NEWSLETTER

WHO COLLABORATING CENTRE FOR AIR QUALITY MANAGEMENT
AND AIR POLLUTION CONTROL at the FEDERAL ENVIRONMENT AGENCY, GERMANY

No. 54 - December 2014

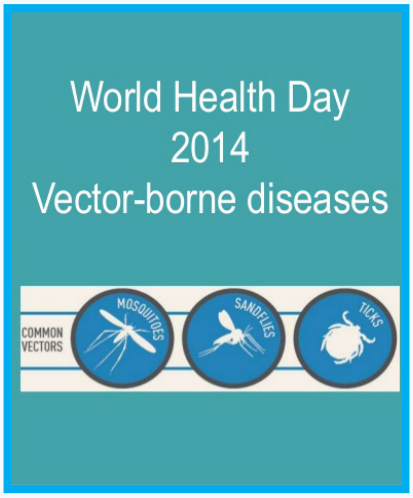
EDITORIAL

Tackling climate change, air pollution and chemicals: European environmental priorities to protect health

Climate change, air pollution and chemicals pose key environmental risks to people's health that require political action in the European Region, according to members of the European Environment and Health Ministerial Board (EHMB). EHMB held its fifth meeting in Vilnius, Lithuania in July 2014.

EHMB members committed themselves to taking concrete action on environment in the near future to address these health-related priority issues. EHMB will:

- to eliminate the exposure that causes asbestos related diseases and the implementation of the new Minamata Convention on Mercury at the core of negotiations with European countries, in line with European Member States' commitment in 2010 to eliminate asbestos-related diseases by 2015;
- support the adoption of a global resolution on air quality, initiated by France, Norway and other countries, in 2015; and
- start action to avoid grave health consequences from climate change, such as diseases and injury from extreme weather events; diarrhoeal diseases from water scarcity or flooding; compromised food security; air pollution; and changing distribution of vector-borne diseases (which is the current 2014 World Health Day motto).



New vector-borne diseases are emerging in the WHO European Region and diseases considered to have been eliminated are returning. Population movement, ecological, climatic and environmental changes, the deterioration of political and socioeconomic situations, and the interruption of action to prevent and control transmission are central to this renewed public health problem. The recent outbreaks of dengue, chikungunya and West Nile virus in countries where these diseases had not occurred before signal the potential threats associated with travel and trade, and with possible climatic changes.

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Thus, the motto of this year's WHO Day is a key opportunity to engage governments and the people – with special emphasis on people on the move - in protecting health from this resurging threat.

In 2014, the Intergovernmental Panel on Climate Change (IPCC) released its Fifth Assessment Report "Climate Change 2014", which marked a new milestone in the assessment of the scientific evidence. Besides, the report indicates increased risks of climate change-related death and illness health consequences of lost work capacity and reduced labour productivity, as well as massive economic damage to infrastructure and livelihoods, including the health facilities, on the global and regional scale.

In line with this, two important events have been conducted for and attended by a considerable number of leading governmental officials, scientists and participants from NGOs: i) a first high level WHO Conference on Health and Climate took place at WHO headquarters in Geneva last August (http://www.who.int/globalchange/mediacentre/events/climate-health-conference/en/), and ii) the World Health Summit held in Berlin in October (http://www.worldhealthsummit.org/the-summit.html), which focused the central issues climate change and health, and healthy cities.

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ABOUT

The NEWSLETTER is published twice a year by the
WHO COLLABORATING CENTRE FOR AIR QUALITY MANAGEMENT AND AIR POLLUTION CONTROL, located at the FEDERAL ENVIRONMENT AGENCY, GERMANY.
It is circulated in 2000 issues and distributed to readers in more than 50 countries.
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HEALTH RISKS TO THE GERMAN POPULATION FROM FINE PARTICULATE MATTER

Dagmar Kallweit

Health risks resulting from exposure of the German population to fine particulate matter (PM) were determined by estimating the environmental burden of disease. The results can be used inter alia to assess the effectiveness of air pollution control measures. The estimates produced indicate that fine particulate matter (PM_{10}) is responsible on average for some 46,000 premature deaths per year in Germany over the period 2007 - 2012.

Determination of exposure to fine particulate matter – Exposure at place of residence

Currently it is not possible to determine the exposure of each individual person to fine PM. Therefore, the annual average concentration of fine PM at the place of residence was used as a parameter to approximately characterize population exposure to fine PM. To estimate the health risk, air quality data on fine PM (PM_{10}, spatial resolution of approximately 7 km x 7 km) were used, consisting of PM_{10} data (hourly averages) detected at stations of the German Federal States (Bundesländer; all station categories) and the Federal Environment Agency (Umweltbundesamt/UBA; rural and regional background stations only) and data from modelling (REM-CALGRID chemical transport model). These data represent annual averages of rural and urban background concentrations in Germany, see Figure 1.

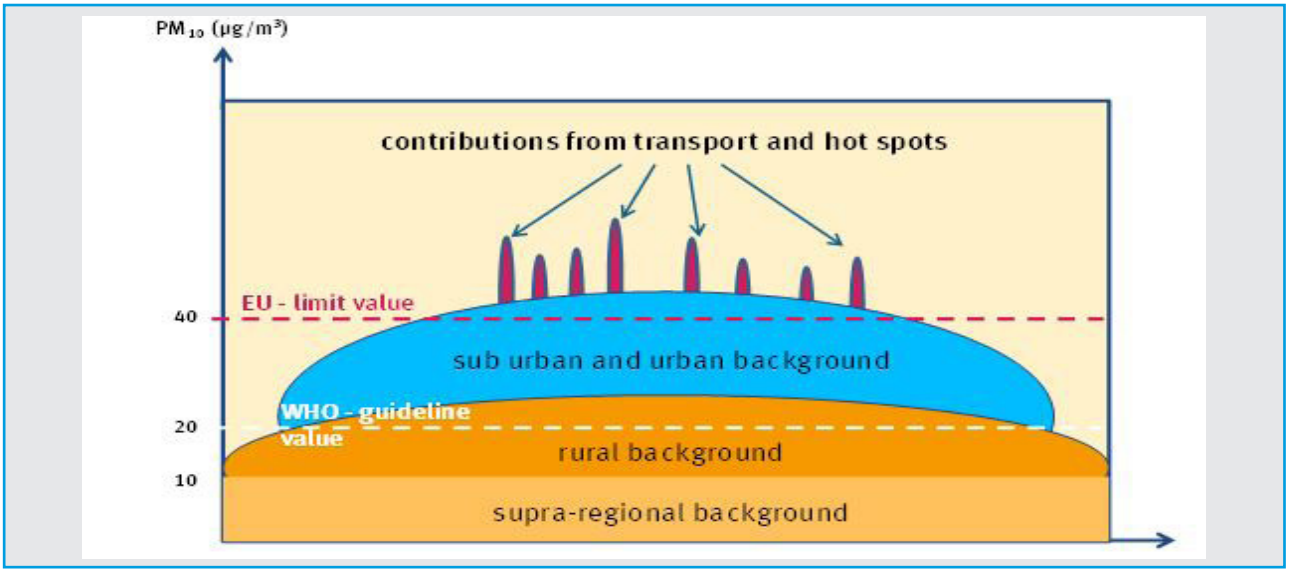

Figure 1: Schematic representation of the composition of exposure to fine particulate matter.
Source: Umweltbundesamt 2014, modified according to Lenschow et al., 2001

The air quality data for the period 2007 – 2012 were combined with currently available small-scale population density data (reference year of the used populations density map 2005 and 2011 resp.) from the Federal Institute for Research on Building, Urban Affairs and Spatial Development to establish a spatial relation between average annual PM_{10} concentrations and the population density at the various locations. In order to combine PM_{10} and population data, these data had to be mathematically transformed and rescaled to 1 km x 1 km grid cells. Methodological details are described in the UBA reference publication (Kallweit and Wintermeyer 2013).

