Agricultural Emissions

Ammonia emissions from agricultural processes can be significant a contributor to urban PM concentrations. For example, the French National Centre for Scientific Research determined that 62% of the fine particles in a severe air pollution episode in Paris during the spring of 2014 were ammonia induced.[17]

The National Emissions Ceiling Directive includes targets for the reduction of agricultural emissions and recognises that some 80% of agricultural emissions originate from roughly 5% of the largest animal rearing installations. The legislation suggests that the largest 3% of animal holdings are targeted with emissions reduction targets however member states are free to decide how they split this burden. Therefore, measures to reduce ammonia emissions from smaller farms are reliant on national legislation and subsequently, more bilateral cooperation and exchange among EU member states could increase efficiency of reductions.

The partnership believes that there should be more effort dedicated to implementation and raising awareness in this field.

Urban Power Generation

Combined heating and power plants (CHP) and supplementary diesel generators are often used during periods of high energy demand and can emit high levels of NO_X to the atmosphere. Those generators rated between 1MW and 50MW fall within the scope of the Medium Combustion Plant Directive (MCPD), however many of these installations are exempt from the regulations due to the limited period over which they are intended to operate, less than 500 or in some cases 1000 hours per year. Therefore, the MCPD's provisions are unlikely to curb the anticipated increase in high NO_X generators and the consequent increase in emissions.

The Partnership does not believe that either the MCPD or the NECD are sufficient to reduce the use of these installations and would like to see specific monitoring or regulation covering these types of engine.

[1] COM(2013)918 Clean Air Programme for Europe
[2] EEA Report No 13/2017 - Air quality in Europe - 2017 report (ISSN 1977-8449)
[3] Directive 96/62/EC on ambient air quality assessment and management
[4] EEA AirBase - The European air quality database / EEA Air Quality e-Reporting
[5] Directive 2008/50/EC on ambient air quality and cleaner air for Europe
[6] Directive 2016/2284/EU on the reduction of national emissions of certain atmospheric pollutants
[7] Directive 2010/75/EU on industrial emissions (integrated pollution prevention and control)
[8] Directive 2015/2193/EU on the limitation of emissions of certain pollutants into the air from medium combustion plants
[9] Directive 459/2012/EC as regards emissions from light passenger and commercial vehicles (Euro 6)

[o] https://ec.europa.eu/transport/modes/inland/promotion/naiades2_en

[10] WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide - Global update 2005 - Summary of risk assessment. WHO 2005.
[11] COM(2013) 918. A Clean Air Programme for Europe. European Commission.
[12] Improving Knowledge and Communication for Decision Making on Air Pollution and Health in Europe. Summary report of the Aphekom project 2008-2011. Aphekom, 2011.
[13] Air Quality and Climate Change: A UK Perspective. Air Quality Expert Group, 2007.
[14] COM(2005) 446 Thematic Strategy on Air Pollution
[15] Report on the inquiry into emission measurements in the automotive sector (2016/2215(INI)) Committee of Inquiry into Emission Measurements in the Automotive Sector
[16] Directive 2016/1628/EU on requirements relating to gaseous and particulate pollutant emission limits and type-approval for internal combustion engines for non-road mobile machinery
[17] Agriculture and air quality - Clean Air Forum, 16 & 17 November 2017, Paris, France. https://www.euconf.eu/clean-air/topics-agriculture-and-air-quality.html

The Partnership

The Urban Agenda for the EU – consolidated with the Pact of Amsterdam, agreed on 30 May 2016 by the EU Ministers responsible for Urban Matters[2] - has introduced a new working method of thematic Partnerships being elaborated by partners representing various governance authorities aiming to tackle social challenges by focussing on cities. It aims to promote cooperation between Member States, Cities, the European Commission and other stakeholders, in order to stimulate growth, liveability and innovation in the cities of Europe. The Partnership on Air Quality is one of the 12 priority themes of the "Urban Agenda for the EU".
The main objective of the Partnership on Air Quality is to improve air quality in cities and bring the 'healthy city' higher on the local, national and EU agendas as part of the Urban Agenda. The Partnership focuses on Better regulation (and implementation), better financing and better knowledge (sharing).

The Partnership has an action plan in place. This position paper is one of the results of action 1.

The Partnership for Air Quality

- EU Member States:
  - The Netherlands (coordinator)
  - Croatia
  - Czech Republic
  - Poland
- Cities:
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- Stakeholders:
  - EUROCITIES
  - HEAL17
- The European Commission
  - DG Regional and Urban policy (coordinator)
  - DG Environment
  - DG Research and Innovation
  - DG Agriculture
  - DG Growth
  - The Joint Research Centre (JRC)
- The URBACT programme (observer)