NEWSLETTER

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

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EDITORIAL

Health and Environment is still a challenge in the WHO European Region

In the early years of the 21st century, the WHO European Region has attained notable progress on environment and health issues. However, significant cause for concern remains. The environmental burden of disease has persisted in some geographic areas, and is either newly emerging or re-emerging in others. Environmental determinants of health are estimated to account for approximately 20 % of total mortality and up to 25 % of the total burden of disease, much of it unevenly distributed across geographic, demographic, socio-cultural and socioeconomic subgroups. This generates large costs, consumes important resources, prevents the attainment of optimal health and wellbeing, and undermines societal and economic development.

Many public health challenges of our times, such as those associated with demographic changes, growing health inequalities and increasing incidence of non-communicable diseases, have complex connections to the physical environment. The environment must be recognised as not only a source of potential hazards, but also a health-promoting and health-protecting asset that can extend life, improve its quality and increase overall well-being. A comprehensive understanding of the relationship between health and the environment requires a forward-looking perspective and insight into the composite interactions among the physical, biological and social spheres.

The WHO Regional Office for Europe supports the efforts of its Member States and partners to understand and navigate this complexity and to identify policies and actions that can benefit the environment and human health, using the best available evidence to guide national and international decision-making in different sectors. Great opportunities for progress lie in changing consumption patterns and fostering healthy and environmentally friendly approaches in energy, transport, housing, urban management and agriculture, as well as in the health sector itself. Yet there is a need to further develop the evidence and arguments in support of these changes, along with the guidance to address new and emerging issues, which are often characterized by a high degree of uncertainty.

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Within its new European health roadmap "Health 2020 – A European policy framework supporting action across government and society for health and well-being", adopted in 2012, the WHO Regional Office for Europe recognizes that environmental determinants of health are as important as biological, social and behavioural determinants for creating, maintaining and restoring health. Health 2020 identifies the creation of resilient communities and supportive environments as one of four priority areas for action in the WHO European Region. Its goals are to improve the health and well-being of populations, reduce health inequalities, strengthen public health and ensure sustainable people-centred health systems that are universal, equitable, of high quality and guided by good intersectoral governance.

In line with this, the Regional Office for Europe has focused its recent publication on 'Creating resilient communities and supportive environments'. Besides, the brochure describes the historical frame of the European Environment and Health process since 1989, as well as the development of operative tasks, programmes and products of the WHO European Centre for Environment and Health. Please have a look and study this overview. It can be obtained from: http://www.euro.who.int/en/health-topics/environment-and-health/pages/european-process-on-environment-and-health/health-and-environment-in-the-who-european-region-creating-resilient-communities-and-supportive-environments.

Andreas Gies and Hans-Guido Mücke
WHO Collaborating Centre for
Air Quality Management and Air Pollution Control

ABOUT

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CONTACT

WHO Collaborating Centre for Air Quality Management and Air Pollution Control
Corrensplatz 1, 14195 Berlin, Germany

phone: + 49-30-8903-1280/81/82, fax: + 49-30-8903-1283
website: www.umweltbundesamt.de/whocc/titel/titel21.htm

EXPERIENCES FROM THE IMPLEMENTATION OF AIR QUALITY LEGISLATION AT URBAN LEVEL IN EUROPE

Alberto Gonzáles Ortiz

Almost three quarters of Europeans live in cities. The air quality in our cities is therefore of significant importance to the health of Europeans. Considerable progress has been made in the past twenty years in improving urban air quality, but issues remain. A number of different air pollutants such as nitrogen dioxide, particulate matter, and ozone remain above regulated levels, posing a threat to human health. This article briefly describes the European project Air Implementation Pilot. It aimed at helping to identify and address the reasons underlying this 'gap' in implementation of air quality policy in 12 European cities, and thereby drawing lessons of wider relevance. The project was undertaken jointly by the European Environment Agency (EEA) and the European Commission (EC).

The project looked at implementation in two ways: firstly, by identifying the implementation challenge, and secondly, by improving knowledge on the policy tools that can address that challenge. Implementation of EU policy is sometimes addressed primarily in terms of compliance, ensuring that countries adhere to EU law, and bringing legal challenges against them if they do not. While compliance is of course essential, the project focused additionally on collaborative work which is needed to build capacity and knowledge in order to deliver policy more effectively in pursuit of agreed objectives.

How the Air Implementation Pilot project was organised

The Air Implementation Pilot project brought together 12 cities across the European Union and was jointly run by the cities themselves, the EC, and the EEA. It aimed to better understand the challenges cities faced in implementing air quality policy, and also encouraged the cities to share their experiences, so they could learn from each other and see what has worked and what has not worked in other cities. The project also aimed to develop common proposals to help improve implementation of air policy. The pilot lasted for 15 months, starting in March 2012. It consisted of several workshops held with representatives of EC DG Environment, EEA, European Topic Centre on Air Pollution and Climate Change Mitigation, and representatives of the participating cities. The EEA prepared the format and topics to be discussed at these meetings, sending out questionnaires and respective materials in order to assist the discussions and the following more in-depth analysis.

Eight cities originally started in the pilot: Berlin, Dublin, Madrid, Malmö, Milan, Ploiesti, Prague and Vienna. Four more cities subsequently joined at the end of 2012: Antwerp, Paris, Plovdiv and Vilnius (**Table 1**). The cities were selected so as to ensure a representative sample of the diversity of Europe's urban areas. The selection aimed at including cities from different parts of Europe, of different population sizes, with different administrative traditions, and with a variety of sources of pollutants. The project focused on five 'workstreams', where lessons for implementation could most usefully be drawn: 1. *'Emission inventories'*, 2. *'Modelling'*, 3. *'Monitoring networks'*, 4. *'Management practices'*, and 5. *'Public information'*.

Lessons learnt from the Air Implementation Pilot project

Workstream *'Emission inventories'*: Although 11 cities have emission inventories, the project identified a great variety of methodologies used to compile them. In consequence cities' emission inventories are often not comparable with one another, or with emission inventories of the regions within they are located. Cities have problems taking into account all sources of

pollution, due to the difficulty in finding available input data or in appropriately quantifying different sources using representative emission factors. The project concluded that better input data, more guidance on emission inventory methodology and a better, common and simpler emission factors database would improve local emission inventories.

