

URBAN AGENDA

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FOR THE EU

AIR QUALITY

CODE OF GOOD PRACTICES FOR CITIES AIR QUALITY PLANS

Part II

**How to Draft and Implement
a City Air Quality Plan**



Comune di
Milano



Committed by

Partnership on Air Quality - Urban Agenda for the EU

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Partnership on Air Quality - Urban Agenda for the EU

City of Milan/AMAT

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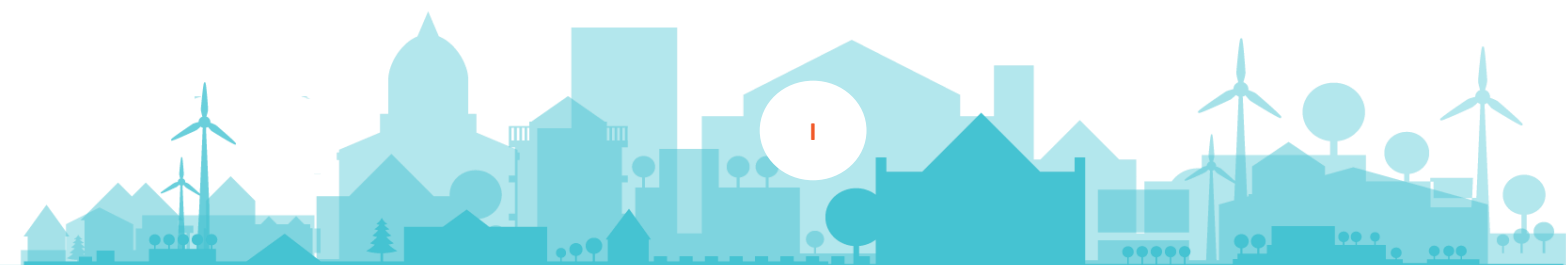
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Partnership on Air Quality

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 - 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 to bring the ‘healthy city’ higher on the local, national and EU agendas as part of the Urban Agenda. This will be done through improving the development and/or implementation of regulation, funding mechanisms and knowledge at all levels, as well as the coordination between them.

The Partnership’s actions and recommendations also aim to contribute to the goals of the New Urban Agenda and to the targets set in the Sustainable Development Goals.

The Partnership on Air Quality is composed by:

EU Member States:

- The Netherlands (*Coordinator*)
- Croatia
- Czech Republic
- Poland

Cities:

- Helsinki/HSY¹ (FI)
- London (UK)
- Utrecht (NL)
- Milan (IT)
- Constanta (RO)
- Duisburg (DE) - representing the Consortium Clean Air Ruhr Area

Stakeholders:

- EUROCITIES
- HEAL²

European Commission:

- DG Regional and Urban policy (*Coordinator*), DG Environment, DG Research & Innovation, DG Agriculture, DG Growth, the Joint Research Centre.

URBACT follows the work of the Partnership as an observer.

¹ Helsinki Region Environmental Services Authority.

² Health and Environment Alliance.





“As a society, we should not accept the cost of air pollution.

With bold decisions and smart investments in cleaner transport, energy and agriculture, we can both tackle pollution and improve our quality of life.

It is encouraging to see that many European governments and specifically cities are showing leadership in protecting people's health by improving air quality.

Clean air belongs to everyone, including people living in cities.”

Hans Bruyninckx
Executive Director of European Environment Agency





Preface

Air pollution is one of the main environmental concerns in Europe, especially in urban areas where three quarters of Europeans live. Poor air quality in cities is associated with significant health effects which lead to huge societal and economic costs. Finding solutions to improve air quality is one of the greatest challenges for Europe.

This Code of Good Practice provides guidelines for cities for drafting and implementing of Air Quality Plans, prescriptive instruments introduced by the Ambient Air Quality Directive 2008/50/EC in order to achieve EU standards. The Code includes a presentation of other tools developed by the Partnership on Air Quality to realize the 'Healthy city'. The Code is one of the results of the actions undertaken by the Partnership on Air Quality under the umbrella of the European Urban Agenda.

Cities are places where exposure to air pollution exposure higher. They also remain the immediate level of intervention for dealing with threats to human health coming from pollutants such as nitrogen dioxide (NO₂), particulate matter (PM₁₀ and PM_{2.5}) and ground-level Ozone (O₃).

EU legislation introduced Air Quality Plans as compulsory for zones or agglomerations within which concentrations of pollutants in ambient air exceed Limit or Target values for protection of human health. The purpose of Air Quality Plans is to set effective measures for attaining Limit or Target Values while keeping the period of exceedance 'as short as possible'. The implementation of an Air Quality Plan can also bring other additional benefits for the quality of life in urban areas, contributing to attain the Sustainable Development Goals of the United Nations for the 2030 Agenda.

This Code is not intended to be a fully exhaustive handbook for drafting an Air Quality Plan. Nevertheless, the Partnership believes that it can be very helpful for cities that are designing and implementing air quality plans, and that it can even inspire cities that want to manage air quality issues and at the same time generate multiple benefits for their inhabitants, for the ecosystem and for the economy. This Code has also been designed to support local decision-making, by improving understanding in Air Quality plans, by showing tested ways to comply with applicable EU legislation, and by helping cities bringing down concentrations of air pollutants and thus improve public health.

The measures defined by an Air Quality Plan to reduce air pollution should address different sectors, whose enforcement and implementation are of respective competence of urban, regional, national or EU authorities, thus co-operation between different levels of governance and integration of planning undertaken at different level or in different sectors is a key factor for improving air quality in cities.

René Korenromp

Coordinator of the Partnership on Air Quality
The Netherlands, Ministry of Infrastructure and the Environment

Executive summary

The **Air Quality Plan is a strategic planning instrument** introduced by the Ambient Air Quality Directive 2008/50/EC (AAQD). The drafting on an **Air Quality Plan (AQP) is compulsory for any 'zone' or 'agglomeration' within which the concentrations of pollutants in ambient air 'exceed any Limit value or Target value'** designed for the protection of human health. The AAQD legislation requires that an Air Quality Plan **sets out appropriate, cost-effective measures to achieve compliance with air quality Limit or Target values** while keeping the period of exceedance *'as short as possible'*.

The adoption of an Air Quality Plan has some direct environmental and societal benefits such as the **improvement of the health of residents and city users** - with reduction of the associated economic impact - and positive feedback for climate change effects mitigation. The implementation of an Air Quality Plan can have also other **additional benefits for quality of life in cities**, contributing to reach many of the United Nations Sustainable Development Goals for the 2030 Agenda.

It is not easy to find guidelines on how to draft and implement AQP at local level that could be used by cities of different EU Member States, due to different approaches adopted at national level for implementing Dir. 2008/50/EC. Existing guidelines are not recent or mainly focus on tools for the elaboration of a plan, rather than on the legal and management processes that have to be followed for its preparation, adoption and implementation. This is the reason for drafting this Code, which is specifically designed to help cities and local authorities in charge of planning Air Quality plans comply with EU legislation and better protect the health of citizens and the environment.

The **mandatory pieces of information that must be included in an AQP** are listed in Section A of Annex XV of the AAQD (see *Section 4.1 - Mandatory Elements* and *Appendix I* of the Code). These include an analysis of the situation based on monitored AQ data and related maps of non-attainment areas, on the use of modelling tools for the assessment of pollution sources (emission inventory, source apportionment, pollutant dispersion models, etc.) and on the relative effectiveness of possible measures in achieving compliance with AQ Limit or Target values. Details of abatement measures and any associated projects adopted with a view to reducing pollution should each be listed and described in an AQP with an accompanying timetable for implementation, as well as the authority responsible for it and the related follow-up (or monitoring of the plan).

By means of Cities AQPs local administration could add to the overarching (regional and national) Air Quality planning instruments important local specific measures, that



cannot be managed at higher level of governance, counting on its peculiar tasks and powers. In the meantime, a number of measures defined as ‘necessary to reach the targets’ during the elaboration of a city AQP cannot be solved solely at an urban level and should address different sectors whose enforcement and implementation could be of competence of overarching authorities, such as Metropolitan area or Agglomeration, Regions, Member States or EU institutions. Thus, **co-operation between different level of governance and integration of planning regarding different sectors is a key factor** for a real improvement of cities air quality (see *Section 4.3 - Integration with other Plans and Programmes*).

Starting from April 2019 local authorities should consider the National Air Pollution Control Plan (NAPCP) compulsorily published by Member States as part of the Dir. 2016/2284/EU, the so-called National Emission Ceiling Directive (NECD). Since each Member State should draw up, adopt and implement a NAPCP with a view to complying with its emission reduction commitments, and to contributing effectively to the achievement of the air quality objectives, it is expected that adopted **NAPCP should contribute to the successful implementation of Air Quality Plans** established under Article 23 of Directive 2008/50/EC.

In accordance with the AAQD (art. 26) and the *Directive 2003/35/EC* (Public Participation Directive - PPD) **the process of drafting an AQP must be open to public participation at all stages of development** (see *Section 6.2 - Participatory approach*). To prepare this public dialogue, to improve acceptability of the proposed measures and to increase efficacy on their implementation, a good practice for cities administration, starting since the first steps of the AQP process, would be to **raise citizens awareness on AQ issues** through transparent and more accessible information on AQ monitored data, health effects related to poor air quality and disseminate good practices in transport, energy and other related sectors to reduce citizens responsibility in emission production (see *Section 6.1 - Citizens Awareness*).

The AAQD and Decision 2011/850/EU (so-called ‘IPR Directive’) state that once an AQP has been initiated, the relevant level of governance is required to compile, *with the help of the IPR Guidelines*, the mandatory elements with a specific procedure that automatically process data by an electronic tool, part of the *EU’s e-Reporting system* (see *Section 4.5 - E-reporting format and Requirements*).

The follow-up of the AQP is performed by regular updating of the indicators set during the elaboration on the plan that would show the degree of the measures’ implementation and their real impact on air quality levels.

The European Commission (EC) monitors the implementation of EU legislation in Member States to ensure that laws achieve their intended objectives and that all



countries of the EU respect the rules that have been agreed. In this context the EC through the e-reporting system controls the correct drafting and implementation of Air quality Plans in EU. Once an AQP is produced it must be communicated to the Commission within two years from the end of the calendar year in which the first exceedance was observed. If an AQP is not delivered to the legislated requirements under the relevant Directives, then **infringement procedures may be opened against a Member State.**

The Partnership observed that dynamics of measures implementation of an Air Quality Plan are to a high degree influenced by the business plans of each individual competent authority, primarily their organizational capacities and the availability of necessary financial resources. Several EU and national funds are available to prepare and implement national, regional and local air quality policies. However, an overall lack of specific programmes dedicated to funding of projects aimed at air pollution reduction has been observed and access to procedures to acquire funding for clean air projects from EU funds is considered difficult by many local authorities. Thus, the Partnership found necessary to explore ways to assess funding needs for the sustainable design/implementation of Cities Air Quality Plans, to design an appropriate **business model to fund air quality measures** and a **Guidance for cities looking for funding AQPs** that have been developed in co-operation with the European Investment Bank (See *Section 6.3 Funding opportunities*).

This Code is not intended to be a fully exhaustive guidance for the preparation and implementation of a AQP, but would be of help in the practical work and could be a source of inspiration for cities that want to manage air quality issues. This is done, starting from legislation and state of the art and presenting a list of **good practices in drafting Air Quality Plan in full compliance with Directive 2008/50/EC provisions** (*Appendix IV*) and **examples of Air Quality measures** recently planned or successfully adopted on in EU cities (*Appendix V*).

A short **list of recommendations** from the Partnership on Air Quality closes the document.



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Abbreviations and Acronyms

APHEKOM	Improving Knowledge and Communication for Decision Making on Air Pollution and Health in Europe project
AQP	Air Quality Plan
AQPs	Air Quality Plans
B(a)P	Benzo(a)pyrene
BC	Black Carbon
CHD	Coronary Heart Disease
CLRTAP	UNECE Convention on Long Range Transboundary Air Pollution
CO₂	Carbon Dioxide
COPD	Chronic Obstructive Pulmonary Disease
CRF	Concentration-Response Function
CVD	Cardiovascular disease
DALY	Disability-Adjusted Life Year; metric for indicating burden of disease based on the combination of years of life lost YLL and years lost due to disability YLD
DPF	Diesel Particulate Filter
DPSIR	Driving forces, Pressure, State, Impact, Response: causal framework for describing the interactions between society and environment, adopted by the EEA
EC	Elemental Carbon
EEA	European Environmental Agency
EEV	Enhanced Environmentally-friendly Vehicles
EU	European Union
FAIRMODE	Forum for AIR quality MODElling in Europe
GDP	Gross Domestic Product
HIA	Health Impact Assessment
COPERT	COmputer Programme to calculate Emissions from Road Transport
HBEFA	HandBook Emission Factors for road transport
HRAPIE	Health Risks of Air Pollution In Europe project
LEZ	Low Emission Zone
LTZ	Limited Traffic Zone
NAPCP	National Air Pollution Control Programme
NNRM	Non-Road Mobile Machinery
NO₂	Nitrogen Dioxide
O₃	Ozone
PAQ	Partnership for Air Quality
PM	Particulate Matter
PM₁₀	Particulate Matter with an aerodynamic diameter smaller than 10 µm

PM_{2.5}	Particulate Matter with an aerodynamic diameter smaller than 2.5 µm
REVIHAAP	Review of Evidence on Health Aspects of Air Pollution project
RR	Relative Risk; describes the likelihood of adverse health effects occurring in high exposed populations compared to low exposed populations
SEA	Sustainable Energy Action Plan
SHERPA	Screening for High Emission Reduction Potential on Air project
SUMP	Sustainable Urban Mobility Plan
UNECE	United Nation Economic Commission for Europe
WHO	World Health Organization
YLD	Years Lost due to Disability, a component of DALYs
YLL	Years of Life Lost, a component of DALYs
µg/m³	Microgram(s) per cubic meter



1 INTRODUCTION

The work of the Partnership on Air Quality has allowed identifying issues of concern for many cities relating to the development and implementation of their Air Quality Plans (AQPs). Notably, it has been found that:

- ✓ access to knowledge and experiences on processes of preparing AQP (e.g. pitfalls, stakeholder interactions, governance, evaluation, etc.) from front-runner cities having already designed and implemented AQPs is often crucial to avoid inefficiencies, and that such knowledge should be improved.
- ✓ Knowledge of best practices in the selection, design, funding, and implementation of air quality measures is essential to facilitate the choice of the relatively most effective measures for the AQP, and that such knowledge should be improved.

An analysis of existing guidelines for drafting and implementing AQPs performed by the Partnership (see *Annex II* and *Annex III*) showed that there is a need for an EU-wide valid document, updated with most recent directives to guide municipalities in the process of adopting an AQP.

The Partnership identified the following actions to tackle the problem described above:

- ✓ development of a Code of Good Practice for Cities Air Quality Plans aiming to present good examples of some cities interpretation of the content listed under Annex XV, Section A of Directive 2008/50/EC.
- ✓ Assemble and keep updated the JRC register of best practices in urban air quality planning, in order to encourage the dissemination of knowledge on relevant air quality measures and facilitate comparative analysis on their relative effectiveness.

The Code of Good Practice for Cities Air Quality Plans, is one of the main products of the Action 2 - Better Air Quality Planning (Governance) included in the Action Plan of the Partnership on Air Quality, together with the updating of the Catalogue of Air Quality Measures managed by the JRC³.

This Code of Good Practice was developed with the co-operation of the Members of the Partnership Air Quality, joining forces, competences and experiences. It is the result of a work that lasted more than a year, started with the collection of Air Quality Plans, dedicated questionnaires, and followed by technical meetings and public stakeholder engagement events.

³ <http://fairmode.jrc.ec.europa.eu/measure-catalogue>.

2 INSTRUCTION FOR USE

The Code of Good Practice for Cities Air Quality Plans is organized in the way described in the followings.

Motivations to draft and implementing a City's AQP are listed in Section 3 - **Why to develop a City Air Quality Plan**, starting from compliance to EU legislation up to the contribution in reaching some United Nations Sustainable Development Goals for the 2030 Agenda.

Section 4 presents the **Content of the City Air quality Plan** starting from mandatory elements listed in Section A of Annex XV of the Ambient Air Quality Directive and considering all factors that could influence the organization of the content.

The Section 5 - **How to develop a City Air Quality Plan** contains schemes and suggestions to organize the process of drafting and implementing a City Air Quality Plan, together with a list of successful factors for the related governance.

In Section 6 - **How to manage and implement a City Air Quality Plan** are reported the key elements that need to be considered to obtain a smart process, required both by legislation and by pragmatism, based on hands-on experience.

Section 7 - **Methodology and tools for elaborating an City Air Quality Plan** contains state-of-the-art methodologies to perform the assessments needed for developing the strategy of the Air quality Plan together with practical examples selected by collected and analysed EU Cities Air quality Plans.

Each topic starts with references to the **legislation**, with citation of the related articles of directives and the description of required elements and tasks.

The Code presents '**state-of-the-art' methodologies and practices** developed in existing AQPs that present different levels of commitment (human resources, budget, computing capability, etc.).

In special boxes are presented some **examples of good practices** adopted by cities or Member States **for each topic** dealt in Sections.

In the Appendixes, apart from lists of existent guidelines for AQ planning and related tools and measures (*Appendix II and Appendix III*) some **examples of AQPs in full compliance with Directive 2008/50/EC** (*Appendix IV*), and **examples of Air Quality Measures successfully adopted** (*Appendix V*) are presented.

Close the Code of Good Practice for Cities Air Quality Plans **recommendations** from the Partnership on Air Quality about air quality planning: Good Policies, Good Governance and Good Practice (*Appendix VI*).

3 WHY TO DEVELOP A CITY AIR QUALITY PLAN

Air quality is one of the most important environmental issue in EU, being long-term exposure to PM_{2.5} responsible for about 428 000 premature deaths in 2014; NO₂ and O₃ are responsible respectively for 78 000 and 14 400 premature deaths in the same year (EEA, 2017a). Reduction of life expectancy, chronic diseases, hospital admissions, medical expenses and working days lost mean a huge societal impact and an economic cost assessed around 5% of GDP for EU (World Bank-IHME, 2016).

Impact on human health is higher in cities, where hundreds of thousands to several millions people live and are exposed in direct proximity to toxic pollutants emitted by vehicular traffic, residential heating systems and power facilities, shipping activities, construction sites, solvent use, etc.

Exposure of such kind of pollutant activities refers both to residential population and daily ‘city users’, enlarging the wideness of the problem in term of health-related burden of air pollution that is significant for both short-term and long-term exposure.

As Figure 1 shows, the percentage of the urban population in the EU-28 exposed to air pollutant concentrations above certain EU and WHO reference concentrations is still too high, and it is clear that a lot of work has to be done to reduce pollution in urban areas and reach the ‘Healthy City’.

Figure 1 - Percentage of the urban population in the EU-28 exposed to air pollutant concentrations above certain EU and WHO reference concentrations, in 2013-2015 period

EU urban population exposed to harmful levels of air pollutant concentrations in 2013–2015, according to:



Source: EEA, 2018; EEA, 2017a



3 -Why to develop a City Air Quality Plan

Cities constitute the immediate administrative level to implement specific actions to reduce polluting activities and improve local air quality. Mayors are the public authority responsible for health of citizens: these two elements bring to the conclusion that air quality governance at urban level can be a challenge that must be tackled to gain overall public health benefits.

On the other hand, not all the problems related to a city's air quality can be solved at local level. It is therefore important to manage policies with an integrated approach that brings cities to work together with the higher level of governance (National Government, Regions, Metropolitan Authorities) or to lobby at international level if needed (e.g. to fight transboundary pollution).

3.1 Compliance with EU Legislation

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 ('Ambient Air Quality Directive' - AAQD): Art. 2, art. 23, art. 24, art. 25, Annexes VII, XI, XII, XIV, XV

Commission Directive (EU) 2015/1480 of 28 August 2015 amending several annexes to Directives 2004/107/EC and 2008/50/EC of the European Parliament and of the Council laying down the rules concerning reference methods, data validation and location of sampling points for the assessment of ambient air quality

Commission Implementing Decision 2011/850/EU of 12 December 2011 laying down rules for Directives 2004/107/EC and 2008/50/EC of the European Parliament and of the Council as regards the reciprocal exchange of information and reporting on ambient air quality (notified under document C (2011) 9068) ('IPR Decision')

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 ('Fourth Daughter Directive')

Directive (EU) 2016/2284 of 14 December 2016 of the European Parliament and of the Council on the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC ('National Emissions Ceilings Directive' - NECD)

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 ('Public Participation Directive' - PPD)

The Air Quality Plan (AQP) is a strategic planning instrument introduced in the Ambient Air Quality Directive 2008/50/EC (AAQD). The drafting of an AQP is compulsory for any

3 -Why to develop a City Air Quality Plan

'zone' or 'agglomeration' within which the concentrations of pollutants in ambient air 'exceed any Limit value or Target value' designed for the protection of human health. These values are specified in Annexes VII, XI of the Ambient Air Quality Directive.

The AAQD legislation requires an AQP to set out appropriate, cost-effective measures to achieve compliance with air quality limit or target values while keeping the period of exceedance 'as short as possible'.

The mandatory elements that must be included in an AQP can be found in *Section 4.1 - Mandatory Elements*. These include a description of measures, assessment on the impact of measures, as well as the authority responsible for monitoring the measures. An AQP may additionally include measures aimed at protecting sensitive population groups, including children.

In situations where a zone or agglomeration is experiencing exceedances of more than one pollutant, the legislation suggests that a single 'Integrated' AQP is produced. An integrated plan can help properly account for co-benefits of emissions reduction measures as well as help reduce the burden of drafting and implementing different plans. AQPs may include short-term measures, designed to mitigate the effects of current or predicted exceedances of one or more Alert thresholds (specified in Annex XII and related to NO₂, SO₂ and O₃) or one or more Limit values or Target values (specified in Annexes VII, XI and XIV and related to O₃ and PM_{2.5}). In the case of a predicted or current exceedance of an Alert threshold, a Member State 'shall' draft a **Short-term Action Plan**, indicating the effective measures to be taken to reduce the risk or duration of such an exceedance⁴. In the case of a current or predicted exceedance of a Limit or Target value a Member State 'may' draft a Short-term Action Plan. The measures in a Short-term Action Plan should aim to address high pollution episodes that last days or weeks and can include the control or suspension of activities contributing to the exceedance. These measures can include suspension of specific industrial processes or motor-vehicle traffic.

Each Member State is responsible for achieving and maintaining air quality target and limit values, and consequently for drafting and implementing AQPs as necessary. A Member State may devolve some or all these responsibilities to regional or local authorities, while all public bodies, including local and regional authorities, are required to work to achieve EU air quality target or limit values and cooperate with overarching authorities in implementing identified mitigation measures.

The AAQD refers to AQPs as covering zones and agglomerations:

- ✓ 'Zones and agglomerations' are defined by each Member State for the purposes of air quality assessment and management;
- ✓ an 'agglomeration' corresponds to a special type of zone that exceeds 250,000 inhabitants, or with a given population density per km² which for the Member States 'justifies the need for ambient air quality to be assessed and managed'⁵.

⁴ However, Dir. 2008/50/EC in Art. 24 specifies that, where there is a risk that the Alert Threshold for Ozone specified in Section B of Annex XII will be exceeded, Member States shall only draw up such Short-Term Action Plans when in their opinion there is a significant potential, taking into account national geographical, meteorological and economic conditions, to reduce the risk, duration or severity of such an exceedance.

⁵ Directive 2008/50/EC: Article 2 (17).

3 -Why to develop a City Air Quality Plan

Given these criteria, larger cities are often represented as a single zone or agglomeration responsible for managing air quality, including the drafting of AQPs. In cases where transboundary sources are a significant contributor to exceedances, the Member States concerned shall cooperate in enacting measures to eliminate the exceedances. This can include joint activities including the drafting of a joint or coordinated AQP.

In the preparation of AQPs, local authorities should consider the National Air Pollution Control Plan (NAPCP) compulsorily published by Member States as part of the National Emission Ceiling Directive (NECD) from April 2019. The NAPCP may contain information that should be considered when drafting AQPs or contain actions that require local implementation. On the other hand NAPCPs would include information related to AQPs, such as their effectiveness in local compliance for Limit and Target values. More details on NAPCPs for the NEC Directive and vertical policy integration can be found in *Section 4.3 - Integration with other Air Quality Plans and Programmes*.

In accordance with the AAQD (art. 26) and the Directive 2003/35/EC (Public Participation Directive - PPD) the process of drafting an AQP must be open to public participation at all stages of development, as described in *Section 6.2 - Participatory approach*.

Once an AQP is produced, it must be communicated to the Commission within two years from the end of the calendar year in which the first exceedance was observed. If an AQP is not delivered to the legislated requirements under the relevant Directives, then infringement proceedings may be brought against a Member State. Follow-up and reporting requirements are covered in more detail in *Section 6.4 - Monitoring, reporting and Reviewing* and in *Section 4.5 - E-Reporting format and requirement*. AQPs are classed as public documents and should be made publicly available, free of charge, by means of any easily accessible media, including the internet.

