NEWSLETTER

WHO COLLABORATING CENTRE FOR AIR QUALITY MANAGEMENT AND AIR POLLUTION CONTROL

at the

FEDERAL ENVIRONMENT AGENCY GERMANY

No. 40 December 2007

CONTENTS

HAMBURG PARTICIPATION IN THE APHEIS NETWORK (PHASE 4): TARGETS, ORGANISATION AND RESULTS

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Introduction

Urban outdoor air in many European metropolitan areas is polluted with a variety of noxious agents that contribute through short- and long-term exposures to increased morbidity and mortality. Epidemiological studies have demonstrated for different continents and urban environments that PM_{10} as well as ozone pollution is associated with a wide range of adverse health outcomes (Brunekreef and Holgate 2002, Anderson et al. 2004, Bates 2005, Pope and Dockery 2006).

Although the exposure-risk-relation shows some uncertainty, there is consensus in the scientific community about a monotonically increasing risk function for long and short term mortality (all causes, cardiovascular and pulmonary diseases) due to PM_{10} and ozone exposure. Although pathophysiological mechanisms are not completely understood the state of knowledge gives rise to concern about public health implications in Europe and elsewhere.

On this basis the APHEIS (Air Pollution and Health: A European Information System) programme has been initiated (supported ever since by EC's Directorate General of Health and Consumer Protection) in 1999 to provide European policy and decision makers, environment and health professionals, the general public and the media with an up-to-date, easy-to-use information resource on air pollution and public health to help them make better-informed decisions about the political, professional and personal issues they face in this area. To develop this information resource, APHEIS has created a public health surveillance system that generates information on health impact assessment (HIA) of air pollution in Europe at the city, regional, national and European levels (http://www.apheis.net/).

Targets and project steps of the APHEIS project

For an integrated approach a basic prerequisite is to collect relevant health, population and environment data locally, to integrate them on the European level and to combine them with scientific knowledge on health impacts. For this purpose a European network of scientific competence and participating cities was built up.

Main targets and project steps include

(a) an exercise of a unified data collection (data standardisation),

(b) the development of a software for data collection (the Information system),

(c) the evaluation of the relevant epidemiological literature (relative risks: exposure-response functions together with an uncertainty analysis),

(d) the calculation and evaluation of the Health Impact Assessment (HIA) on the European level,

(e) a comparison/benchmarking of the collected health and environmental indicators on an European level, and

(f) an evaluation of the effectiveness of exposure reduction measures on a regional level.

Benefits for all participants were expected from the project by dissemination of relevant information, by competence building and by improving the accessibility, the linkage and the compatibility of existing data sources containing environment and health information on the European level.

Organisation and management of the project

The whole project has been built up in several phases; main results are documented in earlier publications (Medina et al. 2005, Boldo et al. 2006). Phase 3 and 4 sought to analyse the number of health events that could be prevented and are related to outdoor air pollution (PM_{10} and ozone). Phase 4 was part of the ENHIS-1 (Environment and Health Information System) project of the European Union and extended HIA approaches to health effects in children (http://ec.europa.eu/health/ph_projects/2003/action1/action1_2003_28_en.htm#4).

Altogether 31 metropolitan areas out of 18 European countries participated in phase 4, coordinated by Sylvia Medina (Dept. of Environmental Health, French Institute for Public Health Surveillance, Institut de Veille Sanitaire, InVS, Saint Maurice, France) together with an international working team. With participation of Hamburg for the first time Germany also was represented in the APHEIS network.

Collection of environment and health information

For HIA, data sets are linked containing information on the environment and health. All data sets must have a synchronised schedule to be analysed in a time series; this holds for the daily data from regional environmental pollution measurement programmes as well as selected health-related data sets (daily mortality counts with a notification of the cause of death, hospital admission data with diagnosis). The year 2001 was chosen for data collection in a harmonised manner for the 31 participating metropolitan areas.

The information base needed to identify and to assess the population risks from particulate matter (PM_{10} and $PM_{2.5}$) and ozone requires a high degree of resolution in time and must be descriptive for the population under risk (spatial aggregation). Environmental pollution measurement programmes in Europe have a different degree of aggregation (number and location of the measurement stations), use different equipment, measurement routines and different correction methods. In consequence some standardisation steps had to be solved. For each city, only data of measurement stations representing urban background pollution have been included (stations representing industrial or traffic emissions were excluded). Empirical PM_{10} measurements were corrected to fit with gravimetric methods using a local conversion factor; if not available, the default European factor of 0.7 was used. For the city of Hamburg these data are collected routinely and calculated by the Hamburg Institute for Hygiene and Environment (http://hamburger-luft.de/). HIA of suspended particles was based, in most of the participating cities, on PM_{10} measurements. However, some of the effects assessed were based on relative risk estimates derived from gravimetric measurements of $PM_{2.5}$, applying an appropriate conversion factor to PM_{10} levels. The HIA exposure-response functions (ERFs) for total mortality were mainly derived from Pope et al. (2002); a summary of all studies and of all the ERFs used for HIA is tabulated in Medina et al. (2005).