Distribution of the population among PM_{10} exposure classes

For further analysis, the average annual PM_{10} values transferred to grid cells were divided into eight exposure classes, each class having a width of 5 µg/m³: class 1: < 10 µg PM_{10}/m³; class 2: ≥ 10 to < 15 µg PM_{10}/m³; class 3: ≥ 15 - < 20 µg PM_{10}/m³; etc., up to class 8: ≥ 40 µg PM_{10}/m³. Exposure class 1 roughly corresponds to the background exposure level in low-emission rural areas in Germany. For each exposure class, the percentage of persons living in the relevant locations was subsequently summed up. The result of this analysis is shown in Figure 2.

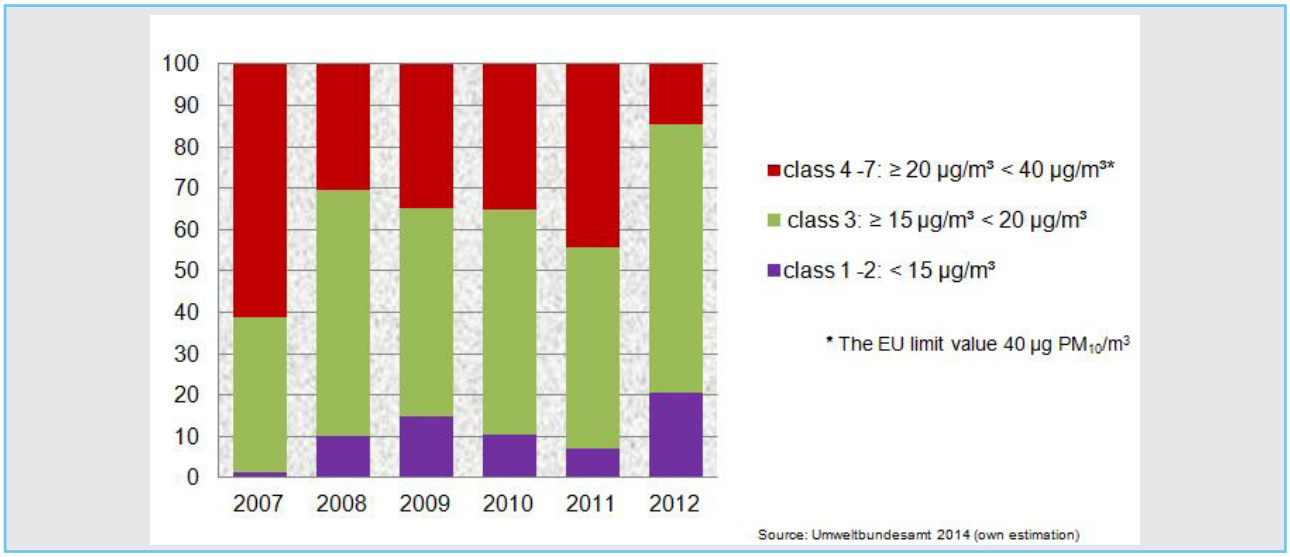

Figure 2: Population percentages per PM_{10} exposure class

This means that in 2007 about 60 percent of the German population lived in regions where average PM_{10} concentrations in ambient air exceeded 20 µg/m³, which is the PM_{10} Air Quality Guideline value derived by the World Health Organization (WHO) for protecting human health. In the following years 2008 to 2010 the percentage exposed to levels above this value dropped to 31 % and 35 %, interrupted by an intermediate increase over 40 % in 2011, but decreased markedly in 2012 to only 15 %. The observed decrease in rural and urban background levels of exposure to fine PM is partly attributable to measures to reduce emissions from stationary sources and in the transport sector. However, PM_{10} exposure levels are also strongly influenced by variations of weather conditions, which explain the sometimes substantial changes from year to year.

Indicator 'population-weighted concentration/exposure to fine PM'

The spatial distribution of PM_{10} concentrations presented here allows average population-weighted exposure to fine PM to be calculated for the years 2007 - 2012 and for nearly the entire population in Germany. This parameter is a suitable indicator to characterise the development of average annual exposure to fine PM over time. Reliable statements on trends in compliance with current WHO guideline and EU limit values (both for annual PM_{10}) can only be made when long-term time series on this indicator become available.

The indicator "RPG3_air_ex2" introduced by WHO (WHO 2012) as part of the Environment and Health Indicator System (ENHIS) mainly represents urban background concentrations which are based on a country-specific selection of cities for which long-term PM_{10} annual mean concentration data are available.

Modifications of measurement modalities, problems on data availability and/or possible changes in population distribution cause incomparabilities which can lead to inconsistencies of the indicator of urban population PM_{10} exposure in the country and between European countries. Nevertheless, both indicators of UBA and WHO reflect a comparable temporal development for the respective period in Germany, see Table 1.

Table 1: Population-weighted average annual concentration/exposure to fine PM (µg PM_{10}/m^3).

Indicator	Considered share of population	2007	2008	2009	2010	2011	2012
UBA indicator[1] population weighted PM_{10} exposure	Total population (about 82 million) in Germany	21	19	19	19	20	17
WHO indicator RPG3_Air_Ex2[2]	Part of urban population (about 20 million of total population from selected cities) in Germany	22	21	22	23	23	20

[1] Derived from the combination of measurements and model data, representing rural and urban background pollution level of PM_{10}. (Umweltbundesamt 2014, own composition)
[2] data http://epp.eurostat.ec.europa.eu/tgm/table.do?pcode=tsdph370&language=de (01.07.2014). (WHO 2014, Environment and Health Information System (ENHIS)).

WHO methodology for estimating burden of disease

To estimate the health risk associated with the previously determined exposure to fine PM, we used the WHO's burden of disease (BoD) concept. The finding that environmental influences (stressors) directly affect human health led to the EBD (Environmental Burden of Disease) concept, which aims to quantify the disease burden for a population or population group attributable to certain environmental stressors and to clearly describe it by means of a single measure (DALY, Disability-Adjusted Life Years). This concept allows to compare the disease burdens caused by different environmental stressors (Ezzati et al. 2004).