Box 1 - Standard format of an infringement proceeding text for Article 23 of Directive 2008/50/EC

Infringement Proceedings - Member State

Infringements of Article 23 of Directive 2008/50/EC have been taken up by the Court of Justice of the European Union (CJEU).

- ✓ On xx/xx/xxxx the CJEU found the *Member State* government⁶ to be in breach of having systematically and continuously exceeded PM₁₀ limit values throughout its territory and for having failed to prepare air quality plans, which would keep the duration of the breach as short as possible (Case X-XXX/XX)⁷
- ✓ XXXXX failed to fulfil its obligations under Article 23(1) to keep the duration of the breach “as short as possible” from xx/xx/xxxx until xxxx, by adopting appropriate measures in an air quality plan. Failure to comply with this judgment and, therefore, to improve the existing, inadequate, air quality plans would expose *Member State* to the payment of fines.

⁶ <https://eur-lex.europa.eu/>

⁷ <http://curia.europa.eu/juris/recherche.jsf?language=en>

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3.2 Health Protection and other purposes

The main purpose of an AQP is the legal compliance with the achievement and/or the maintenance of EU Air Quality Limit Values or Target values settled by the Directive 2008/50/EC (Annex XI and XIV).

As in the current practice AQPs can also be developed to pursue the following purposes that if declared could increase the public acceptance of the AQP:

- ✓ **Improvement of the health of residents and city users** due to reduction of air pollution exposure with benefit both for short-term and long-term related effects (increase of life expectancy, reduction for cancer risk, less cardiovascular and respiratory illness such as asthma, less neurological disorders and metabolic disorders such as diabetes, etc.) with special focus on sensitive people (children, young, elders, chronic patients, woman in pregnancy, etc.);
- ✓ **Reduction of the economic impact associated with burden of diseases and healthcare cost** related to health effects of air pollution exposure (chronic and short-term diseases, hospital admissions, loss of work days, ...);
- ✓ **Improvement of the quality of life** related to improvement of health condition and to liveability of the city (e.g. less congestion in streets can bring more 'liveable' areas for pedestrian with higher safety levels and less noise, ...);
- ✓ **Reduce social inequalities in term of health and quality of life** linked to local air pollution;
- ✓ **Integrate Air Quality into the decision-making process for other municipal sectorial plans and strategies** keeping air quality high on the agenda.

3.3 Related additional benefits

In addition to the objects listed in the previous Sections the adoption of a City Air Quality Plan can bring additional **health, social, environmental and economic benefits** that can be summarized as in the followings:

1. Improve **health** of citizens in an indirect way, through measure adopted (e.g. health benefits due to promotion of active commuting⁸ and reduction of traffic fluxes through discouraging private transport)
2. Most part of intervention to improve air quality could have positive feedback for **climate change** effects mitigation. In fact, in general the reduction of combustion activities, needed to reduce air pollutants, brings contemporarily the decrease of CO₂ emission, first product of fossil fuel combustion. Attention

⁸ Cycling and walking.

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must be taken for the opposite: climate change mitigation actions not always bring positive effects on air quality⁹

3. Reduction of vehicle traffic on streets could let to reduction on **noise** and related health issues;
4. Saving money when damage and soiling of buildings and **cultural heritage** is decreased;
5. Less damage and loss of **vegetation** patrimony of the city, due to demonstrated effects of critical level of O₃, NO_x and SO₂;
6. Saving money and economic profits for **agricultural production preservation**, for less damage to crops (see previous point);
7. Less pollution in **water** due to less leaching into aquifers and basins;
8. More **biodiversity** in the urban environment;
9. Improve the **public image /common perception** of the city;
10. Increase the **economic attractiveness and the competition capability** of the city, bringing more international investors, companies, employers and tourists.
11. **Increase the competition capability** of the city in application process for EU funding opportunity.

The adoption of an Air Quality Plan through the implementation of its measures contribute to reach many of the 17 Sustainable Development Goals settled by United Nations for the 2030 Agenda¹⁰ (Figure 2 and Figure 3)

Figure 2 - United Nations Sustainable Development Goals for the 2030 Agenda




Source: <https://www.un.org/sustainabledevelopment/sustainable-development-goals/>

⁹ See also Section 5.5.3 - Climate Change Impact.

¹⁰ United Nations, 2015 - 'Transforming our world: the 2030 Agenda for Sustainable Development', Resolution 70/1 adopted by the General Assembly on 25 September 2015, 21 October 2015

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Figure 3 - Air Pollution in relation to the UN Sustainable Development Goals

	Reducing air pollution can help families become healthier, save on medical expenses, and improve productivity.		Power generation, industry and transportation are large contributors to air pollution. A new focus on decreasing energy consumption and on improving sustainable and public transportation could progressively reduce pollution.
	Air pollution can cause crop damage and affect food quality and security.		Urban areas significantly contribute to air pollution. Making cities sustainable could progressively improve the air quality.
	Air pollution poses a major threat to human health. It is linked to respiratory infection and cardiovascular disease. It causes increases in population morbidity and mortality.		Chemicals released into the air increase air pollution and contribute to harmful effects on human health. Responsible production and consumption could help to reduce these harmful chemicals.
	Pollutants such as sulfur dioxide (SO ₂) and nitrogen oxides (NO _x) from open fires and the combustion of fossil fuels mix with precipitation causing harmful acid rain that can compromise water quality.		Combustion of fossil fuels plays a key role in the process of climate change, which places food, air and water supplies at risk, and poses a major threat to human health.
	Electricity from renewable energy rather than fossil fuels offers significant public health benefits through a reduction in air pollution.		Deposition of air pollutants on water may negatively affect its quality and life under water. It can lead to eutrophication and acidification of fresh water bodies, and accumulation of toxic metals and Persistent Organic Pollutants (POPs) in fresh and marine waters.
	Air pollution impacts on health, crop and forest yields, ecosystems, the climate and the built environment, with consequences for productivity and economic growth. Ambient and indoor air pollution also has negative effects on the working environment and its safety.		Emissions from combustion of fossil fuels mixed with precipitation cause acid rains that pose a major threat to forests and ecosystems.

Source: In EEA, 2017, adapted from UNICEF 2016

4 WHAT CONTENT FOR A CITY AIR QUALITY PLAN

4.1 Mandatory Elements

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 ('Ambient Air Quality Directive' - AAQD): Art. 23; Section A of Annex XV

Commission Directive (EU) 2015/1480 of 28 August 2015 amending several annexes to Directives 2004/107/EC and 2008/50/EC of the European Parliament and of the Council laying down the rules concerning reference methods, data validation and location of sampling points for the assessment of ambient air quality

Directive (EU) 2016/2284 of 14 December 2016 of the European Parliament and of the Council on the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC ('National Emissions Ceilings Directive' - NECD)

Commission Decision of 19 March 2004 concerning guidance for implementation of Directive 2002/3/EC of the European Parliament and of the Council relating to ozone in ambient air (notified under document number C(2004) 764)

According to the Ambient Air Quality Directive - AAQD (Dir. 2008/50/EC) an Air Quality Plan (AQP) is a planning instrument settling 'appropriate' measures in order to attain the Limit values or Target values set out in the Directive.

AQPs have to comply with certain obligations, as far as a list of specific content: AQPs shall incorporate at least the information listed in Section A of Annex XV of the AAQD (see *Appendix III* of this Code).

A detailed guide covering the mandatory elements for AQPs is presented in the Commission's Decision 2011/850/EU (IPR Guidelines)¹¹.

The information to be included in the AQPs, in compliance to the cited Directives are described in the following:

- ✓ The **localisation of excess pollution** should be described within a region or city with a map and geographical coordinates of the measuring station(s) reporting the exceedance(s). Measuring stations should have a unique unambiguous code that has been generated by the Member State and used for the reporting.

¹¹ http://ec.europa.eu/environment/air/quality/legislation/pdf/IPR_guidance1.pdf and http://ec.europa.eu/environment/air/quality/legislation/pdf/IPR_guidance2.pdf

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- ✓ **General information** about the environment in which the exceedance has occurred is required, such as whether the zone is in a city, rural or industrial area including an estimation of the polluted area (km²), or km of road, and of the population exposed to the pollution. This helps to assess the scale of any possible effects on public health, especially in densely populated urban environments and among the most susceptible and vulnerable groups. The classification of an urban area describes the location with respect to distribution and density of building and should distinguish it from suburban and rural areas. Urban areas are continuously built-up, meaning complete (or at least highly predominant) building-up of the street front side by buildings with at least two floors or large detached buildings with at least two floors¹² (IPR Guidelines). It is also necessary to provide useful climatic data and relevant data on topography with sufficient information on the type of targets requiring protection in the zone.
- ✓ **Responsible authorities**, the names and addresses of persons responsible for the development and implementation of air quality improvement plans are required. Competent authorities in an urban environment might conduct the AQP(s) themselves or contract third party organisations to fulfil some or all of the requirements in the AQP.
- ✓ The **nature and assessment of the pollution** should include concentrations observed over previous years and concentrations measured since the beginning of any associated air quality improvement measures (see *Section 7.1.1 - Air Quality Assessment*)
- ✓ The **origin of the pollution** should be identified with a list of the main emission sources responsible and a corresponding map of the area, contributions lower than 3% are not considered significant¹³. The total quantity of emissions from these sources (tonnes/year) should be presented together with information on pollution imported from other regions. Main emission sources have to be categorized in coherence with the classification required by the e-reporting system (see *Section 6.4* and *Section 4.5*)
- ✓ **Analysis of the situation** should detail the factors responsible for the exceedance (e.g. transport, including cross-border sources and formation of secondary pollutants in the atmosphere). Accurately determining emission source apportionment is important when an exceedance situation can be considered as an amalgamation of individual exceedances, which if comprised of similar source apportionment could be managed together as a macro exceedance. Source apportionment must therefore be relevant to each individual exceedance situation and be applicable to the monitoring station or modelled location with the maximum exceedance situation. It must reflect regional, urban and local contributions within the Member State and include transboundary contributions. Urban and local contributions must be further

¹² With the exception of city parks, large railway stations, urban motorways and motorway junctions, the built-up area is not mixed with non-urbanised areas

¹³ http://ec.europa.eu/environment/air/quality/legislation/pdf/IPR_guidance1.pdf

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divided to identify any significant sources such as transport (road traffic and shipping), industry (including heat and power production), agriculture, commercial and residential sources. It is essential to establish how the exceedance at any single location of maximum exceedance can be accounted for by contributions from the regional background, urban background increment and local increment. This categorisation helps in the selection of possible measures for the improvement of air quality including implementation, responsibility and involvement of stakeholders. Ultimately, a description of possible measures is required.

- ✓ **Previous plans and programmes** that give details of measures or projects for air quality improvement, including those which existed prior to Directive 2008/50/EC, should be reported and at which level of governance any measures were implemented; local, regional, national or international. Previously reported results can help quantify and qualify the impact of measures and inform decisions in future AQPs (see *Section 7.3.1*).
- ✓ **Details of abatement measures and any associated projects adopted with a view to reducing pollution** should each be listed and described in an AQP with an accompanying timetable for implementation. An estimate of the improvement from the baseline scenario ensuing of the AQP is required with an expected timeframe required to attain these objectives. To evaluate any improvement the baseline scenario should be established using measured and/or modelled data. This will include concentrations at the locations of exceedance and will typically require model calculations in which the future development of the regional background level, the total background level and the local source contributions are considered (see *Section 7.4*).
- ✓ **Any measures or projects planned or being researched for the long term** need to be included in detail.
- ✓ To assist in easier assimilation of material related to an AQP, **a list of all publications, documents, and associated work should be provided.**

AQPs may include also measures pursuant to Article 24, that relate to Short-Term Action Plans (see *Section 7.3.2 - Proposed measures for the improvement of Air Quality and Appendix III*).

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4.2 Suggested structure

In Figure 4 is reported the suggested structure of the Table of Content of a City Air Quality Plan.

Figure 4 - The suggested Table of Content of an Air Quality Plan

Table of Contents of an Air Quality Plan	
<u>1. Background Analysis</u>	
1.1. Air Quality Assessment	
1.2. Population Exposure and Health Effects	
1.3. Emission Inventory	
1.4. Other Pressure elements	
1.5. Source apportionment	
<u>2. Air Quality Plan objectives</u>	
2.1. Exceedances Areas	
2.2. Target Pollutants	
2.3. Indicators	
2.4. Period of reference	
<u>3. Proposed measures to improve air quality</u>	
3.1. Measures to improve air quality in relation to existing Plans and Measures	
3.2. Possible measures for the improvement of air quality	
<u>4. Assessing effectiveness of possible measures</u>	
4.1. Air Quality impacts	
4.2. Health impacts	
4.3. Climate Change Impact	
<u>5. Selection and prioritizing measures</u>	
5.1. Cost-Effective Analysis, Cost-Benefit Analysis or Multi-Objective Analysis	
<u>6. List and Comments of the Selected Measure</u>	
6.1. Tables or schemes with measures list and related info	

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4.3 Integration with other Plans and Programmes

Directive 2016/2284/EU of 14 December 2016 of the European Parliament and of the Council on the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC ('National Emissions Ceilings Directive - NECD')

Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment ('Strategic Environmental Assessment - SEA Directive')

Directive 2011/92/EU of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment ('Environmental Impact Assessment - EIA Directive')

Directive 2014/52/EU of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment ('EIA Directive - Amended')

Air Quality Plans are the instruments through which Cities plan to adopt actions for reaching Air Quality objectives on their territory in co-operation with other authorities and economic sectors.

By means of Cities AQPs local administrations could add to the overarching (regional and national) Air Quality planning instruments important local specific measures, that cannot be managed at a higher level of governance, counting on its peculiar tasks and powers. Some example of these measures are:

- ✓ traffic - e.g. with Low Emission Zones;
- ✓ residential heating plants - punctual controls, local regulation;
- ✓ protection of sensitive population groups - e.g. reduce exposure to traffic emissions for schools and hospitals;
- ✓ land use and urban planning - e.g. reduce traffic proximity exposure for new buildings with local urban planning instruments; increasing green areas.

In the meantime, a number of measures defined as '*necessary to reach the targets*' during the elaboration of the city AQP cannot be solved solely at an urban level and should address different sectors whose enforcement and implementation could be of competence of overarching authorities, such as Metropolitan area or Agglomeration, Regions, Members States or EU (see also *Appendix VI – Recommendations for Air Quality Planning on good policies, governance and practices*).

Anyway, all the measures included in the AQ Plan have to be in compliance with national Plans and Programmes and in agreement with neighbouring towns and zones or cross-bordering countries and in harmonization with their plans, in particular of those related to Air Quality.

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In particular, in drafting Cities Air Quality Plans it is important the dialogue with the national level in compliance with the new **National Emissions Ceilings (NEC) Directive** (2016/2284/EU) entered into force on 31 December 2016, replacing earlier legislation (Directive 2001/81/EC). This Directive is designed to further reduce air pollution and its associated risks to the environment and human health (Art. 1) and includes for each Member State future emission reduction commitments for nitrogen oxides (NO_x), sulphur dioxide (SO₂), ammonia (NH₃), non-methane volatile organic compounds (NMVOC), and fine particulate matter (PM_{2.5}) emissions. Compliance with these commitments is also expected to contribute to achieving the Union's long-term objective on air quality in line with the guidelines as set out under the World Health Organisation (WHO) guidelines.

Article 6 of the NEC Directive requires Member States to establish - by 1 April 2019 at the latest - an initial **National Air Pollution Control Programme (NAPCP)** which must be regularly updated, at least every four years. The content of the NAPCP is stipulated by the Article 6 and Annex III part 1 of the NEC Directive. In accordance with Article 6 (10) of the Directive, an Implementing Act laying down a common reporting format for NAPCP is going to be adopted.

The Art. 6. of the NEC Directive requires that Member States when drawing up, adopting and implementing the NAPCP shall:

“(a) assess to what extent national emission sources are likely to have an impact on air quality in their territories and neighboring Member States;

(b) take account of the need to reduce air pollutant emissions for the purpose of reaching compliance with air quality objectives in their territories and, where appropriate, in neighboring Member States”;

Above statements, among other things, mean that NAPCPs have to consider the assessed effectiveness of Air Quality Plans (Art. 23 of 2008/50/EC Directive) in being locally in compliance with EU limit values in 2020, 2025 and 2030 scenarios.

The approach of the NEC Directive shows that ‘local point of view’ should be considered as important along the preparation of NAPCP. As the ‘right balance of action implementation’ among different decision levels it would be important to involve also local level decision makers in the process of stakeholder consultation along the NAPCP preparation as this would guarantee a better implementation of the actions themselves later on.

Since each Member State should draw up, adopt and implement a NAPCP with a view to complying with its emission reduction commitments, and to contributing effectively to the achievement of the air quality objectives, **it is expected that adopted NAPCP should contribute to the successful implementation of Air Quality Plans established under Article 23 of Directive 2008/50/EC.**

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CITIES AIR QUALITY PLANS AND NATIONAL PROGRAMMES

Republic of Croatia



Zagreb, Source: <https://www.google.it/maps>

Generally, in the Republic of Croatia, if in any given zone or agglomeration a level of pollutants in the air exceed any limit or target value, in each of these cases an action plan (Air Quality Plan) for improving the air quality for that zone or agglomeration has to be adopted by **local self-governance authority (City)** in order to ensure, as soon as possible, achievement of limit or target values.

The responsibility for **Air Quality Plan draft development** is given only to a legal persons (expert institutes that has permit/licence to perform expert tasks of development of strategic and action plan documents). Such permitting system is regulated by Environment Protection Law and permit/licence is issued by Ministry of Environment following an administrative procedure. Therefore, each local authority has to implement a limited public procurement call aiming to ensure the Air Quality Plan draft document development/drafting.

For the purpose of coordination of reporting on the AQP, a **Working group** was established at the national level by the Croatian Agency on Environment and Nature, since the Agency is the responsible institution for the e-reporting (Implementing Decision 2011/850/EC) in Croatia. The members of the group are representatives of cities that have adopted the AQP and representatives of the Agency and Ministry of Environment and Energy.

Besides the Air Quality Plans, the representative body of the County and the City of Zagreb (as regional authorities) and the big city (according to the national regulations the big city is a local self-government unit that is at the same time the economic, financial, cultural, health, transport and scientific centre of the wider part of the county, with more than 35,000 inhabitants) shall adopt a **Programme of air protection, ozone layer, mitigation of climate change and adaptation to climate**

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change, which is an integral part of the environmental protection program for the county, i.e. the City of Zagreb and the big city. The program shall be published in the official gazette of the unit of local and regional self-government, depending on which of its representative body it has been issued. Program shall be adopted for a period of 5 years. A report on the program implementation has to be compiled each 4 years. The Programme (regional and of the big city) and the Air Quality Plans must be **publicly available** for obtaining opinions, suggestions and objections of the public, citizens and relevant stakeholders, NGOs and other interested groups. Through the media, the public is informed on the place where the documents are available and the manner and timing for providing opinions, suggestions and objections. The deadline for public to provide comments, suggestions and opinions may not be shorter than 30 days from the date of publication. The body responsible for the adoption of documents (County, big city or City) considers opinions, suggestions and objections submitted by the public and assesses and decides on their justification. For above mentioned documents the Strategic Environment Impact Assessment procedure is not obligatory, since these documents are related to the field of air quality (see also *Section 3.3*).

In 2015, the City of Zagreb developed and adopted its **Air Quality Plan** (see *Appendix IV* for details), defined in format and content in accordance with national legislation in which the provisions of 2008/50/EC Directive have been transposed. Besides own measures, the Action Plan of City of Zagreb also supports the continuation of implementation of measures from other city plans and programmes directed towards air protection, promotion of energy efficiency and use of renewable energy sources and energy in the territory of the City of Zagreb such as the *Programme of the City of Zagreb for the protection of air, ozone layer, climate change adaptation and mitigation* and the *Sustainable Energy Action Plan for the development of the City of Zagreb (SEAP)*. Measures from the mentioned documents were defined in line with the valid national programmes, out of which for the field of air protection the *Plan for the protection of air, ozone layer and climate change mitigation in the Republic of Croatia for the 2013 - 2017 period* (OG 139/13), should be mentioned.

In the following the list of the Air Quality Plans (in Cities) and Programmes (in Counties and Big Cities) in Republic of Croatia is presented. The full reports are available on the links:

<http://iszz.azo.hr/iskzl/godizvrpt.htm?pid=0&t=4>

<http://www.eko.zagreb.hr/default.aspx?id=247>

Air Quality Plans - CITIES

- Action plan for air quality improvement in the territory of the city of Zagreb
- Action plan for improvement of air quality for city of Slavonski Brod
- Action plan for NH₃ emission reduction in city of Kutina
- Action plan for reduction of ozone levels for the city of Rijeka
- Action plan for emissions reduction of PM₁₀ the city of Kutina
- Action plan for emission reduction of (PM₁₀) in city of Osijek
- Action plan for emission reducing of PM₁₀ in city of Sisak

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Programmes - COUNTIES AND BIG CITIES

- Program of air and ozone layer protection, climate change mitigation and adaptation to climate change in Zagreb
- Program of air and ozone layer protection, climate change mitigation and adaptation to climate change for Osijek - Baranja county
- Program of air and ozone layer protection, climate change mitigation and adaptation to climate change for Sibensko-Knin county
- Protection and improvement of air quality in the Zadar county
- Protection and air quality improvement program for the Osjek - Baranja county between 2010 - 2014
- Protection and air quality improvement program for Zagreb city between 2009-2012
- Protection and air quality improvement program for Kostrena municipality
- Protection and air quality improvement program for Primorsko-Goranska county for the period 2009-2012
- Protection and air quality improvement program for Varaždin county between 2010-2013
- Protection and air quality improvement program for Koprivničko-Križevačka county between 2008 - 2012
- Protection and air quality improvement program for split - Dalmatia county
- Air quality protection and improvement program for the city Sisak 2007
- Air quality protection and improvement program for Zagreb county:
<http://iszz.azo.hr/iskzl/datoteka?id=74073>

References:

- Air Quality Legislation in Republic of Croatia:
<http://www.mzoip.hr/en/environment/regulations-and-international-treaties-ratified-or-signed-by-the-republic-of-croatia.html>

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NATIONAL AIR QUALITY COOPERATION PROGRAMME (NSL)

The Netherlands



The Hague, Source: The Netherlands - Ministry of Infrastructure and the Environment

The National Air Quality Cooperation Programme (NSL) is a multilevel governance action plan to improve the air quality of the Netherlands. Participants are the national government, provinces, municipalities, and research institutes. All participants invest capacity and resources in the measures that improve air quality. The NSL includes large spatial projects that negatively impact the air quality - such as the construction of housing or roads - and counters these effects with measures that improve the air quality. The package of measures is created in such a way that the negative effects of spatial developments are amply compensated.

The goal of the NSL is to meet the European limit values for particulate matter (PM₁₀) and nitrogen dioxide (NO₂). Measures such as cleaner public transport and encouraging cycling as a means of transport, counterbalance the negative effects of construction projects, so that the European standards will still be met. In order to verify progress in the NSL programme participants conduct a yearly monitoring of the air quality and others indicators, together with info on the implementation of measures. This 'Monitoring Tool' of the NSL programme could bring to the implementation of additional measures if needed.

References:

- Air Quality Policy and Regulation in The Netherlands:
<https://rwsenvironment.eu/subjects/air/air-quality/>
- Monitoring tool of the NSL Programme:
<https://www.nsl-monitoring.nl>

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AQP WORKING GROUPS WITH ALL DIFFERENT LEVEL AUTHORITIES

Czech Republic



Prague, Source: <https://www.prague.eu/>

- **Cooperation between all levels of governance**

Air quality plan should involve all levels of air quality governance. The air quality plan is usually perceived as a regional/local strategy while there are numerous measures which need to be implemented in close co-operation with the state level. To reach air quality goals it is necessary to ensure co-operation especially with the state government that is empowered to mitigate air pollution, for example from road vehicles. According to the experience of the Czech Republic, it is useful to incorporate measures of the air quality plan that can be done only at the state level into a 'State Governmental Resolution' that is linked to the Air Quality Plan. This also facilitates financing the implementation of the AQPs.

- **Involving of all implementing bodies**

Proper monitoring and co-operation between stakeholders in the implementation phase should be also borne in mind when considering best practices. The Czech Republic has introduced 'special Working Groups' that are intended to discuss the Air Quality Plan agenda and to facilitate coordination between the state and municipalities. The working groups were established by the Czech Ministry of the Environment that is also responsible for its administration. Working groups are attended by members of the Czech ministries, regional municipalities and most polluted cities. Working groups seems to be effective especially in terms of identifying barriers that hinder air quality plan implementation and their solutions.

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▪ Cross border co-operation

The Czech Republic has also introduced a 'special Working Group' to tackle Czech-Polish cross border air pollution. This working group is attended by the Czech and Polish environmental Ministries and border Regions. The working group aims mainly at sharing newly introduced measures.

The focus is on inspiring each other, for example in creating subsidy programmes and introducing stricter environmental law that will surely contribute to decrease cross-border air pollution. Similar working groups have been established also with Germany and Slovakia.

The Czech Republic considers that involving EU bodies more actively into these discussions would be a great opportunity.