The collected information on health state included total daily mortality excluding external causes (ICD9 < 800 - ICD10 A00-R99), mortality due to cardiovascular (ICD9 390-459 - ICD10 I00-I99) and due to respiratory (ICD9 460-519 - ICD10 J00-J99) diseases. Additionally for young children total postneonatal mortality, postneonatal respiratory mortality and number of sudden infant death (SIDS: ICD9 798.0 - ICD10 R95) was assessed. Emergency room visits for asthma (ICD-9 codes 493, ICD-10 codes J45, J46) and hospital respiratory admissions were collected as indicators of morbidity. For all participating cities the population structure was described and used for an age-sex-adjustment of mortality and morbidity data to avoid misleading results biased by demographic differences between participating areas.

Process of data aggregation and HIA calculation

Local data collection was supported by a spreadsheet developed by the French surveillance system on air pollution and health (http://www.invs.sante.fr/psas9), a specific user manual was developed by the Bilbao APHEIS centre. This facilitated data entry and control of data compliance. The data entry resulted in a city specific calculation of results. The aggregation of all city data sets was done in the InVS. HIA results were calculated as the effectiveness of exposure reduction measures by a defined degree of pollution (e.g. 10 µg/m³ PM_{10}; 5 µg/m³ ozone).

Selected results

The European annual limit value of 40 µg/m³ for PM_{10} is exceeded in six cities in Southern and Eastern Europe in the year 2001 but most cities meet that limit value. Only two cities comply with the guideline value of 20 µg/m³ suggested by WHO (2006), six other cities (including Hamburg) are close to the margin of < 25 µg/m³ (Figure 1).

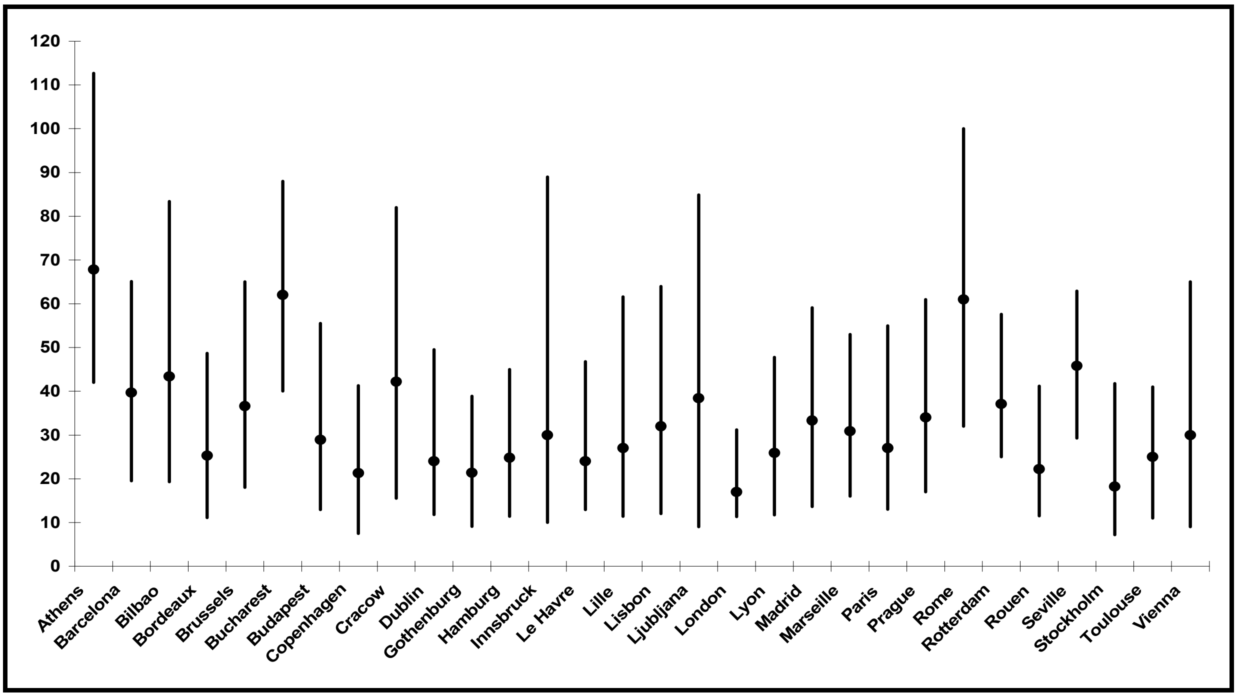

Figure 1: Annual mean values of PM_{10} concentrations (in µg/m³) in participating European metropolitan areas. Vertical bars indicate 5th and 95th percentiles (no data available for Valencia).

