for clean air! everywhere

What can be done in our cities to decrease air pollution?

Although the release of many air pollutants has decreased since 1990, the quality of our air has improved little in the past decades. Poor air quality remains a major public health problem, with concentrations of particulate matter and ozone remaining very high. The health cost of bad air quality is estimated to be nearly half a million premature deaths each year in the European Union[1]. In economic terms, the annual cost to society of health damage from air pollution in 2000 was estimated to amount to between €277 and €790 billion[2]. The average life expectancy in the most polluted cities in Europe is reduced by over two years[3]. However, local solutions do exist and some of them have already been implemented with success. This fact sheet provides an overview of these concrete solutions and shows that cutting air pollution is possible and would improve the lives of some 40 million Europeans exposed to high levels of air pollution[4].

The current legislation on ambient air quality

The 2008 Directive on Ambient Air Quality and Cleaner Air for Europe[5] is one of the EU's main pieces of legislation on air pollution. It is the only legislation which directly addresses the problem of ambient air pollution (the air we breathe) by setting a number of health-based standards and objectives for a number of pollutants. Limit values vary from one pollutant to another and apply over differing periods of time, as summarised in **table 1**.

Under EU air legislation, Member States must assess the air pollution levels throughout their territory. Where the concentrations exceed limit values set in the Directive, Member States must prepare an action plan showing how the limit value will be achieved before its entry into force. Competent authorities also have the obligation to inform the public about the assessment and management of air pollution.

The new Directive includes a possibility for time extensions of three years (particulate matter) or up to five years (nitrogen dioxide, benzene) for complying with limit values, based on the assessment by the European Commission[6]. If, for instance, a time extension for complying with PM10 is granted, the country would have to comply with PM10 standards by June 2011 (extended deadline) instead of 2005 (original deadline). In practice, this means that the country could not be brought before the European Court of Justice for its infringement of limit values between 2005 and 2010.

The limit values and objectives set out in the Directive are based on recommendations made by the World Health Organisation (WHO) which are intended to minimise the health effects of air pollutants. However, the EU standards are still lagging behind: as shown in **table 1**, the EU standards are not sufficient for protecting human health against the adverse impacts caused by the exposure to high concentrations of sulfur dioxide (SO2), particulate matter (PM2.5 and PM10) and ozone (O3). The scientific community and civil society therefore believe a revision of current EU standards is necessary.

Table 1. Effects of major air pollutants on human health, recommended guidelines and current EU standards