NATIONAL/CITY REGULATION FOR SOLID FUELS BURNING

Republic of Poland, City of Krakow



Krakow, Source: <https://www.google.it/maps>

In Poland there are serious air quality problems in cities and town, mainly in the southern part.

Inadequate air quality is mainly caused by the emissions from the municipal and housing sector (old boilers and poor quality of fuel). The non-compliance with the air quality standards for fine dust PM_{10} and excessive concentration of benzo(a)pyrene is caused mainly by this sector. Studies have shown that household stoves burning bad quality coal and wood are responsible for over 50% of national PM_{10} emissions and 88% of the reasons for exceeding the annual limit value of PM_{10} ; the rest being the result of vehicle emissions and other sources.

For improvement of air quality in cities are crucial new regulations on the national level, which tackle the problem of emissions from municipal and housing sector. First is the ordinance of the Minister of Finance and Development, dated 1.08.2017 regarding solid fuel boilers, which only allows new boilers that meet the requirements

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of 5th class according to EN 303-5:2012 standard from July 1, 2018. The second regulation applies the quality of fuels allowed to be used in households (amendment to the Act of August 25, 2006 on the fuel quality monitoring and control system was adopted by Polish Parliament but still ordinance of the Minister of Energy is missing).

Air quality has been an issue for a long time in the city of Krakow and has inspired grass-root initiatives such as the Krakow Smog Alert (Krakowski Alarm Smogowy). Currently, Polish Smog Alert associates almost thirty grass-root organizations in Polish cities and towns advocating for clean air.

In 2015 the president of Poland signed the amendment to the Environmental Protection Act (Ustawa Antysmogowa), which gave regional and local self-governments legal instruments to tackle this problem. Since then, several regions have adopted anti-smog laws: Małopolska, Śląskie, Dolny Śląsk, Mazowsze, Opolskie, Łódzkie, Wielkopolskie, Podkarpackie and Lubuskie. Other regions are expected to adopt them in later time.

The common efforts of the Krakow Smog Alert, regional authorities and the Krakow municipality have been instrumental in rising the general awareness of the inhabitants through many initiatives and programmes, which promote better thermo-modernisation of houses, better fuels and more effective stoves.

A unique contribution to stimulating clean air came from the LIFE Integrated Project 'Implementation of Air Quality Plan for Małopolska Region - Małopolska in a healthy atmosphere', LIFE-IP MALOPOLSKA, a project coordinated by the regional authorities of the Małopolska Region in co-operation with Silesian Region, the Krakow Smog Alert, National Energy Conservation Agency, 55 municipalities and international partners from Czech Republic, Slovakia and Belgium.

Implementation of the LIFE project allowed for establishing a network of 60 Eco-managers to support the implementation of air quality actions at the municipal level, trainings and workshops for local authorities and conducting information and education campaigns at the regional and local level.

Regional Assembly of the Małopolska Region has adopted in 2016 a law banning in Krakow coal and wood as heating fuels starting September 2019 (see *Appendix V*), a radical measure for Poland.

The acceptance for these new laws by the city inhabitants would not be possible without the long and active engagement of initiatives such as the 'Krakow Smog Alert'.

References:

- <https://powietrze.malopolska.pl/en/life-project/>

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4.4 Strategic Environmental Assessment

Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment ('Strategic Environmental Assessment - SEA Directive')

Directive 2011/92/EU of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment ('Environmental Impact Assessment - EIA Directive')

Directive 2014/52/EU of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment ('EIA Directive - Amended')

Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora ('Habitats Directive')

Plans and programmes must be prepared or adopted by an authority (at national, regional or local level) as controlled by legislative, regulatory or administrative provisions.

Air Quality Plans are considered by several Countries, in national transposing of the Directive 2001/42/EC of 27 June 2001, among the Plans and Programmes that require a Strategic Environmental Assessment (SEA) before approval. Anyway, legislative frameworks vary between Member States depending on their administrative structure and this affects the manner of transposing the SEA Directive. In Figure 5 the example of German legislation approach for SEA/EIA application for national Programmes, Plans and Projects is reported.

Figure 5 - SEA/EIA Field of application for Programmes, Plans and Projects in Germany (Federal German Act on EIA/SEA of 2011 - Annex 1 and 3)

Projects (Annex 1 EIA/SEA Act)	Plans (Annex 3 EIA/SEA Act)
<p>Public and private Projects</p> <ul style="list-style-type: none"> - Power plant - Industrial installations - Pipelines - Motorways - Waste incineration plants - Mining - Deforestation - Dams - <p>Basically: any project which may harm the environment</p>	<p>Public plans</p> <p>Spatial Planning (State, Region, Municipality)</p> <p>Sectoral Planning</p> <ul style="list-style-type: none"> - Nuclear waste storage plan - Traffic Infrastructure plan - Electric grid plan - Flood protection plan - Water management plan - Noise reduction plan - Clean Air plan ← - Waste management plan

Source: Reichter, 2015

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In general AQ plans at national and regional level require to perform a SEA process, meanwhile for cities Air Quality Plans SEA is not an obligation and is 'case by case' depending: the nature and the level of specification of measures included in the plans must be considered and the city administration would have to verify with its competent authorities if they fulfil with the criteria stated in Annex II of Dir. 2001/42/EC for which a SEA is needed (Screening).

SEA mechanism

With the objective to “contribute to the integration of environmental considerations into the preparation and adoption of plans and programmes with a view to promoting sustainable development” (Art. 1) the SEA Directive stipulates:

- ✓ the **Screening requirements** for determining whether a SEA is required (Annex II of Directive);
- ✓ the **Scoping** arrangements to identify the most significant effects of proposed plans and programmes that require a SEA;
- ✓ the preparation and submission of an **Environmental Report** that must be made available for **Public consultation** before the adoption of any plan or programme requiring a SEA.

There is no fixed delivery mechanism in the Directive, so individual Member States are at liberty to formulate their own SEA methodologies and procedures to achieve the objectives of the Directive.

Anyway for better implementation of the SEA Directive, European Commission - DG ENV prepared a Guidance available, in different languages, at the following link:

<http://ec.europa.eu/environment/eia/sea-support.htm>

and also some Member States published Practical guides for the local implementation (see References).

SEA as a policy-aiding tool

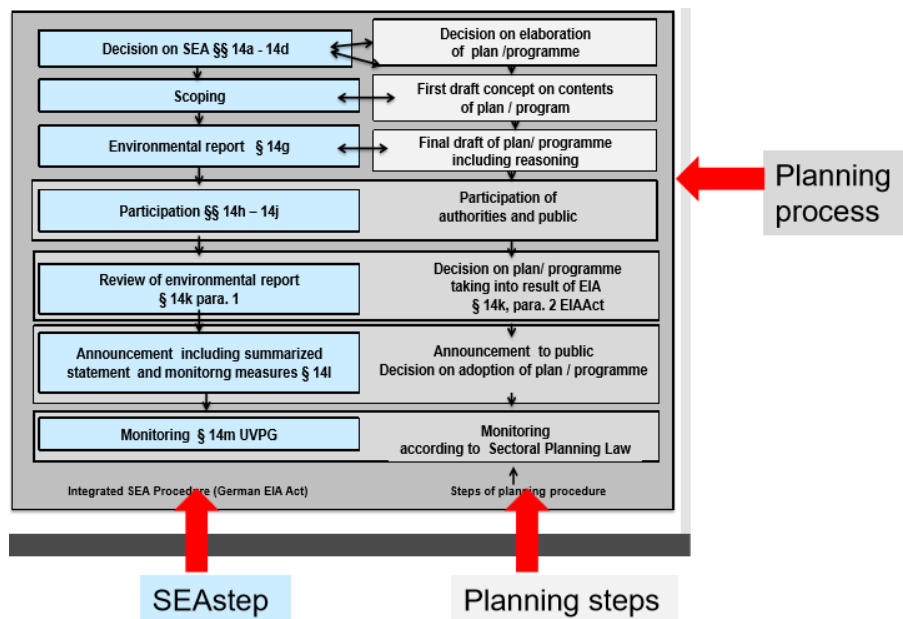
In Figure 6 the integration of SEA into planning or decision-making process is represented: it is clear that SEA can be considered as a policy-aiding assisting organisations, developers and authorities with the drafting and implementation of policy-making tools.

The SEA procedure is initiated when **Scoping** and **Environmental report** are prepared with any significant effects on the environment and alternatives of the proposed plan or programme identified.

The **public and the environmental authorities are informed and consulted on the Draft Plan** or programme and the **Environmental report are reviewed** on the basis of the received observations. Announcement of the Adoption of the Plan including summarized statement and forecasted monitoring measures close the process. The further step is Monitoring of the implementation of the Plan that must be done periodically.

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Figure 6 - Integration of SEA into planning or decision making process in Germany (Federal German Act on EIA/SEA of 2011)



Source: Reichter, 2015

Benefits of the SEA

The advantages to perform a SEA process could be considered as in follows:

- ✓ opportunity to take into account all the environmental effects of the plan and this brings easier to an 'integrated approach' between the AQ plan and, at least, the other environmental plans;
- ✓ having a prescribed process for Public Consultation that enhance the 'transparency' of the planning process and facilitate public participation in decision-making (this in general improve effectiveness of the AQ Plan - see also Section 4.2).

Who has to perform a SEA

A SEA is mandatory for plans and programmes which set the framework for future development consent for projects listed in the EU Environmental Impact Assessment - EIA Directive (85/337/EC) (Annexes I and II) and those determined to require an assessment pursuant of the EU Habitats Directive (92/43/EC) (Articles 6 and 7). The EU explicitly states that if any plans are closely associated they can be coordinated and/or have joint procedures.

A SEA is also mandatory for plans and programmes prepared for agriculture, forestry, fisheries, energy, industry, transport, waste/ water management, telecommunications, tourism, town & country planning or land use.

Member States in whose territory the plan or programme is being prepared that may affect other Member State(s) must consult the other Member State(s). On this issue the SEA Directive follows the general approach taken by the SEA Protocol to the UN ECE Convention on Environmental Impact Assessment in a Transboundary Context.

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Any plans or programmes which determine the use of small areas at local level or those which require minor modifications shall require an Environmental assessment only when the Member State determines that they are likely to have significant environmental effects. Screening is necessary for any type of plan, not already identified, to assess if any significant environmental effects are expected. The screening procedure is based on criteria set out in Annex II of the SEA Directive.

As told previously SEA is not always required for AQPs at city level, however this decision should be made by the competent authorities on a case by case basis.

Cities Examples

In London SEA implementation has been conferred to local council authorities but the screening process, for example in the Hackney Council, stated that the SEA procedure was not necessary why key policy objectives that could require a SEA had already been adopted by other strategies with completed SEAs (Box 2).

Box 2 - Example of screening process result for SEA on an Air Quality Plan¹⁴ in London - Hackney Council (UK)

Example of screening for SEA for AQ Plan

Hackney Council (UK)

Hackney Council produced an AQ Plan with three main policy actions:

Policy 1: Air Quality and development management such as ensuring that air quality is appropriately dealt with during the development control process.

Policy 2: Actions to improve air quality with the sole aim of reducing nitrogen dioxide levels and/or particulate matter levels within the borough such as promoting walking/cycling and Zero Emission Networks.

Policy 3: Actions to reduce the Council's own impacts on air quality such as Promotion of airTEXT¹⁵ and campaign days to the most vulnerable, residents, businesses and visitors in the borough.

Under the SEA Directive Hackney Council initiated a screening process of the AQ Plan to determine if a SEA was required. A determination could not be made until three statutory consultation bodies were consulted:

- ✓ The Environment Agency
- ✓ Natural England
- ✓ English Heritage

On the 19th June 2014 the council decided a SEA was not necessary. The authority then published a statement setting out its decision (within 28 days of the determination). This is needed even if the authority determines that a SEA is not required, and the statement must include the relevant reasons. Hackney Council informed the public and consultation bodies of its decision via air pollution and consultation webpages for an appropriate period. It cited the key policy objectives that could require a SEA had already been adopted by other strategies with completed SEAs (these had no significant environmental effects arising from the objectives). This was supported by the response from the three statutory consultation bodies.

¹⁴ In UK Air Quality Plans are called 'Air Quality Action Plans' and follows in general the LAQM (Local Air Quality Management) process

¹⁵ www.airtext.info/

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4.5 E-Reporting Format and Requirements

Decision 2011/850/EU Commission Implementing Decision of 12 December 2011 laying down rules for Directives 2004/107/EC and 2008/50/EC of the European Parliament and of the Council as regards the reciprocal exchange of information and reporting on ambient air quality (notified under document C(2011) 9068) ('IPR Decision'): Art. 13; Annex II, Art. 5

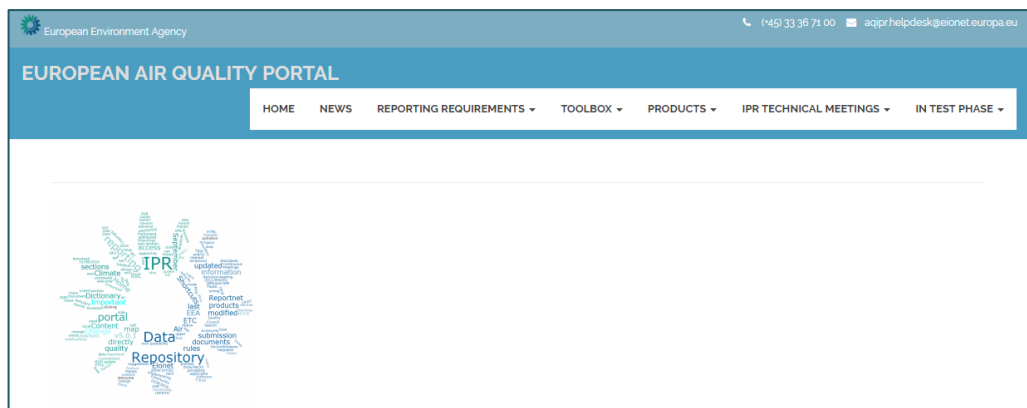
Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe ('Ambient Air Quality Directive' - AAQD)

Directive 2007/2/EC establishing an Infrastructure for Spatial Information in the European Community ('INSPIRE Directive')

Once an AQP has been initiated, the relevant level of governance is required to compile the mandatory elements detailed under Article 23 of the AAQD following Decision 2011/850/EU and with the help of the IPR Guidelines¹⁶. It is mandatory that information submitted for AQPs follow the procedure outlined in Article 5 of Decision 2011/850/EU: as data will be automatically processed by an electronic tool.

The European Air Quality Portal¹⁷ contains technical details and services that facilitate the reporting of official air quality information from EU Member States and other EEA member and co-operating countries. This information is submitted according to Directives 2004/107/EC and 2008/50/EC of the European Parliament and of the Council and the rules for this exchange are set out in the Commission implementing decision 2011/850/EU. The portal (Figure 7) is maintained by the European Environment Agency (EEA) as part of the EU's e-Reporting system.

Figure 7 - The European Air Quality Portal website



¹⁶ http://ec.europa.eu/environment/air/quality/legislation/pdf/IPR_guidance1.pdf and http://ec.europa.eu/environment/air/quality/legislation/pdf/IPR_guidance2.pdf

¹⁷ <http://eeadmz1-cws-wp-air.azurewebsites.net/>

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The e-Reporting system, called '*EIONET Plans and Programmes e-Reporting System*', is organized around 14 interconnected data flows which encompass the information necessary to meet the requirements of the Ambient Air Quality and IPR Directives (Box 3). A User Guide is available for this tool¹⁸. In generating data files for the e-Reporting system each country must follow standardized, INSPIRE compliant XML schemas. To support the generation of these XML reports, the JRC in Ispra have developed the e-Reporting System (PaPeRS)¹⁹ software, this software is hosted by the EEA.

Air Quality Plans in XML format should be uploaded to the EEA's EIONET Central Data Repository by authorised national representatives under data flows H, I, J and K of Annex II of Decision 2011/850/EU to include the mandatory elements of the AQP as listed pursuant to Article 23 of Directive 2008/50/EC in Section A of Annex XV.

AQP specific categories refer to sections H to K:

- (H) includes geographical, administrative and chronological data with appropriate references.
- defines the pollutant(s) exceeded with attributable source apportionment of the pollutant(s) in question.
- (J) defines the baseline and projected scenarios for emissions, concentrations and exceedances.
- (K) describes the available measures, responsible authorities, impacts, costs and monitoring information.

References need to be included so the public can have access to regularly updated information on the implementation of the AQPs.

Box 3 - European Air Quality Portal Dataflow

Structure of the E-Reporting system

ROD Number is the category page on EIONET site ([AQP data flows](#))

- B Information on zones and agglomerations (Art. 6) - ROD 670
- B Preliminary (Year + 1) information on zones and agglomerations (Art. 6) – ROD 693
- C Information on the assessment regime (Art. 7) - ROD 671
- C Preliminary (Year + 1) information on the assessment regime (Art. 7) – ROD 694
- D Information on the assessment methods (Art. 8 and 9) – fixed and indicative measurements - ROD 672
- D1b Information on the assessment methods (Art. 8 and 9) – models and objective estimation – ROD 742
- E1a Information on primary validated assessment data - measurements (Art.10) - ROD 673
- E1b Information on primary validated assessment data – modelled (Art. 10) – ROD 674
- E2a Information on primary up-to-date assessment data (UTD) – measurements (Article 10) – data to be provided via ftp – ROD 675
- G Information on the attainment of environmental objectives (Art. 12) - ROD 679
- H Information on air quality plans (Art. 13) - ROD 680
- I Information on source apportionment (Art. 13) - ROD 681
- J Information on the scenario for the attainment year (Art. 13) – ROD 682
- K Information on measures (Art. 13 and 14) - ROD 683

¹⁸ http://aqportal.eionet.europa.eu/doc/UserGuide2_AQD-HK_XML_v1.pdf

¹⁹ <http://eeadmz1-cws-wp-air.azurewebsites.net/toolbox-for-e-reporting/pp-tool/>

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The Commission with extensive support from the Member States and the European Environment Agency has prepared the IPR Guideline to facilitate the implementation of Decision 2011/850/EC and resultant AQPs. The IPR Guidelines Part I²⁰ provides descriptions of how to interpret and report the data required under Decision 2011/850/EC and IPR Guidelines Part II²¹ in a tabular format with implicit instructions on which data to submit and in which format e.g. specifying whether text or URL.

Geospatial information regarding location of exceedances and subsequent plans are to be detailed under an INSPIRE option (Directive 2007/2/EC).

Data submitted via the e-Reporting system is made publicly available through several online channels. This includes the Reporting Obligations Database (ROD), which is part of *Reportnet*, a group of web applications and processes developed by the EEA to support international environmental reporting.

There are currently 149 Air Quality Plans officially submitted to the EIONET Reporting Obligations Database (ROD), and this includes national, regional and local AQPs from 22 different Member States.

The EEA Air Data Explorer for Europe (AIDE)²² presents data submitted under data flows B to K, this covers all air quality related data including AQPs in an easily accessible format and are regularly updated with the latest information transmitted by Member States.²³

Box 4 - Directive 2007/2/EC establishing an Infrastructure for Spatial Information in the European Community (INSPIRE)²⁴

INSPIRE - Infrastructure for Spatial Information in the European Community

INSPIRE Directive aims to create a European Union spatial data infrastructure for the purposes of EU environmental policies and policies or activities which may have an impact on the environment.

- ✓ Based on the infrastructures for spatial information established and operated by the Member States of the European Union
- ✓ Enable the sharing of environmental spatial information among public sector organizations, facilitate public access to spatial information across Europe and assist in policy-making across boundaries.
- ✓ Addresses 34 spatial data themes needed for environmental applications with full implementation required by 2021.

²⁰ http://ec.europa.eu/environment/air/quality/legislation/pdf/IPR_guidance1.pdf

²¹ http://ec.europa.eu/environment/air/quality/legislation/pdf/IPR_guidance2.pdf

²² <http://eeadmz1-cws-wp-air.azurewebsites.net/products/links-to-eea-website/aide-tables/>

²³ aideh.apps.eea.europa.eu/

²⁴ <https://inspire.ec.europa.eu/about-inspire/563>

5 HOW TO DEVELOP A CITY AIR QUALITY PLAN

5.1 Process main steps

The development of an Air Quality Plan can be seen usefully divided in five main steps that can be shortly summarized as in follows (Figure 8).

1. Preparation
2. Elaboration
3. Adoption
4. Implementation
5. Monitoring, Reporting and Reviewing.

In the view of the achievement of the settled goals (i.e. attainment with EU limit values or target values) or maintenance of them it is important that the AQ plan process would be periodically monitored and the settled measures reviewed if necessary in a circular an iterative process of 'continue improvement' (*Section 6.4*). In this way the AQP could be and 'effective' and 'live' document for the City.

Follow-up and Reporting to EU is required by legislation with specific tools and towards citizens and stakeholders (see *Sections 6.4 and 4.5*).

In parallel to this process, fundamental elements are:

- a. Citizen awareness raising
- b. Public participation
- c. Funding.

In fact, in the preparatory process and for a successful implementation of the AQP it is of a great importance the citizens awareness raising by means of informative campaigns (see *Section 6.1*), since the beginning of the process, in the Preparation phase or as soon as fundamental information are available from the 'Assessment' phase of the Elaboration process.

Participation, that means stakeholder involvement and public consultation, is a fundamental element required also by legislation (see *Section 6.2*).

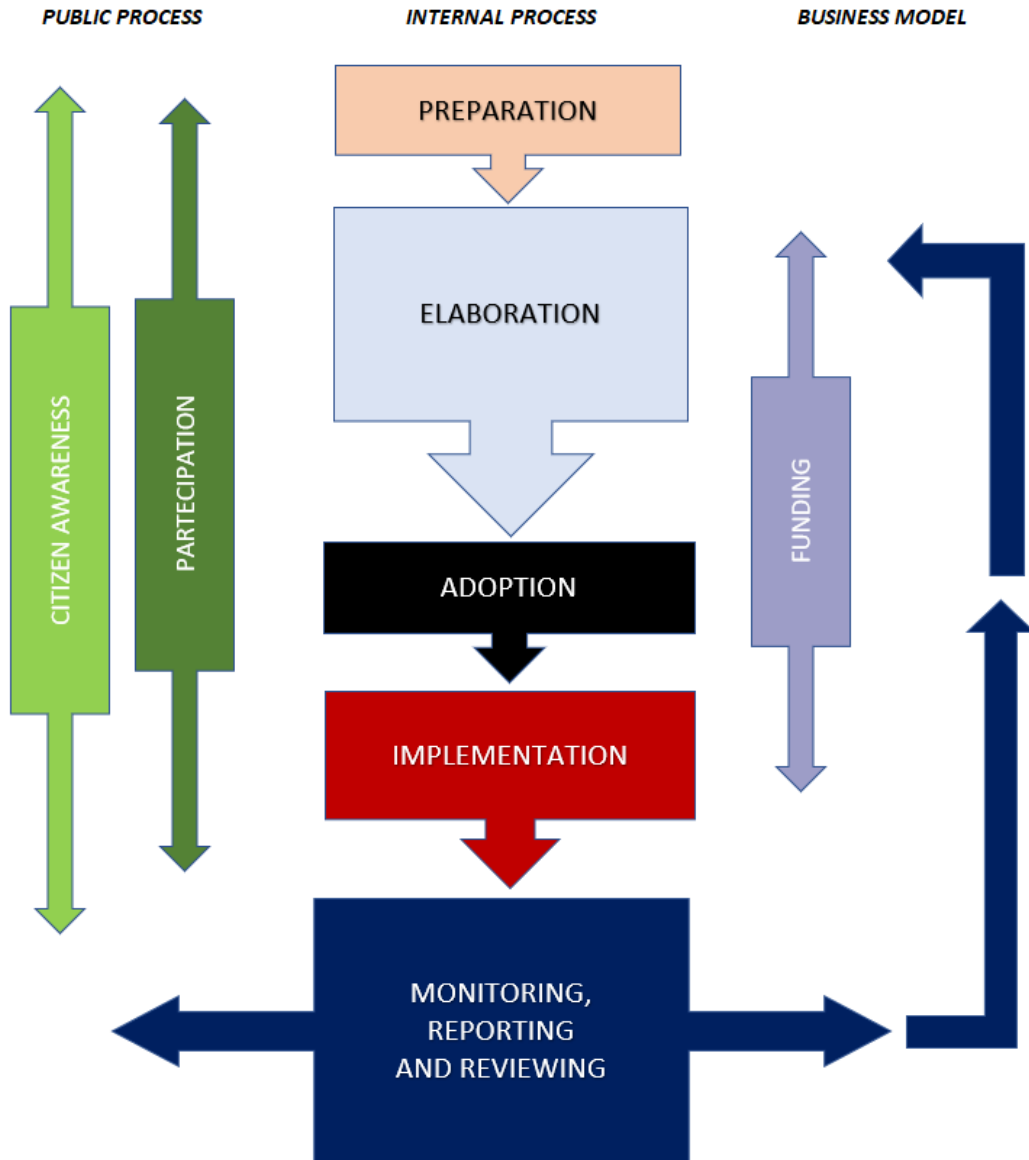
Looking for funding the measures to be included in the plan would be a process that could start as soon as the list of possible measures is defined, building a specific Business Plan. Being the AQ plan development a time-consuming process, that also need specialized competences, it is possible to look for funding the developing phase of the AQ Plan that may need additional human resources, at the beginning of the process. Also specific monitoring instruments and software tools to perform the assessment of

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air quality or measures effectiveness evaluation in the elaboration phase of the AQ Plan would request specific economic resources to be assured at the beginning of the process.