Figure 2 shows the mean values of daily 8h-maximum levels of ozone in summer time (April – September). All mean values fall below the target value of the third Daughter Directive of February 2002 (120 µg/m³) that defines the target values of ozone concentration in ambient air for health protection. According to this directive by 2010 the target value must not be exceeded on more than 25 days per calendar year (averaged over three years), the long term objective is that this value should not be exceeded at all throughout the year. As indicated by the 95th percentiles on a daily basis in many cities the target value appears to be exceeded quite frequently. One advantage for the participating cities is that comparisons with other metropolitan areas allow them to bring their state of environment and health indicators into perspective on a European level.

Compared to other metropolitan areas air quality in Hamburg is satisfactory. Likewise age standardised mortality rate in Hamburg is in the lower range of the spectrum (Figure 3).

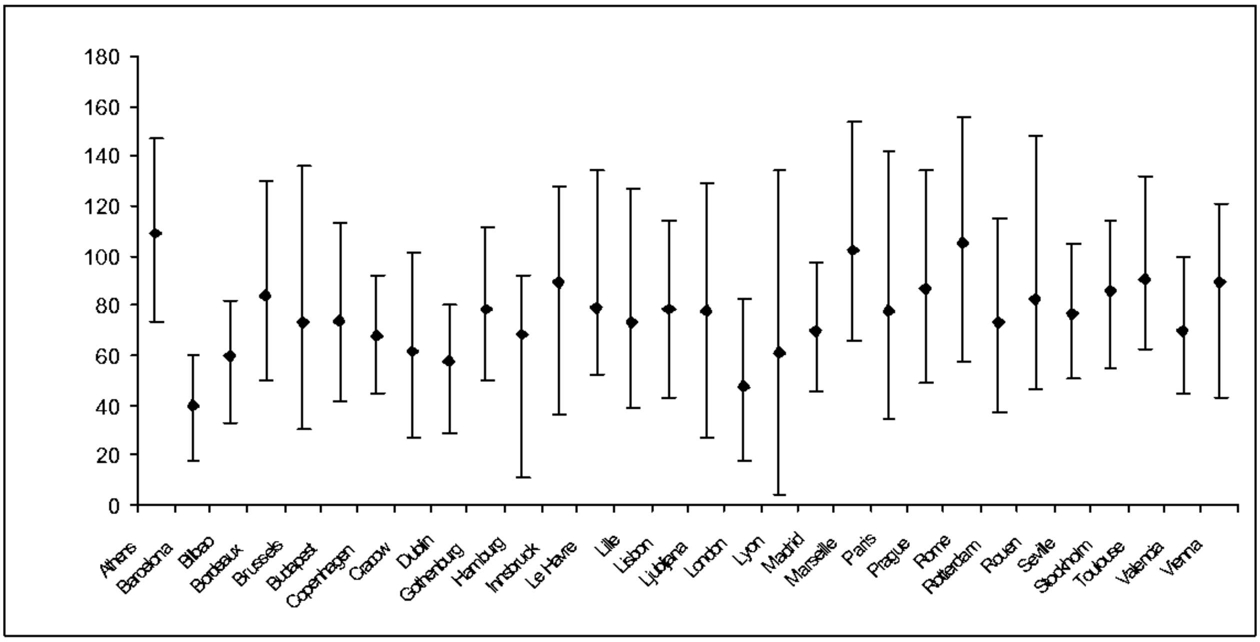

Figure 2: Mean values of daily 8h maximum Ozone concentrations in summer (April - September, in µg/m^3) in participating European metropolitan areas. Vertical bars indicate 5th and 95th percentiles (no data available for Bucharest).

