



4 - Air Quality Management in Europe

European Legislation and Initiatives

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Overview

- Since the early 1970s, the EU has been working to improve air quality by controlling emissions of harmful substances into the atmosphere, improving fuel quality, and by integrating environmental protection requirements into the transport and energy sectors.
- Much progress has been made in tackling air pollutants such as sulphur dioxide, lead, nitrogen oxides, carbon monoxide and benzene
- However:
 - Summer smog - originating in potentially harmful ground-level ozone - regularly exceeds safe limits.
 - Fine particulates also present a health risk which is of increasing concern.

Air Quality

- The Sixth Environment Action Programme of the European Community 2002-2012
 - *"EU environment policy is delivering tangible results for citizens and has helped the European industry to become a world leader in a number of high-growth sectors. But despite this progress, global emissions of greenhouse gases are rising, the loss of biodiversity is not yet under control, pollution is still harming public health and volumes of waste are increasing in Europe. The Commission is committed to fully implement the current Environment Action Programme in order to make significant progress towards tackling these issues"*
- The Community is acting at many levels to reduce exposure to air pollution: through EC legislation, through work at the wider international level in order to reduce cross-border pollution, through working with sectors responsible for air pollution and with national, regional authorities and NGOs, and through research. The focus for the next ten years will be implementation of air quality standards and coherency of all air legislation and related policy initiatives.



EMISSIONS

Emissions of Air Pollutants

- National Emission Ceilings
 - Community legislation
 - Directive 2001/81/EC of the European Parliament and the Council on National Emission Ceilings for certain pollutants (NEC Directive) sets upper limits for each Member State for the total emissions in 2010 of the four pollutants responsible for acidification, eutrophication and ground-level ozone pollution (sulphur dioxide, nitrogen oxides, volatile organic compounds and ammonia)
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2001:309:0022:0030:EN:PDF>
 - The NEC Directive has been amended as part of the accession of new Member States. A consolidated NEC Directive for the EU 27 includes the entire Community including the 2009 amendment of committee decisions.
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:2001L0081:20090420:EN:PDF>
 - The Thematic Strategy on Air Pollution in 2005 identified a number of key measures to be taken to help meeting the 2020 interim objectives for human health and the environment. The revision of the NEC Directive was identified as one of the key measures.
 - Convention on Long-range Transboundary Air Pollution →

Convention on Long-range Transboundary Air Pollution

- Parallel to the development of the EU NEC Directive, the EU Member States together with Central and Eastern European countries, the United States and Canada have negotiated the "multi-pollutant" protocol under the Convention on Long-Range Transboundary Air Pollution (the so-called **Gothenburg protocol**, agreed in November 1999). The emission ceilings in the protocol are equal or less ambitious than those in the NEC Directive.
- Since 1979 the Convention on Long-range Transboundary Air Pollution has addressed some of the major environmental problems of the UNECE region through scientific collaboration and policy negotiation. The Convention has been extended by eight protocols that identify specific measures to be taken by Parties to cut their emissions of air pollutants.
- The aim of the Convention is that Parties shall endeavour to limit and, as far as possible, gradually reduce and prevent air pollution including long-range transboundary air pollution.
- The Parties meet annually at sessions of the Executive Body to review ongoing work and plan future activities including a workplan for the coming year. There are three main subsidiary bodies:
 - the Working Group on Effects
 - the Steering Body to EMEP and
 - the Working Group on Strategies and Review
- <http://www.unece.org/env/lrtap/welcome.html>

Gothenburg protocol – Cont.