In *Section 6.3 - Funding opportunities* some guiding elements are given to obtain economic resources for the AQ Plan development and implementation together with some Good Practice examples, such as national funding for development of AQ Plans.

Figure 8 - Process main steps for development and maintenance of a City Air Quality Plan



Source: Moroni S.

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5.2 Process checklist

Referring to the main steps of the AQ Plan process, in the followings a list with short description of the single actions that have to be put in practice is reported and can be used as a suggested checklist. In Figure 9 a graphic scheme for the process flow is represented.

1. PREPARATION

The main steps for the internal 'start-up' are:

- a. Put Air Quality higher on the Municipal Agenda
Ensuring a corporate approach with policy support and involvement of all different sectors of the Municipal Administration.
- b. Identify stakeholders and key actors
Planning their involvement at the beginning or in future steps. An example of external key actors can be Highways Authorities, Airport management board, Environmental Agencies.
- c. Setting up an 'Air Quality Plan Steering Group'
It would be fundamental to define at an early stage a group of administrative people responsible, also from different municipality departments, and technical experts who will work together with regular exchange of information and following a defined time plan to achieve the necessary objectives.

This approach makes it easier to identify measures implemented in different sectors and related to air quality, to consider more practicable actions, and to obtain higher engagement, at the end of the process, to implement the selected measures.

- d. Review internal resources
The success of the AQP is strictly related to the organizational capability of the competent offices, as the coordination of the different sectors of the administration involved is essential. Management and technical skills have to be defined and improved with additional specific human resources, as appropriate.

Also preparation for an awareness-raising campaign and for the adoption of some Air Quality friendly initiatives and procurement (e.g. low emissions municipal fleet, energy saving for public buildings) can be considered as good practices in the framework of the 'start up' phase.

Box 5 - Key elements in the Preparation phase of the AQP

PREPARATION Key elements

In term of internal organization:

- ✓ **FIRM COMMITMENT**
- ✓ **Coordination and Cooperation**
- ✓ **Dialogue between different Municipal Departments**

and in term of external communication:

- ✓ **LEAD BY EXAMPLE** with AQ friendly public procurement and initiatives
- ✓ Start to create/raise **citizen awareness** on AQ issues.

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Figure 9 - Checklist of the Process flow

PROCESS MACRO STEPS	PROCESS DETAILED STEPS	PUBLIC PROCESS	INTERNAL PROCESS
PREPARATION	Internal start up		Internal start up Put Air Quality Higher on the Municipal Agenda Identify Stakeholders and Key actors Setting up an 'Air Quality Plan Steering Group' Review internal resources
	Elaboration (Assessment)		Define the problem extent (Assessment) AQ Monitoring, Dispersion Modelling <i>up to population exposure/relevant receptors</i> Emission Inventory, Source Apportionment <i>to define sources/city, other areas role</i> Assure Policies coordination and 'Integrated' planning approach
CITIZEN AWARENESS	<i>Lead By example</i>	Lead by example	Adoption of Air Quality friendly procurement and initiatives
	<i>Citizen Awareness</i>	Public start-up	Prepare a Citizens Awareness raising campaign on Air Quality
	Elaboration (Targets definition)		Define Targets of the Air Quality Plan Define the indicative Deadline and Timeplan
	<i>Citizen Awareness</i>	Public start-up	Start Citizens Awareness raising campaign on Air Quality
	Elaboration (Measures and impact)		Define effective Measures / Packages of Measures Draft List possible measures Impact assessment of measures (emix, air, health, external costs) Budgeting Practicability Perception Cost effectiveness analysis Non air quality impact assessment (if SEA)
	Elaboration (Prioritizing)		Prioritizing measures Define role city /other overarching Governance Authorities Define role of different Municipal department Define role/implication of different Stakeholders and Key actors Screening with competent authorities if a SEA process is required
	Funding		Define Business plan and look for funding
PARTICIPATION	Participation	Stakeholder involvement	Stakeholders dialogue Dialogue with other Municipal Department Dialogue with other different Stakeholders Dialogue with overarching Governance Authorities Verify Deadline and Timeplan
		Public participation	Public Consultation AQP Draft for Consultation Prepare a presentation of the AQP Achievement of observation, review and answers
ADOPTION	Elaboration (Refining)		Define Final Set of Measures Define Final Deadline and Timeplan Define Roles and Responsibility Define Monitoring methods and Indicators
	Elaboration (Delivery)		AQP Delivery
	Adoption		AQP Adoption by the Council
IMPLEMENTATION	Elaboration (E-reporting)		AQP e-reporting to EU
		Public information	AQP dissemination
	Implementation		Recognition for possible AQ Municipal Regulation Elaboration of the AQ Municipal Regulation Air Quality MUNICIPAL REGULATION approval Obtaining funding for implementation Involvement of Key Actors for implementation (citizens too) Put in the field the settled AQP measures
MONITORING, REPORTING AND REVIEWING	Monitoring		Periodic monitoring and reporting Process Indicators update Specific result Indicators update Impact Indicators update (annual report)
	Reporting		Reporting process to EC and Public Reports to citizens/stakeholders
	Reviewing		Definition of corrective actions, new measures

Source: Moroni S.

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2. ELABORATION

The elaboration of the AQ plan is influenced by the mandatory elements set in Directive 2008/50/EC (see also *Section 4.1*)

a. Frame the problem (Assessment)

To define the nature of the pollution an assessment of current air quality has to be done by means of air quality monitoring or dispersion modelling up to the assessment of the effect on population exposure, in particular on relevant receptors. Emissions inventory and 'source apportionment' are techniques used to define most relevant sources and different area contribution (city / external areas).

b. Define Targets of the Air Quality Plan

Assessing which are the objectives and purposes (achievement of compliance with in EU legislation, maintenance of AQ level, public health protection, etc.).

c. Define the indicative Deadline and Time plan

It must be coherent with legislation requirement for which AQP must set out 'appropriate measures' to attain air quality limit values while keeping the period of exceedance 'as short as possible' but consider also time of implementation of measures and their practicability.

In general a period of 12-24 months is forecasted, starting from decision to start/first actions (i.e. background analysis) to the Adoption of the AQP.

d. Define effective Measures / Packages of Draft Measures

This is a result that can be obtained through the following steps:

- Inventory of existing and overarching Plans and programmes related to air quality
- Define list of possible measures for the improvement of AQ, also with benchmarking and learning from others cities experience
- Carry out local impact assessment of selected measures by means of modelling scenarios (in term of emissions, concentrations, human health and related external costs, if possible)
- Define the cost of measure implementation (budgeting)
- Verify for technical, economic and political feasibility
- Look for possible perception of the settled measures in the respective target groups and act to improve it
- Perform a Cost-benefit analysis considering also health effects and related external cost of air pollution
- Perform an impact assessment in the case that a SEA process is needed (See point f.)

e. Prioritizing measures

Select most effective measures or packages of measures, and for each one of them:

- Define role of city/other overarching governance authorities
- Define role of different municipal departments
- Define role/implication of different stakeholders and key actors.

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f. Screening with competent authorities if a SEA process is required (see Section 4.4)

In the ELABORATION phase the PARTICIPATION process (see Section 6.2) is crucial and consists of two fundamental elements. In the case of SEA process these elements are prescribed by the procedure, anyway the Directive 2008/50/EC asks for public information on AQ plans:

A. Stakeholder involvement

- Dialogue with other municipal departments, other different stakeholders, overarching governance authorities.

B. Public consultation

- Prepare the final draft of the AQ Plan for consultation
- Prepare a presentation of the AQP
- Collect stakeholder views, review and follow up.

Having gathered practice elements and suggestions through the participation process, it is possible to:

g. Define Final Set of Measures

with associated definition of:

- Final deadline and time plan
- Roles and responsibility
- Monitoring methodology and indicators.

h. Air Quality Plan Delivery.

Box 6 - Key elements in Elaboration phase of the Air Quality Plan

ELABORATION Key elements

- ✓ **Ensure policy coordination and integrated planning**
Coordinating with other sectors of the administration in order to ensure and maintain coherence between different sectorial policies (Climate change, Transport sector, Energy sector, Agriculture, etc).
- ✓ **Define Business plan and look for funding**
Looking for funding for the development of the AQP and for its measures is a step that could start at the beginning of the process and as soon as the list of 'possible measures' is defined. The output is an appropriate Business plan for the implementation of the AQP.
- ✓ **Carry out citizens awareness raising campaigns**
It is fundamental to prepare and implement effective communication to increase involvement and participation in AQ issues and in AQP motivation, targets and measures, and also for promoting citizens' support for AQP measures.

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3. ADOPTION

It is the formal act by which the local Council adopts the AQP.

Box 7 - Key elements in Adoption phase of the Air Quality Plan

ADOPTION Key elements

- ✓ **Assure a political and public consent on AQ issues**
- ✓ **Make clear the need for the AQ Plan**
- ✓ **Create political and public consensus for the planned measures**

After adoption, the steps are:

- **E-reporting to EU**
- **AQP public dissemination**

4. IMPLEMENTATION

According to Directive 2008/50/EC, in order to put in practice as soon as possible effective measures that can contribute to the reduction of ambient air concentrations and citizens exposure, the City administration can consider the opportunity to elaborate and adopt a Municipal Regulation for those measures, that are ready to be 'implemented'. These are the main steps:

- **Recognition for possible AQ Municipal Regulation**
- **Elaboration of the AQ Municipal Regulation**
- **Air Quality MUNICIPAL REGULATION approval**

Other actions to be undertaken for the implementation of the settled measures are:

- **Obtaining funding for implementation**
- **Involvement of Key Actors for implementation (citizens too).**

5. MONITORING, REPORTING AND REVIEWING

a. Periodic **monitoring process** through the updating of different kind of Indicators defined in the plan:

- Process Indicators update
- Specific result Indicators update
- Impact Indicators update (Annual report).

(see *Section 6.4* for more details).

b. **Reporting process** to EC and Public Reports to citizens/stakeholders.

c. **Reviewing process** through definition of corrective actions or new measures, with appropriate impact assessment and cost-effective analysis as during the Elaboration of the plan process ('circular process').

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5.3 Key factors

There is not a one-fits-all recipe to develop an effective AQP and every consideration reported in this Chapter must be tailored to the specific local context. Anyway, the followings are considered key factors to develop a successful AQP:

Box 8 - Key factors for successful development of Cities AQPs

AQ Plans GOVERNANCE Key success factors

- 1 **'Participatory' approach**
- 2 **'Integrated' policy**, both horizontally and vertically
- 3 Consideration of **health effects/external costs** in prioritizing measures
- 4 **Regular follow-up, Review and Reporting.**

1. Participatory approach

As a rule of better governance the 'involvement' of citizens, associations, and main stakeholders is needed, starting from the first steps of the planning of the AQP. In this Code this aspect is considered as a specific topic in *Section 6.2*.

2. 'Integrated' policy (both horizontally and vertically)

One of the most important features that an AQP would have to be effective at is horizontal and vertical **Integration**:

'Horizontal' integration means dialogue and co-operation with different governmental functions of city administration whose activities can be related to the AQP such as: Transport Planning, Energy Use Management, Land Use planning, Sustainable Development and Environmental policies (Climate Change policies, Environmental Noise management, Waste management, etc.), Public Health protection programmes, Educational Sector programmes, Economic Strategy and Budget Department.

'Vertical' integration means dialogue and co-operation with higher levels of administration (metropolitan area, regions, National City council, national government) up to lobbying at international level for issues that cannot be solved directly at urban or at national level.

To achieve a reasonable degree of 'Integration', one also needs to ensure **'coherence'** and **'complementarity'** with all activities defined in the AQP and those already included in other relevant Planning documents applicable to the City for different sectors (*'horizontal' Plans complementarity*) and with other strategic documents adopted at Regional, National and European level (*'vertical' Plans complementarity*).

In this Code the specific topic 'Integration with National, Regional, nearest cities' AQP and Air Quality Strategies' is dealt with in further details (see *Section 4.3*).

3. Consideration of health effects/external costs in the selection process for measures

When selecting and prioritizing measures it is essential to consider health effects and

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related external costs. Even if this selection and prioritization may require a lot of human and economic resources, it helps to choose measures that maximize health benefits in term of public health, and to increase the acceptability of AQP measures by citizens (see *Sections 7.1.2, 7.4.2. and 7.5*).

4. Regular follow-up, Review and Reporting

Regular follow-up, review and reporting are not only good practices in the AQP planning process, but a mandatory task required by legislation (see *Sections 4.5 and 6.4*).

Based on experience, the binding nature of an air quality plan for all implementing bodies seems to be the key factor for a successful implementation.

One of the most important aspect for a successful AQ plan is, in fact, a well-defined timetable for implementation of the settled air quality measures: this should not be underestimated, otherwise it will be very difficult to control the implementation process of the Air Quality Plan. In particular, it is important to determine a detailed timetable for progressive steps especially for long-term measures. The timetable should involve responsible bodies/persons for specific actions.

6 HOW TO MANAGE AND IMPLEMENT A CITY AIR QUALITY PLAN

6.1 Citizens Awareness

In spite of the work carried out by EU institutions, by Member States, by many cities and grass-roots movements in Europe, the general public is little engaged in air quality policy initiatives and knowledge of the effects of poor air quality on health is not widely available. Raising citizens' awareness is key to increase public support for clean air measures that can be included in a city Air Quality Plan.

Initiatives are currently underway in many cities across Europe to remedy the low awareness. A survey with local authorities, carried out for bringing together inspiring examples on communicating on air quality and health, found that many cities not only provide basic information on air quality concentrations as required by law, but also include specific health messaging or recommendations on how each individual can contribute to clean air in their communication.

The reported examples of good practice in citizen awareness-raising could be a source of inspiration for starting a communication campaign to increase acceptability of the measures included in the Air Quality Plan and also to facilitate the implementation of those directly depending on citizens' behaviour (use of public transport, cycling, energy saving, less use of solid fuel burning, etc.). This communication campaign would better start at the beginning of the process of drafting the Air Quality Plan, as soon as fundamental information are available from the 'Assessment' phase of the Elaboration process. This campaign would be better accompanied with good practice examples lead by the cities administration (e.g. green public procurement, energy saving for public buildings, etc).

Some cities use **negative messaging and warnings**, e.g. smog/air pollution harms health (Amsterdam), air pollution shortens your life (Stockholm), the air is bad, please watch out (Katowice), etc. The city of Leerdam in the Netherlands stresses the long term impact on health of air pollution.

People behavioural studies suggest that it would be better to **appeal to positive feelings** in the health messaging, e.g. "clean air, our common good" (Warsaw), "respect the air, it gives life" (Gydina). The city of Siewierz in Poland underlines the importance of clean air for health with "you love children, don't burn rubbish". Some authorities also issue positive messages such as "Let's work together for clean air, even a small decision can

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have big consequences for our health” (Warsaw), or stress the fact that “people will live better with cleaner air” (Suchan).

6.1.1 Recommendations for air quality and health-friendly behaviour

Some cities connect health messages with recommendations on what to do: “not using the car, but public transport, cycling” (e.g. Leerdam, Stockholm, Cluj-Napoca), “not spending too much time outdoors“, or they have special communications for children and/or the elderly.

Local authorities do stress how changes in people’s behaviour can lead to improved air quality. For example, they stress that residents should not burn waste or inform about how a house can be heated without polluting. In Antwerp, Belgium, local authorities give tips and tricks around wood-burning, in addition to having put in place a range of measures to improve air quality, such as a low emission zone for vehicles, additional measures for the industry and the harbour. The city of Münster in Germany communicates that “administrative measures and personal behaviour can significantly improve air quality”.

In Zagreb, Croatia, City’ regulations, plans and programmes have been enacted at the local and regional level to regulate measures and regulate air quality protection for the purpose of preserving human health and quality of life. Plans and programmes are available to the public on the website of the City of Zagreb (see Section 4.3) and point out the need to use public transport, electrical, non-motorized forms of transport (hiking and cycling transport), advise on the application of energy efficiency measures aimed at the thermal protection of homes, the modernization of domestic combustion boilers and boilers, the possibility of subsidizing the costs of procurement and installation of renewable energy sources, promotion of the use of electric vehicles and vehicles of low emissions (hybrid cars) and other.

In addition, many urban authorities work together with schools, the media, environmental groups or health professionals to disseminate information on air quality. Others organize special information session and events.

6.1.2 Citizens’ science projects

An increasing number of cities now run projects that involve citizens so as to raise their awareness through engagement. Involving residents is a promising and inspiring way to achieve buy-in and support for policy measures, and a number of cities which participated in the survey use this (bottom-up) approach. Urban authorities also involve residents through training, e.g. on clean air friendly heating or driving.

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Inspiring examples from Poland include:

- ✓ The city of Krakow organizes regular ecological outdoor events, and runs several campaigns including 'Together in the fight for clean air in Krakow';
- ✓ The city of Poznan sponsored the 'Kawka bis' programme which funds replacement of furnaces, boilers, and also ran a training programme on eco-driving which trained over 1,600 people, or a programme to test heat losses in houses;
- ✓ The city of Warsaw offers a mobile phone application to indicate where to plant trees or consults with residents on anti-smog resolution, air protection program;
- ✓ The city of Otwock organized a prize competition;
- ✓ The city of Gydina offers training to show the correct technique of firing up furnaces.

Likewise, citizens' science on measuring air quality took or takes place in Dutch cities, including Amersfoort, Leerdam, Alkmaar, Zandstad, and Utrecht.

At the end of 2017, the city of Duisburg, Germany launched its network for air quality, a citizens' science project. Until then, the city had seven monitoring stations, run by the city environmental agency, covering an area of 233 square kilometres. City officials stated that this monitoring only gives a rough picture of the exposure to air pollution, and thus invited residents to build their own monitors to measure particulate matter. The city offers special workshops on how to assemble the air monitors.

Cities therefore use a variety of tools to raise residents' awareness, and many local authorities have seen positive impacts, including increased awareness, changes in people's behaviour, support for clean air policy measures (even though sometimes it is not clear if this change was achieved because of awareness-raising efforts or because of a combination of other activities - communication, regulatory measures and even legal obligations).

6.1.3 Communication during pollution peaks

While poor air quality affects everybody, some people are more at risk from health harms from air pollution than others. These include those already ill, such as asthma patients, the elderly, children and pregnant women. Communication by local authorities to these sensitive groups varies greatly across Europe: some cities do not carry out a specific vulnerability communication at all, others, like the city of Utrecht, provide a special app service with recommendations on physical activity. The Polish cities of Pruskow and Katowice also run a special alert system. In view of the lack of knowledge and diversity of communication, guidance on harmonized communication to vulnerable groups is desirable.

6.1.4 Challenges in awareness raising

Cities try their best to communicate and raise awareness, but many challenges remain. These include barriers on the side of residents, for example lack of interest or low understanding of why a 'policy and behavioural' change is necessary, or also social inequalities that hamper air quality improvements. Stumbling blocks for greater

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awareness can also be found at the level of the urban authority itself, with financial and personnel resources missing, lack of co-operation between different departments or lack of political will for air quality measures. In addition, evaluation of awareness raising activities carried out is often not taking place or not comprehensively, which hampers the identification of activities and communications that have worked.

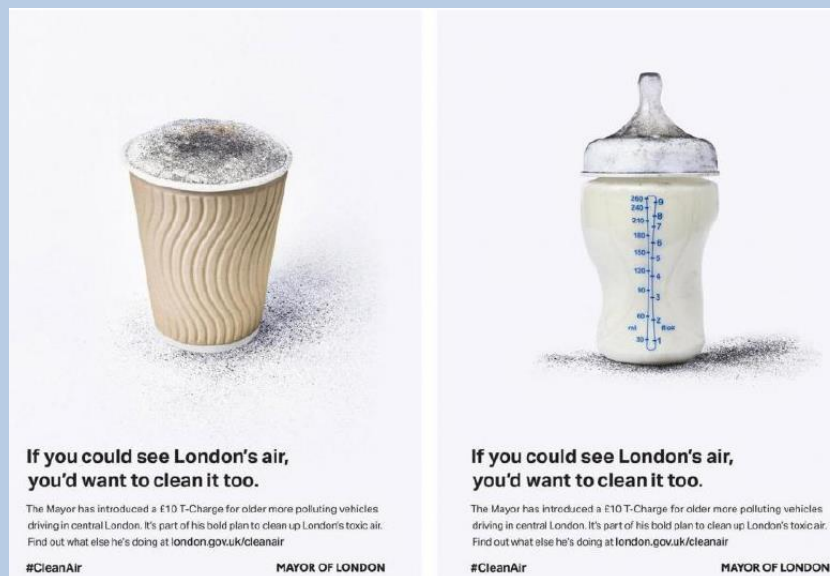
For more details look at the report, developed by the Partnership for Air Quality on the Futurium website:

- HEAL, 2018, 'Communicating on Air Quality and Health: Inspiring practices, challenges and tips. Toolkit' Partnership Air Quality Action Plan, Action 5 Deliverable.

CITIZEN AWARENESS-CAMPAIGN

City of LONDON (UK) [8 546 761 inhabitants]

Example of the Mayor of London advertising campaign to raise awareness on air quality and to promote the acceptability of a transport policy measure ('T-Charge', see for more details *Appendix V*).



References

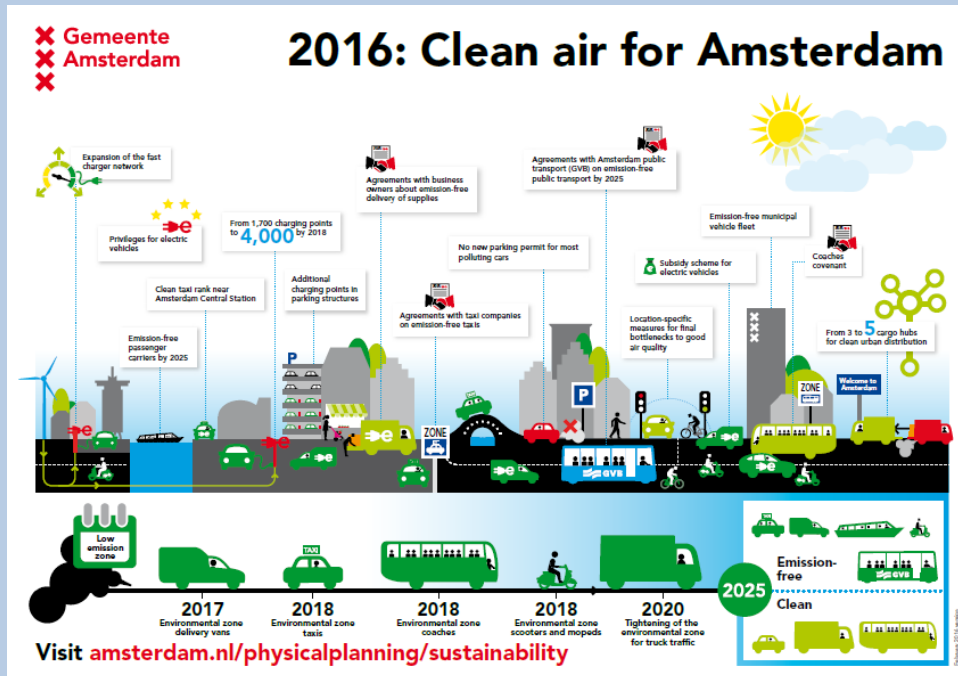
- Greater London Authority, 2017, T-Charge info campaign

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INFOGRAPHIC

City of AMSTERDAM (The Netherlands) [851 573 inhabitants]

Example of the Infographic used to represent the measures of the Clean Air Planning in Amsterdam.



References

- City of Amsterdam, 2016: 'Clean Air for Amsterdam: Set of Measures. Towards an emission-free 2025 Amsterdam', February 2016

6.2 Participatory approach

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 ('Ambient Air Quality Directive'- AAQD): Art. 24 and 26; Annexes XV and XVI

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 ('Public Participation Directive' - PPD)

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Cities, Member States, or other relevant authorities that develop an AQP must ensure that the public as well as the relevant and competent organizations are properly and timely informed of the AQP preparation in order also to receive relevant inputs from third parties and then facilitate the implementation of the plan. The organizations to be consulted include, e.g. environmental and consumer organizations, organizations representing the interests of sensitive populations, other relevant health-care bodies, environment agencies and the relevant tertiary system and industrial federations, energy supplier associations or local/national transport authorities.

The level of involvement from third parties varies between plans, depending on industrial activities, transport infrastructure and existing ordinances and regulations on each city. It also varies depending on the ambition level of the AQP and on which pollutants are being targeted.

The EU Directive does not clarify what the requirement of properly and timely informing them about the preparation of the AQP means in practice. When Member States implement the Directive into their own legislation, this requirement needs to be clarified. Also the list of appropriate organizations to be consulted can be elaborated.

