

# NEWSLETTER



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MANAGEMENT AND AIR POLLUTION CONTROL

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### **Editorial: Eyjafjallajokull's eruption found us well prepared**

Our Newsletter serves as a 'switchboard' for news within the WHO European Region and its programme on Air Quality and Health. Routine work in the programme is driven by toxicological and epidemiological research studies. These are - often after comprehensive discussions and decisions - the scientific basis for documents like the WHO Air Quality Guidelines. Its guideline values are used for setting ambient air quality standards to protect human health from air pollution.

But what happens if we experience the unexpected? The eruption of Iceland's volcano Eyjafjallajokull last April was unforeseen. For parts of Europe the situation became more delicate when northwesterly windstreams transported the volcano ash cloud rapidly towards the British Isles and the European continent. The effect: politicians, journalists and the public wanted to know whether the ash cloud would be harmful. The situation in Europe varied: in Iceland large areas were densely covered with volcanic ash, in parts of the UK cars were covered with visible particles, whereas on the European continent due to diluting effects of long-range transport only relatively low concentrations of particles were detected in rural backgrounds, like in Germany.

Many airports in Europe were closed - a precautionary measure that led to hot and controversial discussions on the security of air traffic. Concerning human health it became clear very soon, that the recommendation of different public health institutions and regulatory bodies in Europe and of the WHO were comparable: For most areas and countries in Europe - with the exception of the direct vicinity of the volcano - no or only very basic preventive measures were advised: People with respiratory diseases were reminded to avoid strenuous exercise and keep their medication with them. Unjustified health concerns could be dispelled. In summary: Adequate risk communication for this episode of volcano ash exposure in Europe.

This issue No.45 deals with information about air pollution abatement measures in Poland and air quality trends in Germany. We hope we can contribute further to a fruitful international co-operation and the development of a common and mutual understanding within the frame of WHO Europe.

Eyjafjallajokull was teaching us that it is worth doing this work.

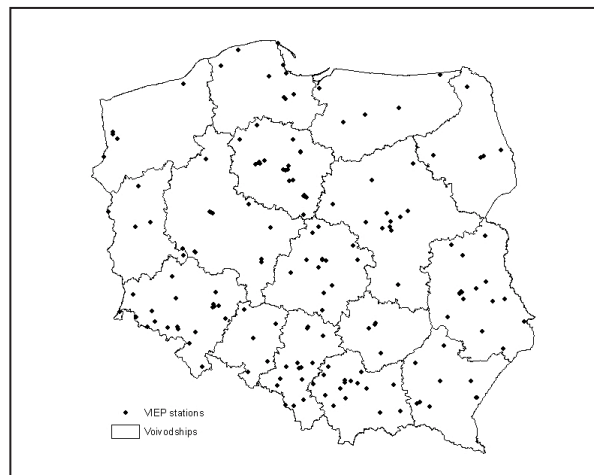
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## AIR QUALITY IN POLAND AND MITIGATION MEASURES CONCERNING EMISSION REDUCTIONS

Magdalena Brodowska

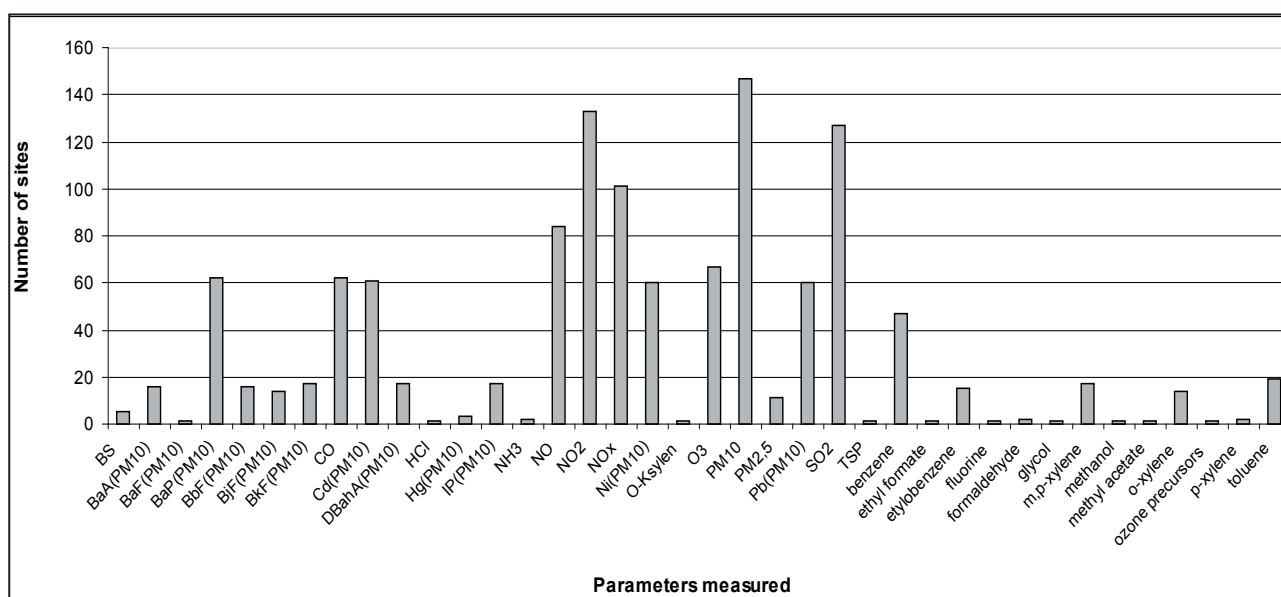
### Air quality measurements – in the past and now

In Poland air quality data are collected within the framework of the State Environmental Monitoring by the Inspection of Environmental Protection – the Chief Inspectorate of Environmental Protection (CIEP) and the regional Voivodship Inspectorates of Environmental Protection (VIEP) or by contracted bodies such as research institutes. Since joining the European Union in 2004, Poland implemented the air quality monitoring and assessment requirements according to the EU Air Quality Law. Nowadays there are more than 1.400 operating monitoring stations (including passive samplers) using automatic, manual and passive measuring techniques (184 of these are automated stations). They are divided into 16 regional networks run by the Voivodship Inspectorates of Environmental Protection (Figure 1). For the purposes of air quality assessment Poland has been divided into 170 zones and agglomerations regarding SO<sub>2</sub>, NO<sub>2</sub>, NO<sub>x</sub>, benzene, CO, PM<sub>10</sub>, as well as Pb, As, Cd, Ni and B(a)P in PM<sub>10</sub> and 28 zones and agglomerations regarding O<sub>3</sub> (Figure 2).



**Figure 1:** Map of VIEP measurement stations included in the State Environmental Monitoring without passive samplers in 2008 (Source: CIEP/State Environmental Monitoring)

The Voivodship Inspectorates of Environmental Protection cooperated closely with the Sanitary Inspection (exclusively based on manual methods) – till the end of 2009 many air quality monitoring stations were operated by the Sanitary Inspection, including a significant number of particulate matter samplers with analysis of heavy metals and poliaromatic hydrocarbons in PM<sub>10</sub>. In 2009 the Sanitary Inspection decided to close their sites and



**Figure 2:** VIEP measurement sites in SEM in 2008 (Source: CIEP/SEM)

nowadays the cooperation continues at the level of exchanging information. CIEP ensures air quality data and further on the Sanitary Inspection is responsible for the assessment of the relation between specific health problems (like pulmonary disorders, cardiac diseases, hospital admissions, cause of death) and adverse air quality episodes.

### Sources of pollutants, air quality monitoring and assessment results

Like a number of other European countries and despite of constant air quality improvement, high concentrations of particulate matter in the winter season and tropospheric ozone in the summer are still on the agenda in Poland.

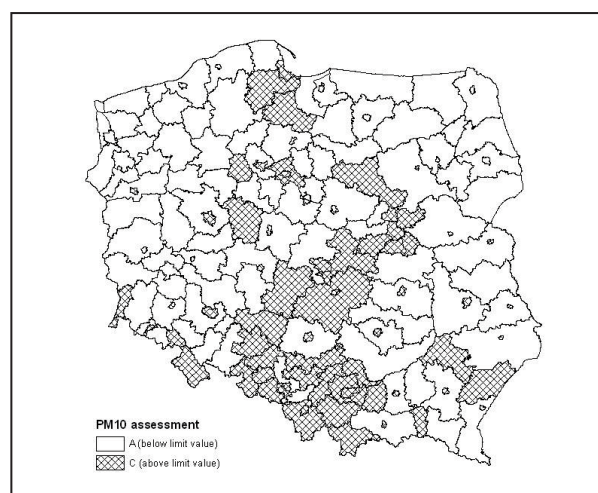
#### *Particulate Matter*

In case of Poland, fine particles originate mostly from household sources. The second major source is the sector of industry and energy and the third one is the traffic sector, particularly affecting urban areas. In cities the first and the last cause play the major role. Due to domestic natural resources of crude coal this fuel is the most common in households' heat production. It is also the cheapest one. Based on model calculations, the majority of PM<sub>10</sub> originates from local sources in the central part of Poland. High contributions of transboundary PM<sub>10</sub> are observed at Polish borders. A higher ratio of PM<sub>2.5</sub>/PM<sub>10</sub> is observed in the eastern and north-eastern parts of Poland.