Workstream *'Modelling'*: A great diversity of models was used by the cities. Because air quality models make use of emission inventories, often shortcomings of the inventories carry over to the modelling activities. Additional issues encountered by the cities related to other input data, such as meteorological information, and background concentrations of pollutants. Another difficulty when applying models at urban level was how to accurately reflect the specificities of urban topography, such as air pollution hot spots on kerbsides. Finally, many city reported that the results of their models were often highly complex, and therefore difficult to interpret, consuming a lot of resources and computational time. This complexity also makes the subsequent validation of model results more difficult. The project concluded that greater training and guidance in modelling are needed, along with improved input data (including meteorological data, background concentrations, and the specificities of each city's topography).

Workstream *'Monitoring network'*: The project identified that most of the cities have the number of monitoring stations required by the relevant directives. However, the criterion for the macro-scale siting of ozone stations (their distribution between urban and suburban locations) has not always been met in the cities. The cities' experts therefore recommended addressing this issue of the classification of monitoring stations. Also it was suggested that the air quality directives should provide more detailed requirements for measuring stations. These requirements would stipulate the macro-siting (where the stations are located with respect to major pollution sources) and micro-siting (where the stations are sited with respect to their immediate surroundings, such as their height, proximity to the kerb, etc.), as well as the representativeness of the stations.

Workstream *'Management practices'*: The project examined concentration trends of three air pollutants: nitrogen dioxide, particulate matter and ozone, as well as measures taken to improve air quality. No clear trend in concentrations of these pollutants could be seen at the monitoring stations considered. Nevertheless, some commonalities did emerge in the management measures taken by the cities. In most of the cities, and in agreement with the main pollutant sources identified, more than 50 % of the implemented measures are traffic related. Other measures focused on the domestic, commercial and industrial sectors. Another common theme emerged among all the cities was how to define and assess the effects of measures. Cities' experts also expressed a common uncertainty regarding how best to assess the costs and benefits of air pollution abatement measures. Again, some of the deficiencies identified in the previous workstreams have implications that carry over: improvement of inventories and modeling tools, for instance, would better enable cities to assess which of their measures were most effective in improving air quality. Further support was also requested in the form of proposals for new EU legislation. Examples included: standard methodologies to measure emissions from boilers, regulations for domestic stoves, and improved vehicle emissions data to help ascertain the effect of traffic measures on air quality.

Workstream 'Public information': Finally, the project showed that, by and large, air quality information is promptly provided by the cities to the public, mostly through dedicated air quality internet sites. In general, the cities underuse mass media, social media websites, and new technologies like smartphone applications. Most of the participating cities lacked feedback on the interest of their citizens in air quality issues. There is thus room for cities to increase the presence of air quality issues in the media and for them to develop their smartphone and

social media presences. The adoption of a common Europe-wide index for air quality, using the same colour codes to facilitate comprehension, would also help make air quality information comparable across Europe.

Table 1: Air quality webpages of the 12 cities participating in the Air Implementation Pilot

Antwerp: http://www.antwerpen.be/eCache/ABE/82/10/708.Y29udGV4dD04MDMzOTAz.html.
See also the Flemish Environmental Agency webpage: http://www.vmm.be; and the Belgian Interregional Environment Agency (IRCEL) webpage: http://www.irceline.be.

Berlin: http://www.stadtentwicklung.berlin.de/umwelt/luftqualitaet/index.shtml.
See also the German Federal Environment Agency webpage: http://www.env-it.de/umweltbundesamt/luftdaten/index.html.

Dublin: http://www.dublincity.ie/WaterWasteEnvironment/AirQualityMonitoringandNoiseControl/Pages/AirQualityandNoiseControl.aspx.
See also the Irish Environmental Protection Agency webpage: http://www.epa.ie/irelandsenvironment/air.

Madrid: http://www.mambiente.munimadrid.es/opencms/opencms/calaire/index.html.

Malmö: http://www.malmo.se/Medborgare/Miljo--hallbarhet/Miljolaget-i-Malmo/Luft.html.

Milan: the Lombardy Environmental Protection Agency webpage: http://ita.arpalombardia.it/ITA/qaria/Home.asp.

Paris: http://www.paris.fr/pratique/environnement/bruit-et-qualite-de-l-air/p136.
See also the Air Quality Monitoring Network (AirParif) webpage: http://www.airparif.asso.fr.

Ploiesti: the Ministry of Environment and Climate Change's Environment Protection Agency webpage: http://www.calitateaer.ro.

Plovdiv: http://www.plovdiv.bg/item/ecology/%d0%b2%d1%8a%d0%b7%d0%b4%d1%83%d1%85.
See also the Regional Inspectorate for Environment and Waters — Plovdiv (RIEW) webpage http://plovdiv.riosv.com/main.php?module=content&cnt_id=1; the Ministry of Environment and Waters (MEW) webpage: http://www3.moew.government.bg/ ; and the Environment Executive Agency (EEA) webpage: http://www.eea.government.bg.

Prague: the Czech Hydrometeorological Institute webpage: http://portal.chmi.cz/portal/dt?action=content&provider=JSPTabContainer&menu=JSPTabContainer/P1_0_Home&nc=1&portal_lang=cs#PP_TabbedWeather.

Vienna: https://www.wien.gv.at/umwelt-klimaschutz/luft.
See also the Austrian Federal Environment Agency webpage: http://www.umweltbundesamt.at/umweltsituation/luft.

Vilnius: http://www.aplinka.vilnius.lt/lt.
See also the Vilnius Public Health Office webpage: http://www.vvsb.lt ; and the Environmental Protection Agency of Lithuania webpage: http://gamta.lt/cms/index.

Perspectives

The Air Implementation Pilot project has identified a number of challenges which cities face in implementing EU air quality policy. These will be taken up by the EC in its ongoing air quality review, which will consider how EU action can best support local, regional and national authorities in addressing them.

Options could include:

- financing of improved management and capacity-building through the forthcoming
- revision of the LIFE regulation;
- the development of a broader network of cooperation on the urban air quality challenge across the EU, with regular information exchange, capacity building, and a common database of measures;
- promoting and enabling increased use of other EU funding opportunities, such as the structural funds, particularly to address local drivers of persistent non-compliance with EU air-related legislation.

One possibility that has been discussed is to package all the European measures related to urban air quality in a single programme, which would then be one of the accompanying documents to a revised Thematic Strategy on Air Pollution.