- The Gothenburg protocol is presently under revision and negotiations are ongoing with the aim to agree on an amended or new protocol by the end of 2011.
- The revision considers also new components like emissions of particulate matter, Black Carbon and intercontinental transport of air pollution.
- A Task Force on Hemispheric Transport of Air Pollution (HTAP), jointly lead by the US and the EU, explores the importance of such long-range pollution.
- The work of the Task Force can be followed on www.htap.org

The European Pollutant Release and Transfer Register (E-PRTR)

- <http://prtr.ec.europa.eu/>
- The European Pollutant Release and Transfer Register (E-PRTR) is the new Europe-wide register that provides easily accessible key environmental data from industrial facilities in European Union Member States and in Iceland, Liechtenstein and Norway. It replaces and improves upon the previous European Pollutant Emission Register (EPER).
- The new register contains data reported annually by some 24,000 industrial facilities covering 65 economic activities across Europe.
- For each facility, information is provided concerning the amounts of pollutant releases to air, water and land as well as off-site transfers of waste and of pollutants in waste water from a list of 91 key pollutants including heavy metals, pesticides, greenhouse gases and dioxins for the year 2007 onwards.
- The register contributes to transparency and public participation in environmental decision-making. It implements for the European Union the UNECE (United Nations Economic Commission for Europe) PRTR Protocol (<https://unece.org/DAM/env/pp/crosscut.htm>) to the Aarhus Convention (<https://ec.europa.eu/environment/aarhus/>) on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters.
- The legal basis of E-PRTR is the Regulation (EC) No 166/2006.
- The first reporting year under the E-PRTR has been 2007, for which the data were reported in June 2009.

The IPPC Directive

- On **21 December 2007** the Commission adopted a Proposal for a Directive on industrial emissions. The Proposal recasts seven existing Directives related to industrial emissions into a single clear and coherent legislative instrument. The recast includes in particular the IPPC Directive.
- The IPPC Directive has been in place for over 10 years and the Commission has undertaken a 2 year review with all stakeholders to examine how it, and the related legislation on industrial emissions, can be improved to offer the highest level of protection for the environment and human health while simplifying the existing legislation and cutting unnecessary administrative costs.
- <https://ec.europa.eu/environment/archives/air/stationary/ippc/summary.htm>

Large Combustion Plants Directive

- The overall aim of the LCP Directive is to reduce emissions of acidifying pollutants, particles, and ozone precursors. Control of emissions from large combustion plants - those whose rated thermal input is equal to or greater than 50 MW - plays an important role in the Union's efforts.
- The LCP Directive entered into force on 27 November 2001. It replaced the old Directive on large combustion plants (Directive 88/609/EEC as amended by Directive 94/66/EC).
- The LCP Directive encourages the combined generation of heat and power and sets specific emission limit values for the use of biomass as fuel. It also includes certain gas turbines in its scope in order to regulate NOX emissions.

The Waste Incineration Directive

- The WI Directive entered into force on 28 December 2000. It repealed former directives on the incineration of hazardous waste (Directive 94/67/EC) and household waste (Directives 89/369/EEC and 89/429/EEC) and replaced them with a single text. The aim of the WI Directive is to prevent or to reduce as far as possible negative effects on the environment caused by the incineration and co-incineration of waste.
- The WI Directive sets emission limit values and monitoring requirements for pollutants to air such as dust, nitrogen oxides (NO_x), sulphur dioxide (SO₂), hydrogen chloride (HCl), hydrogen fluoride (HF), heavy metals and dioxins and furans.
- Transposition into national legislation was necessary by 28 December 2002. From this date on new incinerators have had to comply with the provisions of the WI Directive. The deadline to bring existing plants into compliance was 28 December 2005.
- A summary of the WI directive can be found at

<https://ec.europa.eu/environment/archives/air/stationary/wid/legislation.htm>

The VOC Solvents Emissions Directive

- The VOC Solvents Emissions Directive is the main policy instrument for the reduction of industrial emissions of volatile organic compounds (VOCs) in the European Union.
- It covers a wide range of solvent using activities, e.g. printing, surface cleaning, vehicle coating, dry cleaning and manufacture of footwear and pharmaceutical products.
- The Directive sets out emission limit values for VOCs in waste gases and maximum levels for fugitive emissions (expressed as percentage of solvent input) or total emission limit values.
- The purpose of the reduction scheme is to allow the operator the possibility to achieve by other means emission reductions, equivalent to those achieved if the emission limit values were to be applied. This could be typically achieved by substituting products with a high content of solvents for low-solvent or solvent-free products and changing to solvent free production processes.
- New installations have to comply with the requirements of the VOC Solvents Emissions Directive at the time they are starting the activity. The final implementation date for existing installations was 31 October 2007.
- Summary: <https://ec.europa.eu/environment/archives/air/stationary/solvents/legislation.htm>