Polish studies concerning the composition of PM<sub>10</sub> show a high amount of PM<sub>2.5</sub> within the PM<sub>10</sub> fraction at antropogenic locations resulted from low emission sources, like households. At these locations the amount of elementary and organic carbon is more than 50%. As everywhere else particulate matter is emitted directly into the air or is formed due to physical and chemical reactions in the atmosphere. Regardless noticeable reductions in PM precursor emissions (sulphur dioxide, nitrogen oxides, hydrocarbons and ammonia) and implementation of mitigating measures, especially towards fine particles,

the concentrations of PM<sub>10</sub> remain the most significant air pollution issue in Poland. Exceedances occur in annual limit values as well as in daily limit values, although the latter is more frequent. Excessive concentrations of PM mainly concern cities and agglomerations. Some additional unfavourable circumstances, like local frequent air stagnation and inversion episodes, occurring in a city located on a mountain or in a river valley (e.g. Krakow agglomeration) may also elevate PM concentrations. When high concentrations of industry facilities are added to natural adverse conditions the problem with attaining the limit values gets even worse.

Exceeding PM<sub>10</sub> daily limit values are usually observed during the winter season when along with falling ambient air temperatures the combustion of fuel in households as well as in the energy sector increases. In 2008 the highest concentrations of PM<sub>10</sub> were observed in December simultaneously with air temperatures below 0°C. The number of zones with concentrations exceeding the 24-h limit value was three times higher than with exceedances of annual limit value. Similar proportions were observed in previous years (Figure 3).



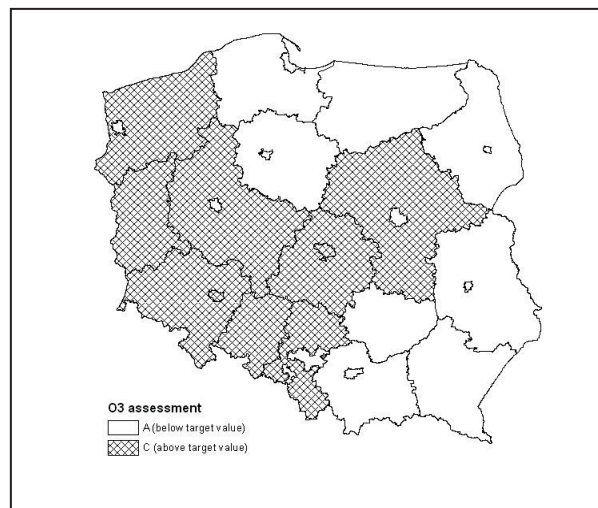
**Figure 3:** Annual air quality assessment in Poland 2008 regarding the PM<sub>10</sub> daily and annual limit value of the protection of human health. The map shows zones where PM<sub>10</sub> daily and/or annual limit values were exceeded in 2008. The zones indicated as C require air quality protection programmes (Source: CIEP/State Environmental Monitoring).

Ozone

Tropospheric ozone is formed as a result of photochemical reactions of nitrogen oxides and volatile organic compounds in presence of UVB radiation. High concentrations are observed during episodes of high ambient air temperature, insolation and lack of precipitation. Therefore episodes of exceeding ozone target values occur in Poland during the summer. They are connected with transboundary ozone precursors and ozone transport from southern and south-western Europe. Rare episodes exceeding the public information threshold result from noticeable contributions by local emission sources. In 2008 five Polish stations registered a few-hour exceedance of the information threshold.

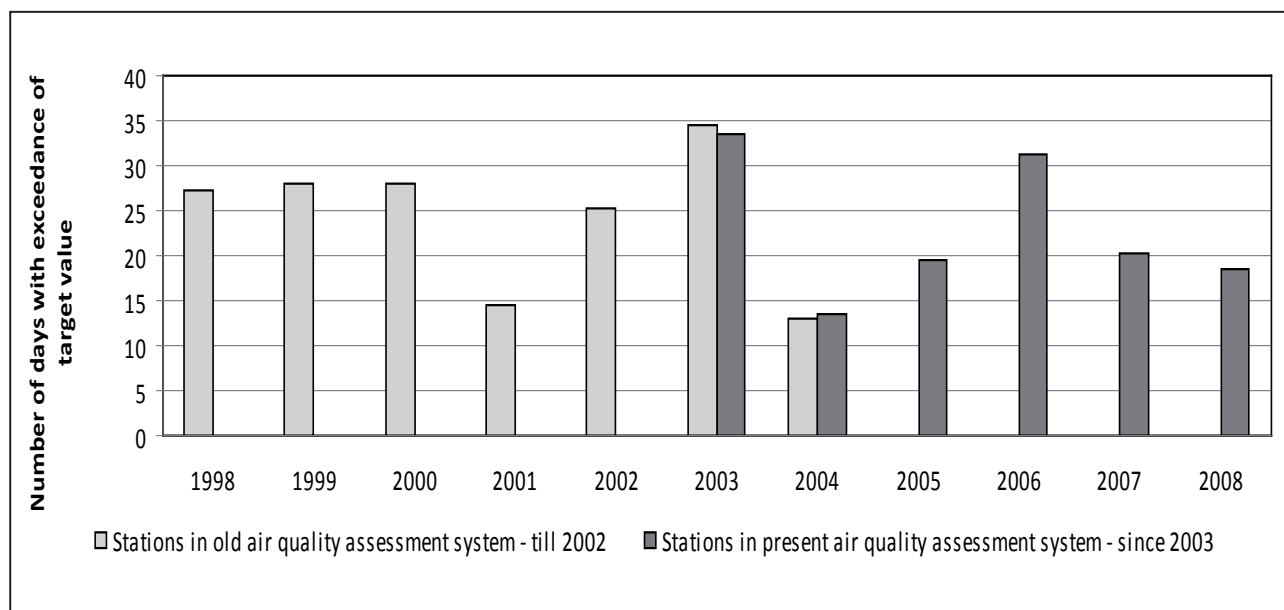
The ozone concentration trends over the last twelve years at three regional background EMEP stations show a slight decrease (the fourth one, located at a southern station in mountains (PL03) reports a minimal increasing trend). With regard to ozone concentrations the annual air quality assessment is based on 8-hour running means (Figure 4). The analysis of measurement data shows that there is no noticeable trend in the category number of days with exceeding target values. The year 2008 was characterised by the lowest ozone concentrations in the last decade.

In 2008 the target value for ozone concerning the protection of human health was exceeded in 10 zones (overall 28). The zones were located in western, south-western and central Poland (Figure 5).