For its part, the EEA will continue to support its member countries and the EC in their aim to improve the implementation of environmental policy. In the area of implementation of air policies and legislation, the EEA plans to focus firstly on data. The Air Implementation Pilot project has shown the importance of comparable, timely information on air quality, and the role of this information in improving implementation. The EEA will work to improve further the quality of data collected and reported to meet the requirements of new implementing provisions for the air quality directives. The EEA will also support the future implementation of a revised National Emissions Ceilings (NEC) Directive. The EEA will assist its member countries in preparing data for the UNECE Convention on Long-range Transboundary Air Pollution (LRTAP Convention). Additionally, the EEA will assist its member countries in improving the quality and timeliness of their air pollutant emissions and air quality data submissions. Therefore, the EEA wants to streamline its own information systems to support the implementation of EU air policy. The EEA stores air pollution emissions and ambient air quality data, and the indicators it produces will contribute to a better understanding of the state of Europe's air quality, both at country level and at city level. Assessments of European air pollution, its impacts and the effectiveness of air quality measures will be delivered regularly. These assessments will, inter alia, examine the synergies and trade-offs between air pollutant emission reduction policies and greenhouse gas emission reduction policies, and the subsequent effects of these policies on air quality and climate change. Finally, the EEA will continue to build capacity by working with experts across scientific and policy networks, such as the European Environment Information and Observation Network (EIONET) and the EMEP Task Force on Emission Inventories and Projections.

The full report of the project was published as EEA report No7/2013 (`Air Implementation Pilot – Lessons learnt from the implementation of air quality legislation at urban level´) and is available from: http://www.eea.europa.eu/publications/air-implementation-pilot-2013.

Contact:
Alberto Gonzáles Ortiz
European Environment Agency
Copenhagen, Denmark
Alberto.Gonzalez[at]eea.europa.eu

CITI-SENSE: A sensor based Citizens' Environmental Observatory

Air quality and climate change, environmental quality of public spaces in cities and indoor environment especially in schools are areas that engage most citizens and other stakeholders. Sources of and access to information varies with user group and issues.

The EU FP7-ENV2012 project CITI-SENSE will develop, test, demonstrate and validate a community-based environmental monitoring and information system using innovative and novel Earth Observation application. The project aims to learn from citizen experience and perception and enable citizenship co-participation in community decision and co-operative planning. The concept rests on realizing the chain 'sensors-platform-products-users'. The elements of this chain are: technologies for distributed monitoring (sensors),; information and communication technologies (platform); information products and services (products); and citizen involvement in both monitoring and societal decisions (users).

Three case studies will focus on combined environmental exposure and health associated with air quality, noise and development of public spaces, and indoor air at schools. Attention will be given to representativeness of citizen participation. The case studies will be performed in nine locations, and will be designed in collaboration with citizens' groups and decision makers.

For further information contact: http://www.citi-sense.nilu.no

Outdoor air pollution a leading environmental cause of cancer deaths

WHO's specialized cancer agency, the International Agency for Research on Cancer (IARC), announced that it has classified outdoor air pollution and one of its major components, particulate matter (PM), as carcinogenic to human beings. After thoroughly reviewing the latest available scientific literature, the world's leading experts, convened by IARC, concluded that sufficient evidence shows that exposure to outdoor air pollution and PM causes lung cancer. They also noted a positive association between such pollution and an increased risk of bladder cancer.

Evidence published by WHO/Europe earlier in 2013, as part of the international project to review evidence on health aspects of air pollution (REVIHAAP), confirmed the importance of outdoor air pollution as a risk factor for health, and strengthened the causal link between fine particles ($PM_{2.5}$) and cardiovascular and respiratory ill health. It also showed that long-term exposure to $PM_{2.5}$ can trigger a range of problems, such as atherosclerosis, adverse birth outcomes and childhood respiratory diseases, and suggested possible links with neurological development, cognitive function and diabetes.

IARC's recent classification provides indisputable evidence that air pollution is carcinogenic, and adds to the compelling evidence for taking action to improve air quality in order to reduce this important burden of disease in Europe.

This information stem from: http://www.euro.who.int/en/health-topics/environment-and-health/air-quality/news/news/2013/10/outdoor-air-pollution-a-leading-environmental-cause-of-cancer-deaths.

Further information can be obtained from: IARC press release of 17 October 2013 http://www.iarc.fr/en/media-centre/iarcnews/pdf/pr221_E.pdf

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EO2HEAVEN – Final project meeting on 14 May 2013 in Leuven, Belgium

The research project EO2HEAVEN (Earth Observation and Environmental Modelling for the Mitigation of Health Risks) was co-funded by the European Commission as part of the Environment (including climate change) theme in the 7th Framework Programme (FP7). This 40 month project was concluded with a final conference day at the Leuven Faculty Club.

EO2HEAVEN contributed to a better understanding of the complex relationships between environmental factors and their impact on human health. The project took a multidisciplinary approach involving experts from the domains of health, epidemiology, microbiology, geo-informatics, ICT, modelling and statistics. The 13 project partners came from six countries in the EU, South Africa and Uganda.

EO2HEAVEN conducted three case studies, two of which dealt with air quality:

1. The impact of air quality on respiratory and cardiovascular diseases in Saxony, Germany
2. The relationship between industrial pollutant exposure and adverse respiratory outcomes in Durban, South Africa.
3. Links between environmental variables and cholera in Uganda.

The Saxony case study investigated the possible correlation between PM_{10} and Ozone and respiratory diseases (bronchitis, asthma) and cardiovascular diseases (Angina pectoris, Ischemic Heart Disease). In-situ environmental measurements were spatially extrapolated with a multivariate geospatial model considering the topography, land cover and traffic data. These results were compared with remote sensing data. The health data was based on medical diagnosis and prescription data of the German Statutory Health Insurance AOK. The approach and methodologies can be used to create risk maps and to facilitate the development of an information system for health authorities with access to primary health incidence data. The identification of causal relationships between air quality and health remains a challenge, however.

The Durban case study developed a system to access in-situ air pollutant and meteorological data, to estimate pollutant concentrations with a dispersion model, and to predict the exposure of vulnerable populations in areas at risk. The area considered was the densely populated Durban South Industrial Basin with a high level of ambient air pollution due to industry emissions, especially from petroleum refineries. There is a significant association between PM_{10}, SO_2 and NO_2 levels and respiratory symptoms, in particular asthma. Local government stakeholders will be able to access information on current environmental and meteorological conditions supplemented by trend predictions that result in elevated air pollution. This will support the timely recognition of adverse conditions, the identification of pollutant sources and early warning of increased patient load in clinics.