DALYs are the sum of years of life lost (YLLs) and years lived with disability or disease (YLDs). Since the health data for Germany needed to calculate YLDs due to fine PM are not yet fully available, the disease burdens presented here in terms of DALYs refer only to years of life lost (YLLs).

Determination of health effects attributable to exposure to fine PM

To calculate DALYs attributable to PM_{10} exposure in Germany, national mortality data (cause of death) due to selected groups of diseases were used along with the data on population-weighted PM_{10} exposure. The selection targeted on those groups of diseases for which a causal link between PM exposure (short-term and long-term) and health effect has been proven through exposure-effect functions derived from epidemiological studies. PM-related health effects can be initiated by short-term (acute diseases of vulnerable groups) and long-term exposures. For the estimation of short-term exposure PM_{10} concentrations are used, and for long-term $PM_{2.5}$ (derived from PM_{10}) respectively.

These are, in terms of short-term exposure:

- Mortality due to acute respiratory illness in children under 5 years of age (see Table 2),

and for long-term exposure:

- Mortality due to cardiopulmonary diseases in adults over 30 years of age (see Table 3), and
- Mortality due to lung cancer in adults over 30 years of age (see Table 4).

In addition, other statistical base data from the national health monitoring (GBE 2014) were used to calculate PM-related DALYs: population figures, numbers of deaths, and average life expectancies by age levels (geometric mean across 5-year intervals) for the German population from 2007 to 2012 (GBE 2014).

The Tables 2 to 4 above show the development of the main environmental burden of disease parameters over time.

These are:

- **Number of premature deaths:** Number of deaths at ages before the statistical average life expectancy.
- **Attributable fraction:** indicates what percentage of total deaths was caused by the selected diseases (95 % confidence interval) is attributable to exposure to fine PM.
- **Attributable DALYs per 1,000 persons:** For better comparability of disease burdens, the DALYs previously listed are calculated to be equivalent to 1,000 persons. (Exception: If the DALYs/1000 persons are less than 1, they can also be scaled to 1 million persons.)

Table 2: Short-term exposure: Mortality due to acute respiratory illness in children under 5 years of age. Source: Umweltbundesamt 2014, own estimation.

Mortality due to acute respiratory illness in children (< 5 years)[1]	2007	2008	2009	2010	2011	2012
Number of premature deaths	0.76 (0.16-1.37)	0.76 (0.16-1.37)	0.71 (0.15-1.28)	0.43 (0.09-0.77)	0.64 (0.13-1.14)	0.38 (0.08-0.69)
Attributable fraction (%)	2.2 (0.5-4.0)	1.9 (0.4-3.4)	1.9 (0.4-3.5)	2.0 (0.4-3.5)	2.1 (0.4-3.7)	1.7 (0.3-3.0)
Attributable DALYs/1,000,000 people[2]	17 (3-30)	17 (4-31)	16 (3-28)	10 (2-17)	15 (3-26)	9 (2-16)

[1] Results as mean value (95 % confidence interval).
[2] For this health endpoint DALYs were standardized to 1,000,000 persons since DALY/1,000 was less than 1.

Table 3: Long-term exposure: Mortality due to cardiopulmonary diseases in adults over 30 years of age. Source: Umweltbundesamt 2014, own estimation.

Mortality due to cardiopulmonary conditions in adults (> 30 years)[1]	2007	2008	2009	2010	2011	2012
Number of premature deaths (thousand persons)	42.6 (16.2-66.7)	38.0 (14.3-60.0)	38.6 (14.6-60.9)	38.5 (14.5-60.6)	38.7 (14.6-60.9)	34.4 (12.9-54.3)
Attributable fraction (%)	13.8 (5.2-21.7)	12.4 (4.7-19.6)	12.5 (4.7-9.6)	12.6 (4.8-19.9)	13.1 (4.9-20.5)	11.4 (4.3-18.1)
Attributable DALYs/1,000 people	5.0 (1.9-7.9)	4.4 (1.7-7.0)	4.4 (1.7-7.0)	4.4 (1.7-6.9)	4.3 (1.6-6.8)	3.7 (1.4-5.9)

[1] Results as mean value (95 % confidence interval).

Table 4: Long-term exposure: Mortality due to lung cancer in adults over 30 years of age. Source: Umweltbundesamt 2014, own estimation.

Mortality due to lung cancer in adults (> 30 years)[1]	2007	2008	2009	2010	2011	2012
Number of premature deaths (thousand persons)	8.3 (3.3-12.7)	7.6 (3.0-11.8)	7.6 (3.0-11.8)	7.9 (3.1-12.0)	8.3 (3.3-12.8)	7.4 (2.9-11.4)
Attributable fraction (%)	20.0 (7.9-30.5)	18.1 (7.0-27.8)	18.1 (7.1-27.9)	18.3 (7.2-28.2)	18.9 (7.4-29.0)	16.7 (6.5-25.8)
Attributable DALYs/1,000 people	1.9 (0.8-3.0)	1.8 (0.7-2.8)	1.8 (0.7-2.8)	1.8 (0.7-2.8)	1.9 (0.8-2.9)	1.7 (0.7-2.6)

[1] Results as mean value (95 % confidence interval).

The following exposure-effect funktions were used for these assessments (see Table 5).

Table 5: Exposure-effect functions used to determine environmental burden of disease.			
Health endpoints with high evidence	**Fraction of pollutant**	**Exposure-effect function**	**Source**
Mortality due to acute respiratory illness in children (< 5 years)	PM_{10}	RR=Exp[β(x-x0)]; β=0.00166(0.00034-0.0030)	Ostro, B. (2004)
Mortality due to cardiopulmonary diseases in adults (> 30 years)	$PM_{2.5}$	RR=[(x+1)/(x0+1)] β; β=0.15515(0.0562-0.2541)	Pope C. A. et al. (2002)
Mortality due to lung cancer in adults (> 30 years)	$PM_{2.5}$	RR=[(x+1)/(x0+1)] β; β=0.23218(0.08536-0.37873)	Pope C. A. et al. (2002)

The graphs below (see Figure 3) illustrate calculated data as premature PM-related deaths. The DALYs per 1,000 people are shown for better comparability on supra-regional or European level.