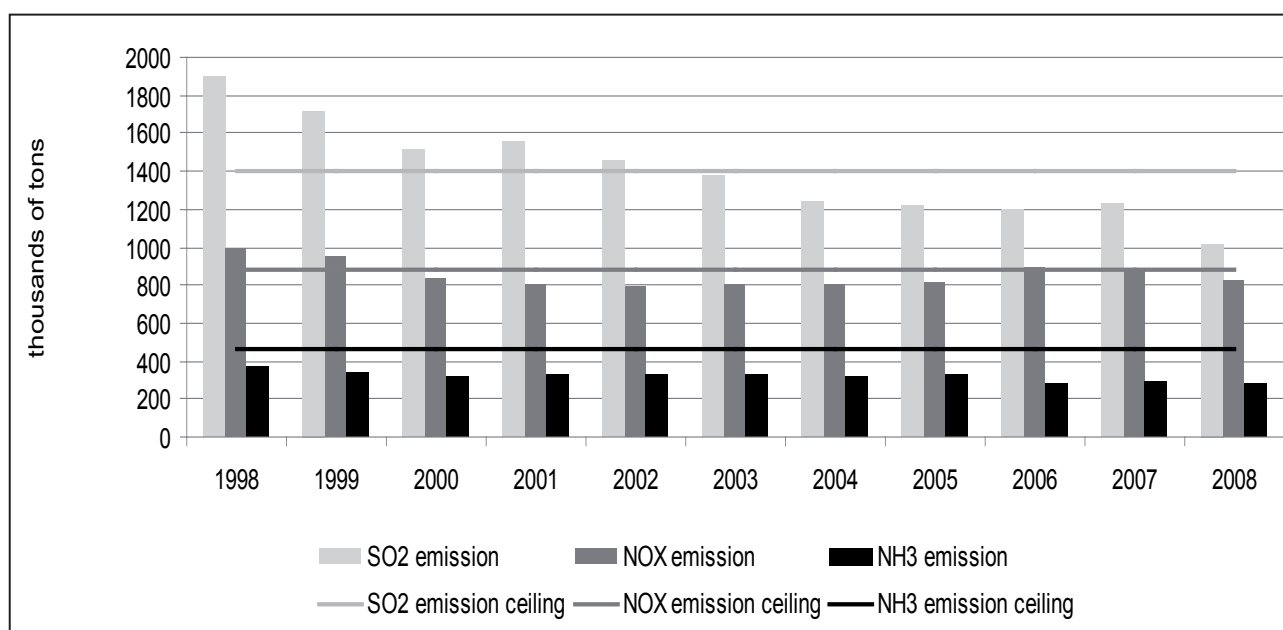


**Figure 5:** Results of the annual air quality assessment in Poland 2008 regarding the ozone target value “protection of human health” (Source: CIEP/State Environmental Monitoring)

Only in few urban locations high concentrations of nitrogen dioxide occur. Concentrations of other pollutants such as sulphur dioxide, carbon monoxide, benzene or heavy metals in the PM<sub>10</sub> fraction seem to be no longer a threat.



**Figure 4:** Arithmetic means of the number of days with 8-h ozone-concentrations exceeding 120 µg/m<sup>3</sup> in the period from 1998 to 2008 (Source: CIEP/State Environmental Monitoring)



**Figure 6:** Emissions of SO<sub>2</sub>, NO<sub>x</sub>, and NH<sub>3</sub> in the period from 1990 to 2007 together with Polish national emission ceilings from Accession Treaty concerning the 2001/81/EC Directive (Source: Polish Ministry of Environment)

### Air pollution abatement strategies/policies to protect population's health in Poland

Despite of the significant economic growth during the last decade Poland has decreased its emissions of SO<sub>2</sub>, NO<sub>x</sub> and NH<sub>3</sub>. It resulted in decoupling the trend of Polish GDP from the emissions over a ten-year period from 1998 to 2007.

In spite of the increasing number of cars (6.5 mio more in the last decade) from 1998 to 2007 Poland has not assessed increasing emissions of NO<sub>x</sub>. Emissions of SO<sub>2</sub>, NO<sub>x</sub> and NH<sub>3</sub> with respect to the Polish emission ceilings as defined in the Accession Treaty have visible downward trends (the most significant trend of emission decrease is observed for SO<sub>2</sub>) (Figure 6).

Historically, public health was intensively protected in health resort areas. There were norms for the whole country territory but not enough action was taken to control exceedances of those standards (it is worth to emphasize that some of these standards were more stringent than the EU ones) because there was no mechanism efficient enough to do it. Nowadays accession to EU has boosted Polish efforts towards attainment of limit and target values.

Several mitigation measures, compliant with the EU *acquis communautaire*, are expected to decrease air pollution: permits for air emissions, integrated permits, emission standards, fuel standards, EURO standards, increase in the use of renewable energy sources and less energy-demanding economy, investments in transport (especially rail) and the implementation of air quality protection programmes required by the CAFE Directive 2008/50/EC on air quality and cleaner air for Europe. The air protection strategy is part of the National Environmental Policy for the years from 2009 to 2012, perceptively up to 2016. At the national level it determines general emission mitigation measures for most polluting sectors of the economy. Regional measures are defined in the Voivodship environmental protection Programmes and reflect actual needs of the regional environment.

In the sector of households and among others they promote the exchange of old highly polluting heat generators using crude coal to oil stoves, and improving the thermo insulation of buildings. For the sector of transport they promote public transport, rail and more environment-friendly fuels including gas (LPG and CNG) and the construction of bypasses for polluted cities.



For the industrial sector the measures include promotion of low emission technologies, cogeneration, using highly efficient filtration devices and switching to a higher-quality fuel. Additional measures on the local level concerning air protection are implemented in the framework of air quality protection programmes. They may include requirements for spatial management programmes, obligations to connect households to central heating systems, construction of networks of cycle paths and lanes, ban of fireplaces within the city borders, etc.

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M. Brodwska 2009: "SOER 2010 Part C - Air Quality in Poland", presentation at 14<sup>th</sup> EIONET Air Quality Management and Assessment Workshop, 5-6 October 2009, Warsaw, Poland, [http://air-climate.eionet.europa.eu/docs/meetings/091005\\_14th\\_eionet\\_aq\\_ws/meetings091005.html](http://air-climate.eionet.europa.eu/docs/meetings/091005_14th_eionet_aq_ws/meetings091005.html).

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## TRENDS IN AIR QUALITY IN GERMANY

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### Introduction

Air pollution has markedly decreased in the last 20 years. Through the introduction of filter and flue-gas denitrification systems in power plants and industrial installations as well as the use of modern catalysts and fuels, considerably fewer pollutants are today released into the atmosphere. EU-wide air quality limit values for sulphur dioxide, carbon monoxide, benzene and lead are no longer exceeded in Germany.

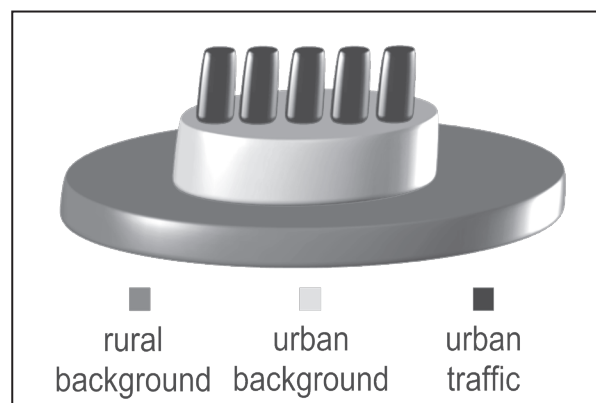
On their way from the emission source (for example, flue or exhaust) to receptor (humans, flora and fauna), pollutant emissions are subject to atmospheric transport and mixing processes as well as chemical reaction. Pollutant concentration in the atmosphere (given, for example, in micrograms per cubic metre of air) can therefore not be directly deduced from the emitted pollutant quantity (given, for example, in tonnes per year). In principle, however, markedly reduced pollutant emissions give cause to expect that pollutant concentration in the atmosphere will also decrease. We observe, however, that since the beginning of the last decade air pollution in Germany through particulates, nitrogen oxide and ozone, despite steadily reduced emissions, has no longer shown a clear trend, but is subject rather to mainly interannual fluctuations.

The limit values for particulate matter, which were laid down already in 1999 and are obligatory since 2005, are exceeded in many places in Germany. The same applies for limit values for nitrogen dioxide, which came into force in Germany on 1 January 2010. In urban areas – and, above all, in places affected by heavy traffic – air pollution with particulate matter and nitrogen dioxide is particularly high. Other than in the case of particulate matter and nitrogen dioxide, ozone pollution is highest in rural areas. For some years, a trend towards higher ozone concentrations has been noticeable in

urban areas. This article describes trends in air pollution with particulate matter, nitrogen dioxide and ozone, and explains their connection to changes in air pollutant emissions in Germany.

### Pollution regimes

In order to be able to understand spatially differentiated trends in air pollution, it is necessary to combine concentration values obtained at individual air quality measuring stations in such a way that they characterize pollution regimes. As shown in Figure 1 the *rural background* regime represents areas in which air quality is largely uninfluenced by local emissions. Stations in this regime thus represent pollution at a regional level, also termed regional background. The *urban background* regime is characteristic for areas in which measured pollutant concentrations can be regarded as typical for air quality in cities. The urban background regime characterizes the pollution that arises from urban emissions (road traffic, domestic fuel etc.) and the regional background. *Urban traffic* regime stations are typically found on roads with heavy traffic. The result is a cumulative contribution to urban background pollution that arises from direct emissions of road traffic.



**Figure 1:** Schematic representation of pollution regimes

The time series curves of air quality shown in this article reflect the trend over time of average concentrations in the respective pollution regime. Time series curves are therefore not suitable for assessment of compliance or non-compliance with limit values of individual measuring stations.