The EO2HEAVEN project results are a contribution to the GEO Health Societal Benefit Area in the Task HE-01 'Tools and Information for Health Decision-Making' in the GEO workplan 2012-2015. EO2HEAVEN partners participate in the GEO Health and Environment Community of Practice in which international experts meet to exchange experience and knowledge on relationships between environment and health. The scope includes air-borne diseases, air quality and aeroallergens as well as pollutant tracking. The cholera case study in Uganda is in the area of water-borne diseases.

The project placed a strong focus on capacity building by holding 10 stakeholder and training workshops at the locations of the case studies. Indeed, the transfer of knowledge across the domain

boundaries is a key to establishing new approaches and sustainable solutions for a complex subject.

Further detailed information can be found in the project deliverables publically available on the web site www.eo2heaven.org. The EO2HEAVEN book gives an easy-to-read overview of all results. Other deliverables describe in depth the case study outcomes, environmental monitoring for health applications, the Spatial Information Infrastructure and software components to access, process and visualize environmental and health data in a geospatial and temporal context.

Kym Watson (e-mail: kym.watson[at]iosb.fraunhofer.de)
EO2HEAVEN Coordinator
Fraunhofer Institute of Optronics, System Technologies and Image Exploitation IOSB

8th Croatian scientific and professional assembly AIR PROTECTION'13 9-14 September 2013, Šibenik, Croatia

Croatian Air Pollution Prevention Association (CAPPA), together with the Institute for Medical Research and Occupational Health (IMROH, Zagreb) and the Meteorological and Hydrological Service of Croatia (MHS, Zagreb) under the auspices of Croatian Ministry of Science, Education and Sports and Ministry of Environmental and Nature Protection organized the 8th Croatian Scientific and Professional Assembly Air Protection '13, which took place 9-14 September 2013 in Šibenik. Forty six oral presentations and eleven posters were presented.
The conference started with an overview of 40 years of CAPPA activities, which traces its origin back to the foundation of the Yugoslavian Association for Clean Air, established 1973 in Zagreb. When Croatia declared independence from Yugoslavia in 1991, the Croatian Republic Association started to act as an independent unit. In 1993, the Association changed its name to CAPPA, and became member of the International Union of Air Pollution Prevention and Environmental Protection Association (IUAPPA) and the European Federation of Clean Air (EFCA). CAPPA has organized many professional meetings across Croatia. In 1997, CAPPA hosted the first national conference on air protection and from then, the conference is organized regularly every two years. In 2003 together with IUAPPA, the 14th International Conference on Air Quality – Assessment and Policy at Local, Regional and Global Scales was organized in Dubrovnik.

Since summer 2013, Croatia became a full EU member state. Therefore, the conference focused on one hand on the transformation process of European air quality legislation into national regulations on air pollution investigation and abatement in Croatia. Following the EC Directive on Ambient Air Quality and Cleaner Air for Europe (2008/50/EC), $PM_{2.5}$ particle fraction concentrations and average exposure indicator (AEI) for Zagreb atmosphere were assessed. Results are predicted for future period based on concentration data from the period 1999-2012. Both trends are negative, with slopes -0.46 µg/m³ per year and -0.43 µg/m³ per year for concentrations and average exposure indicator respectively. Model shows that concentration limit values for Stage 1 and Stage 2 could be met, while national exposure reduction target and exposure concentration obligation values for AEI will not be reached in due time, but probably several years later. Adoption and performance of to the requirements of chapter 5.4.5 of HRN EN ISO/IEC 17025 Norm (General requirements for the competence of testing and calibration laboratories) in Croatia as defined and adopted procedure leading to the test result was elaborated.

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Equivalence testing of automatic analysers with reference samplers is required according to Directive 2008/50/EC. Determination of annual and seasonal correction functions for the automatic analyser ESM Andersen FH-61 IR located at two measuring sites of Croatian national monitoring network were performed in order to determine the spatial dependence of correction functions. Orthogonal regression was used for equivalence and correction function assessment. Yearly and seasonal correction functions obtained at different monitoring sites are comparable to each other. Meanwhile, dispersion of the results and correction function slopes obtained at different monitoring sites differ by season. Quality assurance in gamma-ray spectrometry on air samples containing radionuclides with the half-life of the order of days, it is necessary to calculate correction factors for activity concentration. These factors can be assorted into three main categories, which are: correction for sampling time, correction for time period between the end of a sampling and the beginning of a measurement, and correction for measurement time. When the half-life of a radionuclide is comparable with the sampling time, in calculating the activity concentration, one has to take into account changes in the pumping flow rate during the sampling. In our case, the flow rate decreases with time linearly. For ^{131}I, the flow-rate decrease affects the calculated activity concentration by as much as 30 %, whereas this correction for ^{7}Be is 5 %.

On the other hand the conference was focussed on measurements of ambient air pollution, and their impacts on the environment and health, too. First results and seasonal differences of cadmium concentration monitoring in fine particulate matter fractions with the aerodynamic cut off diameter 10 µm, 2.5 µm or 1 µm (PM_{10}, $PM_{2.5}$ or PM_{1}) were presented. Platinum, palladium, and rhodium measurements of concentrations in samples of PM_{10} performed in Zagreb have shown, that regardless of the low value, it is possible to determine the concentration (pg/m^3) of these elements in the air. Results of continuous measurements of major acidic anions chlorides, nitrates, and sulphates in PM_{10} particle fractions in Zagreb air for the period 1999–2012 were presented. The highest values were obtained in 2003 for all components. The mass concentration of measured pollutants show slight decreasing trend for the investigated period.
Potential carcinogenic activity of measured PAHs using toxicity equivalence factors and measured mass PAHs concentrations in the air was calculated. The relative carcinogenic potential of PAHs measured at two locations was approximately the same; 1.43 for urban areas with industry and 1.45 for urban areas near important traffic ways.

Biomonitoring of air pollution in the Federation of Bosnia and Herzegovina proved that biological indicators can be very effective as sensitive warning system to detect environmental pollution. Content of Co, Cu, Cd, Cr, Fe, Mn, Zn, Bi, Ni, Hg and Pb in lichen (Hypogymnia physodes) and moss (Hypnum cupressiforme) were examined. Samples were collected in three cantons (Canton Sarajevo, Zeničko-dobojski Canton and Tuzla Canton) at 34 locations in 2011. Higher concentrations of all analysed metals were found mainly in moss samples in relation to lichen samples. Moss samples also showed significant variation in the heavy metal contents at certain locations. For the second consecutive time, Croatia participated in the moss survey 2010, which is part of the framework of the International Cooperative Programme on Effects of Air Pollution on Natural Vegetation and Crops heavy metals in Europe. Moss samples were collected during the summer/autumn of 2010, at 121 locations evenly distributed over the country with additional samples in/around urban/industrial areas (with a total of 161 locations). The content of 21 elements was determined by NAA, ICP-AES and AAS. From data obtained in 2010, it can be concluded that the median values and ranges of all elements obtained in this study are very similar to the median values and ranges obtained in the previous study in 2006. Only a few elements (Cd, Cu, Mg, Ni and Pb) have a slightly higher median value. For some typical anthropogenic

elements such as chromium, mercury, vanadium and zinc, lower median values were recorded. Temporal and spatial variations of pollen spectra in the City of Zagreb and Zagreb County according to spatial micro-locations and frequency of inhalation allergy in the adult population by setting the allergen / patient relationship were investigated. The results showed micro-regional statistically significant differences in average total annual pollen concentrations of all kinds.