Solvents in Paints and Vehicle Refinishing Products

- Directive 2004/42/EC on the limitation of emissions of volatile organic compounds due to the use of organic solvents in certain paints and varnishes and vehicle refinishing products (the so-called Paints Directive) establishes limit values for the maximum VOC contents of decorative paints and other products covered by the Directive.
- The products covered by the Directive are paints for use on buildings, their trims and fittings and structures associated to buildings and products for vehicle refinishing.
- For the paints, the Directive sets up two sets of limit values for the maximum contents of VOCs in grammes per litre of the product ready for use. The first set of limit values shall apply from 1 January 2007. The second, and stricter, set of limit values apply from 1 January 2010.
- For vehicle refinishing products there is only one set of limit values for the VOC contents, which applies from 1 January 2007.
- According to Article 4 of the Directive the products shall carry a special label when are placed on the market. The label shall indicate (a) the subcategory of the product and the legal limit value for VOC contents in grammes per litre and (b) the maximum content of VOC in grammes per litre of the product in its ready to use condition.
- https://ec.europa.eu/environment/air/pollutants/stationary/paints/paints_legis.htm



TRANSPORT & ENVIRONMENT

Transport & Environment

- **Road Vehicles**
- **Transport hot spots - people at risk close to transport infrastructure**
- **EU policy on ship emissions**
- **Non-road Mobile Machinery**
- **Fuel Quality Monitoring**
- **Renewable Fuels**

Road Vehicles

- The pollutant emissions from road vehicles are regulated separately for
 - light-duty vehicles (cars and light vans) and for
 - heavy-duty vehicles (trucks and buses).
- For light-duty vehicles, the emission standard currently in force is Euro 4, as defined by Directive 98/70/EC
<https://www.legislation.gov.uk/eudr/1998/70/contents>
which is one of the Directives amending Directive 70/220/EEC. Following the CAFE programme and the resulting Thematic Strategy on air pollution, new Euro 5 and Euro 6 standards have already been agreed by Council and Parliament
- For heavy-duty vehicles see Directive 2005/55/EC (agreed in co-decision) and Directive 2005/78/EC (implementing provisions).
<https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2005:275:0001:0163:EN:PDF>
- This legislation defines the emission standard currently in force, Euro IV, as well as the next stage (Euro V) which will enter into force in October 2008.

Transport hot spots - people at risk close to transport infrastructure

- http://ec.europa.eu/environment/air/transport/pdf/final_report_main.pdf
- New findings support that the adverse health effects due to air pollution (ultra-fine particles, particulate matter mass, ozone, nitrogen oxides, etc) close to major roads in the Netherlands are larger than those of general pollution in the urban area.
- Population living and working close to major transport infrastructure may be at risk due to increased levels of air pollution and noise.
- According to the study close to nine percent of the EU population would live closer than 200 meters from a major road with more than 3 million vehicles per year. And as many as a 25 percent of the EU population would live closer than 500 meters from such a major road.
- The report also gives methodologies and estimates of air pollution and noise from other major infrastructures such as airports, railways and water ways.

EU policy on ship emissions

- Ships are fast becoming the biggest source of air pollution in the EU. Unless more action is taken they are set to emit more than all land sources combined by 2020.
- In 2000 EU-flagged ships also emitted almost 200 million tonnes of carbon dioxide. This is significantly more than emissions from EU aviation. Source: Ship emissions assignment report, p160 (2005)

http://ec.europa.eu/environment/air/pdf/task1_assign_report.pdf

- In November 2002, the European Commission adopted a European Union strategy to reduce atmospheric emissions from seagoing ships. The strategy reports on the magnitude and impact of ship emissions in the EU and sets out a number of actions to reduce the contribution of shipping to acidification, ground-level ozone, eutrophication, health, climate change and ozone depletion.
- From 1 July 2010, when the 2008 amendments to MARPOL Annex VI enter into effect, ships operating in the Sulphur Emission Control Areas comprising the Baltic Sea, North Sea and English Channel will need to use fuel not exceeding 1.00% sulphur.