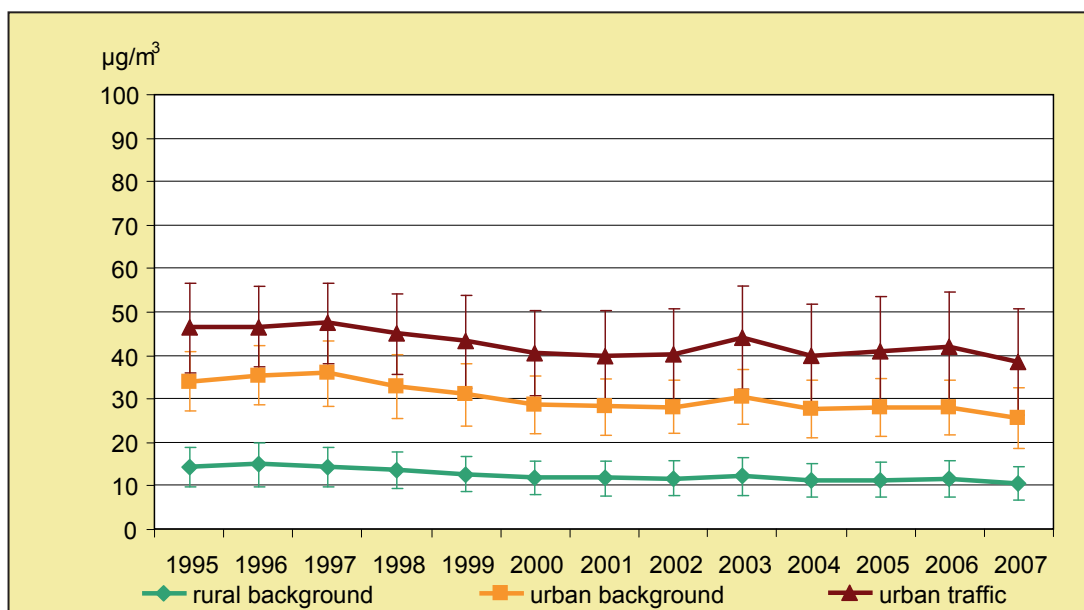
### Nitrogen oxides

NO<sub>x</sub> is a collective chemical term for nitrogen oxides and comprises nitrogen monoxide (NO) and nitrogen dioxide (NO<sub>2</sub>) as summation parameter. Nitrogen oxides are mainly emitted as nitrogen monoxide. Nitrogen oxide is emitted directly, but also formed indirectly through chemical reactions in the atmosphere. Internal-combustion engines and combustion processes in industry and energy production plants are the main sources of nitrogen oxides.

Based on the year 1995, NO<sub>x</sub> emissions of all source categories decreased by 15% by the year 2000. Up to 2007 they sank by a further 24 percentage points. If one merely considers emissions from road transportation, it has to be observed that here the largest reduction, namely 50%, was achieved. Nevertheless, road transportation still accounts for the largest share (44%) of total nitrogen oxide emissions.

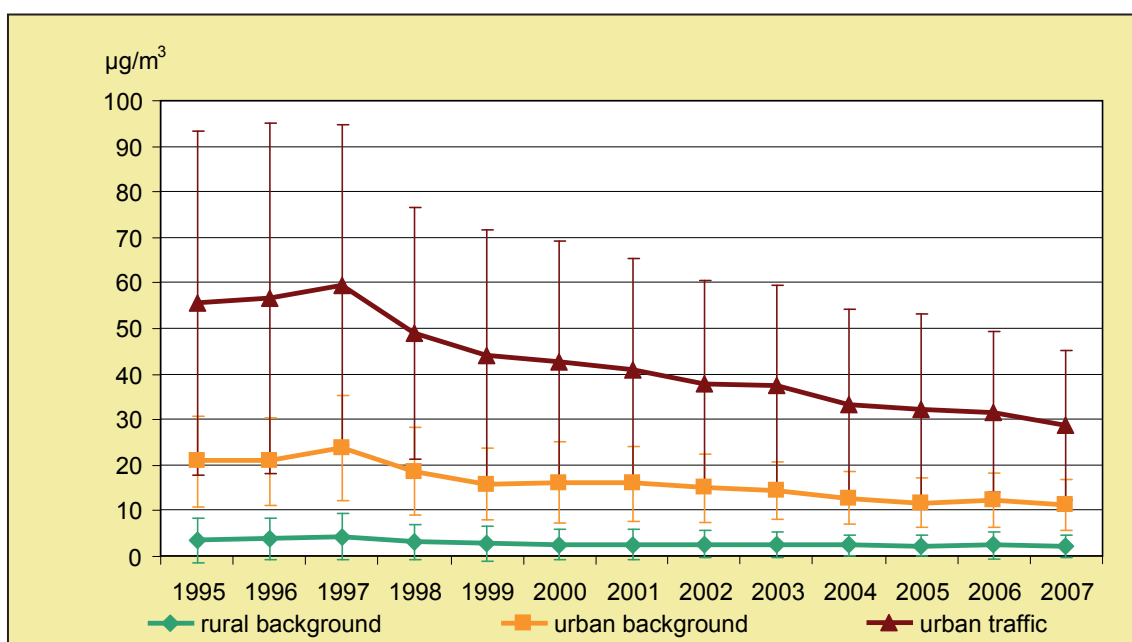
The trend in NO<sub>2</sub> concentrations shows, however, that the marked reduction in NO<sub>x</sub> emissions since 1995 has not been reflected in the state of NO<sub>2</sub> pollution (Figure 2). Since the year 2000, annual mean NO<sub>2</sub> concentrations have hardly changed in urban areas, affected by traffic and in the urban background. Recognizable inter-annual fluctuations are attributable, above all, to weather-related influences. The range of annual mean values of individual measuring stations can be estimated on the basis of the stated standard deviation.

At the same time, it becomes clear that in the urban traffic pollution regime, annual mean concentrations occur that lie considerably above the limit value of 40 µg/m<sup>3</sup>, which is obligatory since January 2010. Since NO<sub>2</sub> concentration in the period under consideration has shown only little reduction since 1995, the decline in NO<sub>x</sub> concentration must be attributable to declining NO concentration. A declining trend in NO annual mean values since 1995 is easily discernible in the urban background (Figure 3, urban background) and even more so in places affected by heavy traffic (Figure 3, urban traffic). Measurements in urban areas affected by heavy traffic show high NO<sub>x</sub> concentrations with a high share of NO (Figure 3, urban traffic), since the transport time from tail pipe to the measuring point is short,



**Figure 2:** Trend in annual mean NO<sub>2</sub> concentration based on the average of measuring stations in the pollution regimes „rural background“, „urban background“ and „urban traffic“ in the period from 1995 to 2007 (with standard deviation)





**Figure 3:** Trend in annual mean NO concentration based on the average of measuring stations in the pollution regimes „rural background“, „urban background“ and „urban traffic“ in the period 1995 to 2007 (with standard deviation)

compared with the reaction time for conversion of NO to NO<sub>2</sub>. With increasing transport time NO is largely converted to NO<sub>2</sub>. This also explains the low NO pollution level in rural areas (Figure 3, rural background), which has remained more or less constant over the entire period under observation.