Another aspect of the conference focused greenhouse gas emissions from fertilizer production and the effect of regulations and compliance activities were presented. According to the data of International Fertilizer Industry Association, fertilizer industry contributes directly and indirectly to the global greenhouse gas emissions with around 0.93 % through production, 0.07 % through distribution and with about 1.5 % through the application of fertilizers. The industry in general is expected to contribute to global efforts to reduce greenhouse gas emissions, and the energy-intensive activities (such as the production of nitrogen fertilizers) are subject to special attention. In line with the national and European regulations and the goals to reduce greenhouse gas emissions, next to priority investments in modern technology, Petrokemija, Plc. conducted a series of activities in implementation of calculating preliminary allocated free allowances system, based on the "benchmark" levels, and monitoring and reporting emissions.

Croatia has joined for the first time in the European Union Emission Trading Scheme (GHG EU ETS), at the start of the third trading period, which began 1 January 2013 and lasts until the end of 2020. The third trading period has much stricter rules than the previous two periods. For the power sector the most significant difference is that there is no allocation of free allowances for carbon dioxide (CO_2) emission, which occurs as a result of burning fossil fuels for electricity production, with some exceptions that are not related to Croatia. The inclusion of the GHG EU ETS, Croatian Electricity Company of activities performed due to emitted CO_2, has the obligation to buy the market allocation of greenhouse gas emissions from the combustion of fossil fuel power plant thermal input > 20 Mega Watt. The obligation to purchase allowances represents a new variable cost which should be included in the generation cost of energy.
Emission Trading System (ETS) is closely connected with the obligation to reduce emissions of a country, with the execution of obligations under the Kyoto protocol. In 2005 the EU started with ETS on the principle of "cap and trade". Under the "cap" is meant limit of the total amount of greenhouse gas emissions from the installations, which is subject of ETS. Within the emission limits, mandatory participants receive allocated emission allowances which they can sell or buy from those that have insufficient. Limited the total quantity of allowances provide their value. At the end of each year an installation is required to submit the amount of allowances to cover their actual emissions. If the ETS's mandatory participants reduce emissions then their "surplus" units can be sold to the installations which does not have enough allowances to cover their actual emissions, or they can use them for their own future needs. The concept of ETS is based on optimizing emission reductions on the cost effective way. The amount of the total allocated allowances will decline over the time, so by 2020 will be allocated 21 % less allowances than on 2005. TE Sisak is a thermal power plant with rated thermal input higher than 50 MW. To continue operation, it has to obtain the integrated environmental requirements (the environmental permit). The Environmental permit will include emission limit values for air pollutants until and after the transition period (end of 2017), which comply with the best available techniques (BAT). TE Sisak activities regarding the implementation of the IPPC Directive and the IE Directive requirements for emissions of air pollutants were presented. It also presents analysis of emission limit values for air pollutants following the IPPC Directive and IE Directive, as well as the proposals for implementing measures in response to these directives. Reducing emissions of air pollutants

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to meet the emission values using best available techniques (BAT) is necessary for continued operation of TE Sisak after the end of the transition period.

The topic 'Carbon in Particles' has been focused in a special session of the European Federation of Clean Air and Environmental Protection Associations (EFCA). The introductory presentation by EFCA concentrated on reducing impacts of particulate pollution: opportunities for achieving cost effective air quality and climate change benefits.
The presentation of the WHO Collaborating Centre for Air Quality Management and Air Pollution Control, Berlin, Germany dealt with health and air quality management aspects of black carbon. It was mentioned that the Task Force on Health working under the Convention on Long-range Transboundary Air Pollution, lead by its secretariat at the WHO European Centre for Environment and Health, Bonn/Germany, World Health Organization, Regional Office for Europe, conducted in 2010/2011 and published in 2012 an assessment of the health impacts of black carbon (BC) as a component of fine particulate matter ($PM_{2.5}$) (http://www.euro.who.int/en/what-we-do/health-topics/environment-and-health/air-quality/publications/2012/health-effects-of-black-carbon). BC has been identified as an indicator of combustion-related air pollution and it was recently recognized as one of the short-lived climate-forcers. The assessment is based on a systematic review of evidence of health effects of BC in ambient air. The respective WHO report concludes that epidemiological studies provide sufficient evidence of the association of cardiopulmonary morbidity and mortality with BC exposure. The review of toxicological studies suggested that BC may not be a major directly toxic component of fine particulate matter ($PM_{2.5}$), but it may operate as a universal carrier of a wide variety of chemicals of varying toxicity to human health. Any reduction of BC emissions and in human exposure to $PM_{2.5}$ containing BC, and other combustion-related particulate material for which BC is an indirect indicator, should lead to a reduction in the health effects associated with PM in ambient air and simultaneously contribute as a co-benefit to the mitigation of climate change.
Another two scientific presentations covered the topic of carbon mass concentrations in airborne particulates measurements performed in Croatia during the period 2009-2012 and assessment of BC concentrations by modelling reflection of $PM_{2.5}$ samples. Invited experts from Greece and Australia dealt with the parameters affecting the optical measurements of BC aerosols and advantages and artifacts of EC/OC thermooptical method and protocols, as well as regarding the role of organic fraction in the toxicity of combustion-generated particulate matter.

A final round table discussion focused on the proposed changes of the Croatian Air protection law. The role of national reference laboratories and their participation in air pollution monitoring in Croatia and conducting monitoring within the State air pollution monitoring network were the main issues. Discussing and elaborating complaints and proposals, the participants concluded to prepare in the name of CAPPA a brief conclusion with recommendations for the Ministry of Environment and Nature Protection.
A conference book (ed. K. Šega) containing presentation abstracts, both in Croatian and English language, was prepared and distributed and can be obtained from the CAPPA web-page: http://www.huzz.hr/index.html.