6.2.1 Stakeholders involvement

The main organizations and stakeholders are invited to actively take part in the preparation of the plan from start to end (e.g. workshops, seminars). If a previous AQP exists, it is evaluated in co-operation with the relevant actors implementing the plan and the results are used in the preparation of the new plan. In the final stakeholder consultation, the national authorities in charge of AQ issues are invited to give their comments as well as all authorities who deal with issues related to the AQP. All other relevant stakeholders are also given sufficient time to acquaint themselves with the plan and to give their opinions on it. The timeline for the consultation is at least 30 days.

Box 9 - Best Practices for stakeholder involvement in AQP

Best Practices for stakeholder involvement in AQP

- ✓ Key stakeholders are invited to actively participate in expert meetings and workshops and to give their contributions in the preparation of the plan from start to end
- ✓ If previous AQPs exist, their successes, failures and necessary changes are evaluated in co-operation with key stakeholders and the results are drawn upon in the preparation of the new plan.
- ✓ The final stakeholder consultation of the AQP is carried out at the same time as the public consultation and the stakeholders are given at least 30 days to give their comments.

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STAKEHOLDER INVOLVEMENT

City of HELSINKI (Finland) [635 000 Inhabitants]



Helsinki, *Photo credits: Paul Williams*

In 2016 Helsinki city administration adopted the **Air Quality Plan of the City of Helsinki 2017-2024** (see *Appendix IV* for details) in compliance with Directive 2008/50/EC. The planning process started with a **kick-off seminar on air quality**, which was held two years before the deadline for the adoption of the final plan. The seminar had a morning session with a keynote speaker from London as well as presentations of air quality in Helsinki and of the city's existing AQP. In the afternoon session the stakeholders were divided into groups who worked on the 3 themes: traffic, street dust and wood burning. In the workshop the participants discussed the existing AQP and evaluated which measures had been successful and which not so successful as well as what was lacking from the plan and should be incorporated in the new plan.

A main coordinator was in charge of the planning process with three assisting experts who worked on preparing the three different themes of the plan in co-operation with relevant stakeholders. The key organizations who were expected to implement the measures of the AQP were actively involved in the planning of the measures from the beginning. For each theme the first drafts of AQ measures were presented and worked upon at another workshop one year before the deadline of the plan. The drafts were also presented to the city's Environment Committee, who was responsible for approving the final AQP.

The responsibility for the preparation, implementation and follow up of the AQP was given to a working group led by the Environment Centre and to in an official AQ working group appointed by the Mayor. These two groups approved the draft of the AQP which was sent out for comments and public consultation by the Environment

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Committee about nine months before the deadline of the plan. The duration of the consultation was ca. 6 weeks. Comments were asked from 41 relevant organizations and authorities, of which 17 replied.

On the basis of the received comments, the coordinator and assisting experts added two new measures to the plan and fine-tuned some of the measures. As required by Finnish legislation, the stakeholders and the public were informed of the final plan and of how the received comments and opinions had been taken into account. An interaction report containing a description of the consultation process and of the changes made to the plan was attached to the final AQP which was approved by the Environment Committee and published in the city's webpage.

6.2.2 Public consultation

The public should be invited to actively contribute already in the early stages of the planning process. If appropriate, at least some of their suggestions should be incorporated in the plan. They could also be urged to consider how they could improve air quality with their own actions. The public is informed of the consultation of the final AQP with a press release and an announcement on the website of the authority in charge of the preparation of the plan as well as with an announcement in at least one major local newspaper. When the Final AQP has been adopted, the public is informed of the final plan and of how the received comments and opinions have been taken into account. The interaction with the public and the resulting changes made in the plan are summarized in an interaction report which is attached to the AQP and published together with it. The plan is made available on the website and as paper copies in the premises of the authority in question as well as some other central venue (e.g. City hall). The duration of the public consultation should be at least 30 days.

Box 10 - Best practices for the public consultation of AQPs

Best Practices for the public consultation of AQPs

The public is invited to actively contribute already in the early stages of the planning process.

Information of the public of consultation is made available:

- ✓ on the website of the authority in charge of the plan
- ✓ in a press release by the authority in question
- ✓ in announcements in major local newspapers
- ✓ in different languages if needed.

The public is given at least 30 days to give their opinions to the plan.

The interaction with the public and the resulting changes made in the plan are summarized in an 'Interaction report' attached to the final AQP.

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PUBLIC CONSULTATION

City of HELSINKI (Finland) [635 000 inhabitants]



Photo credits: City of Helsinki

In 2016 Helsinki city administration adopted the **Air Quality Plan of the City of Helsinki 2017-2024** (see *Appendix IV* for details) in compliance with the Directive 2008/50/EC. A project coordinator was hired to engage the inhabitants already in the early stages of the planning process of the AQP, not only in the official consultation of the final plan. The process began with an air quality quiz with 10 questions about air quality. This quiz was advertised in the webpages and social media (FB, Twitter) by the city and different environmental and health organization. In the quiz people were invited to give their contact details if they wanted to be informed in the course of preparation of the plan. They were also given the contact details of the person in charge of the plan in case they wanted more information. The quiz was open for a month. It was specifically designed by media experts to attract people's attention and make them aware of the issues of air quality.

When the first sketches of AQ measures had been made, the public was given an opportunity to comment on them. There were three rounds of comments, one for each theme of the AQP. The commenting took place in digital form for about a month for each theme. The link was sent to the people who had given their contact details and to a few schools in Helsinki. The consultation was also advertised on the city's webpage and in the social media. Commenting of the measures on traffic took place during the European mobility week and was advertised in mobility events. Comments for measures on wood burning were asked at the beginning of the heating season.

The final draft of the AQP was out for comments for ca. six weeks on the city's website and as paper copies in the City Hall and in the premises of the Environment Centre. The public consultation was announced in two major newspapers (one in Finnish and one in Swedish) and in the free *Metro* newspaper as well as in the official

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announcement board of the city. The major newspapers wrote articles about air quality in Helsinki and the AQP several times during the planning process. The interaction with the public and the resulting changes made in the AQP were summarized in an interaction report which was attached to the AQP and published with the plan. A brochure (in Finnish, Swedish and English) was also published containing information about air quality in Helsinki, what the city does to improve it and how people can improve air quality with their own actions.

6.3 Funding opportunities

The Partnership observed that dynamics of measures implementation of an Air Quality Plan are to a high degree influenced by the business plans of each individual competent authority, primarily their organizational capacities and the availability of necessary financial resources.

Several EU and national funds are available to prepare and implement national, regional and local air pollution policies. However, an overall lack of specific programmes dedicated to funding of projects aimed at air pollution reduction has been observed, as funding of air quality improvement projects usually has to compete with other societal challenges. In addition, knowledge of the right procedures and conditions are required and procedures to acquire funding for clean air projects from EU funds could be considered difficult by local authorities. In the operational programmes (OPs) for the large funding mechanisms (i.e.: such as European Regional Development Fund - 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. This can be linked with the lack of funding available for regions to achieve abatement measures since air quality improvement may have not have been given priority in the OP's earmarked budgets. It also appears that in some Member States the legal support for local experiments could be improved.

Additionally, air quality policy is often treated as a stand-alone effort, where developments in economic activities, transport, agriculture and energy use are seen as given. Air quality policies becomes more effective when integrated to other policies, for examples decisions about implementation of common agricultural policy, the European transport network, or the EU-climate and energy policy. This increases the possibilities for synergies between policy areas or to include potential negative side effects for air pollution in an early stage of the policy development process. In this respect, cities are in demand for more possibilities to integrate existing EU/MS/regional funds for implementing air quality measures.

The elements above combined notably determine a need for an increase in the relevant funding options for urban projects/plans to carry out air quality management solutions. This issue is particularly sensitive for those urban areas where the costs of local abatement measures for limit values compliance are remarkable, due to the fact that stronger measures and wider range of action have to be taken.

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Management authorities in each Member State decide about specific operational allocation of the available funds. Moreover, co-funding for innovative projects can be obtained from the Connecting Europe Facility (CEF) programme, the LIFE-programme, the European Fund for Strategic Investments (the so-called Juncker Investment Plan), Horizon 2020 (e.g. the European Green Vehicles Initiative), the Urban Innovative Actions (UIA) initiative, and the JPI Urban Europe.

However, to tackle the problem described above the Partnership identified as necessary to carry out an assessment of funding needs for the sustainable design/implementation of Cities Air Quality Plans and to develop an appropriate business model to fund air quality measures, considering also the possibilities offered by the integration of different funding instruments (e.g. blending facilities).

In Box 11 are reported the tools that the Partnership on Air Quality has developed in co-operation with the European Investment Bank (EIB) in the framework of Action 3 (Better targeted funding for Air Quality) of the Partnership Action Plan.

Box 11 - Better funding tools for Cities Air Quality Plans developed by Partnership Air Quality and European Investment Bank

General Business Model for Air Quality Plan and Guidance for Cities Funding

The Partnership Air Quality in co-operation with the European Investment Bank (EIB), in the framework of Action 3 (*Better targeted funding for Air Quality*) of the Partnership Action Plan has developed:

- a General Business Model for funding Air Quality Plans
- and
- A Guidance for Financing Air Quality Plans, addressed to cities and local authorities

These tools will be available by the end of 2018 on the Futurium Platform:

<https://ec.europa.eu/futurium/en/air-quality>

In the followings boxes some good practices are reported in relation to existent targeted national funding available in some Member States to promoting the development and adoption of Air Quality Plans and the implementation of related measures. Cities that are developing and Air Quality Plan should look if a such kind of initiative, or similar, are available in their own country before looking at other funding sources or in addition to those.



FOND ZA ZAŠTITU OKOLIŠA I ENERGETSKU UČINKOVITOST

Source: www.fzoeu.hr

In the Republic of Croatia the **Environmental Protection and Energy Efficiency Fund** was established in 2003 by the Environmental Protection and Energy Efficiency Fund Act (OG 107/03 and 144/12) and is the central place for collecting and investing extra budgetary resources in environmental and nature protection programs and projects, energy efficiency and use of renewable energy sources. The activities of the Fund include activities related to the financing of the preparation, implementation and development of programs and projects and similar activities in the field of conservation, sustainable use, protection and improvement of the environment and in the area of energy efficiency and the use of renewable energy sources.

By collecting extra-budgetary revenues according to the **'polluter-pays' principle** in accordance with the applicable laws and regulations the above-mentioned activities of the Fund have been enabled. An overview of collected fees and revenues is as follows: sulphur oxide emissions expressed as sulphur dioxide charges; nitrogen oxides expressed as nitrogen dioxide charges; carbon dioxide emissions in environment charges; special annual fee on greenhouse gas emissions; the proceeds of sale on the auction of greenhouse gas emission units; compensation for environmental burden on non-hazardous industrial waste; environmental pollution charges for hazardous waste; a special environmental charge on motor vehicles; compensation to cover the costs of collecting, recovering, recovering and destroying controlled substances and fluorinated greenhouse gases; packaging waste management fee and reimbursement fee; handling fees for waste tires and vehicles; EE waste management fees, waste batteries and accumulators; fee; environmental benefit charges and others.

The Fund allocates its funds in accordance with the Rulebook on the Conditions and Methods of assessing funds of the Fund for Environmental Protection and Energy Efficiency and the criteria and criteria for assessing the Fund's allocation requirements (OG 18/09, 42/12, 73/13, 29/14 and 155/14) which stipulates the

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conditions to be met by the beneficiaries of funds, the method of allocation of funds, and the criteria and criteria for assessing the Fund's allocation of funds.

The Fund has co-financed the preparation of three out of six existing Air Quality Plans for local authorities (City of Kutina, Slavonski Brod and Rijeka) in the past period, since 2014. The financing principle was based on the national strategic document - Plan for the Air Protection, Ozone Layer and Mitigation of Climate Change in the Republic of Croatia for the Period 2013 to 2017 (Official Gazette 139/13), which states that the measure MGV - 2: Strengthening the capacity of local and regional self-government to prepare the Air Quality Improvement Action Plans, can also be co-financed with the Fund's resources.

Funds for funding of the development of Air Quality Plans were generally planned by the annual financial plan of the Fund and the amount of funds that the Fund could approve was determined in accordance with the request of the beneficiary - local self-government unit self-government units (city), but also in accordance with the Decision on classification of local and regional self-government units by degree of development ('Official Gazette' 158/13) and the Ordinance on the Conditions and Methods for Assigning the Funds to the Fund for Environmental Protection and Energy Efficiency, and Criteria and Measures for Assessing Fund Submissions ('Official Gazette' No. 18/09, 42/12, 73 / 13 and 29/14). An average amount of co-financing that cities can get from the Fund is 60% of the total cost of the Air Quality Plan development (while maximum 80% co-financing can be realized by the users from the group of regional self-government units whose value of development index is less than 75% of the average of the Republic of Croatia or the first group of local self-government units whose value of development index is less than 50%, in accordance with a special regulation).

The procedure applied for the purpose of co-financing the Air Quality Plan is as follows: the potential beneficiary (City) when it has a legal obligation to adopt the Air Quality Plan submits a direct request to the Fund for co-financing (not through a public call) together with an estimation of costs for the Air Quality Plan development. If the funds are available in the allocation of the Fund budget, then the expert service of the Fund shall submit a proposal to the director of the Fund for the approval of funds in accordance with the Regulations on the Conditions and Methods for Assigning Funds to the Environmental Protection and Energy Efficiency Fund and a Financing Decision. Based on the Financing Decision issued by the Fund, a City can start official public procurement procedure aiming to conclude a contract with a legal person (expert institute) licensed to carry out expert work on drafting plans and programs. After executing the work on AQP development a City claims for the reimbursement of real costs occurred.

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NATIONAL FUNDING FOR HUMAN RESOURCES IN AIR QUALITY PLANS

Czech Republic



Třebíč, *Photo credits:* <https://traveltiptheculturetrip.com/30-of-the-most-beautiful-cities-and-towns-in-the-europe/czech-republic/>

Air quality plan development and implementation is a time-consuming process and need specialized human resources.

In the Czech Republic, many local or even regional authorities lack financial and human resources that could be assigned to the Air Quality Plan agenda.

The Czech Republic has therefore introduced a **special national subsidy programme** to cover those personal expenses and to enable municipalities to hire additional staff **to ensure the implementation of AQP measures.**

One of the requirements of the national subsidy programme is that the municipality must create via the newly hired staff an 'Action Plan' that contains detailed and binding timetable for the air quality plan implementation from the cities perspective. The deadlines in the action plan must be met by the municipality otherwise the subsidy will be reduced. Municipalities are however capable to create the timetable according to their own specifications.

Offering financial resources to support air quality plan agenda at the municipal level seems to be effective to some extent, at least for active and committed municipalities.

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The Polish government is fighting the problem of bad air quality in cities and regions by implementing a special programme entitled 'Clean air' (accepted by the Council of Ministers on the 25th of April 2017) and by utilizing funds from many different sources. On a national level, the National Fund for Environmental Protection and Water Management (NFOSiGW) plays a major role in the financing of a wide range of air quality measures. The basis of the National Fund's operation is the Environmental Protection Law.

Currently, the two main pillars of financing projects for the improvement of air quality in Poland are programmes and solutions that deal with the pollution caused by the housing sector (low energy efficiency, old boilers, low quality fuel) and transport (too many old cars in cities).

Billions for energy efficiency in single family houses

In Poland there are 5.5 million residential buildings, 90% of which are single family houses. Amongst them, 3.8 million are heated by coal, 1.5 million households use old boilers and most of them are ten or more years old. The financial programme of the NFOSiGW called 'Clean air' started in September 2018 with a budget of approximately 25 billion EUR (103 billion PLN). Within this programme, residents of single family houses can receive either grants (budget 15 billion EUR) or loans at low interest rates.

It is the first programme in Poland and possibly in Europe which is addressed to the owners of single family houses on such a wide scale. It is estimated that over the next ten years - until 2029 - modernisation in about 3.5 million single family houses will be carried out which must include thermo-modernisation of the building with a possibility to use renewable energy sources (solar panels, photovoltaics). The second component of the programme is the replacement of older generation boilers for new efficient ones, or for a heat pump, etc.

The level of co-financing for the project will depend on the income of the household. It is foreseen that the energy poor beneficiaries will receive grants totalling up to 90% of the value of the modernisation which means a maximum value of nearly 11, 500 EUR.

Low Emission Transport Fund

To address the problem of the poor air quality in cities caused by the transport sector, there will be invested from the national level approximately 2.4 billion EUR (10 billion PLN).

In July 2018, the Low Emission Transport Fund was established in Poland. Since year 2027, approximately 1.6 billion EUR will be allocated to this Fund. Around one billion euros will come from the state budget. Additionally, from the resources of the National Fund for Environmental Protection and Water Management will be spend 0.8 billion EUR.

In general, support under the Low Emission Transport Fund will be granted to initiatives related to the development of electro-mobility (e.g. vehicles powered by electricity) as well as transport based on alternative fuels, including CNG and LNG.

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The range of projects that can receive funding is very wide: amongst others, local governments investing in clean public transport, means of transport producers, bio-component manufacturers, as well as entities wishing to purchase new low-emission vehicles will be supported. Within the resources from the Fund, promotional and educational activities concerning the use of alternative fuels in transport will also be supported.

6.4 Monitoring, Reporting and Reviewing

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 ('Ambient Air Quality Directive' - AAQD): Chapter II, Section 1 (Art. 5, 6, 7 and 8) and Section 2 (Art. 9, 10 and 11) and Annex III

Decision 2011/850/EU, Commission Implementing Decision of 12 December 2011 laying down rules for Directives 2004/107/EC and 2008/50/EC of the European Parliament and of the Council as regards the reciprocal exchange of information and reporting on ambient air quality ('IPR Directive')

The success of the AQP is assessed through specific indicators defined in the AQP. Such indicators are used to monitor progress on implementation and the impact of the adopted plan on air quality. Regular analyses and evaluations from air quality monitoring stations data and other indexes will track the degree of progress in the implementation of the measures, and their impact on air quality. Monitoring success of target attainment will verify specific measure effectiveness. This can determine if the measures are performing sufficiently or whether additional or different measures are required.

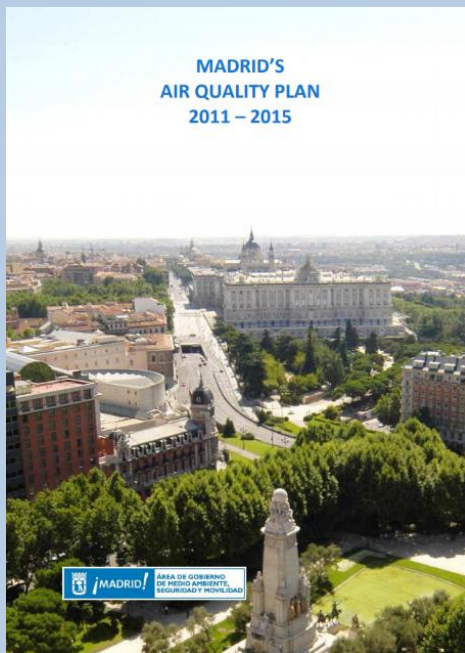
If the AQP has been adopted by a city as an update of previous plans, it has to include progress reports on the relevant measures introduced in the earlier plans. Timetables for continuing existing measures and implementing new measures are included in the plans as are estimates of the impact of the new measures on air quality. The impact of the measures has to be determined using modelling with varying degrees of detail.

The European Commission monitors the implementation of EU legislation in Member States to ensure that laws achieve their intended objectives and that all countries of the EU respect the rules that have been agreed. The most common way of doing this is through reporting and monitoring defined as a set of reporting obligations within each Directive. Internal monitoring by Member States precedes submission of data and information to the Commission for analyses, this monitoring may be undertaken by competent authorities administered at different levels of governance, businesses or other stakeholders following the indication given by Directive 2011/850/EU and relative IPR Guidelines for e-reporting (see also *Section 4.5 - E-Reporting and requirements*).

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MONITORING INDICATORS

City of Madrid (Spain) [3 141 991 inhabitants]



Madrid adopted an original AQP for the 2011-2015 time frame, and more recently it is implementing an AQP referred to as 'Plan A'. Monitoring of this plan is conducted by an air quality commission and technical committee and will hopefully include citizen participation and the active involvement of many municipal representatives from departments such as town planning, mobility and environmental outreach. To monitor the Plan three types of indicators have been established:

- ✓ Impact - associated with overall objectives;
- ✓ Specific - assessing the real impact of the actions carried out as a whole
- ✓ Process - evaluating the degree of implementation of the measures.

Source:

https://www.madrid.es/UnidadesDescentralizadas/AreasUrbanas_EducacionAmbiental/Catalogo/AirQualityPlan2011-15.pdf

Monitoring of AQPs is specifically referred to in Annex II of the Commission Decision 2011/850/EU Part J in that an 'Indicator for Monitoring Progress' must be included. It is important that any monitoring and reporting should result in a clear, coordinated and coherent picture of the level of implementation of a certain piece of legislation and the 'distance to target' with regards to the objectives of this legislation. Monitoring needs to consider the objectives of the AQP and evidence needs to be collected to track its progress and performance, this will require understanding of the logic of the plan and how the evidence will be used.

Resources are available for the authorities involved with implementing AQPs, such as the Commission's Better Regulation Guidelines which provide key requirements for monitoring, i.e. to '*establish monitoring arrangements and indicators that will generate the necessary information for subsequent evaluation of the performance of the AQP while minimizing data collection costs*'.

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MONITORING AND REPORTING ASSISTANCE

United Kingdom

In the United Kingdom the monitoring and reporting of AQAPs²⁵ is assisted by the Department of Environment, Food and Rural Affairs (Defra) with provision of template versions of AQAPs to facilitate reporting to Local Air Quality Management (LAQM) authorities.

The screenshot shows the Defra website interface. At the top, there is a navigation bar with links for 'Home', 'About Defra', 'The Environment', 'Food and Farming', 'Rural and Countryside', and 'Wildlife and Pets'. Below this is a search bar and a 'You are here' breadcrumb trail: Home > The Environment > Environmental quality and pollution > Air and atmosphere > Air Quality > Local air quality management > LAQM support > Homepage >. The main content area is titled 'Action Planning: Supporting Guidance' and includes a sidebar with a tree view of navigation options: LAQM Support, Action Planning (with sub-items: Introduction, Good Practice, Case Studies, Supporting Guidance, Communities of Practice, Measures), and a 'You may also be interested in...' section with links to various air quality resources.

Source: <https://laqm.defra.gov.uk/action-planning/aqap-supporting-guidance.html>

To monitor the success of AQAPs, additional templates are available for the review and assessment of Air Quality Action Plans progress. Care should be taken when adopting templated AQAPs in areas that may require a more comprehensive and tailored plan.

To assist local authorities in AQAP establishment and review and assessment duties a series of generic report templates are provided by Defra:

- ✓ Standard document template published by Defra to help local authorities prepare their AQAP. Local authorities can supplement sections with any additional information they feel is necessary.
- ✓ Local authorities may also find it useful to refer to existing good practice examples of AQAPs as a starting point²⁶.

To monitor progress of AQAP, assessment templates are available along with more detailed updating and screening assessment report templates.