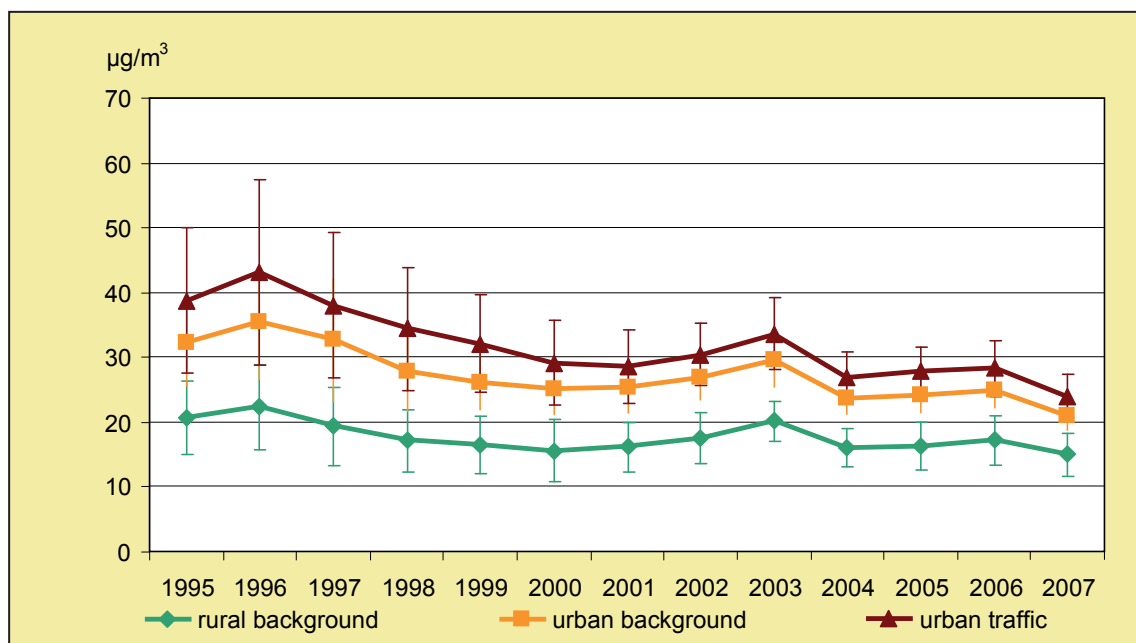
### Particulate matter

Particulate matter concentrations (here considered as PM<sub>10</sub> only) in the air stem partially from PM<sub>10</sub> emissions (for example, traffic and industrial installations), but also arise from secondary PM<sub>10</sub>. The latter arises through chemical reaction of the inorganic and organic precursor substances ammonia (NH<sub>3</sub>), nitrogen oxides (NO<sub>x</sub>), sulphur dioxide (SO<sub>2</sub>) and non-methane volatile organic compounds (NMVOC) during transport over substantial distances. Total particulate pollution results from the sum of both components (primary and secondary). Important anthropogenic sources of particulates are vehicles, power and district heat plants, furnaces and heating systems in residential buildings, handling of dry bulk materials as well as certain industrial processes. In urban conurbations, road traffic is a particularly important source of particulates.

At the same time, particulate matter enter the atmosphere not only from engines – primarily from diesel engines – but also from brake and tyre abrasion, as well as through the raising of dust from road surfaces. Agriculture is another important source.

Emissions of gaseous precursors – in particular ammonia – from livestock husbandry contribute to secondary aerosol formation. Natural contributions towards particulate pollution arise, for example, through sea salt, Sahara dust and forest fires.

Based on the year 1995, primary PM<sub>10</sub> emissions decreased by 7% by the year 2000, by 2007 they had decreased by further 10 percentage points. The greatest reductions in absolute terms were recorded in the areas of industrial processes and road transportation. With the exception of agriculture, shares in emissions of individual polluters in the total period have hardly changed. Sulphur dioxide and non-methane volatile organic compounds contribute towards the formation of secondary particulates. Emissions of these PM<sub>10</sub> precursors have been considerably reduced since 1995. By contrast, emissions of ammonia, 95% of which come from agriculture, have barely decreased since 1995.



**Figure 4:** Trend in PM<sub>10</sub> annual mean based on the average of measuring stations in the pollution regimes „rural background“, „urban background“ and „urban traffic“ in the period from 1995 to 2007 (with standard deviation)

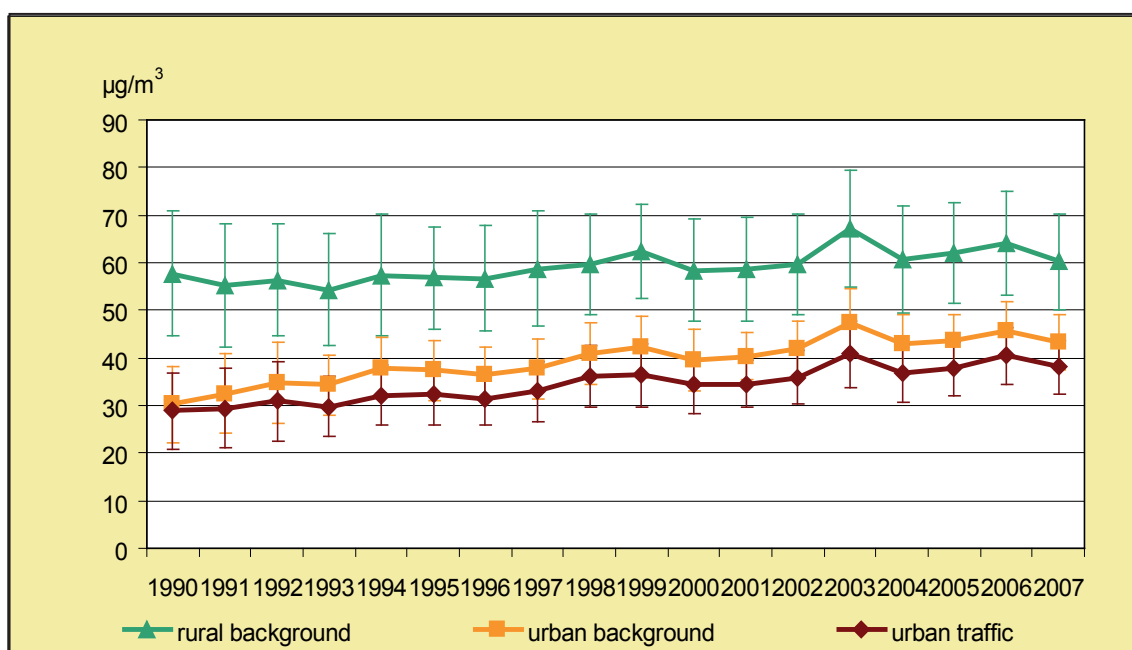
Accompanying the strong reduction in SO<sub>2</sub> emissions and the decline in primary PM<sub>10</sub> emissions in the period from 1995 to 2000, PM<sub>10</sub> concentrations in all pollution regimes also decreased in the same period (Figure 4). Since then, a clearly-declining trend in concentration has no longer been observed. The fact that the level of PM<sub>10</sub> concentration in urban conurbations has remained static since the year 2000, not only in the urban background but also in the urban traffic pollution regime, is primarily attributable to a low reduction in traffic-related PM<sub>10</sub> emissions and a slight decrease in emissions in residential heating.

PM<sub>10</sub> pollution in the rural background, far-removed from emitters, which has remained at a more or less constant level since the year 2000, indicates that the secondary PM<sub>10</sub> share in total PM<sub>10</sub> pollution has not decreased. While emissions of the PM<sub>10</sub> precursors NMVOC and NO<sub>x</sub> each dropped markedly by about 40%, NH<sub>3</sub> emissions barely decreased. NH<sub>3</sub> emissions are a limiting factor in the formation of secondary particles in rural areas. Since agriculture, with a share of over 90%, is the main source of NH<sub>3</sub> emissions, and these have hardly decreased in the period since 1995, this source category has made no contribution towards the reduction in particulate pollution.

The trend in PM<sub>10</sub> concentrations over time is overlaid by inter-annual, weather-related fluctuations, which is easily recognizable, for example, in the “peaks“ in all three curves in the year 2003.

### Ozone and its precursors

Ground level ozone (O<sub>3</sub>) is not directly released, but rather develops secondarily with intensive solar radiation from precursors – predominantly nitrogen oxides and non-methane volatile organic compounds (NMVOC) – through complex photochemical processes. High air temperatures and strong solar radiation favour the development of ground-level ozone in the atmosphere. This is characteristic for meteorological high-pressure conditions during the summer. Ozone precursors have both natural and anthropogenic sources. 44% of nitrogen oxides stem from the traffic area, in particular from road traffic. More than half (56%) of volatile organic compounds are released during the use of solvents. Solvents are found in many products, such as paint and varnish, adhesives and detergents. Compared with the year 1995, NMVOC and NO<sub>x</sub> emissions in Germany declined in the period to 2007 by 39%.



**Figure 5:** Trend in ozone annual mean values based on the average of measuring stations in the pollution regimes „rural background“, „urban background“ and „urban traffic“ in the period from 1990 to 2007 (with standard deviation)

The largest NMVOC reductions in absolute terms occurred in the traffic area, the application of solvents and in fugitive emissions from fuels. Although emissions of ozone precursors declined substantially, ozone annual mean concentrations have shown a clear upward trend since 1990. The increase of  $0.80 \mu\text{g}/\text{m}^3$  per year in the urban background regime (Figure 5) is the most pronounced. The difference between concentrations in urban stations and those in the rural background steadily decreased from 1990 to 2007.

### Conclusions and implications for future measures

The trend in concentrations of the air pollutants  $\text{NO}_2$ ,  $\text{PM}_{10}$  and  $\text{O}_3$  over time clearly shows that for causal analysis there are insufficient grounds to directly infer an improvement in air quality from a reduction in emissions. This must be taken into consideration in future in the deduction of indicators. Beyond that, it is apparent that some pollutant-specific measures have had an effect on other pollutants.