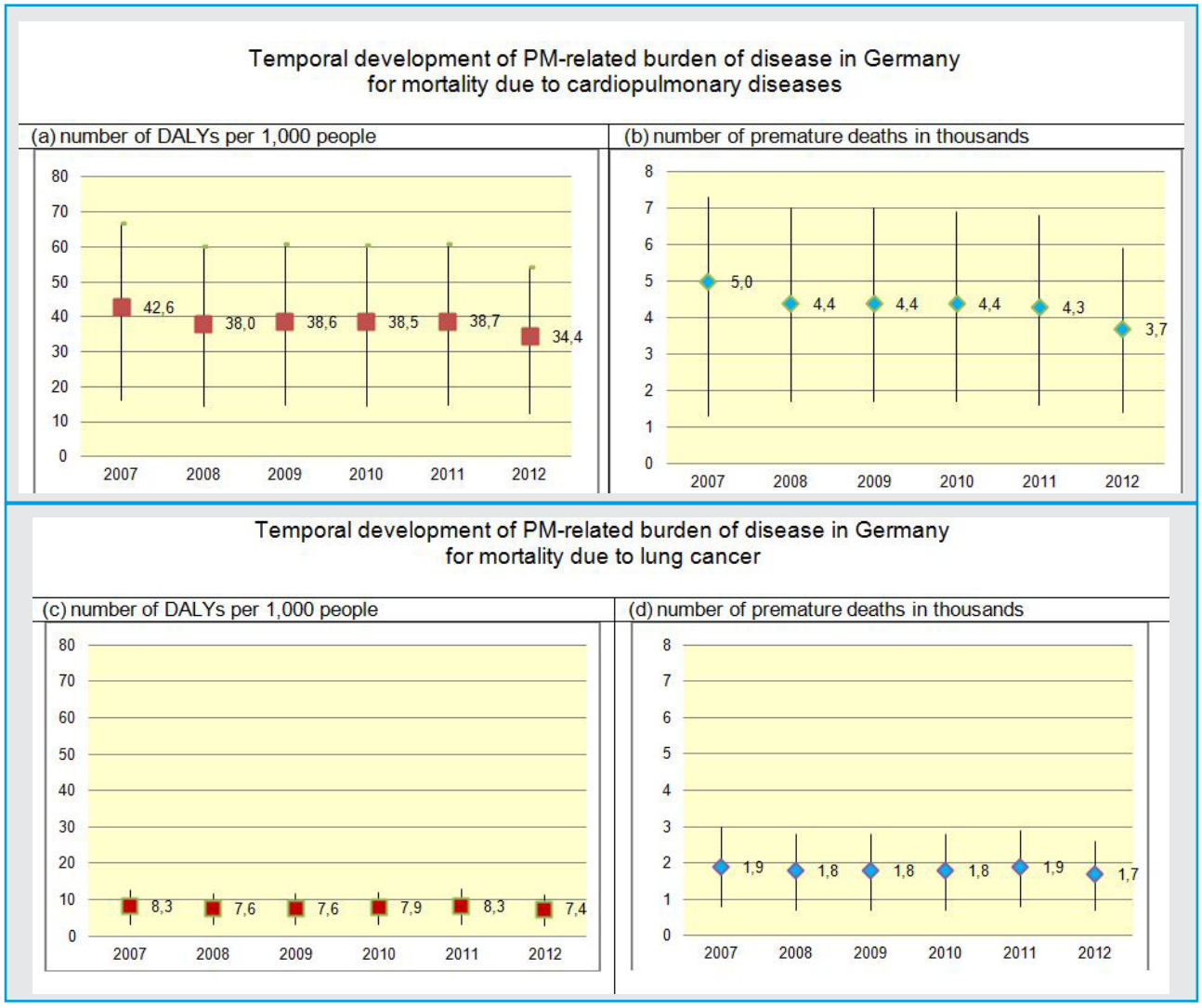

Figure 3 Temporal development of PM-attributable premature deaths (b and d) and attributable DALYs/1,000 people for two selected health endpoints (a and c)

In estimating the environmental burden of disease presented here we assumed that an average annual concentration of fine PM (PM_{10}) of 7 µg/m^3 is unavoidable. This is close to the lowest concentration measured in Germany during the period considered and deliberately leaves exposure to fine PM from natural sources unconsidered. Currently there is no evidence of an effect threshold for human exposure to fine PM. This means that health effects may occur both in long-term exposure and in exposure to short-term concentration peaks. Even concentrations of

fine PM below 7 µg PM_{10}/m^3 may potentially affect the health of the population, particularly risk groups such as the elderly, persons with pre-existing respiratory conditions, and small children.

Results

Using the methodology described, we estimated that in Germany, during the period 2007 - 2012 and for the health endpoints, an average of about 46,000 premature deaths per year were attributable to exposure to rural and urban background concentrations of fine PM. This is equivalent to an average of 6 years of life lost per 1,000 inhabitants, declining from 2007 with almost 7 years to about 5 years and 4 months in 2012. Looking at acute respiratory illness among children under 5 years of age, the number of premature deaths continued to decrease between 2007 and 2012 on low levels. Overall, long-term exposure accounts for the largest share of the total burden of disease due to exposure to fine PM: Our estimates indicate that about 11 to 14 % of all deaths due to cardiopulmonary conditions and about 17 to 20 % of deaths due to lung cancer in adults over 30 years of age were attributable to the environmental stressor fine particulate matter.

Outlook

The methodology allows an annual update of the present data set.
At present it is not possible to conclude any statements about trends since the current time series is too short and the exposure data are influenced by changes of weather conditions from year to year. Furthermore, the presented methodology here has to be refined to allow the use of air quality data with a higher spatial resolution in order to include, in particular, exposure to traffic-related fine PM, especially at urban locations. Should an association with fine PM be proven for further diseases in future, these should also be taken into account in the calculations.

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WHO honoured with lung health award for Air Quality Guidelines

WHO has been awarded with the annual European Lung Foundation award for improving the lung health of millions of people by providing ambient Air Quality Guidelines/AQG. The WHO Regional Director for Europe, Mrs Zsuzsanna Jakab, received the award in September 2014 at the annual European Respiratory Society (ERS) Congress in Munich, Germany. During this year's Healthy Lungs for Life campaign (www.healthylungsforlife.org), and in celebration of its "Breathe clean air" message, the award recognizes WHO for its work in providing guidelines for outdoor air quality. This pioneering action is helping to improve the respiratory health of millions of people in Europe and across the globe.

Breathing clean air is fundamental to a healthy human population, yet air pollution poses a threat to the physical well-being of millions of people around the world. WHO estimates that air pollution was at the root of 7 million premature deaths in 2012, with 3.7 million of these being connected with poor ambient air quality. Therefore, it is essential that policy-makers understand what constitutes a "safe" level of air quality, so that air can be monitored with the population's health in mind. AQG that can help to assess the public health risks of different amounts of air pollution are particularly valuable to the decision-making community.

WHO produced its first set of air quality guidelines in 1987, with subsequent updates in 2000 and 2005. A further revision will soon be initiated, in the context of new evidence. The AQG are based on expert reviews of the latest scientific research on the health effects of air pollution, and aim to equip policy-makers, who have a range of different needs, with a solid evidence base that they can use to inform their decisions. The latest AQG, from 2005, cover the four main pollutants found in ambient air: particulate matter, ozone, nitrogen dioxide and sulfur dioxide. A maximum recommended value for different time periods of exposure is assigned to each pollutant, so that countries know what they should be aiming for. In addition, the AQG provide interim targets for each pollutant and exposure periods, including information on the health implications of each level, to support the most polluted countries with making incremental improvements.