²⁵ In UK the Air Quality Plan is called Air Quality Action Plan (AQAP) and follows the Local Air Quality Management (LAQM)

²⁶ DEFRA, Action Planning: Good Practice website: <http://laqm.defra.gov.uk/action-planning/good-practice.html>

REFERENCES

Technical reports and scientific papers

- Anenberg S.C., Schwartz J., Shindell D., Amann M., Faluvegi G., Klimont Z., Janssens-Maenhout G., Pozzoli L., Van Dingenen R., Vignati E., Emberson L., Muller N.Z., West J.J., Williams M., Demkine V., Hicks W.K., Kuylenstierna J., Raes F., Ramanathan V., 2012: 'Global Air Quality and Health Co-Benefits of Mitigating Near-Term Climate Change through Methane and Black Carbon Emission Controls', Environ Health Perspect. 2012 Jun;120(6):831-9. doi: 10.1289/ehp.1104301. Epub 2012 Mar 14. <https://www.ncbi.nlm.nih.gov/pubmed/22418651>
- Bruyninckx H., 2017, Cleaner air benefits human health and climate change, EEA Newsletter, Issue 2017/4, 15 December 2017, <https://www.eea.europa.eu/articles/cleaner-air-benefits-human-health>
- Claudio A. Belis, Bo R. Larsen, Fulvio Amato, Imad El Haddad, Olivier Favez, Roy M. Harrison, Philip K. Hopke, Silvia Nava, Pentti Paatero, André Prévôt, Ulrich Quass, Roberta Vecchi, Mar Viana - 2014, European Guide on Air pollution Source Apportionment with receptor models, JRC, Report EUR 26080 EN, ISBN 978-92-79-32513-7, doi: 10.2788/9307
- Commission Staff Working Document Better Regulation Guidelines {COM(2015) 215 final} {SWD(2015) 110 final http://ec.europa.eu/smart-regulation/guidelines/docs/swd_br_guidelines_en.pdf
- EEA, 2017a. Air quality in Europe. 2017 report, EEA Report no. 13/2017, <https://www.eea.europa.eu/publications/air-quality-in-europe-2017>
- EEA, 2017b. European Air Quality Index: current air quality information at your finger tips, <https://www.eea.europa.eu/themes/air/air-quality-index>
- EEA, 2018. Improving air quality in European cities will bring major health benefits, EEA News, <https://www.eea.europa.eu/highlights/improving-air-quality-in-european>
- EMEP/EEA, 2016. EMEP/EEA Air pollutant Emission Inventory Guidebook 2016. Technical guidance to prepare national emission inventories, EEA Report No 21/2016, ISBN 978-92-9213-806-6, ISSN 1977-8449, doi:10.2800/247535
- Maas, R., Grennfelt P., (eds), 2016. Towards Cleaner Air. Scientific Assessment Report 2016. EMEP Steering Body and Working Group on Effects of the Convention on Long-Range Transboundary Air Pollution, Oslo.
- Miranda A., Silveira C., Ferreira J., Monteiro A., Lopes D., Relvas H., Borrego C., Roebeling P., Current air quality plans in Europe designed to support air quality management policies, Atmospheric Pollution Research, 6 (2015) 434-443
- P. Thunis, B. Degraeuwe, E. Pisoni, M. Trombetti, E. Peduzzi, C.A. Belis, J. Wilson, A. Clappier, E. Vignati, 2018 - PM2.5 source allocation in European cities: A

REFERENCES

- SHERPA modelling study, Atmospheric Environment, Volume 187, 2018, Pages 93-106, ISSN 1352-2310, <https://doi.org/10.1016/j.atmosenv.2018.05.062>.
- Partnership Air Quality - Urban Agenda for the EU, 2018, 'Final Draft Action Plan', 1st November 2017. <https://ec.europa.eu/futurium/en/air-quality>
 - Philippe Thunis, 2018 - On the validity of the incremental approach to estimate the impact of cities on air quality, Atmospheric Environment, Volume 173, 2018, Pages 210-222, ISSN 1352-2310, <https://doi.org/10.1016/j.atmosenv.2017.11.012>
 - Shindell D. Kuylenstierna J.C.I., Vignati E., van Dingenen R., Amann M., Klimont Z., Anenberg S., Muller N., Janssens-Maenhout G., Raes F., Schwartz J., Faluvegi G., Pozzoli L., Kupiainen K., Höglund-Isaksson L., Emberson L., Streets D., Ramanathan V., Hicks K., Oanh N.T.K., Milly G., Williams M., Demkine V., Fowler D., 'Simultaneously Mitigating Near-Term Climate Change and Improving Human Health and Food Security', Science 2012; 335: 183-189. <http://science.sciencemag.org/content/335/6065/183>
 - Thunis et al., 2017: Urban PM2.5 Atlas - Air Quality in European cities. EUR 28804 EN, Publications Office of the European Union, Luxembourg, 2017, ISBN 978-92-79-73876-0, JRC10808595. <https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/urban-pm25-atlas-air-quality-european-cities>
 - United Nations, 2015 - 'Transforming our world: the 2030 Agenda for Sustainable Development', Resolution 70/1 adopted by the General Assembly on 25 September 2015, 21 October 2015 http://www.un.org/en/development/desa/population/migration/generalassembly/docs/globalcompact/A_RES_70_1_E.pdf
 - World Bank and Institute for Health Metrics and Evaluation, 2016. 'The Cost of Air Pollution: Strengthening the Economic Case for Action'. Washington, DC: World Bank. License: Creative Commons Attribution CC BY 3.0 IGO

Air quality plans

- Action Plan for air quality improvement in the territory of the City of Zagreb, <http://www.eko.zagreb.hr/default.aspx?id=247>
- Action Plan for emission reducing of PM₁₀ in City of Sisak, <http://iszz.azo.hr/iskzl/datoteka?id=18615>
- Action Plan for emission reduction of (PM₁₀) in City of Osijek, <http://iszz.azo.hr/iskzl/datoteka?id=18613>
- Action Plan for emissions reduction of PM₁₀ the City of Kutina, <http://iszz.azo.hr/iskzl/datoteka?id=21784>
- Action Plan for improvement of air quality for City of Slavonski Brod, <http://iszz.azo.hr/iskzl/datoteka?id=28575>
- Action Plan for NH₃ emission reduction in City of Kutina, <http://iszz.azo.hr/iskzl/datoteka?id=46178>

REFERENCES

- Action Plan for reduction of Ozone levels for the City of Rijeka, <http://iszz.azo.hr/iskzl/datoteka?id=26072>
- Air Quality Plan for Berlin 2011-2017, https://www.berlin.de/senuvk/umwelt/luftqualitaet/de/luftreinhalteplan/download/lrp_150310_en.pdf
- Air Quality Plan of the City of Helsinki 2017-2024, <https://www.hel.fi/static/ymk/julkaisut/julkaisu-11-16.pdf>
- City of Amsterdam, 2016: 'Clean Air for Amsterdam: Set of Measures. Towards an emission-free 2025 Amsterdam', February 2016
- Dreal, Rhone Alpes, 2015, Plan local d'amélioration de la qualité de l'air sur le territoire de Chambéry Métropole, Document soumis à la concertation, Version du 2. févr. 2015
- Hackney Council (UK) Air Quality Plan <http://www.bas-rhin.gouv.fr/Politiques-publiques/Environnement-prevention-des-risques-naturels-et-technologiques/Air/Plan-de-Protection-de-l-Atmosphere-de-l-agglomeration-strasbourgeoise-PPA>
- https://ajuntament.barcelona.cat/qualitataire/sites/default/files/pdfs/PMQAB_EN_2014.pdf
- Madrid's Air Quality Plan 2011-2015, https://www.madrid.es/UnidadesDescentralizadas/AreasUrbanas_EducacionAmbiental/Catalogo/AirQualityPlan2011-15.pdf
- Plan de Protection de l'Atmosphère de l'agglomération strasbourgeoise, 2015-2020, <http://www.bas-rhin.gouv.fr/Politiques-publiques/Environnement-prevention-des-risques-naturels-et-technologiques/Air/Plan-de-Protection-de-l-Atmosphere-de-l-agglomeration-strasbourgeoise-PPA>
- Plan to improve air quality in Barcelona 2015-2018, https://ajuntament.barcelona.cat/qualitataire/sites/default/files/pdfs/PMQAB_EN_2014.pdf
- Préfet de la Region de l'Île-de-France, Préfet de Paris, Plan de protection de l'Atmosphère pour l'Île-de-France. Revision approuvée, le 25 mars 2013

References Section 4.4 – Strategic Environmental Assessment

- European Commission - DG ENV: Implementation of directive 2001/42 on the Assessment of the effects of certain plans and programmes on the environment.
- <http://ec.europa.eu/environment/eia/sea-support.htm>
- Ispra, 2015: Indicazioni operative a supporto della valutazione e redazione dei documenti della VAS. Delibera Consiglio Federale. Seduta del 22/04/2015 Doc. N. 51/15-CF. Manuali e Linee Guida 124/2015 <http://www.isprambiente.gov.it/it/pubblicazioni/manuali-e-linee-guida/indicazioni-operative-a-supporto-della-valutazione-e-redazione-dei-documenti-della-vas>

REFERENCES

- Ispra, 2017, Linee guida per l'analisi e la caratterizzazione delle componenti ambientali a supporto della valutazione e redazione dei documenti della VAS, Delibera del Consiglio federale. Seduta de 29/11/2016. Doc. n. 84/16 - CF. Manuali e Linee Guida 148/2017. http://www.isprambiente.gov.it/files/pubblicazioni/manuali-lineeguida/MLG_148_17_LGVAS.pdf
- Richter M., 2015: EIA and SEA in Germany Federal German Act on EIA and SEA of 2011 - The national system including transboundary environmental assessment - Subregional Workshop on the Espoo-Convention and the SEA Protocol, Rabat, Morocco, 14-15 April 2015
- UK Government, 2005: A Practical Guide to the Strategic Environmental Assessment Directive, Scottish Executive, Welsh Assembly Government Department of the Environment, Northern Ireland, Office of the Deputy Prime Minister, London, September 2005

References Section 4.5 – E-Reporting Format and Requirements

- <http://ec.europa.eu/environment/air/pdf/guidanceunderairquality.pdf>
- <http://www.unece.org/env/lrtap>
- http://www.ceip.at/fileadmin/inhalte/emep/pdf/NFR09_SNAP_GNFR.pdf
- <http://eeadmz1-cws-wp-air.azurewebsites.net/toolbox-for-e-reporting/pp-tool/>
- http://ec.europa.eu/environment/air/quality/legislation/pdf/IPR_guidance1.pdf
- http://ec.europa.eu/environment/air/quality/legislation/pdf/IPR_guidance2.pdf
- <https://inspire.ec.europa.eu/about-inspire/563>
- <http://eeadmz1-cws-wp-air.azurewebsites.net/products/links-to-eea-website/aide-tables/aideh.apps.eea.europa.eu/>

References Section 5.3 – Key factors

- DEFRA, 2018: Local Air Quality Management Technical Guidance (TG16), Part IV of the Environment Act 1995, Environment (Northern Ireland) Order 2002 Part III, February 2018
- <https://www.gov.uk/government/organisations/department-for-environment-food-rural-affairs>
- NSCA, 2000: National Society for Clean Air and Environmental Protection, Air Quality Plans, 2000: Interim Guidance for Local Authorities, 2000
- Partnership Air Quality, 2017 Final Action Plan of the Partnership on Air Quality
- Partnership Air Quality, 2017, WP4 deliverables

REFERENCES

References Section 6.1.4 – Challenges in awareness raising

- City of Amsterdam, 2016: 'Clean Air for Amsterdam: Set of Measures. Towards an emission-free 2025 Amsterdam', February 2016
- Greater London Authority, 2017, T-Charge info campaign
- HEAL, 2018, 'Communicating on Air Quality and Health: Inspiring practices, challenges and tips. Toolkit' Partnership Air Quality Action Plan, Action 5 Deliverable.

References Section 6.4 – Monitoring, Reporting and Reviewing

- Commission Staff Working Document Better Regulation Guidelines {COM(2015) 215 final} {SWD(2015) 110 final http://ec.europa.eu/smart-regulation/guidelines/docs/swd_br_guidelines_en.pdf
- DEFRA, Action Planning: Good Practice website: <http://laqm.defra.gov.uk/action-planning/good-practice.html>

References Section 7.1.1 – Air Quality Assessment

- Belis C.A., Janssen S., Thunis P., 2015. FAIRMODE contribution to the e-reporting implementation.
- Denby B. et al., 2011, Guide on modelling Nitrogen Dioxide (NO₂) for air quality assessment and planning relevant to the European Air Quality Directive, ETC/ACM Technical Paper 2011/15, December 2011
- EEA, 2011, The application of models under the European Union's Air Quality Directive: A technical reference guide, EEA Technical report No 10/2011, ISBN:978-92-9213-223-1
- VITO et al., 2015, WP4 Guidance on integrated air quality and health assessment systems. D4.4. Final version of the Guidance document. Appraisal FP7 project. http://appraisal-fp7.terraria.com/site/images/pdf/Appraisal_D4_4final.pdf

References Section 7.1.3 – Emission inventory and projections

- COPERT - COmputer Programme to calculate Emissions from Road Transport, www.emisia.com/copert
- EMEP/EEA, 2016. EMEP/EEA Air pollutant Emission Inventory Guidebook 2016. Technical guidance to prepare national emission inventories, EEA Report No 21/2016, ISBN 978-92-9213-806-6, ISSN 1977-8449, doi:10.2800/247535
- HBEFA - Handbook Emission Factors for Road Transport, <http://www.hbefa.net>
- Miranda A., Silveira C., Ferreira J., Monteiro A., Lopes D., Relvas H., Borrego C., Roebeling P., Current air quality plans in Europe designed to support air quality management policies, Atmospheric Pollution Research, 6 (2015) 434-443

References Section 7.1.4 – Source apportionment

- Belis C. A., Georgieva E, Janos O, Segal K, Török S, Veleva B, Perrone M, Vratolis S, Pernigotti D, Eleftheriadis K., A comparative analysis of the causes of air

REFERENCES

- pollution in three cities of the Danube region: implications for the implementation of the air quality directives. EUR 27712 EN. doi:10.2788/73231, <http://source-apportionment.jrc.ec.europa.eu/Docu/LB-NA-27712-EN-N.pdf>
- Belis C.A., Bo R. Larsen, Fulvio Amato, Imad El Haddad, Olivier Favez, Roy M.Harrison, Philip K. Hopke, Silvia Nava, Pentti Paatero, André Prévôt, Ulrich Quass, Roberta Vecchi, Mar Viana - 2014, *European Guide on Air pollution Source Apportionment with receptor models*, JRC, Report EUR 26080 EN, ISBN 978-92-79-32513-7, doi: 10.2788/9307
 - Belis, C. A.; Favez, O.; Harrison, R. M.; Larsen, B. R.; Amato, F.; El Haddad, I.; Hopke, P. K.; Nava, S.; Paatero, P.; Prévôt, A., Quass U., Vecchi R., Viana M., 2014. *European Guide on Air Pollution Source Apportionment with Receptor Models*, Report EUR 26080 EN, Publications Office of the European Union, Luxemburg,
 - Denby B. et al., 2011, *Guide on modelling Nitrogen Dioxide (NO₂) for air quality assessment and planning relevant to the European Air Quality Directive*, ETC/ACM Technical Paper 2011/15, December 2011
 - EEA, 2011, *The application of models under the European Union's Air Quality Directive: A technical reference guide*, EEA Technical report No 10/2011, ISBN:978-92-9213-223-1
http://fairmode.jrc.ec.europa.eu/document/fairmode/WG3/Sources_and_geographic_origin_of_particulate_matter.pdf
 - Lenschow, P., Abraham, H. J., Kutzner, K., Lutz, M., Preuß, J. D., and Reichenbacher, W., 2001. Some ideas about the sources of PM₁₀. *Atmospheric Environment* 35, S23-S3
 - Miranda A., Silveira C., Ferreira J., Monteiro A., Lopes D., Relvas H., Borrego C., Roebeling P., *Current air quality plans in Europe designed to support air quality management policies*, *Atmospheric Pollution Research*, 6 (2015) 434-443
 - P. Thunis, B. Degraeuwe, E. Pisoni, M. Trombetti, E. Peduzzi, C.A. Belis, J. Wilson, E. Vignati, *Urban PM_{2.5} Atlas - Air Quality in European cities*, EUR 28804 EN, Publications Office of the European Union, Luxembourg, 2017, ISBN 978-92-79-73876-0, doi:10.2760/336669, JRC108595
<https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/urban-pm25-atlas-air-quality-european-cities>
 - P. Thunis, B. Degraeuwe, E. Pisoni, M. Trombetti, E. Peduzzi, C.A. Belis, J. Wilson, A. Clappier, E. Vignati, 2018 - *PM_{2.5} source allocation in European cities: A SHERPA modelling study*, *Atmospheric Environment*, Volume 187, 2018, Pages 93-106, ISSN 1352-2310, <https://doi.org/10.1016/j.atmosenv.2018.05.062>

References Section 7.4.1 – Air Quality impacts

- Belis C. A., Georgieva E, Janos O, Sega K, Török S, Veleva B, Perrone M, Vratolis S, Pernigotti D, Eleftheriadis K., *A comparative analysis of the causes of air pollution in three cities of the Danube region: implications for the*

REFERENCES

- implementation of the air quality directives. EUR 27712 EN. doi:10.2788/73231, <http://source-apportionment.jrc.ec.europa.eu/Docu/LB-NA-27712-EN-N.pdf>
- Belis C.A., Bo R. Larsen, Fulvio Amato, Imad El Haddad, Olivier Favez, Roy M.Harrison, Philip K. Hopke, Silvia Nava, Pentti Paatero, André Prévôt, Ulrich Quass, Roberta Vecchi, Mar Viana - 2014, *European Guide on Air pollution Source Apportionment with receptor models*, JRC, Report EUR 26080 EN, ISBN 978-92-79-32513-7, doi: 10.2788/9307
 - Belis, C. A.; Favez, O.; Harrison, R. M; Larsen, B. R; Amato, F.; El Haddad, I.; Hopke, P. K; Nava, S.; Paatero, P.; Prévôt, A., Quass U., Vecchi R., Viana M., 2014. *European Guide on Air Pollution Source Apportionment with Receptor Models*, Report EUR 26080 EN, Publications Office of the European Union, Luxemburg,
 - Denby B. et al., 2011, *Guide on modelling Nitrogen Dioxide (NO₂) for air quality assessment and planning relevant to the European Air Quality Directive*, ETC/ACM Technical Paper 2011/15, December 2011
 - EEA, 2011, *The application of models under the European Union's Air Quality Directive: A technical reference guide*, EEA Technical report No 10/2011, ISBN:978-92-9213-223-1
http://fairmode.jrc.ec.europa.eu/document/fairmode/WG3/Sources_and_geographic_origin_of_particulate_matter.pdf
 - Lenschow, P., Abraham, H. J., Kutzner, K., Lutz, M., Preuß, J. D., and Reichenbacher, W., 2001. Some ideas about the sources of PM10. *Atmospheric Environment* 35, S23-S3
 - Maas, R., Grennfelt P., (eds), 2016. *Towards Cleaner Air. Scientific Assessment Report 2016*. EMEP Steering Body and Working Group on Effects of the Convention on Long-Range Transboundary Air Pollution, Oslo.
 - Miranda A., Silveira C., Ferreira J., Monteiro A., Lopes D., Relvas H., Borrego C., Roebeling P., *Current air quality plans in Europe designed to support air quality management policies*, *Atmospheric Pollution Research*, 6 (2015) 434-443
 - Thunis P., Degraeuwe B., Pisoni E., Trombetti M., Peduzzi E., Belis C.A., Wilson J., Vignati E., *Urban PM2.5 Atlas - Air Quality in European cities*, EUR 28804 EN, Publications Office of the European Union, Luxembourg, 2017, ISBN 978-92-79-73876-0, doi: 10.2760/336669, JRC108595
<https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/urban-pm25-atlas-air-quality-european-cities>

References Section 7.4.2 – Health impacts

- APHEKOM, 2012: Summary report of the Aphekom project 2008-2011, <http://aphekom.org/web/aphekom.org/home>
- Brandt et al., 2011: *Assessment of Health-Cost Externalities of Air Pollution at the National Level using the EVA Model System*, CEEH Scientific Report No 3, Centre for Energy, Environment and Health Report series, March 2011, pp. 98. http://www.ceeh.dk/CEEH_Reports/Report_3/CEEH_Scientific_Report3.pdf

REFERENCES

- Brukmann and Lutz, 2011: Do Low Emission Zones reduce the burden of particulates?, *XV ETH Conference on Combustion Generated Nanoparticles*, Zurich, June 26th-29th 2011
- EEA - European Environmental Agency, 2014: Air Quality in Europe - 2014 report, No. 5/2014
- IARC/WHO, 2013: IARC Outdoor air pollution is a leading environmental cause of cancer death, Press Release n. 221, 17th October 2013
- Miller, B., Hurley, F., 2006: Comparing estimated risks for air pollution with risks for other health effects.
- Pascal M., Corso M., Chanel O., Declercq C., Badaloni C., Cesaroni G., Henschel S., Maister K., Haluza D., Martin-Olmedo P., Medina S. Assessing the public health impact of urban air pollution in 25 European cities: results of the Aphekom project. *Science of the Total Environment*, 2013; 449:390-400.
- Pennell, K. G., Thompson, M., Rice, J. W., Senier, L., Brown, P., & Suuberg, E., 2013: Bridging research and environmental regulatory processes: the role of knowledge brokers. *Environmental science & technology*, 47(21), 11985-11992
- Perez L., Declercq C., Iñiguez C., Aguilera I., Badaloni C., Ballester F., Bouland C., Chanel O., Cirarda FB, Forastiere F., Forsberg B., Haluza D., Hedlund B., Cambra K., Lacasaña M., Moshammer H., Otorespec P., Rodríguez-Barranco M., Medina S., Künzli N.. Chronic burden of near-roadway traffic pollution in 10 European cities (Aphekom network). *ERJ Express*. Published on March 21, 2013 as doi: 10.1183/09031936.00031112
- Perez L., Künzli N., 2011: Guidelines of methods for integrating chronic effects of local-traffic pollution in the air pollution health impact methodology (WP4). Deliverable D3 April 2011, Swiss Tropical and Public Health Institute, Basel University of Basel CREAL.
- Raaschou-Nielsen et al., 2013: Air pollution and lung cancer incidence in 17 European cohorts: prospective analyses from the European Study of Cohorts for Air Pollution Effect (ESCAPE), www.thelancet.com/neurology Published on line July 10, 2013 [http://dx.doi.org/10.1016/S1470-2045\(13\)70279-1](http://dx.doi.org/10.1016/S1470-2045(13)70279-1)
- Van den Brenk, I., 2018: The Use of Health Assessment Impact Tools in European cities. A guide to support policy towards cleaner air and improvement of citizens' health. *Urban Agenda - Partnership on Air Quality, Action 4 Deliverable*, November 2018
- WHO, 2006: Air Quality Guidelines. Global Update 2005. Particulate matter, ozone, nitrogen dioxide and sulfur dioxide', <http://www.euro.who.int>, ISBN 92 890 2192 6
- WHO, 2013, a: Review of evidence on health aspects of air pollution - REVIHAAP Project. World Health Organization, Copenhagen, Denmark.
- WHO, 2013, b: Health risks of air pollution in Europe - HRAPIE project. New emerging risks to health from air pollution - results from the survey of experts. Copenhagen, Denmark.

REFERENCES

- WHO, 2013, c: Health risks of air pollution in Europe-HRAPIE project: Recommendations for concentration-response functions for cost-benefit analysis of particulate matter, ozone and nitrogen dioxide. Copenhagen, Denmark.
- WHO, AirQ+: software tool for health risk assessment of air pollution, <http://www.euro.who.int/en/health-topics/environment-and-health/air-quality/activities/airq-software-tool-for-health-risk-assessment-of-air-pollution>
- Zuurbier, M., van de Weerd, R., Fischer, P. (2014): Rekenmethode gezondheidseffectschatting luchtkwaliteit en geluid - een handreiking voor GGD'en, September 2014

References Section 7.4.3 – Climate change impact

- Anenberg et al., 2012: 'Global Air Quality and Health Co-Benefits of Mitigating Near-Term Climate Change through Methane and Black Carbon Emission Controls', Environ Health Perspect. 2012 Jun;120(6):831-9. doi: 10.1289/ehp.1104301. Epub 2012 Mar 14.
- Bond and Sun, 2005: 'Can reducing black carbon emissions counteract global warming?', Environ Sci Technol. 2005, Aug 15;39(16):5921-6 <https://www.ncbi.nlm.nih.gov/pubmed/16173547>
- Bruyninckx H., 2017, Cleaner air benefits human health and climate change, EEA Newsletter, Issue 2017/4, 15 December 2017, <https://www.eea.europa.eu/articles/cleaner-air-benefits-human-health>
- Defra, 2015 - 'Engaging local decision-makers about air pollution'. A guide for Directors of Public Health, February 2015
- Maas, R., Grennfelt P., (eds), 2016. Towards Cleaner Air. Scientific Assessment Report 2016. EMEP Steering Body and Working Group on Effects of the Convention on Long-Range Transboundary Air Pollution, Oslo.
- Shindell et al., 2012: 'Simultaneously Mitigating Near-Term Climate Change and Improving Human Health and Food Security', Science 2012; 335: 183-189.
- Stohl et al., 2015, Evaluating the Climate and Air Quality Impacts of Short-Lived Pollutants, Atmos. Chem. Phys., 15, 10529-10566, <https://doi.org/10.5194/acp-15-10529-2015>.

References Section 7.5 – Selection and prioritizing measures

- Amann et al., 2011: Cost-effective control of air quality and greenhouse gases in Europe: Modelling and policy applications, Environmental Modelling & Software, 26, 1489-1501.
- Carnevale et al., 2012: An integrated assessment tool to define effective air quality policies at regional scale, Environmental Modelling & Software, 38, 306-315.
- EMEP/EEA, 2016: EMEP/EEA air pollutant emission inventory guidebook.

REFERENCES

- Guariso G., Maione M., Volta M., 2016: A decision framework for Integrated Assessment Modelling of air quality at regional and local scale, *Environmental Science & Policy*, 65, 3-12.
- Miller, B., Hurley, F., Comparing estimated risks for air pollution with risks for other health effects.
- Stohl et al., 2015. Evaluating the Climate and Air Quality Impacts of Short-Lived Pollutants, *Atmos. Chem. Phys.*, 15, 10529-10566
- Thunis P., Degraeuwe B., Pisoni E., Ferrari F., Clappier A., 2016: On the design and assessment of regional air quality plans: The SHERPA approach, *Journal of Environmental Management*, 183, 952-958.
- Thunis P., et al, 2018: PM2.5 source allocation in European cities: A SHERPA modelling study, *Atmospheric Environment*, 187, 93-106.
- WHO, 2013: Health risks of air pollution in Europe - HRAPIE project. New emerging risks to health from air pollution - results from the survey of experts. Copenhagen, Denmark.
- World Bank and Institute for Health Metrics and Evaluation, 2016. 'The Cost of Air Pollution: Strengthening the Economic Case for Action'. Washington, DC.
- Zuurbier, M., van de Weerd, R., Fischer, P. (2014): Rekenmethode gezondheidseffectschatting luchtkwaliteit en geluid - een handreiking voor GGD'en, September 2014.