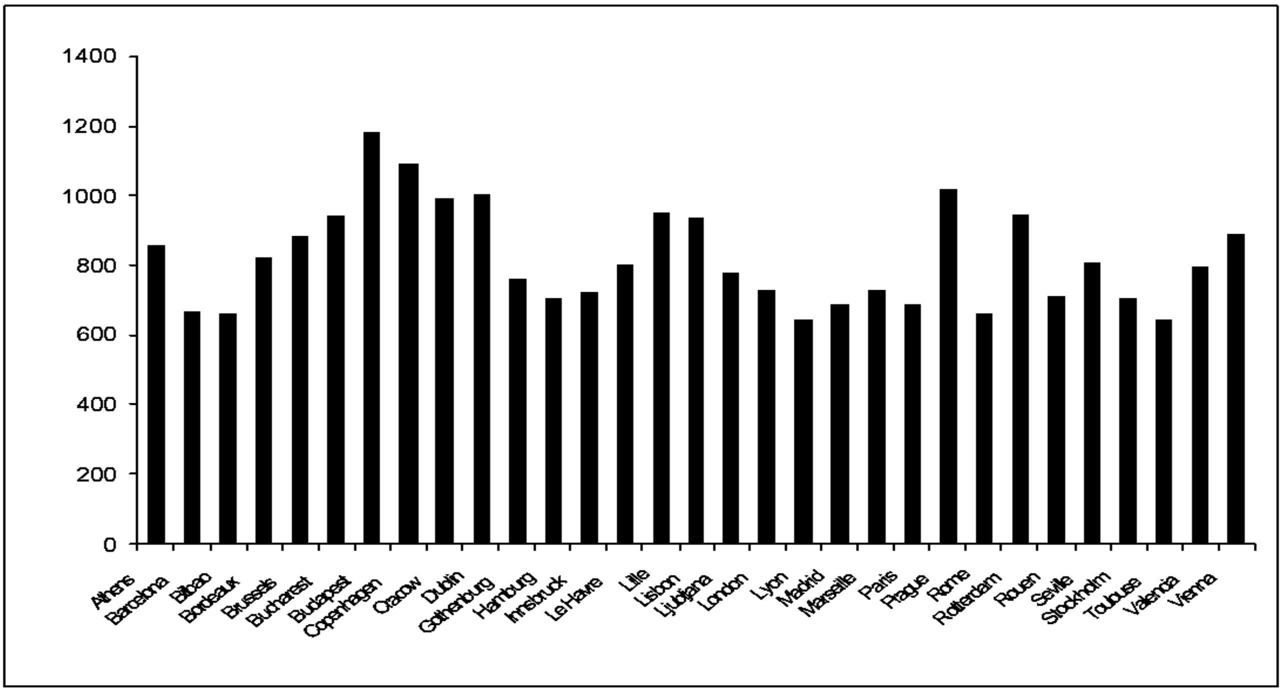

Figure 3: Age standardized mortality rates (all causes of death) in participating European metropolitan areas (rate per year and per 100,000 inhabitants).

HIA showed that – irrespective of their initial status and compliance with legal limit values - all cities would benefit from improvement of air quality with respect to the registered health indicators. For example for Hamburg a decrease in PM_{10} concentration by 5 µg/m^3 is expected to lead to a decrease of age standardised mortality by 1.8 % and postneonatal mortality by 2.8 %. A decrease in ozone concentration in summer time by 10 μg/m^3 would have a weaker effect, reducing age standardised mortality by 0.14 %. Detailed results can be found in the ENHIS-1 final report of the international project (http://www.apheis.net/), results related to Hamburg in the Hamburg city report (www.gesundheit-umwelt.hamburg.de, in German language).

Conclusion

The APHEIS project has developed an integrated collection of environment and health information that gives a useful overview of the current situation with respect to possible adverse health effects from air pollution in Europe. The results indicate that further incentives to reduce PM_{10} levels will serve public health in metropolitan areas throughout Europe and describe the effects to be expected quantitatively. The methods for estimating health impacts of ambient air pollution require further development, and conclusions should be treated with caution; but the results are developed on the ground of the current scientific knowledge and validated data. Thus, despite its limitations HIA methodology has been proven helpful in estimating the potential health impact of environmental policies. The information available provides a broader understanding of health impacts for administrational units as well as for the public and will support European legislators as well as national and local policy-makers.

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THE EUROPEAN NETWORK OF NATIONAL AIR QUALITY REFERENCE LABORATORIES (AQUILA): ITS ROLES AND ACTIVITIES

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Introduction

The European Community ambient air quality legislation has the objective of mitigating human health and ecological damage due to air pollution in the EU. To achieve this objective, an EU-wide air quality assessment (monitoring, modelling and estimation) is required that enables comparisons of pollutant concentration levels with the defined European Union limit or target values within and between the Member States.

The Ambient Air Quality 'Framework' Directive was published in 1996, and since then four 'Daughter' Directives have been published. More recently the EC has prepared, through the Clean Air for Europe Programme, a proposal for a new Directive entitled 'Directive of the European Parliament and Council on Ambient Air quality and Cleaner Air for Europe (Commission proposal COM (2005) 447 final. The Directive is currently in the co-decision second reading by the European Parliament and the Council and is expected to enter into force in first half of 2008. For more information, see http://ec.europa.eu/environment/air/directive.htm). The main novelty is the introduction of new fine particle ($PM_{2.5}$) objectives and the corresponding monitoring requirements. The proposal also merges and updates the original Framework and the first 3 Daughter Directives. These Directives require EU Member States to nominate 'competent bodies' to carry out a number of tasks at a national level including:

- Assessment of ambient air quality;
- Approval of measurement systems (methods, equipment, networks and laboratories);
- Ensuring the accuracy of measurements;
- Analysis of assessment methods;
- Coordination on their territory if Community-wide quality assurance programmes are being organised by the Commission.