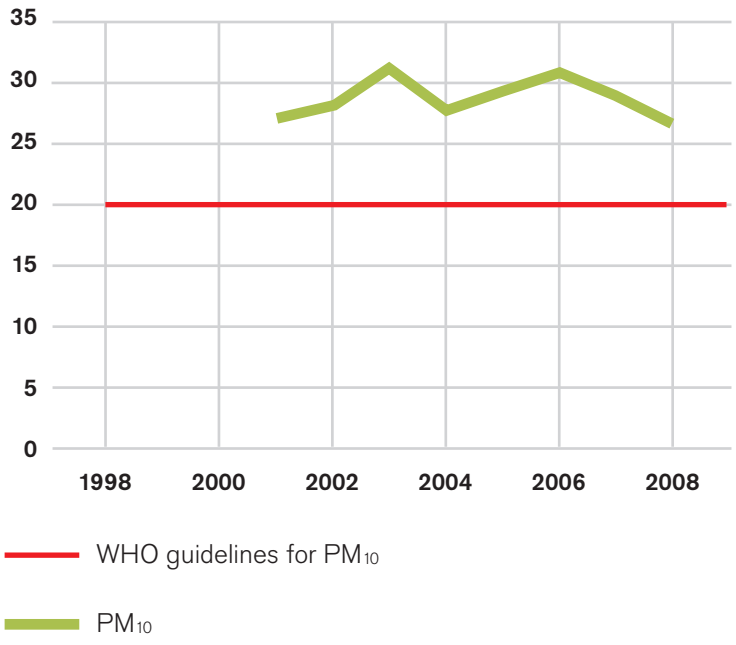
	Health effects[7]	Guideline values recommended by the World Health Organisation (WHO)[8]	Current EU Air Quality standards[9]
Particulate matter <2.5µm (PM2.5)	Coughing; wheezing; shortness of breath: aggravations of respiratory conditions such as asthma; chronic bronchitis; lung damage; premature death; risk of cardiovascular and respiratory diseases; risk of mortality among young children; risk factor for chronic obstructive pulmonary disease, and lung cancer among adults **In the EU, the average life expectancy is 8.6 months lower due to exposure to PM2.5 produced by human activities.**	10 µg/m3 annual mean 25 µg/m3 24-hour mean	25 µg/m3 annual mean to become a limit value in 2015 Exposure concentration obligation of 20 µg/m3 based on a 3-year average (legally binding in 2015) Exposure reduction target in percentage to be attained by 2020*
Particulate matter <10µm (PM10)		20 µg/m3 annual mean 50 µg/m3 24-hour mean	40 µg/m3 annual mean 50 µg/m3 24-hour mean with a maximum of 35 permitted exceedences each year
Nitrogen dioxide (NO2)	Inflammation of the airways; reduced lung function growth; symptoms of bronchitis in asthmatic children; increased susceptibility to respiratory infection; alterations, and damage in the lung	40 µg/m3 annual mean 200 µg/m3 1-hour mean	40 µg/m3 annual mean in force since 2010 200 µg/m3 1-hour mean with a maximum of 18 permitted exceedences each year
Sulfur dioxide (SO2)	Damage to the respiratory system and the lung functions; irritation of the eyes; inflammation of the respiratory tract; coughing; mucus secretion; aggravation of asthma and chronic bronchitis, and increased susceptibility to infections of the respiratory tract	20 µg/m3 24-hour mean 500 µg/m3 10-minute mean	125 µg/m3 24-hour mean with maximum 3 permitted exceedences each year 350 µg/m3 1-hour mean with maximum 24 permitted exceedences each year
Ozone (O3)	Breathing problems; asthma; reduction of lung function, and lung diseases	100 µg/m3 8-hour mean	120 µg/m3 8-hour mean with permitted exceedences of maximum 25 days averaged over 3 years

note: µg= microgram (one millionth of a gram)

* The percentage is based on the exposure indicator of 2010. If AEI in 2010 is assessed to be over 22 µg/m3, all appropriate measures need to be taken to achieve 18 µg/m3 by 2020

Little progress in reducing particulate matter concentrations

Graph 1. Population-weighted concentrations of PM10 in urban agglomerations of more than 250,000 inhabitants in the EU* compared with WHO guidelines



* BASED ON EEA DATA, 2010

What is Particulate Matter?

Particulate matter (PM) is a complex mixture of various things which are suspended in the air.

It is made up of nitrates, sulfates, dust and soot and is easily inhaled by humans, increasing the risk of respiratory and cardiovascular diseases. It also aggravates respiratory problems such as asthma and increases the risk of mortality among young children.

PM can come in different sizes (measured in diameter). PM10 is for particles 10µm or less and PM2.5 for particles of 2.5µm or less.

In addition, ultra-fine particles (less than 0.1µm) are particularly damaging to human health as they have the ability to be inhaled much deeper into the lungs.

According to the WHO, there is no threshold for PM below which no damage to health is observed. However, the organisation has developed standards aiming at achieving the lowest health damage possible in the context of local constraints and public health priorities.

The graph on this page demonstrates how we are still a long way from reaching these recommendations.

A lot more still needs to be done.

Things your city can do to counter air pollution

In most European cities, road transport is the predominant cause of air pollution and it is shown that living and working near busy roads substantially increases the total amount of diseases attributed to air pollution. While technical progress has to be fostered at EU level to create the necessary framework to clean the air, a lot remains to be done locally to decrease air pollution and to meet the EU air quality standards. The poor real-life performance of Euro standards (emissions limits for vehicles) in controlling nitrogen dioxide (NO2) emissions in urban environments across Europe clearly shows that technical progress is not sufficient to effectively respond to air quality issues.