LEGISLATION

Commission Decision of 19 March 2004 concerning guidance for implementation of Directive 2002/3/EC of the European Parliament and of the Council relating to ozone in ambient air (notified under document number C(2004) 764)

Commission Directive (EU) 2015/1480 of 28 August 2015 amending several annexes to Directives 2004/107/EC and 2008/50/EC of the European Parliament and of the Council laying down the rules concerning reference methods, data validation and location of sampling points for the assessment of ambient air quality

Commission Implementing Decision 2011/850/EU of 12 December 2011 laying down rules for Directives 2004/107/EC and 2008/50/EC of the European Parliament and of the Council as regards the reciprocal exchange of information and reporting on ambient air quality (notified under document C (2011) 9068) ('IPR Decision')

Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora ('Habitats Directive')

Directive (EU) 2016/2284 of 14 December 2016 of the European Parliament and of the Council on the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC ('National Emissions Ceilings Directive' - NECD)

Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment ('Strategic Environmental Assessment' - SEA Directive)

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 ('Public Participation Directive' - PPD)

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 ('Fourth Daughter Directive')

Directive 2007/2/EC establishing an Infrastructure for Spatial Information in the European Community ('INSPIRE Directive')

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 ('Ambient Air Quality Directive' - AAQD)

Directive 2011/92/EU of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment ('Environmental Impact Assessment' - EIA Directive)

Directive 2014/52/EU of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment ('EIA Directive - Amended')



APPENDIXES



I List of mandatory elements of an Air Quality Plan

This Appendix shows the list of information to be included in the local, regional or national air quality plans for improvement in ambient air quality, as included in Annex XV - Part A of Directive 2008/50/EC.

ANNEX XV

Information to be included in the local, regional or national air quality plans for improvement in ambient air quality

A. Information to be provided under article 23 (air quality plans)

1. Localisation of excess pollution

- (a) region;
- (b) city (map);
- (c) measuring station (map, geographical coordinates).

2. General information

- (a) type of zone (city, industrial or rural area);
- (b) estimate of the polluted area (km²) and of the population exposed to the pollution;
- (c) useful climatic data;
- (d) relevant data on topography;
- (e) sufficient information on the type of targets requiring protection in the zone.

3. Responsible authorities

Names and addresses of persons responsible for the development and implementation of improvement plans.

4. Nature and assessment of pollution

- (a) concentrations observed over previous years (before the implementation of the improvement measures);
- (b) concentrations measured since the beginning of the project;

I - List of mandatory elements of an Air Quality Plan

- (c) techniques used for the assessment.
5. *Origin of pollution*
 - (a) list of the main emission sources responsible for pollution (map);
 - (b) total quantity of emissions from these sources (tonnes/year);
 - (c) information on pollution imported from other regions.
 6. *Analysis of the situation*
 - (a) details of those factors responsible for the exceedance (e.g. transport, including cross-border transport, formation of secondary pollutants in the atmosphere);
 - (b) details of possible measures for the improvement of air quality.
 7. *Details of those measures or projects for improvement which existed prior to 11 June 2008, i.e:*
 - (a) local, regional, national, international measures;
 - (b) observed effects of these measures.
 8. *Details of those measures or projects adopted with a view to reducing pollution following the entry into force of this Directive:*
 - (a) listing and description of all the measures set out in the project;
 - (b) timetable for implementation;
 - (c) estimate of the improvement of air quality planned and of the expected time required to attain these objectives.
 9. *Details of the measures or projects planned or being researched for the long term.*
 10. *List of the publications, documents, work, etc., used to supplement information required under this Annex.*

II List of existing guidelines for Air Quality Plans

It is not easy to find guidelines on how to draft and implement Air Quality Plans at local level that could be used by cities of different EU Member states, also due to the different implementation of Dir. 2008/50/EC in the various EU countries. This is the motivation for drafting this Code, which has been produced to help cities and local authorities fulfil EU legislation applicable to Air quality planning, and thus protect the health of citizens and of the environment.

The UK, for instance, in the implementation of Dir. 2008/50/EC has developed Technical Guidelines that are different for England, Scotland, Wales and for the London area. In the present Code the most recent Technical Guidance for Northern Ireland (DEFRA, 2018) has been considered, seeming to be nearest to legislation for Cities AQPs of other EU Countries. Well before the adoption of the Dir. 2008/50/EC the UK National Society for Clean Air and Environmental Protection drafted an Interim Guidance for Local Authorities AQPs (NSCA, 2000), but indication need to be adapted to the present legislative context.

Two other interesting Technical Guidance documents are respectively, the one edited by the German Environment Agency and addressed to the Bulgarian Government (Umweltbundesamt, 2015), and the one commissioned by the Italian Ministry to the Italian Environmental Agencies System (SNPA, 2016) for Regions - who are in charge for AQPs in Italy - both focused on the content of the AQP and on available instruments for assessment and air quality modelling, rather than on the process to follow for adopting the Directive. Others Guidance documents found in research literature are focused on specific topics (air quality modelling tools, air quality measures, etc.) and are cited in the Code in the related section.

EXISTING GUIDELINES FOR DRAFTING AQPs:

- DEFRA, 2018: Local Air Quality Management Technical Guidance (TG16), Part IV of the Environment Act 1995, Environment (Northern Ireland) Order 2002 Part III, February 2018 <https://www.gov.uk/government/organisations/department-for-environment-food-rural-affairs>
- NSCA - National Society for Clean Air and Environmental Protection, 2000: Air Quality Plans: Interim Guidance for Local Authorities, Air Quality Plans Working Group of NSCA's Air Quality Committee, 2000 <https://laqm.defra.gov.uk/assets/aqactionplansinterim.pdf>
- SNPA - Sistema Nazionale per la Protezione dell'Ambiente, Gruppo di Lavoro Interagenziale 30, 2016 - Linee Guida per la redazione dei Piani di Qualità dell'Aria di cui all'art. 9 del D.Lgs. 155/2010, 29 Novembre 2016 <http://www.isprambiente.gov.it/files/snpa/consiglio-federale/Delibera90cfPropostaLLGGredazionepianidiqualitdellariaconallegati.pdf>

II - List of existing guidelines for Air Quality Plans

- UBA, 2016 - Guideline on Air Quality Plans, August 2016, ISSN 2363-832X
<https://www.umweltbundesamt.de/en/publications>
- DEFRA, 2018 - Air Quality Action Planning and Good Practice
<http://laqm.defra.gov.uk/action-planning/good-practice.html>

Some EXISTING GUIDELINES on Health Impact/related Citizens Awareness/AQ Measures

- DEFRA and Public Health England, 2017: Air Quality: A Briefing for Directors of Public Health, March 2017
https://www.local.gov.uk/sites/default/files/documents/6.3091_DEFRA_AirQualityGuide_9web_0.pdf
- GLA - Greater London Authority, 2012: Air Quality in City of London: A Guide for Public Health Professionals, November 2012
https://www.london.gov.uk/sites/default/files/air_quality_for_public_health_professionals_-_city_of_london.pdf
- ENVII Committee, 2016: Implementation of Ambient Air Quality
[http://www.europarl.europa.eu/RegData/etudes/STUD/2016/578986/IPOL_STU\(2016\)578986_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/STUD/2016/578986/IPOL_STU(2016)578986_EN.pdf)

Some EXISTING GUIDELINES on AQ Measures:

- UBA, 2015: Inventory and effectiveness of measures to improve air quality, TEXTE 05/2015, ISSN 1862-4804
<http://www.umweltbundesamt.de/publikationen/inventory-effectiveness-of-measures-to-improve-air>
- X. Querol and F. Amato (eds.) 2017: GUIDEBOOK: Measures to Improve Urban Air Quality, AIRUSE Project, ISBN: 978-84-697-5499-3, September 2017
<http://www.cleanaircities.net/>
- EEA - European Environment Agency, 2013: Air Implementation Pilot. Lessons learnt from the implementation of air quality Legislation at urban level, EEA Report No 7/2013, ISSN 1725-9177
<https://www.eea.europa.eu/publications/air-implementation-pilot-2013/file>
- ETC/ACM - European Topic Centre on Air Pollution and Climate Change Mitigation, 2013: Air Implementation Pilot: Workshop on measures, Copenhagen, February 27th, 2013 - ETC/ACM Technical paper 2013/5, June 2013

TRANSPORT

- *Low Emission Zones:* <http://urbanaccessregulations.eu/>



II - List of existing guidelines for Air Quality Plans

LAND USE PLANNING

- EPUK & IAQM, 2017: Land-Use Planning & Development Control: Planning For Air Quality. Guidance from Environmental Protection UK and the Institute of Air Quality Management for the consideration of air quality within the land-use planning and development control processes, January, 2017
<http://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf>

CONSTRUCTION SECTOR

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

Some EXISTING GUIDELINES on AQ Modelling:

- Belis C., et al, 2014: European Guide on with Receptor Models Air Pollution Source Apportionment, European Commission Joint Research Centre Institute for Environment and Sustainability, Report EUR 26080 EN, ISBN 978-92-79-32513-7, doi: 10.2788/9307
<https://ec.europa.eu/jrc/en/publication/reference-reports/european-guide-air-pollution-source-apportionment-receptor-models>
- G. Guariso and M. Volta (eds.) 2017, Air Quality Integrated Assessment, PoliMI SpringerBriefs, DOI 10.1007/978-3-319-33349-6_1, November 2017
<https://www.springer.com/gp/book/9783319333489>
- JRC - Joint Research Centre, 2014: European Guide on with Receptor Models Air Pollution Source Apportionment, European Commission Joint Research Centre Institute for Environment and Sustainability, Report EUR 26080 EN, ISBN 978-92-79-32513-7
<https://ec.europa.eu/jrc/en/publication/reference-reports/european-guide-air-pollution-source-apportionment-receptor-models>
- Miranda A. et al, 2015: Current air quality plans in Europe designed to support air quality management policies, Atmospheric Pollution Research 6 (2015) 434-443
<https://www.sciencedirect.com/science/article/pii/S1309104215302129>
- VITO, 2015: WP4 Guidance on integrated air quality and health assessment systems. D4.4 Final Version of the Guidance document (version 1.1), FP7 Appraisal project, 8 June 2015.
www.appraisal-fp7.eu
- P. Thunis, B. Degraeuwe, E. Pisoni, F. Ferrari and A. Clappier, 2016: On the design and assessment of regional air quality plans: The SHERPA approach, Journal of Environmental Management 183
<https://core.ac.uk/download/pdf/82813188.pdf>

III List of existing guidelines for Short-term Action Plans

Short-term action plan are defined by Art. 24 of Directive 2008/50/EC.

An existing collection of Best Practices for implementing short-term action plans, that can be seen as a sort of Guidance, is given in the following report:

- AEA and Umweltbundesamt, 2012: Best Practices for short-term action plans, Report for the European Commission, January 2012
http://ec.europa.eu/environment/air/quality/legislation/pdf/SC5_Task%201_report.pdf

EXAMPLES of short-term action plans

- STRASBOURG (France)
https://www.bisonfute.gouv.fr/IMG/pdf/Strasbourg_Dossier_de_presse_du_3_juillet_17.pdf
- MANNHEIM (Germany)
https://rp.badenwuerttemberg.de/rpk/Abt5/Ref541/Luftreinhalteplan/rpk54.1_lrp_fortschr_jan12.pdf
- PO VALLEY BASIN Agreement_(Italy)
<http://www.regione.lombardia.it/wps/portal/istituzionale/HP/DettaglioRedazionale/servizi-e-informazioni/cittadini/Tutela-ambientale/Qualita-dell-aria/misure-di-limitazione-per-qualita-aria/misure-di-limitazione-per-qualita-aria>

IV Cities Air Quality Plans: examples of best practices

BERLIN

Air Quality Plan for Berlin 2011-2017

https://www.berlin.de/senuvk/umwelt/luftqualitaet/de/luftreinhalteplan/download/lrp_150310_en.pdf

(English full version)

Themes and pollutants: traffic (NO₂, PM₁₀, diesel soot), construction sites (PM₁₀, diesel soot).

Objective: for compliance with EU Limit Values for NO₂ and PM₁₀ in long term for the whole city territory; to protect citizens health reducing the number, duration and intensity of the exceedances.

For AQP structure:

- ✓ A full version in English

For consistent implementation of Dir. 2008/50/EC

For attention for social equity in air pollution exposure and related health effects (Environmental justice as a model scheme):

- ✓ Socio-spatial distribution maps of air pollutants in Berlin considered for Urban Planning and AQ measures

For Citizen Awareness efforts:

- ✓ An **AQP Brochure** to explain easily the Plan to the citizens:
https://www.berlin.de/senuvk/umwelt/luftqualitaet/de/luftreinhalteplan/download/lrp_broschuere_en.pdf
- ✓ **maps of congestion, emissions and air pollution** on the main road network created for the Air Quality Plan are made available in Berlin's Environmental Atlas:
http://www.stadtentwicklung.berlin.de/umwelt/umweltatlas/dinh_03.htm
- ✓ **Information on air pollution** available on the website of the Senate Department for Urban Development and Environment:
<http://www.stadtentwicklung.berlin.de/umwelt/luftqualitaet/>



IV - Cities Air Quality Plans: examples of best practices

HELSINKI

Air Quality Plan of the City of Helsinki 2017-2024

<https://www.hel.fi/static/ymk/julkaisut/julkaisu-11-16.pdf>

(English summary)

Themes and pollutants: traffic (NO₂, PM_{2.5}), street dust (PM₁₀), wood burning (PM_{2.5}, B(a)P)

Objective: to get below the annual limit value for NO₂, to generally improve the air quality in Helsinki

For AQP structure:

- ✓ a short summary in English for each report;
- ✓ a separate detailed report with Analysis of Air Quality situation a part from the AQP:

Background Report of the AQP of the City of Helsinki 2017-2024 (English summary)

For Participatory process:

- ✓ Public consultation and Stakeholder involvement description in a dedicated publication:



Interaction Report of the AQP of the City of Helsinki 2017-2024 (English summary)

<https://www.hel.fi/static/ymk/ilmansuojelu/vuorovaikutusraportti.pdf>

(See also Section 6.2 of this Code)

For Citizen Awareness efforts:

- ✓ An air quality citizens awareness brochure
Clean Air for Helsinki - Brochure (English version)
www.hel.fi/air-protection
- ✓ A website with real time information on air quality situation:
Air quality in the Helsinki Metropolitan Area – Website
www.hsy.fi/airquality

Legislation on Air pollution control in Finland

<http://www.ym.fi/en->

[US/The_environment/Legislation_and_instructions/Climate_protection_legislation](http://www.ym.fi/en-US/The_environment/Legislation_and_instructions/Climate_protection_legislation)

IV - Cities Air Quality Plans: examples of best practices

STRASBOURG

Plan de Protection de l'Atmosphère de l'agglomération strasbourgeoise, 2015-2020
<http://www.bas-rhin.gouv.fr/Politiques-publiques/Environnement-prevention-des-risques-naturels-et-technologiques/Air/Plan-de-Protection-de-l-Atmosphere-de-l-agglomeration-strasbourgeoise-PPA>

Themes and pollutants: PM₁₀, NO₂

Objective: Compliance with EU Limit Values for NO₂ and PM₁₀; to reduce citizens' exposure and AQ related health impact also to local exceedances

For AQP structure:

- ✓ rigorous structure and detailed report
- ✓ Impact assessment of measures finalized to consider 'citizens exposure' to several pollutants

For consistent implementation of Dir. 2008/50/EC

For APHEKOM approach in health assessment

For Citizen Awareness efforts:

http://www.laircmonaffaire.net/advice_notes.php?PHPSESSID=28d51b5be9fae3a2c96dee63ff2de88e



IV - Cities Air Quality Plans: examples of best practices

ZAGREB

Air Quality Plan of the City of Zagreb (2015-2023)

<http://www.eko.zagreb.hr/default.aspx?id=247>

Themes and pollutants: traffic (NO₂, PM₁₀, PM_{2.5}), households plants (PM₁₀, benzo(a)pyrene), expansion of measuring stations network for continuous AQ monitoring

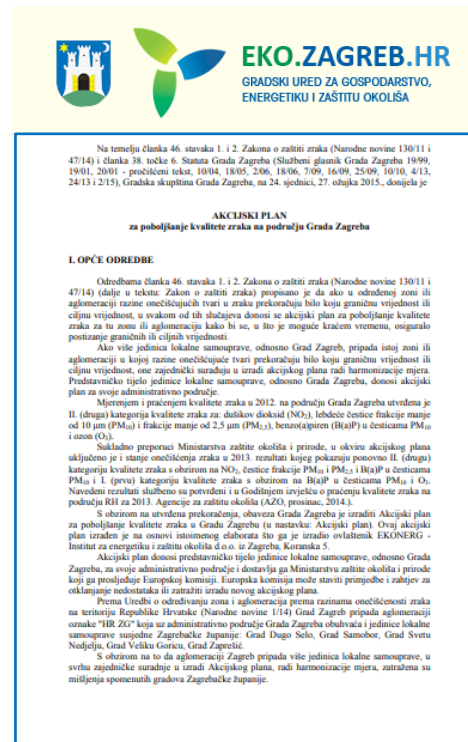
Objective: Air quality improvement in the territory of the City of Zagreb and compliance with EU Limit Values. A significant effect on reduction of levels of nitrogen oxides (NO_x), PM₁₀ and PM_{2.5} and benzo(a)pyrene - B(a)P and Ozone (O₃) is expected.

For AQP structure:

- ✓ A full version in Croatian (SGGZ 5/15): Action Plan for Improving Air Quality in the City of Zagreb

For consistent implementation of Dir. 2008/50/EC:

- ✓ The Air Quality Plan of the City of Zagreb format and content are defined in accordance with national legislation in which the provisions of 2008/50/EC Directive have been transposed
- ✓ For regular monitoring reporting:
 - 2015 and 2016 Report on the Implementation of the Action Plan for the Improvement of Air Quality in the City of Zagreb
- ✓ For integration with other Plans and Programmes at local and national scale:
 - *Programme of the City of Zagreb for the protection of air, ozone layer, climate change adaptation and mitigation;*
 - *Sustainable Energy Action Plan for the development of the City of Zagreb (SEAP);*
 - *Plan for the protection of air, ozone layer and climate change mitigation in the Republic of Croatia for the 2013- 2017 period (OG 139/13).*
- ✓ For tackling B(a)P emissions and reduction of ground-level ozone pollution (O₃). For reduction of O₃ precursors (e.g. NO_x, VOC) local measures are not sufficient, and action by the international community within the framework of LRTAP and the related Gothenburg protocol is required.



Legislation on Air pollution control in Republic of Croatia

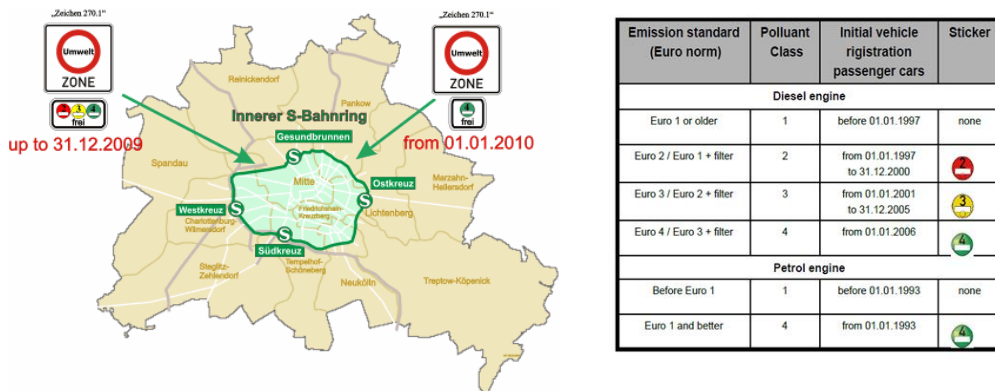
<http://www.mzoiop.hr/en/environment/regulations-and-international-treaties-ratified-or-signed-by-the-republic-of-croatia.html>

V Examples of Air Quality measures

TRANSPORT MEASURES

Low Emission Zone - LEZ for trucks and cars (Berlin)

This emission-based limited traffic zone includes the inner city of Berlin within the suburban rail ring. It covers about 85 km² of a very densely built-up area with more than 1 million residents. The traffic restriction applies permanently and independently from the current pollution level of the air. It is based on German vehicle emissions level classification for which three coloured stickers have been settled to label lowest emission vehicles (highly emitting vehicles have no sticker) in order to help roadside controls in LEZs implementation.



Source: <https://www.berlin.de/senuvk/umwelt/luftqualitaet/de>

The following requirements are effective for the whole area of the LEZ, settled in 2005. *Stage I* from 1.1.2008: Vehicles (trucks and cars) must at least be up to the standards of the emission group 2. Vehicles of emission groups 2, 3 and 4, i.e. with red, yellow or green stickers, are allowed to drive. *Stage II* from 1.1.2010: Only vehicles of emission group 4, i.e. with a 'green sticker', are allowed to drive.

LEZ results in Berlin were assessed in term of vehicular emissions avoided as in the followings. *Stage I*: - 24% of diesel soot, - 14% NO_x; *Stage II*: - 58% of diesel soot, compared to trend without LEZ.

In the framework of the AQ Plan of Berlin 2011-2017, in consideration of the persistent high fraction of Euro 3 diesel vehicles without a particulate filter due to individual exemptions it was decided to limit those only to few categories. The effects of this tightening of the LEZ was assessed by modelling for main roads a reduction of vehicular emissions: - 3.6 t/a of diesel soot (or -3.6% black carbon emissions); - 55 t/a (-1.1%) of NO_x emissions. However, benefits in term of emissions reduction and air quality are expected also in minor roads and beyond the boundary of the LEZ.

V - Examples of Air Quality measures

In term of air quality the effect of the LEZ was assessed in the framework of the AQ Plan of Berlin together with the others 'vehicles technology' measures: the number of residents on main roads affected by EU limit value exceedances could be reduced approximatively by 25% for PM₁₀ and by 46% for NO₂ thanks also the LEZ *Stage II* implementation. Notably this kind of measure allows to reduce the exposure to traffic proximity primary pollutant (-5% of NO₂ and -50% of diesel soot/Black Carbon concentration measured) and less to secondary pollutants such as PM₁₀, more affected by larger scale pollution phenomena.

Berlin experience showed that to reduce the economic and social consequence of this measure it is useful introduce different stages with long transitional periods and economic incentives for scrapping older vehicles to help vehicle owner. Lesson learnt is also that the city management of granting individual exemptions is a human resources cost to be considered in planning.

For more details:

- https://www.berlin.de/senuvk/umwelt/luftqualitaet/de/luftreinhalteplan/download/paper_lez_berlin_en.pdf
- https://www.berlin.de/senuvk/umwelt/luftqualitaet/de/luftreinhalteplan/download/lrp_150310_en.pdf
- Brukmann and Lutz, 2011: Do Low Emission Zones reduce the burden of particulates?, XV ETH Conference on Combustion Generated Nanoparticles, Zurich, June 26th-29th 2011

Additional information about LEZ in German Cities could be found in the following document:

- UBA, 2015: Inventory and effectiveness of measures to improve air quality, TEXTE 05/2015, ISSN 1862-4804
<http://www.umweltbundesamt.de/publikationen/inventory-effectiveness-of-measures-to-improve-air>

V - Examples of Air Quality measures

Congestion Charge (London) - Road pricing to reduce congestion

The congestion charging scheme in London was introduced in February 2003. This road charging scheme charges a daily rate for vehicles to enter and travel in the 21 square kilometres central zone between 7:00 and 18:30 during weekdays. The scheme is supported by an infrastructure of camera sites, using automatic number plate recognition (ANPR) technology cameras placed on the entry points into the congestion zone and in locations within the zone.



Source: <https://tfl.gov.uk/modes/driving/congestion-charge/congestion-charge-zone/road-signs>

Vehicles driving in the charging zone during the charging period are charged a flat rate of £10 per day. Vehicles exempt from the scheme include licensed taxis and minicabs, buses, motorcycles, vehicles for disabled persons including “blue badge” holders and vehicles with 9 seats or more. Residents in the charging zone - of which approximately 40,000 households own a car - are entitled to a 90% discount of the charge.

Within the charging zone road traffic flows have decreased by 15% and mean daily traffic speed has increased by 20 per cent (from 19 km/h to 23 km/h). Congestion in the charging zone has been reduced by 30%. Car trips into the central charging zone has reduced by 65,000 - 70,000 per day. Changes in vehicle km travelled in the charging zone shows an increase in buses (+20%), an increase in taxis (+13%) and a decrease in cars (-29%) and heavy goods vehicles (-11%).

Bus usage has increased inside and outside the congestion charging zone. In terms of air quality, congestion charging in London has been found to reduce emissions of nitrogen oxides and particulates by 12% and carbon dioxide by 19% within the charging zone.