Through the disproportionately high rise in the share of diesel vehicles in the total vehicle fleet, and through technical reduction of vehicle-related particulate emissions, the  $\text{NO}/\text{NO}_2$

emission ratio has therefore changed and contributed to an increase in  $\text{NO}_2$  pollution. This is a clear argument for expedited introduction of the EURO 5 and, in particular, EURO 6 norm for passenger cars and commercial vehicles.

A further example, which has basically to be welcomed, is the decrease in traffic-related  $\text{NO}$  emissions, which, however, is accompanied by a weakening of the titration effect and results in increased ozone concentrations in urban conurbations. The necessity of greater efforts towards the abatement of emissions of volatile organic compounds therefore remains, particularly in the use of solvents and product use.

Observations also show that with the decline in industrial and traffic-related emissions the relative importance for pollution of other sectors grows. Reduction measures in the agricultural sector have up to now not been pursued with the required determination, as a result of which the decrease in concentrations of particulate matter in the rural background, and thus also in urban conurbations, has remained behind the required, cost-effective rate. Since limits on particulate emissions, despite improved exhaust gas treatment in the traffic area, cannot be complied with in the urban traffic pollution regime, additional non-technical measures remain necessary.

The main focus is on traffic avoidance and speed limit, which contribute, at the same time, towards city centres worth living in.

Emissions from as yet secondary sectors, such as single combustion with solid fuels, likewise gain in importance in the context of climate policy. The laying down of ambitious regulations for small-scale combustion plants and their fuels is a measure with which, inter alia, particulate emissions are effectively limited.

At the same time, efforts in the area of technical emission reduction must also be maintained in the future. Large stationary plants have to be continuously adapted to the latest developments in technology, in order to minimize as far as possible nitrogen oxides as well as ozone and particulate precursors. Apart from road traffic, air traffic and shipping has also to be included in emission reduction concepts. In order to weigh up and compare available measures and to take cost-optimized decisions, the laying down of national emission ceilings through international agreements has proven of value. The limit values valid from 2010 have to be urgently revised and supplemented with a regulation for particulate emissions.

Although limit and target values for some air pollutants are still exceeded, immission control during the past 30 years in Germany has also recorded a number of successes. With the Federal Immission Control Act (*Bundes-Immissionsschutzgesetz*) of 1974, for the first time systematic regulation – in particular of state-of-the art emission limitation – for new installations and existing plants in polluted areas was introduced. The 1980s were marked by extensive remediation programmes for all power plants and major industrial plants.

In the 1990s, sources of emission in the new federal states (the former GDR) were reconstructed or closed down and replaced with modern plants with state-of-the-art emission reduction facilities. Pollutants such as soot and coarse dust, sulphur dioxide and summer smog with the lead compound ozone are therefore nowadays no longer a problem. This applies also to carbon monoxide, benzene and lead.

Protection against harmful influences on human health and the environment, as well as their prevention, remain an important task for German and international air pollution control policy on the way towards cleaner air in Germany.

### References

The full text of the background paper „Trends in Air Quality in Germany“, published by the German Federal Environment Agency in October 2009 is available online:  
<http://www.umweltdaten.de/publikationen/fpdf-l/3870.pdf>

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NOTES AND NEWS

**World Health Day 2010: ‘1000 cities, 1000 lives’**

World Health Day 2010 is about urban health. The campaign – “1000 cities, 1000 lives”, took place on 7–11 April 2010 – encourages cities to open up public spaces to health, and to collect stories of urban health champions who have taken action and significantly benefited health in their cities. Over 175 cities in 31 countries across the WHO European Region have joined the campaign.

In the WHO European Region, about 70% of the population lives in urban areas. Urban living is associated with many health challenges related to water, air and other aspects of the environment, violence and injury, noncommunicable diseases (NCDs) and lifestyle, such as tobacco use, unhealthy diets, physical inactivity, harmful use of alcohol and disease outbreaks. These challenges fall more heavily on the urban poor, because:

- Over 92% of urban populations live in cities with levels of air pollution (with particulate matter) that exceed the WHO air quality guideline value.
- Environmental noise is perceived as the most common stressor in urban areas.
- Road traffic crashes kill about 100 children and young people aged under 25 every day, and cause on average 35 non-fatal injuries for every death.
- The prevalence of overweight (including obesity) in 11- and 13-year-olds ranges from 5% to more than 25% in some countries.
- 50% of car journeys are under 5 km, a distance that could be covered in 15–20 minutes by bicycle or 30–50 minutes by brisk walking.

Urban planning can promote healthy behaviour and safety through: investing in active transport, designing areas to promote physical activity and passing regulatory controls on tobacco and food safety.

Improving urban housing, water and sanitation will go a long way towards mitigating health risks. Building inclusive cities that are accessible and welcoming to people of all ages will benefit all urban residents.

The WHO Healthy Cities programme engages local governments in health development through a process of political commitment, institutional change, capacity building, partnership-based planning and innovative projects. It also supports the WHO European Healthy Cities Network: cities from around Europe that are committed to health and sustainable development. Over 1200 cities and towns from over 30 countries in the WHO European Region are healthy cities. These are linked through national, regional, metropolitan and thematic Healthy Cities networks, as well as the WHO European Healthy Cities Network for more advanced cities.

The WHO European Healthy Cities Network consists of a network of cities from around Europe that are committed to health and sustainable development. They are designated to the WHO European Healthy Cities Network on the basis of criteria that are renewed every five years. Each five-year phase focuses on a number of core priority themes and is launched with a political declaration and a set of strategic goals. The overarching goal of Phase V (2009–2013) is Health and health equity in all local policies. Cities are focusing on three core themes: caring and supportive environments, healthy living and healthy urban design. Phase V is supported by the Zagreb Political Declaration for Healthy Cities in the European Region.

Healthy Cities is a global movement. Healthy Cities networks are established in all six WHO regions.



### **CitiesACT and the Clean Air Portal**

Although a great deal of information has been generated on air quality management and sustainable urban transport, this has been available in various data formats and spread across different organizations. Data collection is therefore time consuming and inefficient, making it more difficult to use the data for effective policymaking.

To help address this problem, the Clean Air Initiative for Asian Cities (CAI-Asia), with support from the Global Atmospheric Pollution Forum (GAPF), developed the CitiesACT database ([www.citiesact.org](http://www.citiesact.org)) last year.

The CitiesACT database features data and information on Air Quality, Climate Change & Energy, and Transport. It includes a growing list of country and city profiles; policy profiles; organization profiles; projects and programs; and training courses – all related to air quality and/or sustainable transport in Asia.

Since measures to address one problem may have positive benefits in other areas, the CitiesACT portal aims to provide a more integrated perspective for policymakers through this “cobenefits” approach. By engaging organizations to share their respective data sets, stakeholders will be able to access the data from a single location at their convenience. It also gives them a “big picture” perspective, especially when the data is organized and interpreted for reports and action plans.

However, while GAPF funds provided seed funding to conceptualize and develop the initial version of the database, additional funding was needed to take this to the next level. The Asian Development Bank, through its KnowledgeAir project, funded the creation of a more general Clean Air Portal ([www.cleanairinitiative.org](http://www.cleanairinitiative.org)), which was launched on 15 February 2010.

### **WHO/Europe expert group concludes Icelandic volcanic ash currently poses no threat to public health**

Health surveillance systems in countries in the WHO European Region detected no exposure of the population to volcano-related air pollution and no health effects which could have been potentially related to volcanic ash following the volcanic eruption of 14 April 2010 in Iceland.

This is the main conclusion of the scientific advisory group (SAG), convened for the third time by WHO/Europe in collaboration with WHO headquarters, to coordinate risk assessment, surveillance and monitoring regarding the volcanic ash cloud’s possible impact on health.

Countries’ reports have identified no exposure to volcanic ash and gases on ground level and no changes in the air quality situation over recent days.

Eruptions in Iceland have decreased in intensity. Owing to this and the volcano’s emission of coarser particles, ash is not expected to spread widely beyond Icelandic territory.

SAG will move into a stand-by mode unless further volcanic activity in Iceland necessitates a more active status. All members will continue exchanging information and data, including for longer-term research on similar events.

SAG members include experts from countries in the European Region and the United States, specialized in assessments of air quality and effects of air pollution on health, toxicology, atmospheric chemistry and vulcanology.

### Environment and Health 2010

The Ministers and Representatives of Member States in the WHO European Region responsible for health and the environment, have gathered in Parma, Italy from 10 to 12 March 2010 to face the key environment and health challenges of our time.