12 tips to reduce air pollution in your city

There are a variety of transport measures to improve air pollution that can be implemented at local level. These measures can, for example, aim at improving traffic flows, decrease the number of vehicles, increase the attractiveness of sustainable modes of transport, offer economic incentives for the use of cleaner cars or alternative modes of transport, etc. Such measures are frequently integrated in an overall mobility management scheme developed by local authorities, transport suppliers, user organisations, car-sharing clubs, schools, businesses, etc. The more measures and the more partners there are the greater the benefits to transport, health, and the environment. The examples below provide an overview of what has been successful in a number of European cities and can be used as examples of what can be achieved in your city:

1 Low emission zones

Low Emission Zones (LEZs) are urban areas or roads where the most polluting vehicles are restricted from entering. This means that vehicles are banned, or in some cases charged, if they enter the LEZ when they do not comply with certain emission requirements. These requirements can be linked to compliance with Euro Standards or to other criteria such as the existence of a particulate filter or a catalytic converter. In Berlin, LEZs have been effective since 2008, and their emission standards requirements have become stricter in 2010. One year after entry into force, Berlin's emissions of diesel exhaust particulates had already decreased by one quarter and nitrogen oxide (NOx) emissions had fallen by 14%. In addition, LEZ requirements could be extended to off-road transport such as rail (diesel rail operations) and inland shipping.

2 Encourage cycling and walking

It is important to ensure that cycling and walking are both safe and convenient means of transport. There are many ways of promoting cycling and the most important measure is to develop cycle paths and lanes. Where separate paths and lanes are not possible, traffic calming measures, such as 30km/hr speed limit, can play an important role in cycling safety. Extensive bike-parking facilities, especially at train and tram stations and bus stops, and bike-sharing systems are also an effective way to encourage 'bike-and-ride' travelling. The feeling of safety is an important factor for the success of any walking or cycling policy and it can be achieved by giving cycling training to young children as well as training for car drivers, as has happened in the Netherlands, Germany and Denmark[10].

Things your city can do to counter air pollution

3 Land use planning

Land use planning measures can also be considered to counter air pollution. Because their benefits are long term, land use and accessibility issues should be worked out in planning strategies right away so as not to further delay their positive impacts. The integration of air pollution and health considerations in land use planning should become systematic: reducing commuting distances and encouraging cycling and walking should become priorities. Air quality must be part of a more global strategy which aims at achieving clean and sustainable cities.

Addressing ultra-fine particles

The current approach on particulate control is based on PM mass limit values. However, these values may not be adequate to set a limit for the ultra-fine particles since they are almost weightless. A more appropriate measuring method would use the reference to particulate number concentration (PN). The US EPA has already launched a study programme looking in detail at the effects of ultra-fine particles and exploring the possibility to regulate particles based on number rather than size[11].The European Union should follow suit and start preparation for an appropriate PN limit value.

Benefits from going down to WHO guidelines for Particulate Matter

EU standards are still above the guidelines made by the WHO, both for PM10 and PM2.5. Recent research shows that a decrease to WHO's annual air quality guideline for PM2.5 in 25 large cities could add up to 22 months of life expectancy for persons 30 years of age and savings of €31.5 billion annually.[12] There are currently no specific standards for ultra-fine particles.

4 Congestion charges

A significant part of air pollution occurs when cars are stopped in traffic jams and reducing congestion is therefore a key action against air pollution. In addition, congestion pricing will also contribute to partly solve parking problems in cities. In Stockholm, where a congestion charge has been implemented since 2006, a significant decrease of traffic has been observed (traffic entering inner city dropped by 18%). Positive effects include reduction of air pollutants and CO_2 emissions, fewer accident and road casualties, and decrease of exposure to air pollution. Moreover, the congestion tax generates revenues, which can be reinvested into the same locality, thereby increasing welfare. This makes congestion pricing arguably the most cost-effective measure to be taken locally.

5 Lower urban speed limits

In many European cities lowering urban speed limits has been put in place, leading to a significant reduction in emissions. In Stockholm, the majority of the roads are now limited to 30km/h and are accompanied by a strong communication strategy as well as enforcement measures. Establishing lower speed limits also includes other benefits such as making roads less hazardous and reducing noise, which in turn helps develop other transport modes such as cycling and walking. While the impact of low speed measures depends on enforcement and the compliance of drivers, its effects are immediate.

6 Restricting access to cars

Restricting car access to certain areas is useful for diverting traffic from areas with poor air quality. The effects on the restricted areas are substantial and immediate. Restrictions can be set on a permanent basis for specific streets, pedestrian residential areas for example, or temporarily such as in the case of pollution alerts or during certain times of day.