Formally, the responsibility for these tasks usually lies with the corresponding environmental ministries at the national, regional or even local level. The technical implementation at the national level however, in particular when coordinating the nation-wide quality assurance programmes and participation in the Community-wide QA/QC programmes, is left to one or several bodies within the Member States known as the 'National Reference Laboratories' (NRLs). AQUILA (see AQUILA website: http://ies.jrc.cec.eu.int/Units/eh/Projects/Aquila/) as the formal network of these laboratories has been established in 2001 with the support of the two European Commission services that are involved in the development and implementation of the Community ambient air quality legislation: Joint Research Centre – Institute for Environment and Sustainability, and DG Environment. It currently comprises about 40 organisations across Europe and is open to all NRLs in Europe (including non-EU countries) that are performing the assessment of ambient air quality in close relation to the provisions of the EU ambient air quality legislation.

Scope of AQUILA work

AQUILA objectives and some of its current activities and plans include:

1. Providing scientific and technical support to the EC and the Member States on the implementation of the ambient air Directives;

2. Providing internationally coherent expert judgements and scientific advice on issues related to measurements and their strategy;
3. Providing a forum for the exchange of scientific and technical information and good practice;
4. Promoting harmonisation of ambient air quality measurements across the EU and the EFTA countries;
5. Co-ordinating, where needed, quality assurance and quality control activities;
6. Participating in, and coordinating where required, relevant European standardisation (CEN) activities, collating information on their applicability and providing advice when published;
7. Contributing to the organisation of appropriate training courses, workshops, conferences etc;
8. Providing technical advice to improve national and regional air monitoring practices;
9. Taking the lead in identifying the requirements for Standard Reference Materials (both gaseous and particulate) to be used in the calibration, validation and auditing of relevant measurements carried out in the Member States.

Examples of recent AQUILA activities

In the following, some examples of recent or ongoing AQUILA projects are briefly presented.

Harmonisation and quality assurance of PM measurements across Europe (JRC-AQUILA project)

Experiences of the Member States for many years and from comprehensive data evaluation has shown that there is a specific need for harmonisation of PM monitoring methods, especially for continuous methods. The JRC together with AQUILA have initiated a large monitoring campaign across Europe in order to harmonise PM measurements in Member States and provide information on comparability of PM_{10} and $PM_{2.5}$ monitoring data; to provide information on use and validity of calibration factors for continuous monitoring methods as a way of providing measurement results equivalent to those that would be obtained by the reference method; and to assess comparability of reference and equivalent methods.

Member States and possibly accession/candidate countries will be involved in the study for the next few years. An urban background station is selected in each country and parallel measurements are carried out for 14 days. During this time the JRC uses two PM_{10} equivalents to reference samplers, and a continuous PM_{10} monitor. In addition, in order to obtain a better characterisation of the PM, the JRC also measures $PM_{2.5}$ and PM_1, the number and size distribution of the PM, as well as its organic and elemental carbon content.

This project started in 2006, and so far 10 countries have been visited (ES, PT, SI, AT, CZ, DE, DK, SE, FI, EE). The results of the inter-comparison have already been evaluated, and a "preliminary evaluation sheet" was delivered to each participant. In each sheet all of the 24-hour average PM_{10} values (gravimetric and continuous monitors) obtained by the JRC, NRLs and Local Networks were compared: The gravimetric data obtained by the JRC (the average of the two equivalent PM_{10} samplers) served as the reference. Orthogonal regression was applied to compare data (procedures based on EN 14907 were used). When possible, also $PM_{2.5}$ and PM_1 (very limited data) were compared with the values obtained by the JRC.

Comparisons with the gravimetric samplers taken by the NRLs showed differences on average lower than 25 % with satisfying correlations ($R^2 > 0.9$). However, in some case correlations may be limited ($R^2 \leq 0.8$), in particular at concentrations at the applicability margins of the method (i.e. very high values in traffic sites or very low values $< 10\ \mu g/m^3$), where comparability is lower and uncertainties may be up to 30 %. The results of the comparisons obtained by local monitoring networks were also in general good when low-volume samplers were used, but problems were evidenced when high-volume samplers were used, with a poor correlation probably due to difficulties in handling or maintenance of the devices. Figure 1 and 2 show results obtained using the orthogonal regression for gravimetric measurements (a = intercept; b = slope).