Building on the foundations laid in the European Environment and Health Process it has been declared to intensify the efforts to implement the commitments made through previous WHO ministerial conferences, especially those set out in the Children's Environment and Health Action Plan for Europe (CEHAPE) in Budapest 2004.

Prioritized actions under the regional priority goals (RPGs) in the Children's Environment and Health Action Plan for Europe (CEHAPE) are indicated below:

RPG 1: Ensuring public health by improving access to safe water and sanitation

RPG 2: Addressing obesity and injuries through safe environments, physical activity and healthy diet

RPG 4: Preventing disease arising from chemical, biological and physical environments, and due to the focus on air hygienic aspects RPG 3 in a little more detail:

RPG 3: Preventing disease through improved outdoor and indoor air quality

i. Advantage of the approach and provisions of the protocols to the 1979 Convention on Long-Range Transboundary Air Pollution will be acknowledged.

Efforts will be continued and enhanced to decrease the incidence of acute and chronic respiratory diseases through reduction of exposure to ultrafine particles and other particulate matter, especially from industry, transport and domestic combustion, as well as ground-level ozone, in line with WHO's air quality guidelines. Monitoring, control and information programmes, including those related to fuels used in transport and households will be strengthened.

ii. An appropriate cross-sectoral policies and regulations capable of making a strategic difference in order to reduce indoor pollution should be developed, as well as to provide incentives and opportunities to ensure that citizens have access to sustainable, clean and healthy energy solutions in homes and public places.

iii. It is the aim to provide each child with a healthy indoor environment in child care facilities, kindergartens, schools and public recreational settings, implementing WHO's indoor air quality guidelines and, as guided by the Framework Convention on Tobacco Control, ensuring that these environments are tobacco smoke-free by 2015.

MEETINGS AND CONFERENCES

**7<sup>th</sup> Biometeorological Conference (BIOMET), 12 to 14 April 2010 in Freiburg, Germany**

Biometeorology represents a discipline of the interactions between atmosphere and the living environment, not only related to atmospheric exchange but also visible and sensitive from daily life to global warming issues.

The 7<sup>th</sup> BIOMET conference was hosted from 12 to 14 April 2010 at Meteorological Institute, Albert-Ludwigs-University of Freiburg, Germany in collaboration with several national societies and institutes. About one hundred scientists from over twenty countries participated in this event, which was divided into eight sessions covering the following topics: agricultural meteorology, animal biometeorology, climate change, human biometeorology, phenology, tourism climatology and urban bioclimatology. In total ninety oral presentations and posters have been presented.

The session on human biometeorology were focused on a number of presentations on human health related impacts of heat, thermal discomfort and aeroallergens/pollen. Recent research has shown that there are many meteorological and climatological effects on pollen and thus pollen-induced diseases, such as allergic rhinitis and asthma. Also the number of respiratory diseases due to pollen in the air increased in the last decades world-wide. More than fifteen million people in Germany each year suffer from hay fever and rhinitis. Clinical studies showed that there is a clear dose-response-relationship between pollen exposition and the occurrence of allergenic rhinitis. Particularly new research results and implementations at regional and local level of emissions, spread and control of main allergic pollen (hazel, alder, birch, grasses and ragweed/ *Ambrosia artemisiifolia*) was discussed for Germany.

Regarding the start of the pollen season and the total amount of pollen, the results demonstrate that changes are strongest in the South- and Northeast Germany. Ragweed, as one of the strongest pollen allergen, was investigated in the southwest region of Germany particularly. There, high ragweed concentrations are measured in the vicinity of large ragweed populations. But air mass origin analyses have shown that highest ragweed pollen pollution occurred with long-range transport from southern France. A changed climate leads to a changed occurrence of biological species in the air. As discussed before, extended vegetation periods result in a prolongation of the pollen season, and new allergic species can be established as well. Insects, which transmit diseases or have allergenic potential, can extend their range or become domestic. Mild temperatures favour the presence and distribution of thermophile organisms of plants and insects, species e.g. ragweed and the oak processionary moth. Contact with pollen and stinging hairs of such species may not only lead to allergic skin, eye and pulmonary irritations, but may also cause serious asthma attacks.

The proceedings of the 7<sup>th</sup> BIOMET conference are published in a report series of the Meteorological Institute of the University of Freiburg and are available online:

<http://www.meteo.uni-freiburg.de>.

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## PUBLICATIONS

## WHO

**The European Health Report 2009 – Health and Health Systems**

WHO Regional Office for Europe, Copenhagen, Denmark 2009, 126 pages, ISBN 978 92 890 1415 1, CHF 40.00, in developing countries CHF 28.00, Order-No. 13400093, also available through the web: <http://www.euro.who.int/Document/E93103.pdf>.

Investing in health and health systems is especially important during times of crisis, such as the severe economic crisis and pandemic (H1N1) 2009 influenza. To address these issues, governments and policy-makers need information that is current, accurate, comparable and user-friendly. What were the trends in public health indicators over the last four years? What factors influence health, and what are the challenges for the future? What contribution can health systems make to improve population health in the WHO European Region? In addressing these questions, the report illustrates the wide-ranging reforms countries have undertaken to strengthen performance in four core functions of health systems: service delivery, resource generation, financing and stewardship.

This report presents essential public health information to support countries in choosing sound investments in health. It should encourage the successful implementation of effective health system reforms and policies, and help countries improve their health systems' performance to provide efficient patient-centred, high-quality health care. The annex provides some of the data used in the analysis.

**Atlas of Health in Europe, Second Edition 2008**

WHO Regional Office for Europe, Copenhagen, Denmark 2008, 178 pages, ISBN 978 92 890 1410 6, CHF 20.00, in developing countries CHF 14.00, Order-No. 13402049, also available through the web: <http://www.euro.who.int/Document/E91713.pdf>.

This updated statistical atlas presents key health figures for the WHO European Region. They cover basic data on populations, births, deaths, life expectancy and diseases, lifestyle and environmental indicators, such as drinking, smoking and traffic accidents, and types and levels of health care. Each indicator is presented as a map to show overall regional variations, a bar chart to indicate country rankings and a time chart to show trends over time in three main country groupings. Using the WHO Regional Office for Europe's unique Health for All database, combined with the best alternative sources of data around the Region, this atlas offers the most comprehensive overview of health in Europe. In a handy size, this atlas is designed to be an easily accessible resource at all times, in the office or on the road.

**WHO Handbook on Indoor Radon – A Public Health Perspective**

WHO Publications, Geneva, Switzerland 2009, non-serial publication, 108 pages, ISBN 978 92 415 4767 3, Order-No. 11500763, CHF 30.00, in developing countries CHF 21.00 Available through the web: [http://whqlibdoc.who.int/publications/2009/9789241547673\\_eng.pdf](http://whqlibdoc.who.int/publications/2009/9789241547673_eng.pdf).

The WHO handbook on indoor radon is a key product of the WHO International Radon Project, which was launched in 2005. The handbook focuses on residential radon exposure from a public health point of view and provides detailed recommendations on reducing health risks from radon as well as policy options for preventing and mitigating radon exposure.

The material in this handbook reflects the epidemiological evidence that indoor radon exposure is responsible for a substantial number of lung cancers in the general population. Information is provided on devices to measure radon concentrations and on procedures for achieving reliable measurements. Also discussed are control options for radon in new dwellings, radon reduction in existing dwellings and the assessment of the costs and benefits of different radon prevention and remedial actions. Radon risk communication strategies and organizational aspects of national radon programmes are also covered.

This publication is intended for countries planning to develop national radon programmes or to extend existing activities as well as for stakeholders involved in radon control such as the construction industry and building professionals. The overall goal of this handbook is to provide an up-to-date overview of the major aspects of radon and health. It does not aim to replace existing radiation protection standards, rather it emphasizes issues relevant to the comprehensive planning, implementation and evaluation of national radon programmes.

**A healthy City is an active City: A physical Activity planning Guide**

P. Edwards, a. Tsouros, WHO Regional Office for Europe, Copenhagen, Denmark 2008, 80 pages, ISBN 978 92 890 4291 8, to be ordered free of charge or online: <http://www.euro.who.int/document/E91883.pdf>.

With this guide, city leaders can create a plan for physical activity, active living and sport in their city or community. It describes how the approach relates to the Healthy Cities movement, why people need active living opportunities and who to involve; how to create, implement and evaluate the plan; and what tools, good examples and other sources to use. The guide will be invaluable not only to city leaders and local governments, but also to all those they seek to involve in the process: city departments, nongovernmental organizations, schools and educators, the health sector, the private sector and residents themselves.