Things your city can do to counter air pollution

7 Parking management

Regulating and limiting the number of available parking spaces is an effective means to encouraging use of other modes of transport in various cities. Paris, Copenhagen and Zurich have recently modernised their parking policy by decreasing the number of public parking spaces and by turning free parking places into paid ones or increase existing fees. These measures have the effect to reduce commuter car traffic. In Copenhagen, new parking spaces were created underground for residents while the city closed on-road parking spaces, hence improving urban space and urban environment. In addition to its deterrent effects, parking management can also include economic incentives, such as in Amsterdam where owners of cleaner cars benefit from reduced parking fees.

8 Public procurement

Reducing the environmental impact of vehicle traffic can also be achieved through green public procurement. In Copenhagen, all vehicles within the municipal fleet are required to meet low emission zones' requirements and from 1st January 2011 onwards all passenger cars bought by the city of Copenhagen will need to be either electric or hydrogen cars. In Berlin, new diesel cars must have diesel particulate filters, and buses have been equipped with diesel particulate filters for ten years. Provisions on public procurement could also apply to construction machines that are used in the framework of a public contract. Similar to Euro standards for vehicles, the Directive 97/68/EC creates emissions categories for these engines which could be used as a basis for selecting the best technologies (vehicles retrofitted with particle filters and NOx abatement technologies, etc.).

9 Car-sharing

Car-sharing is used to fill the gap created when public transport, cycling or walking are inadequate or unavailable. It is a mobility service which allows the use of one vehicle by different users registered in advance with an operator that manages the fleet of vehicles. In Lyon, the car sharing system has been recently developed and offers low prices for individuals and companies[13].

10 Improving public transport

Measures to increase the attractiveness of public transport should be implemented as a package including aspects of availability, accessibility, reliability, pricing, safety, and comfort. To increase speed and reliability, innovative strategies involving coordination of traffic light signals could be employed to ease the bus flows through city centres. In Glasgow, GPS signals relaying the location of buses can be compared with the actual timetable and if necessary traffic signals can be pre-empted in order to allow buses to continue on their journey more quickly. Traffic light detection systems are a similar strategy currently being trialled in Lyon.

11 Park and ride schemes

Establishing park and ride schemes can be efficient in relieving sensitive city centres but depends on the quality of public transport. Their success relies on the difference in travel times and costs between a car trip and a combined car-public transport trip. In Vienna, parking facilities on the outskirts of the city have been established and makes it easy to change from individual car to public transportation (such as underground, street car or bus).

12 Promoting electro mobility

The promotion of low-emission vehicles such as electric vehicles as a replacement of conventional cars is also an important measure to reduce air pollution in city centres. Various actions can be taken by cities to promote electro mobility. It is particularly important for local authorities to ensure that charging points for electric vehicles are easily accessible. Some cities are also exploring the possibility to equip their car-sharing system with low emissions vehicles.

Not only do these measures have an impact on air pollution, most of them also result in substantial secondary benefits such as less hazardous roads, a reduction in CO_2 emissions, less noise, improved health, and decreased congestion.

Urban goods transport

Urban freight transport is an important contributor to air pollution in cities, which can be addressed via a combination of different measures such as LEZs, congestion charging, delivery restriction, etc. In order to improve freight transport in and around some cities freight operators have also developed freight consolidation centres where goods are consolidated before being delivered to the target areas. As a result, fewer vehicles are required to deliver the same amount of goods. Low emission vehicles such as electric vehicles can also be used to further reduce air pollution. Freight consolidation centres have already been implemented in the Netherlands and in the United Kingdom and have shown very positive results in terms of emission reductions and safety benefits.

Specific problems of harbours cities

In a harbour town, for example, it may make sense to address SOx and NOx emissions from maritime transport in addition to road transport, since the port itself and shipping are likely to be important contributors to air pollution in the area. Besides the use of electric power for ships anchored in port, speed reduction strategies are a very effective solution to reduce air pollution in harbour cities. Speed reduction initiatives have already been launched in Californian ports and studies by the Californian Air Resource Board (CARB) indicate that reducing speed to 12 knots 40 nm outside ports could cut PM, NOx, SOx emissions by 31%, 36% and 29% respectively.