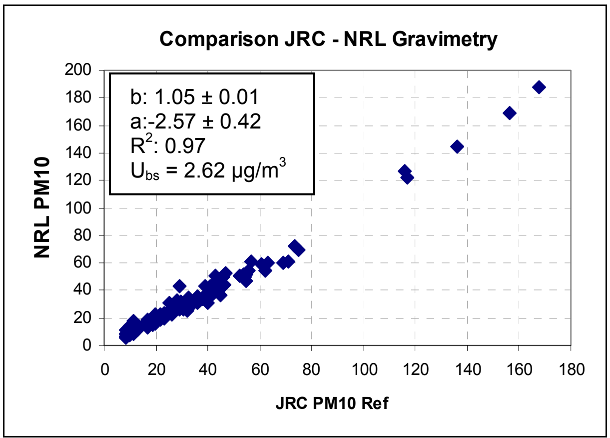

Figure 1

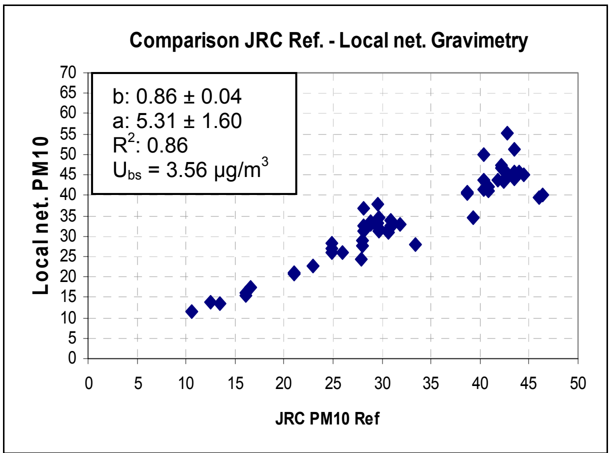

Figure 2

Data obtained from JRC reference methods have been also compared to data from continuous monitors used by National Reference Laboratories and the monitoring networks. As evident from figure 3 and 4, results are not always satisfactory and the use of a proper value for correction factors is in many cases problematic.

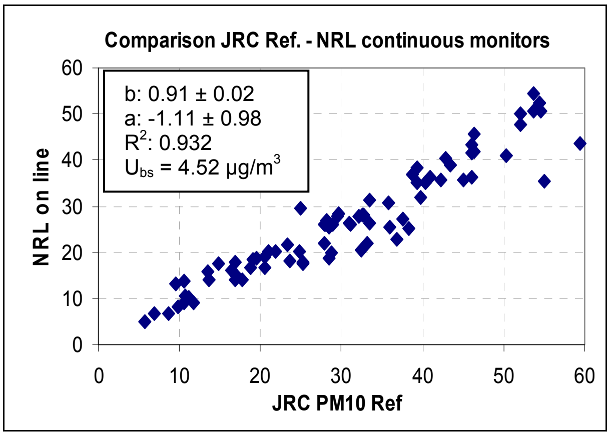

Figure 3

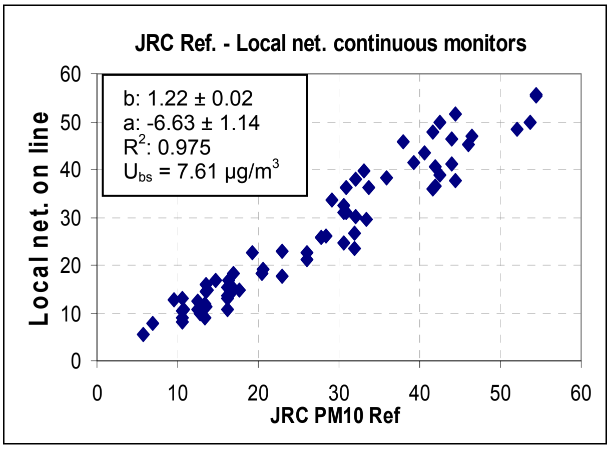

Figure 4

The project will continue in 2008, and measurement campaigns will start again in February in Belgium, France and The Netherlands. In May 2007, the JRC, with the support of AQUILA, organised a workshop on ‘Demonstration of Equivalence of Ambient Air Monitoring Methods’, where equivalence testing of continuous PM-monitors played a central role. Some PM monitors of the ‘new generation’ consistently demonstrate equivalence without the need to apply a further 'correction', and there are strong indications that they could, as a general rule, meet the requirements of the 1st Daughter Directive regarding their measurement uncertainty.

Analysis of metals and PAH in particulate matter (JRC-AQUILA project)

15 NRLs participated in a large inter-comparison organised by JRC under the umbrella of AQUILA in 2006/2007 for the analysis of heavy metals. According to the 4th Daughter Directive either the Inductively Coupled Plasma Mass Spectrometry (ICP-MS) or the Graphite Furnace Atomic Absorption Spectrometry (GF-AAS) shall be used as reference methods. However, some NRLs implemented different methods, which were accepted for this inter-comparison in order to get a whole picture of data quality of heavy metals across the EU. Various samples were prepared by the JRC and forwarded to all participating NRLs (liquid sample based on a liquid Certified Reference Material (CRM); solution of a certified dust sample; a sample with a known mass of a dust CRM; and a solution prepared by digestion of an exposed filter; blank and exposed filters).