The extended WHO press release can be obtained from: http://www.euro.who.int/en/media-centre/sections/press-releases/2014/who-honoured-with-lung-health-award-for-air-quality-guidelines.

Attitudes of European citizens towards the environment

Within the 'Special Eurobarometer' No. 416 about 28.000 people of 28 EU Member States had been interviewed in April/May 2014. 95 % of the citizens in Europe considered that protecting the environment is an important effort. When looking at the environmental issues which European worries about the most, the majority common responses relate to air pollution (56 %); 50 % are worried about water pollution, followed by health impacts of chemicals used in every day products (43 %). Regarding air pollution, Europeans tend to continue to adopt an environmentally-friendly actions and behavior particularly transport modes, such as by foot, by bicycle or using public transport. Still about 27 % of the respondents feel not well enough informed or a lack of information.
The full report is available at: http://ec.europa.eu/public_opinion/archives/ebs/ebs_416_sum_en.pdf.

Joint WMO/WHO office for climate and health established

In July 2014, the World Meteorological Organization/WMO and the World Health Organization/ WHO established a joint office under the auspices of the Global Framework for Climate Services (GFCS) to promote the coordinated development and use of climate services to improve public health. It will increase awareness, build capacity, and connect meteorological services with experts in the health sector in an active partnership for climate adaptation and risk management. The move comes in response to increasing demand from the health community for improved access to climate and weather products like regional climate predictions, hazard warnings and seasonal outlooks needed to understand and manage health risks related to weather and climate and to cope with a shifting burden of disease due to climate change. The office will ensure that there is in-house health expertise at WMO and a focal point for liaison with WHO and other health partners.
Besides, the joint office will strengthen coordination and collaborative initiatives between WHO and WMO, and with the wider community of practice for climate service action for health. Additionally, the office will provide communications and capacity development by developing awareness raising and technical guidance materials.

Further information can be obtained from: http://www.who.int/globalchange/mediacentre/news/joint-office/en/http://www.gfcs-climate.org/.

Health Economics and Air Pollution

According to WHO estimates released in March 2014, air pollution contributed to around 7 million premature deaths globally in 2012 (up to 582 000 in the WHO European Region) as a result of the joint effects of ambient and household air pollution. Equating to one in eight deaths worldwide, this confirms air pollution as the world's largest single environmental health risk. These global and European Regional totals must be viewed in the context of significant advances in air pollution monitoring and modeling technologies and in epidemiology. These advances have permitted a more accurate picture of air pollution-related morbidity and mortality to emerge but do imply a need for caution when comparing current estimates with those published previously. To foster uptake of the existing technical evidence by policy-makers, the WHO Europe is striving to provide relevant policy advice not only on health impacts but also on their economic dimension. International experts on air pollution and health, economics, policy-making and communication met recently for a WHO Environmental Health and Economics Symposium in Bonn, Germany, to discuss economic impacts of the health effects of air pollution in Europe and to identify efficient policy interventions.
The meeting participants reached a number of conclusions. Principal amongst these were:

1. The evidence on health impacts from air pollution is convincing, and published studies consistently affirm air pollution as a risk to health globally and a significant issue for the European Region.
2. Despite their use of differing metrics and analytical approaches, available economic studies show remarkable consistency in the trends they report.
3. Economic evidence may be an effective way to inform and persuade policy makers to adopt policies of proven efficacy to reduce the health burden of air pollution, and climate change.

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13th International Conference on Indoor Air Quality and Climate 7-12 July 2014, at the University of Hong Kong, China

The 13th International Conference on Indoor Air Quality and Climate organized by the International Society of Indoor Air Quality and Climate (ISIAQ) was held at the University of Hong Kong in July 2014. 1065 researchers, academics, students, policy makers and industry R&D personnel from 550 organizations in 45 countries attended the conference.

About 1000 scientific papers have been presented in 33 sessions. Furthermore the conference included 6 plenary sessions, 4 keynote sessions, 20 workshops/symposia and 2 training courses. The program of the Indoor Air Conference can be found under http://www.indoorair2014.org/.

The technical sessions covered 4 main topics:
A: Fundamentals of indoor air sciences
B: Application of indoor air sciences
C: Emerging issues
D: New technologies.

Several subsections were included under each of the main topics (in total 33 different sessions). Subsections with the most scientific papers under A Fundamentals of indoor air sciences were 'Thermal comfort', 'Health and indoor air epidemiology' and 'Public health and exposure studies'. Topic B Application of indoor air sciences had the most contributions in the subsections 'Ventilation' and 'Prediction & measurement' followed by 'Control of indoor environment', 'Source of indoor air pollutants' and 'Filtration and air cleaning'. Under C Emerging issues most papers have been presented in the sessions 'Low energy buildings' and 'Transport cabin environments'. Topic D new technologies contained 2 subsections: 'Smart and mobile technologies' and 'Wireless sensors & smartphone'.

Some results from the Indoor Air Conference 2014:

- Energy saving in the building construction sector is a very important issue since it can have a strong impact on the indoor air quality. Low energy buildings or passive houses have a bad air quality if no proper ventilation plan and measures are being taken.
- Topics like 'Thermal comfort', 'Ventilation' and 'Filtration and air cleaning' are of great importance and will also be relevant in the future in view of the continuous rise of the air-tighter building construction. In this regard, the use of filtration and air cleaners for the reduction of particle counts and volatile organic compounds (VOC) is being analyzed. The results show that some devices are able to reduce the number of particles and the emissions of single VOC. However it has also been shown that the emissions of other VOC (i.e. formaldehyde) may increase instead.
- Due to the high number of Asian colleagues present at the Indoor Air Conference the household air pollution issue shifted into the foreground. About 3 billion people worldwide are still cooking and/or heating with solid fuels (wood, wood charcoal or biomass fuels) and this leads to high indoor air pollution. Women and young children are the most exposed. The fumes emitted during these activities contain a wide range of harmful pollutants like particles and carbon monoxide. Exposure to these contaminants can cause acute infections of the lower respiratory tract in children

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under five years, ischemic heart diseases, strokes, chronic obstructive pulmonary diseases and lung cancer in adults. WHO estimated for 2012 3.3 million deaths caused by this type of indoor air pollution.