Krešimir Šega
Environmental Hygiene Unit
Institute for Medical Research and Occupational Health
Zagreb, Croatia

"Clean air": Conference on air quality control in the light of present and future challenges 16–17 September 2013 in Dessau-Roßlau, Germany

Janez Potočnik, the European Commissioner for the Environment, has declared 2013 as the year of air. For this reason, the German Federal Environment Agency organized a national conference to discuss present and upcoming challenges in air quality control and proposals to improve air quality. About 150 experts from air quality authorities, scientific institutions, consulting agencies and non-governmental organizations shared their experiences on how air quality has improved in Germany, how suitable measures can be implemented to further improve air quality and how limits on air pollutants have to be set up for an effective protection of human health and ecosystems. The need for integrated approaches in air quality policies was emphasized by many speakers.

During the first session, speakers discussed general trends of air quality in Germany and the main issues for air quality control on a national level were highlighted. New findings regarding negative effects of air pollutants on human health were also shown in this session.

There has been a remarkable improvement of air quality in Germany since the 1970s. Especially the emissions of SO_2 could be reduced considerably. Also emissions of NOX and primary $PM_{2.5}$ decreased during the last years, whereas those of ammonia stayed more or less on a constant level. The reduction of SO_2 emissions caused a significant decline in ambient SO_2 concentrations. Reduced emissions of NOX and primary particles on a national level are not reflected in the same way in reduced concentrations of NO_2 and PM_{10}. Ambient concentrations of these pollutants are still too high. In cities, where motorized traffic is a main source of these pollutants, the EU limit values are often exceeded. This is especially true for the annual mean limit value for ambient NO_2. Even if the limit values can be kept, human health is not protected sufficiently. It was shown that exposure to particles is associated with increased mortality, even at very low particle concentrations. But mortality is only the peak of the iceberg. Ambient particle concentrations are also associated with many other negative health outcomes like hospital admissions and cardiovascular diseases. In Germany, ecosystems face ozone concentrations and deposition of nitrogen and heavy metals leading to damages. Since there is only a target value for ozone, it is not in the main focus of air quality control. It has been emphasized, that low ozone concentrations show a decreasing trend in Germany, whereas medium concentrations are increasing. A general improvement of air quality beyond 2020 was demanded.

The second session focused on industrial emissions, which are regulated on a European level by the IED (Industrial Emissions Directive) and on measures to improve air quality in agglomerations.

The integrated approach of the IED aims at a high level of protection of the environment taken as a whole. To achieve this, Best Available Techniques (BAT) have to be used. BAT are defined for several industrial sectors in reference documents (BREFs), which are developed in the so-called Sevilla process. Therefore, the BREFs play a crucial role to control industrial emissions in the EU. The need to encourage national experts to participate in the Sevilla process and the demand for valuable input data has been emphasized.

An analysis of over 240 air quality plans in Germany showed that exeedances of NO_2 limit values are mainly caused by traffic and exeedances of PM_{10} limit values can mostly attributed to long-rang transport and traffic. Single measures like the introduction of low-emission zones,

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the reduction of emissions from non-road mobile machinery or actions to perpetuate traffic are mostly not sufficient to ensure concentration levels below limit values. They have to be combined and integrated approaches linking air quality measures with noise reduction actions and traffic development strategies seem to give promising results. It has also been demanded to lower background concentrations in urban agglomerations, since measures to reduce pollutant levels acting only at hot-spot locations are often not adequate to decrease concentrations below limit values. Lowered background concentrations will also reduce health effects for the majority of urban population living in background areas.

In the third session, topics related to burning of wood, protection of ecosystems and agricultural emissions have been discussed. It has been demonstrated that the increasing use of wood in domestic boilers leads to increased PM_{10} concentrations and also to raised levels of PAHs in ambient air. Factors leading to high particle emissions from these boilers and measures to reduce these emissions have been shown. The critical loads for nitrogen deposition are exceeded in most German regions. Areas, which are protected by the Habitats Directive, have special requirements for reduced nitrogen deposition. Therefore, the protection of these ecosystems is also an important task for air quality control. One important source of reactive nitrogen in ambient air is still the agricultural sector. Especially ammonia is mostly emitted by this sector. A couple of measures were presented to reduce ammonia emissions targeting at farming and feeding of animals and an appropriate application of slurry.

The last session focused on future challenges of air quality control in the light of scenarios and climate change.

It was demanded that air quality control should address not only particle mass but also soot and ultrafine particles. Scenarios of future development of air quality, which are based on a coupling of emission models with chemical transport models, show remarkable uncertainties which have to be considered during the interpretation of the results. Climate change and air quality are connected via the short-lived climate pollutants (SLCPs), namely black carbon, methane and tropospheric ozone. It has been highlighted that a reduction of SLCPs will attenuate global warming on a short time scale of years to decades and will also have positive effects for human health. Nevertheless, it was also emphasized that efforts to reduce SLPCs emissions do not obviate the need for a reduction of CO_2 emissions.

Posters covering a wide range of topics like indoor air quality, case studies of urban planning which integrated air quality, the integration of air quality and climate change polices, emissions from small combustion installations using biomass, ultra fine particles in ambient air and chemical characterizations of PM_{10} particles have been presented during the two days of the conference. The presentations of the conference are available (in German only) at https://www.umweltbundesamt.de/service/termine/reine-luft-luftreinhaltung-heute-morgen.

Marcel Langner
Department of Air
Federal Environment Agency, Dessau-Roßlau

Co-Benefits for Clean Air and Climate: 1 October 2013, Capetown, South Africa

The European Federation of Clean Air and Environmental Protection Association (EFCA) supported the 16th World Clean Air Congress under the title 'Many Nations: One Atmosphere', held from 29 September to 4 October 2013 in Capetown, South Africa, with a special Session on current topics and new developments in Europe.

The session was introduced to the one atmosphere – two problems approach: climate policies and air quality policies may be mutually supportive, for example in energy conservation, where climate policies may help;, they may also obstruct, however, air quality policies,.for example, Carbon Capture and Storage may help to reduce CO_2 emissions from energy conversion but air pollution impacts have to be taken into account. Similarly, to prevent adverse impacts on air quality, initiatives to increase the use of renewable energy sources by promoting biomass had to be combined with strict emission controls. On the other hand, measures to control emissions of regulated pollutants by end of pipe technology risk carrying an energy penalty which would have a negative effect on efforts to control global warming. There is a need for an integrative approach, and both EFCA and International Union of Air Pollution Prevention and Environmental Protection Associations (IUAPPA) are committed to this.