<https://www.epa.gov/enforcement/marpol-annex-vi-and-act-prevent-pollution-ships-apps>

Renewable Fuels

- Transport is today fuelled to a very large extent by oil. This situation has implications for energy policy, but it is also of great relevance from an environmental perspective, notably in view of climate change. Action has been seen on the topic of alternative fuels in general and on biofuels specifically. The long-term vision of hydrogen as an energy carrier is being pursued following the work of a high-level group on hydrogen and fuel cells.
- Study on renewable fuels
 - From an environmental perspective, it is important to bear in mind that it is not enough to seek 'alternative' fuels - if we are to move towards a sustainable transport system, these fuels must ultimately come from renewable sources. DG Environment has sponsored a study on renewable fuels for cross border transportation in the EU.

https://elib.dlr.de/6729/1/Renewable_Fuels_Final_Report.pdf

This study looks at the potential of producing such fuels within the boundaries of the EU, at the costs and at the environmental impacts involved in doing so. The study looks at a wide range of options and selects a few for in-depth study and conceivable introduction strategies.

Non-road Mobile Machinery

- Since 1997 Community legislation has required new diesel engines to meet certain environmental standards for air pollutants before they are placed on the market.
- Engines in non-road mobile machinery contribute to emissions of air pollutants. Diesel engines in excavators, bulldozers, front loaders, back loaders, compressors etc. emit nitrogen oxides (NO_x) and particulate matter. Emissions from these engines are regulated before they are placed on the market by Directive 97/68/EC.

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31997L0068:EN:HTML>

- Also emissions from small spark ignition (petrol) engines are contributing to emissions - especially emissions of hydrocarbons (HC). One hour use of a normal chainsaw equipped with a two-stroke engine emits as much hydrocarbons as driving a modern passenger car for 2000 km. Emissions from these engines are regulated by Directive 2002/88.

<https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:035:0028:0081:en:PDF>

Fuel Quality Monitoring

- In April 2009, Directive 2009/30/EC

<https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0088:0113:EN:PDF>

was adopted which revises the Fuel Quality Directive [Directive 98/70/EC]. It amends a number of elements of the petrol and diesel specifications as well as introducing in Article 7a a requirement on fuel suppliers to reduce the greenhouse gas intensity of energy supplied for road transport (Low Carbon Fuel Standard).

- In addition the Directive establishes sustainability criteria that must be met by biofuels if they are to count towards the greenhouse gas intensity reduction obligation.
- A number of aspects of the Directive require further work. As a result the Commission has recently published a consultation on the implementation of various issues relating to Article 7a and has also carried out a pre-consultation in relation to policy options for addressing indirect land use change from biofuels. Article 7a consultation:

<https://circabc.europa.eu/d/d/workspace/SpacesStore/0a750c71-26c7-4959-b61c-553779fc13ff/art7a%20consultation.pdf>

Transport & Environment

- **Special Topics**
 - **Developing a sustainable transport system**
 - **Decoupling of transport growth from GDP growth**
 - **Transport through sensitive areas**

Developing a sustainable transport system

- The EU transport system is currently not sustainable, and in many respects moving away from sustainability rather than towards it. The European Environment Agency highlights in particular the sector's growing CO₂ emissions that threaten the EU meeting its target under the Kyoto protocol. It also points to additional efforts that are needed to reach existing air quality targets, points to a large proportion of the population that is exposed to annoying or harmful noise levels, and highlights many more environmental impacts from transport in the EU.
- For more information on the environmental impacts of transport, look up the Environment Agency's Transport pages,
<http://www.eea.europa.eu/themes/transport>, in particular the following Agency's reports of the Transport and Environment Reporting Mechanism (TERM) :
 - TERM report 2008, TERM report 2007, TERM report 2006, 'Transport : bottom of the Kyoto class again', TERM report 2005, TERM report 2004 and briefing, TERM report 2002
- Latest result: a renewed EU Sustainable Development Strategy adopted by Heads of State and Governments at the European Council of 15-16 June 2006, where specific objectives, targets and actions are promoted regarding sustainable transport:
<http://register.consilium.europa.eu/pdf/en/06/st10/st10917.en06.pdf>