- In many countries various studies are carried out with the objective to examine environmental influences on (school)children or residents. The following parameters are being measured for data collection: various VOC, CO_2 levels, PM_{10}, $PM_{2.5}$. Furthermore questionnaires and in some cases clinical examination (lung function) are carried out. Also, correlations between environmental factors and different health symptoms are analyzed.
- In the field of regulation some new and updated standards have been presented. The new technical specification CEN/TS 16516 'Construction products - Assessment of release of dangerous substances - Determination of emissions into indoor air' is now published and will play in the future a significant role since it enables the realization of reliable and reproducible measurements in the laboratories around the world. Also changes in the updated American ASHRAE Standard 62.2-2013 'Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings' have been illustrated. Some of these changes include the calculation of the effectiveness of intermittent ventilation, a new section on multifamily buildings or the protection of residents from life-threatening carbon monoxide. Furthermore the question how to define sustainability has been posed. The complexity of this issue is acknowledged, as the author said: 'Sustainability is a deceptively simple concept, with myriad interpretations.'
- The outcomes of various European projects have been presented and discussed with the participants. HealthVent was a project granted by the European Commissions and was aimed to develop health-based ventilation guidelines. In the EPHECT project the emissions, exposure patterns and health effects of consumer products (e.g. all purpose cleaners, kitchen cleaners, furniture and floor polish, coating products, combustible air fresheners, hair styling sprays etc.) have been investigated. The results showed that emission profiles, emitted compounds and concentrations vary between products of the same product class and may reach TVOC (sum of VOCs) ideal room concentrations up to 960 µg/m³ for continuous sources.

The writer would like to emphasize that this report contains only impressions and statements from the sections of the conference which could be personally attended. The huge amount of parallel sessions forced to focus strictly on some topics and often, regretfully, to miss other relevant information.

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COST 'EuNetAir' Workshop, 13 - 15 October 2014 in Aveiro, Portugal

COST Action TD1105 *'EuNetAir'* (www.cost.eunetair.it) is a Concerted Action on *New Sensing Technologies for Air Pollution Control and Environmental Sustainability*, running as an international Network coordinated by the National Agency for New Technologies, Energy and Sustainable Economic Development/ENEA (Italy), including 80 institutions of 28 European and 7 Non-EU countries, and funded by the framework *European Cooperation in the field of Scientific and Technical Research* (COST) during 2012 - 2016. Main objective is to develop new sensing technologies for Air Quality Control at integrated and multidisciplinary scale by coordinated research on nanomaterials, sensor-systems, air quality modelling and standardised methods for supporting environmental sustainability with a special focus on small and medium enterprises.

The Workshop was held at the Institute for Environment and Development/IDAD, University of Aveiro, Portugal, chaired by Prof. Carlos Borrego (MC Member). The core-issues of *EuNetAir* had been surveyed and presented as current results and scientific and technological breakthrough. The Working groups 1 to 4 met to discuss on *New Sensing Technologies and Models for Air Pollution Monitoring* in an interdisciplinary approach aiming to provide a Joint-Exercise as Intercomparison *Sensors-versus-Analyzers*.
Several teams (15 teams from research centers, universities and companies coming from 12 countries: *Austria, Belgium, Germany, Greece, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, UK*) of the COST Action TD1105 have been largely interested and successfully involved in the two-week experimental campaign (13 - 27 October 2014) at Aveiro city centre for the *Joint-Exercise Intercomparison* including the contribution in expertise to the multidisciplinary inter-WGs Meeting. The IDAD Air Quality Mobile Lab, equipped with chemical reference analyzers (CO, NO_x, O_3, SO_2, PM_{10}, BTEX, CO_2), and systems to measure some meteorological parameters (temperature, humidity, atmospheric pressure, wind velocity/direction, solar radiation, rainfall/precipitation), was used to host the advanced low-cost sensor-systems in order to compare the sensing performance in real scenario. The benchmarking of the sensor data, generated by different sensor-systems installed side-by-side on the top of the AQ Mobile Lab, with reference analyzers data will address to understand the accuracy of the low-cost and low-power sensor-systems in the real-world context of indicative measurements, as defined by the Ambient Air Quality EU Directive 2008/50/EC.

At the open WGs Meeting of *EuNetAir*, a strong impact on focus of the critical environmental issues was mutual benefit for participants. 10 Sessions have been well-attended by around 50 scientists from Austria, Belgium, Bulgaria, Denmark, Germany, Greece, Hungary, Italy, Latvia, Netherlands, Norway, Portugal, Serbia, Slovenia, Spain, Sweden and UK (including 11 invited speakers, 19 contributed speakers and 11 Poster Presenters with an Advisory Board and a Technical Programme Committee).
High quality output such as joint-publications of the achieved results of the experimental campaign and discussion of the AQ results to be shared in the *'EuNetAir'* partnership by future meetings are highly expected.

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MEETINGS AND CONFERENCES — MEETINGS AND CONFERENCES — MEETINGS AND CONFERENCES

Ultrafine Particles and Health: Final UFIREG Conference 28 November 2014 in Dresden, Germany

The project UFIREG (Ultrafine Particles – an evidence based contribution to the development of regional and European environmental and health policy) intended to increase the knowledge base on potential health effects of ultrafine particles (UFP) and to raise overall awareness of environmental and health care authorities and the population. Within the scope of the project, concentrations of UFP and other air pollutants were assessed in five European cities and short-term effects on mortality and hospital admissions were investigated. The project was implemented through the CENTRAL EUROPE Programme co-financed by the ERDF (7/2011 – 12/2014). The consortiums included seven institutions from four European countries from the field of air quality and environment, epidemiology and public health.

The results of the project were presented at the international conference "Ultrafine particles and health" on 28 November 2014 in Dresden. On the preceding evening, UFIREG partners organised a guided tour through the streets of Dresden for interested citizens to raise public awareness for traffic as one of the major sources for ultrafine particles. With the help of a mobile particle counter, participants of the guided tour could witness that particle number concentrations vary depending on the distance to the road, the heights of buildings, the width of the street, the local wind direction and the wind speed. Moreover, vehicles with and without particle filters could be clearly identified.

The overall aim of the international conference on 28 November was to discuss existing and new knowledge about ultrafine particles with regard to their determination in air, sources, mitigation measures, health effects and possible regulation. Eighty scientists and representatives of research institutes, the public and the private sector participated. The conference was opened with a general introduction into the topic and an overview of the CENTRAL EUROPE programme. The presentation of the UFIREG project started with an outline of the project aim and objectives, its structure and partners, followed by summaries of the results of the two lines of work.

UFIREG air quality analyses have shown that particle number concentrations (PNC) varied between the five cities involved in the study (Augsburg, Chernivtsi, Dresden, Ljubljana, Prague). In summer, there was a considerable influence of new particle formation due to global radiation and precursor gases such as SO_2, especially in Dresden and Prague, whereas leaf burning probably caused high PNC in Chernivtsi in autumn. In Ljubljana, traffic and domestic heating in combination with thermal inversion led to high-polluted periods during the winter months. The correlation of PNC and other air pollutants was extensively studied by the JOAQUIN project, as shown in the following presentation. Both projects agreed that integration of PNC measurements into monitoring networks is still a challenge. Moreover, the need for an extensive quality assurance to ensure comparable UFP measurements was highlighted. A third presentation emphasised the importance of long-range transport and the influence of meteorological conditions on air pollution in urban areas.