For more details:

- <http://www.tfl.gov.uk/roadusers/congestioncharging/default.aspx><http://www.tfl.gov.uk/roadusers/congestioncharging/default.aspx>

V - Examples of Air Quality measures

T-Charge (London)

The Mayor of London has launched a £10 toxicity 'T-Charge' aimed at older, more polluting vehicles on London roads. The T-Charge, which went into force on 23 October 2017, applies mainly to diesel and petrol vehicles registered before 2006, but also includes later models. The T-Charge aims to help improve air quality in London, in particular with regard to nitrogen dioxide (NO₂) and particulate matter (PM), both of which have an adverse effect on human health.



Source: <https://www.london.gov.uk/what-we-do/transport/mayors-new-ps10-toxicity-charge-londons-most-polluting-cars>

The T-Charge (officially known as the 'Emissions Surcharge') aims to discourage the use of older, more polluting vehicles driving into and within central London. The T-Charge applies in the same area as the existing Congestion Charging Zone.

It is the first step towards the introduction of the Ultra Low Emission Zone (ULEZ), a 24-hour charging zone in central London for older vehicles.

For more details:

- <https://www.london.gov.uk/what-we-do/transport/mayors-new-ps10-toxicity-charge-londons-most-polluting-cars>

V - Examples of Air Quality measures

Environmental Bonus for Buses Cutting Emissions (Helsinki)



Source: <https://www.smartcitiesworld.net/news/news/app-teaches-helsinki-citizens-about-pollution-1793>

Helsinki's goal is emission-free public transport by 2025.

Environmental bonuses are paid on the basis of a tendering process to bus operators for measures to cut emissions. The tendering process takes account of both carbon emissions and harmful local emissions such as small particles and nitrogen oxides. The emphasis is on reducing nitrogen oxides and carbon emissions.

Bonuses are paid for new measures that exceed the commitments set out in the currently valid contracts. Helsinki assesses the measures offered and pays bonuses according to the emission reductions achieved. The costs of emissions avoided are assessed according to the Directive 2009/33/EC. Measures are ranked according to their cost-effectiveness and they are procured with the allotted sum of money (1 million euros in 2016). The bonus has been applied to finance emission reductions by using biofuels and by retrofitting EEV buses with high NO₂ emissions (15 000 euros per retrofitted bus).

After the retrofit the emissions of these EEV buses in real world driving were measured and found to be on the Euro VI level. There is an environmental zone in the city centre applying to local Helsinki buses and Helsinki waste collection vehicles. When new lines and areas are opened for competitive bidding, the buses and waste collection vehicles operating within the environmental zone must comply with the Euro VI emission norms. The environmental zone covers the Southern part of the Hakamäentie road.

For more details:

- <https://www.hsl.fi/en/news/2016/hsl-invests-one-million-euros-reducing-emissions-9094>

V - Examples of Air Quality measures

Cleaning public transport (Berlin)



Source: <https://www.berlin.de/>

The public transport company of Berlin (BVG) operates a fleet of currently about 1,320 buses. These buses are equipped since the late 1990s gradually with particle filters. Prior to entry into force of the Clean Air Plan 2005, about 72 % of the buses were equipped with particulate filters. With these filters, the particulate emission of buses was reduced by about 70-90%. In addition to the particle emission the buses also contribute significantly to local pollution by nitrogen oxides. In 2005 the following goals to reduce emissions of the buses were set out in the Clean Air Plan: full retrofitting with particulate filters by 2010 and conversion to Euro5/EEV-Standard of 600 buses by 2010.

The objectives of the Clean Air Plan were implemented in the local transport plan (NVP) of Berlin from 2006 to 2009 and incorporated in the draft NVP 2010-2014. The BVG has procured between 2005 and 2010 a total of 923 buses, 161 of them with the exhaust emission standard Euro 3, 409 with Euro 4 and 353 with EEV/Euro 5.

All newly purchased diesel buses are equipped with a closed particulate filter.

For more details:

- http://www.stadtentwicklung.berlin.de/umwelt/luftqualitaet/de/luftreinhalteplan/download/Luftreinhalteplan_Berlin_2011.pdf

V - Examples of Air Quality measures

Buses retrofitting for NO_x (Copenhagen)

City buses contribute to a large proportion of air pollution in cities because normal filters and catalysts only function well with high motor temperatures. The low speed and many stops counteract the traditional pollution reduction systems in cities.

In order to improve the air quality for the citizens, 299 diesel buses in Copenhagen has been fitted with an innovating NO_x reduction technology that neutralizes NO_x emissions even at low motor temperatures, reducing emissions by 90-95%.



Source: <https://ing.dk/artikel/299-busser-i-koebenhavn-har-faet-nox-og-partikelfiltre-182756>

The upgraded fleet is a mix of both older and newer vehicles, and after the upgrade they are robustly meeting Euro VI emissions legislation in all real driving conditions, including congested city driving and at sub-zero temperatures.

City of Copenhagen has reduced NO_x emissions by up to 95% on its public buses since implementing new clean air filters in early 2016. The total amount of NO_x emissions in Copenhagen have been reduced by 4% as a result of the new bus filters.

For more details:

- http://www.cleanaireurope.org/fileadmin/user_upload/redaktion/downloads/The_Danish_Ecocouncil/Clean_air_CPH_2014_UK.pdf
- The Danish Council, 2014: CLEAN AIR COPENHAGEN: Air quality challenges and solutions, ISBN: 978-87-92044-65-5, January 2014

V - Examples of Air Quality measures

Cycling networks, Cycling Highways (Copenhagen/Groningen/London)

A Cycle Super Highway is a cycle highway, where the commuters' needs have been given the highest priority. The project seeks to create routes that offer fast, comfortable and safe service. A Cycle Super Highway is defined both by its location, as well as its physical qualities. The highway should connect areas with many workers and students to their homes, and to public transportation possibilities as well. The highways should be fast, meaning as direct as possible and with as few stops as possible. A good example of how this is achieved is by the use of green waves. Traffic lights are normally coordinated in favour of cars, but the aim for the Cycle Super Highways, is for traffic lights to be adjusted for cyclists along the many main traffic arteries. At a speed of 20 km/h, cyclists will be able to surf a wave of green lights through the city during rush hour.



Source: <http://denmark.dk/en/green-living/strategies-and-policies>

Furthermore, the highways have to be comfortable and safe. Comfort is secured by the use of high quality asphalt and maintenance. Security is achieved for instance, by clear marking and distance to cars including advanced stop lines, to make cyclists more visible to motorists, as well as sufficient lightning. In order to reduce risks of accidents, many intersections will be restructured in order to give cyclists priority. For example, in intersections with separate traffic lights for bikes, the cyclists may get a green light four seconds before cars would. In some cases, the head start would be as much as 12 seconds. These initiatives make the cyclists far more visible in traffic. In addition, you get to where you're going quicker. Clear signage will make it easy for the commuter to find his way. To minimize clutter, design will be based on traditional signage and we will use existing posts where possible. Maintenance is essential for the commuters, especially during the winter. The Cycle Super Highways will be given the highest priority in each municipality, concerning issues of road repair and snow removal.

For more details:

- <http://www.cykelsuperstier.dk/sites/default/files/Cycle%20Super%20Highways.pdf>
- <http://www.cykelsuperstier.dk/concept>
- <http://www.aviewfromthecyclepath.com/2009/02/how-groningen-grew-to-be-worlds-number.html>
- <http://www.tfl.gov.uk/roadusers/cycling/11901.aspx>

V - Examples of Air Quality measures

Parking discount for Low-emission Vehicles (Helsinki)



Source: <https://www.ksml.fi/kotimaa/Tuleeko-sakko-jos-parkkimitari-on-rikki-%E2%80%93-pys%C3%A4k%C3%B6innivalvoja-kertoo/192892>

Low-emission vehicles get a 50 % reduction on parking fees in Helsinki. The discount applies to all paid car parks in general traffic areas controlled by the city. It also applies to paid resident and corporate parking permits. In order to get the discount, the parking charge must be paid either by mobile phone or a specific payment device (Comet).

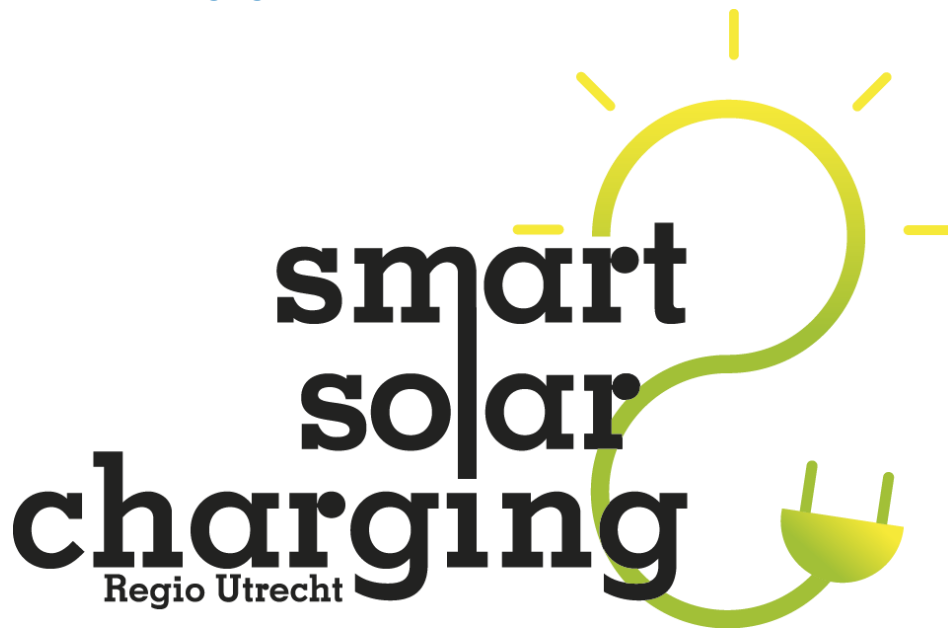
The emission criteria are reviewed regularly. The criteria cover both carbon dioxide emissions and regulated emissions which have an impact on air quality. These emissions are regulated with Euro norms. From the beginning of 2017 the criteria are Euro 5 for all types of cars and specific CO₂ limits depending on the fuel: 50 g/km for diesel cars (only plug-in hybrids fulfil this criteria), 100 g/km for petrol cars and 150 g/km for natural gas (bifuel) and ethanol (flexifuel) cars. All fully electric cars and electrically operated class L vehicles which have been registered for road use are categorized as low-emission vehicles.

For more details:

- http://www.hel.fi/www/helsinki/en/maps-andtransport/parking/vahapaastoisten_alennus

V - Examples of Air Quality measures

Smart Solar Charging for electric cars (Utrecht)



Source: <https://smartsolarcharging.eu/uniek-energiesysteem-in-utrechtse-wijk-lombok-breidt-uit-in-de-regio/>

The measure involves the development of renewable energy (solar power) in combination with storage in electric car batteries of a surplus of the decentralized produced power in order to avoid grid stress. Electric cars can be charged and discharged according to the demand of the power in the house or the electric car battery. Bidirectional charging points for electric cars, provide optimal use of decentralized generated solar power. At this charging point, the car can both charge and discharge wherever the power is necessary. The car battery is therefore used as a storage unit for solar energy that can be used when necessary.

Solar powered electric mobility is made accessible to a large audience by sharing the costs among users. Through a website 'We Drive Solar' residents can apply for a 100% (shared) electric car with a range of 300 kilometres, which also forms part of a local energy system on solar energy. All residents, businesses and organizations in the province of Utrecht can participate. Entry fee: € 99, - per month, including mileage, insurance and an app to unlock the car. Each car gets its own parking space and charging point. There are 150 cars available.

For more details:

- https://youtu.be/4FehgeU62Jk?list=PLvzHLhum83vvafIbil9BcQPzea1DrB5_6



V - Examples of Air Quality measures

Street cleaning and dust binding to reduce re-suspension (Helsinki)

Street dust concentrations in Helsinki have been successfully reduced by:

- intensive street cleaning with high-pressure washing equipment;
- dust binding with calcium chloride solution.



Source: http://www.redust.fi/files/2015/03/Laymans-report_net2.pdf

Different methods of cleaning streets were studied in the REDUST Life + project in 2011-2014. The best results for respirable street dust mitigation in the street cleaning demonstration tests were achieved with methods which apply high pressure water washing, such as the modern street scrubber. During first day after treatment the emission reduction was approximately 40% and during the first week after treatment on an average 20%. Compared to traditional street cleaning equipment (so-called suction sweepers) the modern street scrubber has additional high pressure washers which reach the dust accumulated in the pores of street surfaces. Reduction in respirable street dust emissions was not recorded for a traditional suction sweeper in the demonstration testing. The traditional method is based on mechanical brushing and suction, which does not deep-clean the street surface like the machines with actual pressure washers. But when the traditional suction sweeper was operated in combination with a separate lorry using high pressure washing, reductions in respirable street dust emissions were achieved.

Dust binding refers to the spreading of liquid solutions on paved streets to mitigate street dust emissions. In the Helsinki region mainly calcium chloride is used for dust binding.

The effects of dust binding on street dust emissions were studied in the REDUST Life + project in 2011-2014. The results showed that dust binding is a very cost-effective way to reduce high street winter and springtime dust concentrations in road environments. Targeted dust binding to street edges and to the area in the middle of the lanes decreased street dust emissions by approximately 40% during two days after the action and whole lane dust binding by approximately 60% for three days after the action.

For more details:

- REDUST Life + project website, Layman's report:
http://www.redust.fi/files/2015/03/Laymans-report_net2.pdf
- REDUST Life + project website, Best practices report:
<http://www.redust.fi/files/2014/12/REDUST-best-practices.pdf>

V - Examples of Air Quality measures

CONSTRUCTION SECTOR MEASURES

Non-Road Mobile Machinery Low Emission Zone - NRMM LEZ (London)

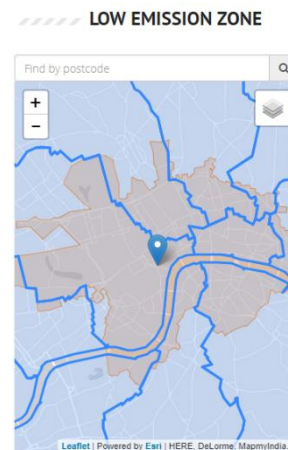


LONDON'S 'LOW EMISSION ZONE' FOR NON-ROAD MOBILE MACHINERY

Low emission zone for non-road machinery e.g. construction machinery: within central areas of London all NRMM must meet Stage 3B (3A in outside central London).

For more details:

- <http://nrmm.london/>



Source: <http://nrmm.london/>

V - Examples of Air Quality measures

Particle Filters eco-label for construction machinery (Berlin)

On public works sites in Berlin, many construction machines have to meet environmental requirements. Compliance with the requirements must be demonstrated by the contractor. To simplify this, an eco-plaque for construction machinery was created in Berlin: it is an eco-label in terms of public procurement law.

The environmental standards required on public works sites in Berlin are usually met by new machines without further systems. Older machines can still be used if they are retrofitted with a particulate filter. In these filters, the very smallest soot particles are retained, so that both the particle mass and the number of particles in the exhaust gas are reduced by more than 90%.

The introduction of environmental standards for construction equipment and filter retrofitting is a new challenge for many construction companies. For a successful retrofit, careful filter selection and proper maintenance are essential. Therefore, the Senate Department for Urban Development and Environment promotes a consultancy project by 2016 that provides companies with technical support.



Source: <https://www.berlin.de/>

For more details:

- <https://www.berlin.de/senuvk/umwelt/luftqualitaet/de/baumaschinen/plaketten.shtml>

V - Examples of Air Quality measures

HEATING SUPPLY MEASURES

Ban of solid fuels for household heating (Kraków)

The European Environmental Agency has ranked the City of Krakow the third most polluted city in Europe. Being air quality an issue for a long time in the city of Krakow it has inspired grass-root initiatives such as the Krakow Smog Alert (Krakowski Alarm Smogowy).



Source: <http://www.krakowpost.com>

Acceleration of anti-smog activities was possible thanks to the LIFE Integrated Project 'Implementation of Air Quality Plan for Małopolska Region - Małopolska in a healthy atmosphere', LIFE-IP MALOPOLSKA - a project implemented by the regional authorities of the Małopolska Region and Silesian Region, the Krakow Smog Alert and 55 municipalities including the City of Krakow.

The Regional Assembly of the Małopolska Region adopted in 2016 a ban of coal and wood as heating fuels in Krakow starting September 2019, through a specific **Municipal Regulation** (so-called anti-smog resolution). This is a radical measure for Poland and the acceptance for these new laws by the city inhabitants wouldn't be possible without the long and active engagement of initiatives such as the 'Krakow Smog Alert' and support from regional and local authorities offering subsidies up to 100% for solid fuel boilers replacement and additional assistance in covering the differences in heating costs for people affected by energy poverty.

At the beginning of 2018, less than 10,000 boilers and stoves remained in Krakow out of 24,000 counted in 2015.

For more details:

- <https://powietrze.malopolska.pl/en/anti-smog-resolution/>



V - Examples of Air Quality measures

District heating mandatory for new buildings (Upper Austria)

The Air Quality Protection and Energy Act of Upper Austria regulates the installation and use of heating systems.



Source: <https://www.upperaustria.com>

Since 2012 it requires new public buildings and apartment buildings including more than three apartments to be connected to a public district heating system in the case such a system is available.

In addition, cities where are quality limit values are breached might require all new apartment buildings to be connected to the district heating system. This is the case in the city of Linz.

There are exemptions for buildings with heating systems based on renewable energy and passive houses.

For more details:

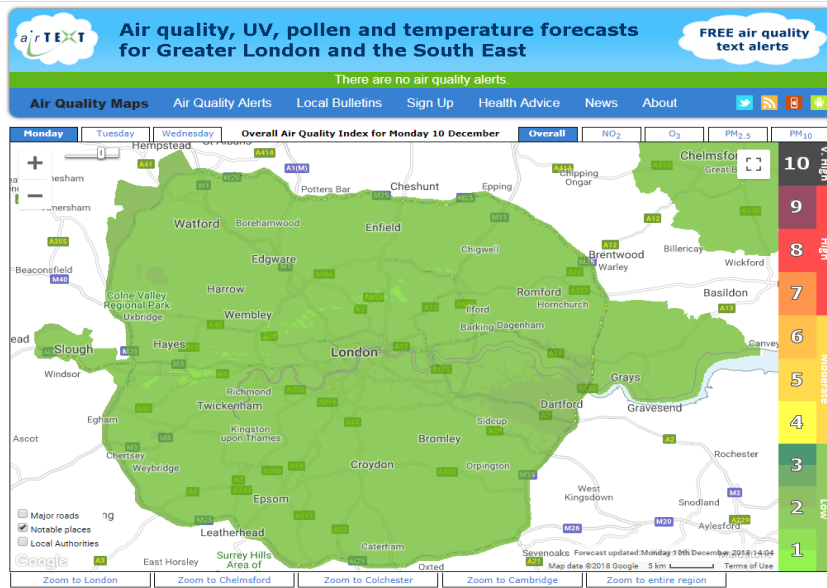
- http://www.land-oberoesterreich.gv.at/cps/rde/xchg/ooe/hs.xsl/68293_DEU_HTML.htm
- http://www.land-oberoesterreich.gv.at/cps/rde/xchg/ooe/hs.xsl/110309_DEU_HTML.htm

V - Examples of Air Quality measures

CITIZENS' AWARENESS MEASURES

Air Quality Alert Websites (London)

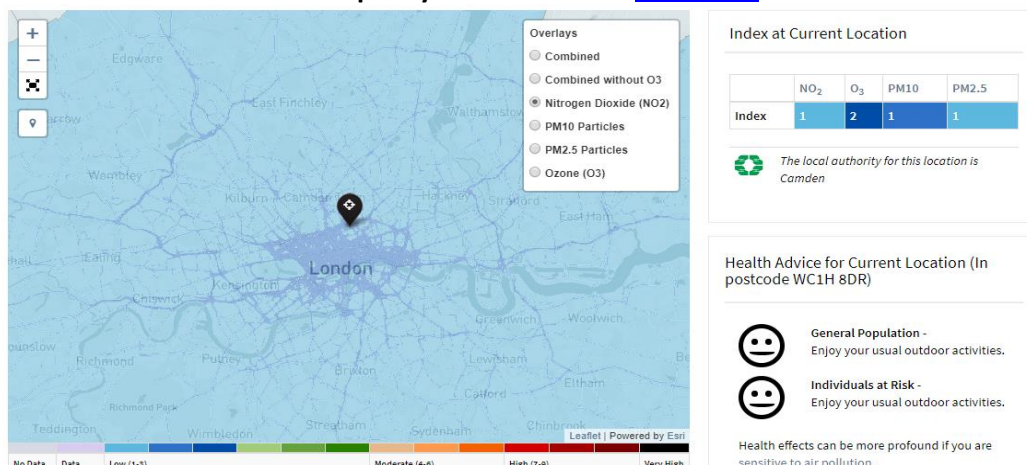
A dedicated website shows maps with **forecasts** of expected air quality over the **next three days**, to enable citizens to plan ahead. It is possible to see the **'health advice'** to learn more about how the expected pollution levels might affect citizens health. The maps are produced using CERC's world-leading **'ADMS-Urban'** air quality model. Free air quality alerts are available on demand on **Mobile App**.



The maps show **forecasts** of expected air quality over the next three days, to enable you to plan ahead. Measurements of current air quality are available on LondonAir. See the **health advice** to learn more about how the expected pollution levels might affect your health. The maps are produced using CERC's world-leading ADMS-Urban air quality model.

Source: <https://www.airtext.info/>

Measurements of **current air quality** are available on LondonAir web site.



Source: <https://www.londonair.org.uk/london>

For more details:

- www.airtext.info/
- <http://www.londonair.org.uk/LondonAir/Default.aspx>

VI Recommendations for Air Quality Planning on Good Policies, Governance and Practices

In the following sections are reported some recommendations formulated by the cities that responded to a survey launched by the PAQ to its members in the framework of WP4 activities, which prepared Action 2 - Better Air Quality Planning (Governance).

These recommendations, fully implemented in the text of this Code, could be used for inspiration by cities in drafting, implementing and monitoring their own Air Quality Plan (AQP).

Policies

Aspects to be considered when drafting AQP

- **Complementarity of all activities defined in the AQP and those included in other relevant Planning documents of the City**, in order to obtain a positive synergistic impact and measurable
- **Complementarity with other strategic documents adopted on regional and national level**

Governance

Aspects to be considered when drafting AQP

- **Involving the Stakeholders who carry out the actual air quality measures** (e.g. procurement of **bus fleet**, **traffic system planning offices**, **tertiary system representative organizations**, **energy supplier agencies**) in preparation for the plan, to ensure their full implementation
- **Stakeholder/Public Consultation**
- **Looking for Political and Public support for air quality measures listed in the AQP**
- **Looking for available funding for specific measures**

ISSUES TO BE addressed in drafting AQP

SELECTION OF MEASURES TO BE ADOPTED

- Verifying if **any management/maintenance of air quality measures need to be enforced by Local Environmental Protection Agencies or National Authorities** (e.g. Large infrastructures within the boundary or in the near proximity of the City)

ISSUES TO BE addressed in MONITORING AQP

MONITORING IMPLEMENTATION OF AQP

- An important component of the process of implementation of AQP is **supervision and control** through **reports on measures implementation**, which contain a

VI - Recommendations for Air Quality Planning on Good Policies, Governance and Practices

description of measures, information on undertaken activities, performance assessment, potential issues, deviations and justification. Based on such feedback it is possible to consider the **effectiveness of the selection of measures defined in the plan** or **avoid potential problems in the development of new and/or other plans**

How to deal with Air Quality issues that cannot be solved at urban level

REGIONAL AND METROPOLITAN ISSUES

- **Involvement of Regional or Metropolitan area Organizations and Agencies** in order to better manage main emission sources (e.g. roads and highways, public transport, Local Environmental Authority)

NATIONAL ISSUES

- As far as over-regional issues are concerned **City Authorities could send communication to or look for dialogue with relevant National Ministries asking them to take action** (e.g. to amend the legislation concerning vehicle taxation and to enable regional congestion charges with the revenue directed to the region in question)
- **Lobbying Central Government** on a number of air quality issues that cannot be resolved solely at a city level (e.g. a national diesel scrappage scheme, reform to Vehicle Excise Duty, a new Clean Air Act)
- **The City Authorities could also address these issues to a National Council with representatives of cities/big cities**

INTERNATIONAL ISSUES

- **Lobbying at international level**

Tuning between cities AQP and AQP developed for other zones and agglomerations

During the development of the AQP it is important to:

- to create **co-operation between national, regional, agglomerations and cities authorities**, in areas where air quality standards are not met (crossing areas) **to meet the limit values**
- **to request opinions on the Plan and its measures from the neighbouring cities that belong to the Metropolitan Area**, in order to cooperate and harmonize measures
- **to align cities air quality strategy with Regional Air Quality Plans and National Air Quality Strategy, Plans and Programs**

Practices

- **Following the suggestions and source of inspiration listed in the present Code of Good Practice for Cities Air Quality Plans, which is, at present, the best Recommendation for AQ planning.**



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