Data gained during this inter-comparison are being evaluated at present (Gerboles et al.) and will be discussed at a workshop in December 2007. The final report will be published in 2008. For demonstration of the traceability of air quality measurements it is essential to have suitable certified reference materials (CRMs). At present, this is only partly the case because the available CRMs are out of stock and/or have a matrix rather different from ambient air dust. In co-operation with the JRC Institute for Reference Materials and Measurements (IRMM), requirements for new CRMs containing heavy metals and PAH were defined. After a successfully completed feasibility study the new materials are under development at IRMM.

Co-operation between AQUILA and EURAMET

Some of the National Reference Laboratories (NRLs) are also National Metrology Institutes (NMIs) which are (in Europe) organised in an organisation now known as EURAMET. Consequently, because of the (partially) similar tasks of the EU NRLs and NMIs, joint efforts were made in the field of quality assurance/quality control. For example, a workshop on static and dynamic dilution techniques was held in March 2007 with participants from the EURAMET and the AQUILA community as well.

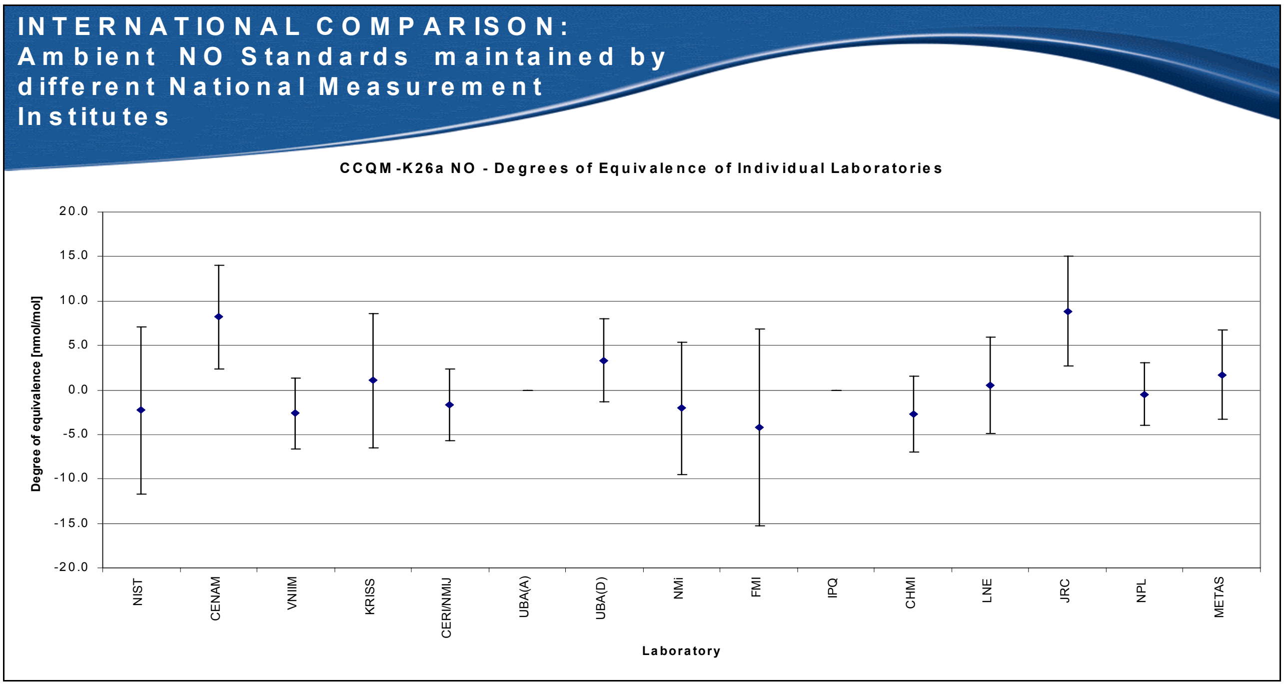

Figure 5

In addition, a number of technical projects, involving inter-comparisons of calibration standards and procedures at a national level, have been organised by EURAMET, or its worldwide equivalent organisation (the Consultative Committee for amount of Substance – CCQM – see www.bipm.org), in collaboration with AQUILA, where these international inter-comparisons cover ambient air quality. These completed and on-going inter-comparisons include:

- Comparisons of calibration standards between National Reference Laboratories and Metrology Institutes maintaining standards of NO_x and SO_2 for use with ambient air instruments, as specified in European (EN) standards - see Figure 5;
- Comparisons of national reference ozone photometers, used in Europe and elsewhere for the calibration of ozone monitoring instruments;
- Comparisons at a national level of multi-component measurements of hydrocarbons in ambient air that are considered as ozone precursors, to fulfil the requirements of Annex X of the new EC ambient air Directive.