Other sources of air pollution

Although transport remains a major cause of air pollution in urban areas other sources of air pollution need to be addressed simultaneously. According to recent analyses for the revision of the National Emission Ceilings (NEC) Directive, small-scale domestic combustion (e.g. wood-fired boilers and stoves for domestic heating) is the biggest source sector for emissions of PM2.5, responsible for nearly one third of the total emissions. Currently, there is no EU legislation to tackle these sources of air pollution, which stresses the need for local action. Germany has already established emission standards for domestic combustion installations, and other Member States should follow that example.

And don't forget to...

- Look for cities with similar problems and their ways of handling them and get involved in networking and exchanging ideas on good practices.
- Communicate the benefits, cost-effectiveness and positive impacts of different measures. Stress that they will help improve the quality of life in your city and save money.
- Mobilise the public and emphasise the importance of community and individual awareness and engagement. Public information and awareness raising campaigns on air pollution and how to tackle it can be determining factors in the implementation of measures.

The ultimate goal of these strategies is to bring about a change in the public's behaviour away from a reliance on the personal car to the support of a less environmentally damaging and more sustainable transport system.

EUROPEAN ENVIRONMENTAL BUREAU

EEB is the environmental voice of European citizens, standing for environmental justice, sustainable development and participatory democracy. We want the EU to ensure all people a healthy environment and rich biodiversity.

TRANSPORT & ENVIRONMENT

T&E is the principal environmental organisation campaigning on sustainable transport at the EU level in Brussels.

Established in 1990, our primary focus is on European transport and environmental policy but our work in Brussels is supported by 50 member organisations working across the EU to promote an environmentally sound approach to transport.

AirClim

Air Clim is a joint venture between four Swedish environmental organizations with the chief purpose of promoting awareness of the problems associated with air pollution and climate change, and thus, in part as a result of public pressure, to bring about the required reduction in the emissions of air pollutants, including greenhouse gases.

Footnotes

1 According to a recent study by the European Topic Centre on Air and Climate Change (ETC/ACC) on behalf of the European Environment Agency (EEA), pollution of fine particles is associated with more than 455,000 premature deaths every year in the EU's 27 member states.

2 NEC CBA Report 1. Baseline report (May 2007) referring to the year 2000 http://ec.europa.eu/environment/air/pollutants/cba.htm

3 http://www.eea.europa.eu/themes/air/about-air-pollution

4 According to the WHO, some 40 million people in the 115 largest cities in the European Union (EU) are exposed to air exceeding WHO air quality guideline values for at least one pollutant, http://www.euro.who.int/en/what-we-do/health-topics/environmental-health/air-quality/facts-and-figures

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, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32008L0050:EN:NOT

6 The assessment done by the European Commission is based on conditions laid down in article 22 of the Air Quality Directive.

7 WHO factsheet Air Quality and Health, http://www.who.int/mediacentre/factsheets/fs313/en/index.html

8 WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide - Global update 2005 - Summary of risk assessment, http://whqlibdoc.who.int/hq/2006/WHO_SDE_PHE_OEH_06.02_eng.pdf

9 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, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32008L0050:EN:NOT

10 John Pucher and Ralph Buehler. (2008). Making Cycling Irresistible: Lessons from The Netherlands, Denmark and Germany. Transport Reviews. 28(4): 495–528. This article is free to download from: "http://www.informaworld.com/smpp/"www.informaworld.com/smpp/

11 http://www.epa.gov/ord/ca/quick-finder/pm-health-particle.htm

12 According to the findings of the project APHEKOM, the monetary health benefits from complying with the WHO guidelines would total some €31.5 billion annually, including savings on health expenditures, absenteeism and intangible costs such as well-being, life expectancy and quality of life. http://www.aphekom.org/web/aphekom.org/home;jsessionid=196F85AD90D285D4755D72CAE82EE617

13 13 http://www.grandlyon.com/Autolib.3533.0.html

Additional sources of information

World Health Organization, www.euro.who.int

European Environment Agency, http://www.eea.europa.eu

European Commission's DG Environment, http://ec.europa.eu/dgs/environment/index_en.htm

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