The UFIREG project has assessed the short-term effects of UFP particles on human mortality and morbidity, especially in relation to cardiovascular and respiratory diseases. Due to their small size and little mass, UFP can proceed deeply into the pulmonary alveoli and might even translocate into the blood stream whereas PM_{10} and $PM_{2.5}$ deposit mainly in the upper and lower airways. The pooled analyses of the epidemiological studies in the five cities in the frame of UFIREG have shown an overall increase in respiratory hospital admissions and mortality in association with increases in UFP concentrations. UFIREG results on cardiovascular health

were less conclusive. Moreover, a presentation on a European multi-centre initiative also highlighted the importance of effects of UFP on cause-specific mortality and hospital admissions.

There is suggestive, but not consistent epidemiological evidence on the association between short-term exposure to UFP and cardiorespiratory health because only few studies have been carried out so far. Current data on health effects of UFP do not allow firm conclusions on exposure limits. Since no directives for the regulation of UFP in ambient air exist, UFP are only rarely included in routine measurements of air quality monitoring stations. This in turn explains the lack of data for epidemiological studies.

Solutions for this chicken-egg problem were debated in a panel discussion on new challenges of air quality and health. Four panellists representing the approaches of WHO, NGOs and research institutions brought forward arguments for immediate introduction of limit values for UFP based on toxicological and clinical evidence on one side and the need for a more solid evidence base for the development of guidelines and policies on the other hand. While limit values provide NGOs and other stakeholders with the necessary support for concrete measures to reduce UFP emissions (e.g. in the transport sector) and protect human health, agencies and policymakers would not be in the position to justify limit values without conclusive epidemiological evidence. In conclusion, the need for further efforts to routinely monitor UFP and to generate data for epidemiological studies was stressed.

For further details on the project and project results please consult the UFIREG webpage at: http://www.ufireg-central.eu.

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Health and environment: communicating the risks

by WHO (World Health Organization), 2013. viii + 54 pages. ISBN: 978 92 890 0051 2. Available in English (PDF) 926.1 KB MB, Russian (PDF) 1.2 MB.

Public administrations at all levels must often manage complex situations related to environmental determinants of health, often surrounded by controversy. Many factors contribute to a rapid escalation of such situations: increased sensitivity in the face of uncertain risks, uneven distribution of risks and benefits, and decreasing trust in authorities making decisions influencing public health. There is a need, in such circumstances, to assess the extent of possible effects on health and the environment and to manage information, evidence and communication on possible risks, while understanding and taking into consideration stakeholders' opinions, interests and values.The WHO Regional Office for Europe organized a workshop in Trento, Italy to enable participants to share experience in the management and communication of environmental risks. This report builds on the presentations and discussions from the workshop and presents a series of key messages useful to regional and local authorities, as well as to risk managers in general.
http://www.euro.who.int/en/about-us/networks/regions-for-health-network-rhn/publications/2013/health-and-environment-communicating-the-risks

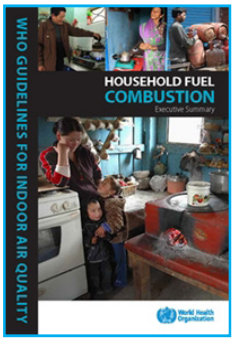
Combined or multiple exposure to health stressors in indoor built environments

by WHO (World Health Organization), 2014. Available in English (PDF), 1.5 MB.

Millions of citizens within the WHO European Region spend approximately 90% of their time indoors: in their homes (2/3 of this time), workplaces, schools, and public spaces. Despite undeniable improvements in the quality of indoor environments in the last twenty years, a range of health risks still exists, such as indoor air pollution, injury risks, noise, humidity, mould growth, inadequate indoor temperature, lack of hygiene and sanitation equipment, and crowding. Many of these risks are either directly or indirectly related to the quality of the building. Furthermore, problems with building quality disproportionally affect vulnerable population groups in terms of socioeconomic status or class age. Despite the scientific progress in understanding the connection between indoor environments and health, evidence is often restricted to categorical studies targeting specific health risks and/or outcomes; much less evidence is available regarding the combined or multiple exposure to risk factors. This report aims to explore and shed light on the links between different exposure stressors and modifiers people confront in residential dwellings, day care centers, schools and kindergartens. It summarizes a systematic review of literature and project reports presenting evidence on multiple or combined risk exposure in indoor environments, covering the range of health risks encountered.
http://www.euro.who.int/en/health-topics/environment-and-health/air-quality/publications/2014/combined-or-multiple-exposure-to-health-stressors-in-indoor-built-environments

Indoor air quality guidelines: household fuel combustion

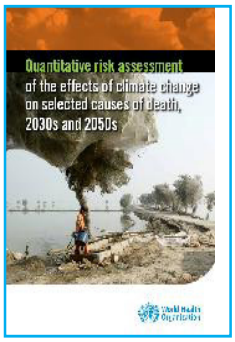
by WHO (World Health Organization), 2014. Available in English, Russian, Spanish, Arabian (PDF).



TAlmost 3 billion people, in low- and middle-income countries mostly, still rely on solid fuels (wood, animal dung, charcoal, crop wastes and coal) burned in inefficient and highly polluting stoves for cooking and heating. In 2012 alone, no fewer than 4.3 million children and adults died prematurely from illnesses caused by such household air pollution, according to estimates by the World Health Organization. Together with widespread use of kerosene stoves, heaters and lamps, these practices also result in many serious injuries and deaths from scalds, burns and poisoning. These new indoor air quality guidelines for household fuel combustion aim to help public health policy-makers, as well as specialists working on energy, environmental and other issues understand best approaches to reducing household air pollution -- the greatest environmental health risk in the world today.
http://www.who.int/indoorair/guidelines/hhfc/en/

Quantitative risk assessment of the effects of climate change on selected causes of death, 2030s and 2050s

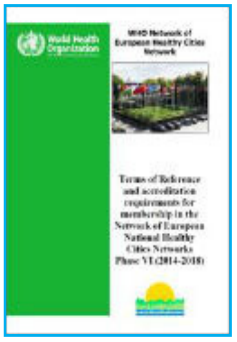
by WHO (World Health Organization), 2014. Available in English (PDF), 4.01 MB.



WHO has released a quantitative assessment of the health impacts of climate change. It is an update and a further development of the assessment that was first published by WHO for the year 2000, including a wider range of health impacts, and projections for future years. By the 2050s, deaths related to heat exposure are projected to increase. Impacts are greatest under a low economic growth scenario.
Click on the image to open the document. More information is found on:
http://www.who.int/globalchange/publications/quantitative-risk-assessment/en/

Terms of Reference and accreditation requirements for membership in the Network of European National Healthy Cities Networks Phase VI (2014-2018)

by WHO (World Health Organization), 2014. Available in English (PDF), 235.1 KB.