Until now legal and institutional barriers to an integrated approach exist in Europe. The recently established Climate and Clean Air Coalition (CCAC) has the ambition to contribute to the aim of an integrated approach, by addressing short lived climate pollutants (SLCP). Policies addressing the Regarding all other themes and issues of the 16th World Air Congress is the reality that tomorrow's mega-cities are now emerging across Africa and Asia. It is clear that such rapid urbanization is the SLCPs inevitably produce co-benefits for air quality and climate objectives. Black Carbon (BC) is the second largest climate forcer. In terms of health effects, in the EU more than 75 % of the estimated excess mortality ascribed to air pollution is associated with $PM_{2.5}$. It also appears that the association with a number of health effects is stronger for BC than for $PM_{2.5}$. Because of this, EFCA suggested nominating BC as a "Triple-PR component" for developing integrated policies for Climate Change and Air Pollution (PRominent, PReferential, PRioritised).

Two presentations focused on co-benefits for air quality and climate change through effective policy co-ordination at the national scale. A presentation from Scotland demonstrated how such co-benefits can be maximized through effective policy co-ordination. There is evidence to suggest that some policy choices can reduce greenhouse gas emissions but have a negative impact on air co-benefits can be maximized through effective policy co-ordination. There is evidence to suggest that some policy choices can reduce greenhouse gas emissions but have a negative impact on air quality and vice versa. Such eventualities can be avoided through effective policy co-ordination and a multidisciplinary approach, resulting in win-win outcomes for climate change and air quality. The Scottish examples presented illustrated how this can be done. The use of BC for urban AQ management planning was described for the Netherlands. It was shown that for Low Emission Zones/LEZ, used as a local policy measure, the PM-mass reduction might be on average less than 1 % of PM_{10}/$PM_{2.5}$, which would not be appealing to local governments and therefore no argument for extension of an LEZ by itself. However, the BC reduction in a LEZ could be 5-10 % and therefore more convincing. If, in addition, health impacts were taken into consideration and not simply PM mass, the results would be even clearer. Because health effects also occur below PM limit values, there would therefore be an advantage in using BC to turn 'compliance' policies into 'environmental health' policies and to demonstrate that BC is a useful and better parameter to assess health/policy impact.

The current situation in the Netherlands is that the application of the new Elemental Carbon (EC) modeling and assessment information remains limited. Additional promotion of EC as a tool in demonstration projects is needed, while waiting for a limit value.

Another presentation concentrated on the control of 'Ultrafine Particle Emissions from Small-Scale Wood Combustion Boilers by Optimized Combustion and Electrostatic Precipitation'. A main characteristic of wood burning is that wood combustion is a major contributor to ambient PM_{10} during the winter season. The particle mass concentration in the exhaust gasses of modern wood chip boilers is between 50 to 100 mg/m³, influenced by fuel composition and humidity. The C- Content of fly ash < 1 %, the modal of size distribution is about 150 nm, the number concentration = 107/cm³. To guarantee emissions meet the expected new 20 mg/m³ emission limit, many boilers would have to be equipped with fine particle collectors. As biomass combustion is booming globally, filters will be required worldwide. Electrostatic precipitation filter system has been developed in response. BC emissions from biomass combustion must be controlled to protect health and because of climate effects. BC emissions in wood combustion in Europe are reduced by stringent legislation (PM, CO), and by emerging combustion technology and control technologies for ultrafine particles. Due BC is a global issue, there is currently increasing interest towards black carbon and several policy processes are addressing it such as CCAC, UNECE Convention on Long-range Transboundary Air Pollution, as well as the Arctic Council and its working groups. It is important to ensure collaboration and effective exchange of information between European initiatives to different fora at other continents.

The presentations of this special EFCA session and further information can be found on http://www.efca.net.

Regarding all other themes and issues of the 16th World Clean Air Congress is the reality that tomorrow's mega-cities are now emerging across Africa and Asia. It is clear that such rapid urbanization is the dominant environmental – as well as social – trend of our time. It has to inform and condition the 'One Atmosphere' vision, and the means by which it can be effectively pursued. For this reason the International Board of IUAPPA has resolved that 'Mega-Cities' should be the theme of the next World Clean Air Congress to be held 2016 in Korea.

Thomas Reichert and Joop van Ham
EFCA president EFCA secretary general

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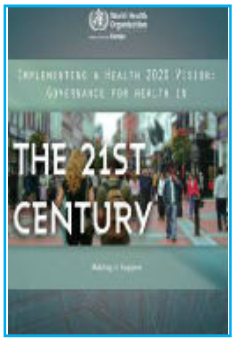
Implementing a Health 2020 vision: governance for health in the 21st century. Making it happen

by WHO (World Health Organization). 2013. vi + 82 pages, ISBN 978 92 890 0043 7. CHF 20.00, In developing countries: CHF 14.00. Available in English (PDF), 1.5 MB.



The WHO Regional Office for Europe commissioned this report to support the implementation of the Health 2020 policy framework. It builds on a study on governance for health in the 21st century. This report provides policy-makers with examples from around the world of how whole-of- government and whole-of-society approaches have been implemented, along with a set of tools to manage the complex policy process. The examples were selected with a view to the four policy priority areas of Health 2020 and with the following criteria in mind: they provide useful lessons, often illustrate best practices, cover a wide variety of different contexts and countries and, as far as possible, have been implemented and, ideally, evaluated. The report aims to contribute, in particular, to the Health 2020 strategic policy objective of "improving leadership and participatory governance for health". It is conceived as a living document that will be continually enriched with new examples and analysis.

The European health report 2012: charting the way to well-being

by WHO (World Health Organization). 2013. xiii + 142 pages, ISBN 978 92 890 1427 4. CHF 40.00, In developing countries: CHF 28.00. Order no. 13400123. Available in English (PDF), 15.8 MB.

Like its predecessors, the 2012 European health report describes both the overall improvements in health in the WHO European Region and their uneven distribution within and between countries. It breaks new ground, however, by helping both to define well-being, a goal of Europe's new health policy, Health 2020, and to map the way towards achieving it. By describing health in Europe, this report provides policy-makers and public health professionals with the epidemiological evidence base that underpins Health 2020 and its six overarching targets. In addition, it sets out the agreed approach to monitoring progress towards Health 2020, outlines the collaborative agenda to address the challenges ahead and makes the case for measuring well-being as a marker of progress in health.