Decoupling of transport growth from GDP growth

- Calls for action to tackle the volume of transport, or at least its growth, have frequently been formulated. They have come on the level of experts including the Commission's own expert group on transport and environment, but also on the highest political levels in the EU.
- In its integration strategy [1], the Transport Council states "It is necessary to ensure that economic growth can continue without necessarily entailing traffic growth with an increase in the negative effects of transport".
- The conclusions from the European Council in Gothenburg in June 2001 state that "A sustainable transport policy should tackle rising volumes of traffic and levels of congestion, noise and pollution [..]. Action is needed to bring about a significant decoupling of transport growth and GDP growth, in particular by a shift from road to rail, water and public passenger transport."
- The volume of transport is also a concern in the 6th Environmental Action Programme which calls for "decoupling economic growth and the demand for transport with the aim of reducing environmental impacts".

Transport through sensitive areas

- The environmental impacts of transport can be of greater concern in some areas than in others.
- A typical example is freight transport through mountain areas which is concentrated on a small number of corridors where the local topography and microclimate exacerbate the effect caused by pollutant emissions and noise.
- In order to address this situation at the EU level, it would help to have a workable definition of sensitive areas in connection with transport at that level.
- This is why DG Environment has undertaken a study on sensitive areas.



ASSESSMENT OF AIR QUALITY

Assessment of air quality

- Air quality assessment has an important role to play within the implementation of an air quality management strategy.
- The goals of air quality assessment are to provide the air quality management process with relevant data through a proper characterization of the air pollution situation, using monitoring and/or modelling programs and projection of future air quality associated with alternative strategies.
- Dispersion models can be used very effectively in the design of the definitive monitoring network.

Assessment of air quality – Cont.

- **Monitoring methods**
 - The monitoring method (automatic, semi-automatic or manual) adopted for each pollutant should be a standard or reference method, or be validated against such methods.
 - Quality assurance/quality control procedures are an essential part of the measurement system, the aim being to reduce and minimize errors in both the instruments and management of the networks.
- **Design of the monitoring network**
 - An air quality monitoring network can consist of fixed and/or mobile monitoring stations. In designing a monitoring network, a primary requirement is to have information about emissions from the dominant and/or most important sources of pollutants. Second, a pilot (or screening) study is needed to gain a good understanding of the geographical distribution of pollutants and to identify the areas with the highest concentrations. Such a screening study can be performed using dispersion models, with the emission inventory as input, combined with a monitoring study using inexpensive passive samplers in a rather dense network.

Assessment of air quality – Cont.

- **Air quality modelling**
 - Air quality models are used to establish a relationship between emissions and air quality in a given area, such as a city or region. On the basis of emission data, of atmospheric chemistry, and of meteorological, topographical and geographical parameters, modelling gives an opportunity
 - *to calculate the projected concentration or deposition of the pollutants in regions, and*
 - *to predict the air pollution level in those areas where air sampling is not performed.*
- **Abatement strategies**
 - Abatement strategies are the set of measures to be taken to reduce pollutant emissions and therefore to improve air quality.
 - Authorities should consider the measures necessary in order to meet the standards.
 - In addition to the comprehensive programme of emission control designed to reduce average pollution levels and the risk of high pollution episodes, short-term actions may be required for the period when the pollution episodes may occur. Such actions, however, should be considered to be applicable in a transitional period only or as a contingency plan.

Assessment of air quality – Cont.

- **Enforcement**

- The government of each country establishes the responsibilities for implementing air quality standards. Responsibilities for overseeing different aspects of compliance can be distributed among national, regional and local governments depending on the level at which it is necessary to take action.
- Success in the enforcement of standards is influenced by the technology applied and the availability of financial resources to industry and government.
- Compliance with standards may be ensured by various approaches such as administrative penalties or economic incentives.
- Sufficient staff and other resources are needed to implement the policy actions effectively.