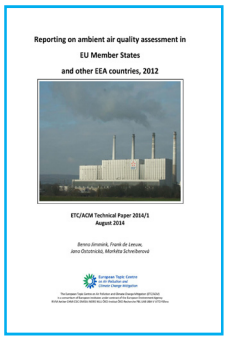


This document outlines Terms of Reference and accreditation requirements for membership in the Network of European National Healthy Cities Networks and explains the application process for National Networks interested in joining this Network.
http://www.euro.who.int/en/health-topics/environment-and-health/urban-health/publications/2014/terms-of-reference-and-accreditation-requirements-for-membership-in-the-network-of-european-national-healthy-cities-networks-phase-vi-2014-2018

Other Publications:

Reporting on ambient air quality assessment in EU Member States and other EEA countries, 2012 (ETC/ACM Technical Paper 2014/1)

by EIONET (European Topic Center on Air Pollution and Climate Change Mitigation), 2014.



The number of designated zones in 2012 in the EU-27 (765) was lower than in 2011 (811) and even lower than in any previous year since 2006 (the first year of EU-27 wide reporting). The designation of zones for pollutants having a health related limit value (LV) or target value (TV) is completed for SO_2, NO_2, PM_{10}, CO and ozone. For these compounds, the zones cover 90 % or more of the population; exceptions are found in Romania where the population coverage may drop below 80 %. For $PM_{2.5}$ an incomplete zoning is found in Greece and Romania. the zones cover less than 80 % of the population in Estonia (benzene), Italy (lead) and Romania (both pollutants). In 2012, the percentage of zones in all reporting countries exceeding the limit values set for the protection of human health was highest for the annual LV of NO_2 and the daily LV of PM_{10} (30 % and 29 %, respectively). The health-related target value of O_3 has been exceeded in a slightly larger fraction (34 %). Looking at the population, the highest fraction potentially exposed to levels above the LV or TV is found for the annual LV of NO_2 (46 %), next the daily LV of PM_{10} (38 %), followed by the O_3 TV (35 %).
http://acm.eionet.europa.eu/reports/ETCACM_TP_2014_1_AQQ2012

Air quality in Europe - 2014 Report (EEA Report No 5/2014)

by EEA (European Environment Agency), Copenhagen, 2014.

This report presents an overview and analysis of air quality in Europe from 2003 to 2012. It reviews progress towards meeting the requirements of the air quality directives and gives an overview of policies and measures introduced at European level to improve air quality and minimise impacts.
http://acm.eionet.europa.eu/reports/EEA_Rep_5_2014_AQinEurope

Strategies and Policies for Air Pollution Abatement

by UNECE (United Nations Economic Commission for Europe), 2013. Available in English (PDF), 3.7 MB.

This publication presents the 2010 review prepared under the Convention on Long-Range Transboundary Air Pollution based on the responses to the 2010 questionnaire of policies and strategies for air pollution abatement and their analysis.
http://www.unece.org/index.php?id=35140

Progressing to cleaner air - ETC/ACM Technical Paper 2013/17

by EIONET (European Topic Center on Air Pollution and Climate Change Mitigation), 2014.

This paper focuses on the attainment areas, i.e. those areas where exceedances of the limit or target values have not been observed during a longer period of time. The definition of an attainment area and the methodology to assess attainment zones is discussed. An evaluation is given on the probability that the status of the area changes from attainment into non-attainment. This evaluation is based on a short-term (five years) and long-term (ten years) trend in air quality.
http://acm.eionet.europa.eu/reports/ETCACM_TP_2013_17_ProgressToCleanerAir

Harmonisation framework for health based evaluation of indoor emissions from construction products in the European Union using the EU-LCI concept

(European Collaborative Action 'Urban Air, Indoor Environment and Human Exposure', Report No. 29, 2013).

by EU Joint Research Centre, Institute for Health and Consumer Protection, EUR 26168 EN, Luxembourg, 2012.

This EU-LCI development work outlined in the present report builds on firm foundations of existing national labeling schemes established by AgBB in Germany and ANSES in France that currently apply the LCI concept, as well as those in Finland, Denmark and Belgium. Ultimately, the harmonization process and procedures described here will allow voluntary and mandatory labeling schemes to evaluate product emissions in the same way by using a robust health-based procedure. This work also supports the establishment of future emission classes for CE marking under the European Construction Products Regulation (EU No 305/2011) with harmonised list of LCI values (EU-LCIs). In this EU-LCI work performed to date, only volatile organic compounds (VOCs) have been considered. Very volatile, semi-volatile compounds and carcinogens will be considered at a later stage.

Promoting actions for healthy indoor air (IAIAQ)

by EU Joint Research Centre, Institute for Health and Consumer Protection, 2014. ISBN 978-92-79-20419-7. Available in English (PDF).

This report should be quoted:
Jantunen M., Oliveira Fernandes E., Carrer P., Kephalopoulos S., (2011) Promoting actions for healthy indoor air (IAIAQ). European Commission Directorate General for Health and Consumers. Luxembourg.
http://ihcp.jrc.ec.europa.eu/our_activities/public-health/indoor_air_quality/promoting-actions-for-healthy-indoor-air

COMING EVENTS — COMING EVENTS — COMING EVENTS — COMING EVENTS — COMING EVENTS — COMING EVENTS

2015

ICAPC 2015 - International Conference on Air Pollution and Control
23-24 February, Paris, France, https://waset.org/conference/2015/02/paris/ICAPC

5th EFCA Symposium on Ultrafine Particles – Sources, Effects, Risks and Mitigation Strategies
4-5 May, Brussels, Belgium, http://ufp.efca.net/

ECCA 2015 - European Climate Change Adaptation Conference
12-14 May, Copenhagen, Denmark, http://www.burchardt-apps.dk/ecca2015.eu/

Healthy Building 2015: 'Stepping beyond traditional boundaries, (re)creating healthy buildings'
18-20 May, Eindhoven, The Netherlands, http://hb2015-europe.org/

Air Pollution 2015 - 23rd International Conference on Modelling, Monitoring and Management of Air Pollution
1-3 June, València, Spain, http://www.wessex.ac.uk/15-conferences/air-pollution-2015.html

19th ETH Conference on Combustion Generated Nanoparticles
28 June–1 July, Zurich, Switzerland, http://www.lav.ethz.ch/nanoparticle_conf/

International Scientific Conference - Our Common Future Under Climate Change
7-10 July, Paris, France, http://www.commonfuture-paris2015.org/

27th Conference of the International Society for Environmental Epidemiology – Addressing Environmental Health Inequalities
30 August-3 September, São Paulo, Brazil, http://www.isee2015.org/

EAC 2015 - European Aerosol Conference
6-11 September, Milan, Italy, http://www.eac2015.it/

13th International Conference on Atmospheric Sciences and Applications to Air Quality
11-13 November, Kobe, Japan, http://www.metsoc.or.jp/asaaq13/index.htm

2016

14th International Conference on Indoor Air Quality and Climate
3–8 July, Ghent, Belgium, http://www.indoorair2016.org/

17th IUAPPA World Clean Air Congress - Mega-City Perspectives
28 August-2 September, Busan, South Korea, http://www.iuappa2016.org/