Core Health Indicators in the WHO European Region 2013. Special focus: Non-communicable diseases

by WHO (World Health Organization). 2013. Available in English (PDF), 2.31 MB.

Within the Health 2020 framework, WHO European Member States confirmed that timely and high quality health information is essential to monitor trends and evaluate policy. Core health indicators in the WHO European Region contributes to these efforts by providing basic country and Region-wide information that is collected annually from the Member States. Non-communicable diseases remain the leading cause of premature death, disease and disability in the WHO European Region. This 2013 publication also includes figures and tables illustrating country trends in cardiovascular disease mortality, child overweight and obesity as one of its risk factors and Member States' work to limit the effects of risk factors. http://www.euro.who.int/__data/assets/pdf_file/0019/216703/RC63-Core-Health-Indicators-in-the-WHO-EURO-Eng.pdf.

Health and environment: communicating the risks

by WHO (World Health Organization) 2013, viii + 54 pages. ISBN 978 92 890 0051 2. Free of charge. Available in English (PDF).

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.

Health risks of air pollution in Europe – HRAPIE project. New emerging risks to health from air pollution – results from the survey of experts

by WHO (World Health Organization). 2013. Available in English (PDF), 2.13 MB.

This document presents the results of a survey of experts developed and conducted as part of the WHO "Health risks of air pollution in Europe – HRAPIE" project. The survey's objective was to assess and document the views of expert stakeholders regarding "evidence of new emerging issues on risks to health from air pollution, either related to specific source categories (e.g. transport, biomass combustion, metals industry, refineries, power production), specific gaseous pollutants or specific components of particulate matter (e.g. size-range like nano-particles and ultra-fines, rare-earth metals, black carbon (EC/OC))" via an online survey tool. The document describes the methodology applied to develop and implement the survey tool and provides a summary of the findings. The views of the experts are generally consistent with the findings of the REVIHAAP evidence review.
http://www.euro.who.int/en/health-topics/environment-and-health/air-quality/publications/2013/health-risks-of-air-pollution-in-europe-hrapie-project.-new-emerging-risks-to-health-from-air-pollution-results-from-the-survey-of-experts.

Protecting health from climate change: A seven-country initiative

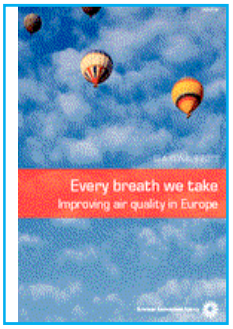
by WHO (World Health Organization). Available in English (PDF).

This publication presents the results of a seven-country initiative of the WHO Regional Office for Europe aimed to protect health from climate change through addressing adaptation, strengthening health systems and building institutional capacity in Albania, Kazakhstan, Kyrgyzstan, Russian Federation Tajikistan, the former Yugoslav Republic of Macedonia and Uzbekistan. This project is part of the International Climate Initiative (ICI). The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) supports this initiative based on a decision adopted by the German Parliament.
http://www.euro.who.int/en/health-topics/environment-and-health/Climate-change/country-work/protecting-health-from-climate-change-a-seven-country-initiative-in-the-eastern-part-of-the-who-european-region.

Other Publications:

EEA Signals 2013 - Every breath we take

by EEA (European Environment Agency), 2013. ISBN: 978-92-9213-363-4. Available in English (PDF), 12.8 MB.



Improving air quality in Europe: Signals 2013 focuses on Europe's air. This year's edition tries to explain the current state of air quality in Europe, where they come from, how air pollutants form, and how they affect our health and the environment. It also gives an overview of the way we build our knowledge on air, and how we tackle air pollution through a wide range of policies and measures.

Environment and human health (EEA-Report 5/2013)

by EEA (European Environment Agency), 2013. ISBN: 978-92-9213-392-4, free of charge. Available in English (PDF), 9.2 MB.

Human health and well-being are intimately linked to environmental quality. This has been recognised for decades amongst policymakers in Europe, and most recently appears as a cornerstone in the European Commission's proposal for the 7th Environment Action Programme. This report, produced jointly by the European Environment Agency (EEA) and the European Commission's Joint Research Centre (JRC), outlines a number of environmental issues with a direct influence on people's health and well-being and is a follow-up and update to the 2005 EEA/JRC report.

WMO/IGAC Impacts of Megacities on Air Pollution and Climate (GAW Report 205)

by WMO (World Meteorological Organization), 2012. ISBN: 978-0-9882867-0-2. Available in English (PDF)

Given the current state of available information about many megacities around the world, a truly comprehensive, integrated assessment of the impact of megacities on air pollution is not possible at this time.
However, an initial assessment of what information is available on air pollution in megacities across Africa, Asia, South America, North America, and Europe was deemed to be valuable and worth pursuing. Therefore, a large portion of the report is devoted to summarizing the current situations of megacities on different continents. Many issues and scientific questions remain to be addressed and discussed, such as tropical/sub-tropical cities versus mid-latitude cities, direct and indirect radiative forcing of aerosols in megacities and the surrounding regions. WMO/GURME plans to address these issues and scientific questions, along with more integrated analysis, in a future updated version of this report.

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

2014

9th International Conference on Air Quality - Science and Application
24-28 March, Garmisch Partenkirchen, Germany, http://www.airqualityconference.org/

2nd International Conference on Environmental and Economic Impact on Sustainable Development - Environmental Impact 2014
14-16 May, Ancona, Italy, http://www.wessex.ac.uk/14-conferences/environmental-impact-2014.html

11th International Conference & Exhibition on Emissions Monitoring (CEM)
14-16 May, Istanbul, Turkey, http://www.cem.uk.com/index/

Joaquin Midterm-Conference
21-22 May, University of Leicester Conference Centre in Leicester (UK), http://www.joaquin.eu/

Urban Transport 2014 - 20th International Conference on Urban Transport and the Environment
28-30 May, The Algarve, Portugal, http://www.wessex.ac.uk/14-conferences/urban-transport-2014.html

Air Pollution 2014 - 22nd International Conference on Modelling, Monitoring and Management of Air Pollution
7-9 July, Opatija, Croatia, http://www.wessex.ac.uk/14-conferences/air-pollution-2014.html

Indoor Air 2014 - 13th International Conference on Indoor Air Quality and Climate
7-12 July, Hong Kong, China, http://www.indoorair2014.org/

International Aerosol Conference
21 August-5 September, Busan, Republic of Korea, http://www.iac2014.net

26th Conference of the International Society for Environmental Epidemiology
24-28 August, Seattle / Washington, USA, http://www.iseepi.org