## OTHERS

**The Indoor Environment Handbook – How to make Buildings healthy and comfortable**

P.M. Bluysen, published by Earthscan, distributed by Macmillan Distribution Ltd, Hampshire, UK 2009, 400 pages, ISBN 9781844077878, £ 49.99.

Ensuring that buildings are healthy and comfortable for their occupants is a primary concern of all architects and building engineers. This highly practical handbook will help make that process more efficient and effective. It begins with a guide to how the human body and senses react to different indoor environmental conditions, together with basic information on the parameters of the indoor environment and problems that can occur. It then moves on to give a background to the development of the study and control of the indoor environment, examining the main considerations (including thermal, lighting, indoor air and sound-related aspects) for a healthy and comfortable indoor environment and discussing the drivers for change in the field. The final section presents a new approach towards health and comfort in the indoor environment, where meeting the wishes and demands of the occupants with a holistic strategy becomes the overriding priority. The book is filled with useful facts, figures and analysis, and practical methods that designers who are keen to assess and improve the user experience of their buildings will find invaluable.

**Indicators on Urban Air Quality - A Review of current Methodologies ETC/ACC Technical Paper 2009/8**

F. de Leeuw, J. Fiala, ETC/ACC, Bilthoven, The Netherlands 2009, 35 pages, available through the web: [http://air-climate.eionet.europa.eu/docs/ETCACC\\_TP\\_2009\\_8\\_UrbanAQindicators.pdf](http://air-climate.eionet.europa.eu/docs/ETCACC_TP_2009_8_UrbanAQindicators.pdf).

To follow the development of the air quality in European urban areas, several sets of indicators have been developed over the years. At the European level, Eurostat, the European Commission and EEA use each a different set. This report discusses the similarities and differences in objectives, methodologies, assumptions made in calculating the indicator values and in input data between the three main indicators at the European level (Structural Indicator, Urban Audit indicators and the Core Set of Indicators). Recommendations on streamlining the input requirements of the indicators and on harmonisation of calculation procedures are given. A possible extension of the indicator with PM<sub>2.5</sub>-results is recommended. An additional indicator giving more directly information on the health impacts of air pollution is presented.

**Reporting on ambient Air Quality Assessment - Preliminary Results for 2008 ETC/ACC Technical Paper 2009/10**

F. de Leeuw, E. Vixseboxse, ETC/ACC, Bilthoven, The Netherlands 2009, 60 pages, available through the web: [http://air-climate.eionet.europa.eu/docs/ETCACC\\_TP\\_2009\\_10\\_prelim\\_AQanalysis\\_2008.pdf](http://air-climate.eionet.europa.eu/docs/ETCACC_TP_2009_10_prelim_AQanalysis_2008.pdf).

EU Member States have submitted annual reports on air quality in 2008 to the European Commission under the Air Quality Framework Directive (96/62/EC). This report gives a preliminary overview and analysis of the information submitted up to 23 November 2009, including a list of zones in EU Member States in relation to air quality thresholds. Exceedances of the daily limit value of PM<sub>10</sub>, of the annual limit value of NO<sub>2</sub>, and of the target value of ozone remain the largest problems across Europe in 2008. New in 2008 is the reporting on the pollutants of the 4th Daughter Directives. Except from a few hot-spot situations, no exceedances of the target values of arsenic, cadmium and nickel are observed. However, the target value of benzo(a)pyrene is exceeded in a relatively large number of zones.

**Guide to the Demonstration of Equivalence of Ambient Air Monitoring Methods**

EC Working Group on Guidance for the Demonstration of Equivalence, January 2010, 92 pages, available through the web: <http://ec.europa.eu/environment/air/quality/legislation/pdf/equivalence.pdf>.

This report describes the principles and methodologies to be used for the demonstration of the equivalence of methods other than the EU reference methods. It is intended for use by laboratories nominated by National Competent Authorities (see Directive 2008/50/EC) to perform the tests relevant to the demonstration of equivalence of ambient-air measurement methods.

**Assessment of ground-level Ozone in EEA Member Countries, with a Focus on long-term Trends - EEA Technical Report 7/2009**

European Environment Agency, Copenhagen, Denmark 2009, 56 pages, ISBN 978 92 9213 003 9, available through the web: [http://www.eea.europa.eu/publications/assessment-of-ground-level-ozone-in-eea-member-countries-with-a-focus-on-long-term-trends/at\\_download/file](http://www.eea.europa.eu/publications/assessment-of-ground-level-ozone-in-eea-member-countries-with-a-focus-on-long-term-trends/at_download/file).

**Air Pollution by Ozone across Europe during Summer 2009 - Technical Report 2/2010**

European Environment Agency, Copenhagen, Denmark 2010, 40 pages, ISBN 978 92 9213 090 9, available through the web: [http://www.eea.europa.eu/publications/air-pollution-by-ozone-across-europe-during-summer-2009/at\\_download/file](http://www.eea.europa.eu/publications/air-pollution-by-ozone-across-europe-during-summer-2009/at_download/file).



COMING EVENTS

2010

June 2010

**HARMO 13 – 13<sup>th</sup> International Conference on Harmonisation within Atmospheric Dispersion Modelling for Regulatory Purposes**

1-4 June, Paris, France. For more information, see: <http://www.aria.fr/harmo/>.

**10<sup>th</sup> Urban Environment Symposium**

9-11 June, Gothenburg, Sweden. For more information, see: <http://www.hues.se/>.

**Urban Environmental Pollution**

20-23 June, Boston, Massachusetts, USA. For more information, see: <http://www.uep2010.com/index.asp>.

**Air Pollution 2010 – 18<sup>th</sup> International Conference on Modelling, Monitoring and Management of Air Pollution**

21-23 June, Kos, Greece. For more information, see: <http://www.wessex.ac.uk/air2010cfp.html>.

**Forest Fires 2010 – Second Int. Conference on Modelling, Monitoring and Management Forest Fires**

23-25 June, Kos, Greece. For more information, see: <http://www.wessex.ac.uk/fires2010cfp.html>.

August 2010

**Seventh International Conference on Indoor Air Quality, Ventilation and Energy Conservation in Buildings**

15-18 August, Syracuse, New York, USA. For more information, see: <http://www.IAQVEC2010.org/>.

September 2010

**Air Quality Management in European Regions – Challenges and Success Stories**

9 September, Essen, North Rhine-Westphalia, Germany. For more information, see: [http://www.umwelt.nrw.de/umwelt/umwelt\\_gesundheit/apug\\_nrw/index.php](http://www.umwelt.nrw.de/umwelt/umwelt_gesundheit/apug_nrw/index.php).

**15<sup>th</sup> World Clean Air and Environmental Protection Congress**

12-16 September, Vancouver, Canada. For more information, see: <http://www.iuappa2010.com/>.

**Risk Analysis 2010 – Seventh International Conference on Computer Simulation in Risk Analysis and Hazard Mitigation**

13-15 September, Algarve, Portugal. For more information, see: <http://www.wessex.ac.uk/risk2010rem3.html>.

Oktober 2010

**Fourth Central and Eastern European Conference on Health and the Environment**

10-13 October, Prague, Czech Republic. For more information, see: [www.ceeche.org](http://www.ceeche.org) and <http://isee.ehc.ro/future.php>.

**Road Dust – Health Effects and Abatement Strategies**

18-19 October, Stockholm, Sweden. For more information, see: <http://gpc.slb.nu/register/>.

December 2010

**Health and Solidarity – 10<sup>th</sup> International Seminar on Medical Geography**

16-18 December, Rome, Italy. For more information, see: <http://popgeog.org/2010/01/international-seminar-of-medical-geography-geomed-rome-2010/>.

2011

June 2011

**Indoor Air 2011**

5-10 June, Austin, Texas, USA. For more information, see: <http://lifelong.engr.utexas.edu/2011/>.

**Urban Transport 2011 – 15<sup>th</sup> International Conference on Urban Transport and the Environment**

6-8 June, Pisa, Italy. For more information, see: <http://www.wessex.ac.uk/urban2011cfp.html>.

October 2011

**Air Quality Eight**

24-27 October, Arlington, Virginia, USA. For more information, see: <http://www.undeerc.org/AQ8/>.

## NEWSLETTER

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### EDITORS' NOTE

We appreciate submissions to NOTES AND NEWS regarding programmes and projects within the field. Notes (100-500 words) should be sent directly to the WHO Collaborating Centre for Air Quality Management and Air Pollution Control.

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