Inter-laboratory exercises and co-operation with WHO (JRC-WHO-AQUILA)

Already under the old European air quality directives, which were published in 1979 and in the following years, quality assurance played an important role. Inter-laboratory comparisons are an essential element in order to safeguard the comparability of results obtained by air quality monitoring networks in Europe. The LANUV (formerly the LUA and the LIS) in Essen (Germany) carries out such comparisons for the German networks over the past more than 25 years at *finca* – the facility for inter-laboratory comparisons and analyses. The European Commission organised the first European exercise at this agency in May 1992 and built in the following years another inter-comparison facility at the premises of the European Reference Laboratory for Air Pollution (ERLAP) at the JRC in Ispra. With the new ambient air quality directives as of 1996, the central role of quality management was strengthened further and the so-called ‘data quality objectives’ were explicitly formulated, specifying requirements for measurement uncertainty, time coverage and data capture. The Directives also require Community-wide QA programmes; the inter-comparisons between NRLs, organised by the EC, were held during the following years at the Joint Research Centre in Ispra (Italy) and also in Essen.

One of the basic elements of the European directives are the limit values for the protection of human health – which is the central working area of the Word Health Organization (WHO). In 1985 the WHO policy *Health for All by the year 2000* stated: “All people of the European region should be effectively protected against recognised health risks from air pollution”. It was also stated that quality assurance and quality control are highly desirable for monitoring programmes associated with this. As a consequence, the WHO Collaborating Centre at the Federal Environment Agency (UBA), formerly at the Federal Health Office (BGA), was designated to organise inter-laboratory exercises for the Member States in the WHO European Region. The first two workshops were organised in 1994 at the LANUV (LUA) in Essen. Following exercises were held in Langen at the UBA laboratories.

With the enlargement of the European Union, especially in Central and Eastern Europe, it became obvious that the quality management programmes of the EU and the WHO should be coordinated. In 2004, a Letter of Understanding was formulated as the basis for this new approach. A recent inter-laboratory exercise took place in Essen in October 2007, as a joint event organised by the European Commission, the WHO, and AQUILA. 40 participants came from 11 EU Member States, the European Reference Laboratory (ERLAP) of JRC, and from 5 institutions of the “WHO-community” in Albania, Macedonia, Serbia and Ukraine.

Figure 6: Participants of EU/WHO inter-comparison exercise at LANUV (Essen, Germany, October 2007)

New challenges and future work of AQUILA

Besides the promotion and coordination of Community-wide measurement QA activities, the strength of AQUILA as the established forum that facilitates exchanges of best measurement practices is in its ability to support EC in developing and improving measurement provisions of the ambient air quality directives. This support has been important in the development of the Commission proposal for the new ambient air quality Directive, in which further QA/QC provisions and explicit accreditation requirements for NRLs are included. It will become crucial when this new Directive enters into force, as it includes a number of new measurement provisions for PM speciation, for which no reference methods are yet prescribed. At that time and with AQUILA's support, the Commission also intends to update guidance related to the air quality assessment under ambient air quality legislation.

Currently, AQUILA's 'sibling' known as FAIRMODE is being created. This is a joint EC/EIONET network supporting modelling as the assessment tool under the ambient air quality legislation. The two networks should soon provide comprehensive support to all ambient air quality assessment aspects to the competent bodies in EU and outside.

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GERMAN ENVIRONMENTAL SURVEY OF CHILDREN (GerES IV): ENVIRONMENTAL TOBACCO SMOKE

Christine Schulz, Anja Lüdecke, André Conrad, Margarete Seiwert, Detlef Ullrich, Marike Kolossa-Gehring

Since 30 September 2003 (EC 2001), each cigarette packet sold in the EU must carry one of two obligatory warnings ("Smoking kills/can kill" and "Smoking seriously harms you and others around you"), which must cover 30% of the front side surface. At least 40% of the back of the packet must be covered with one of 14 additional warnings (Figure 1). On 1 January 2004, maximum levels of tar (10 mg), nicotine (1 mg) and carbon monoxide (10 mg) were introduced for cigarettes manufactured and sold in the EU (Figure 2).

Smoke contains benzene, nitrosamines, formaldehyde and hydrogen cyanide	**Protect children: don't make them breathe your smoke**

Figure 1: Examples of additional warnings on packets of cigarettes produced and sold in the EU

Tar 8 mg
Nicotine 0.6 mg
Carbon monoxide 9 mg

Figure 2: Labelling of tobacco products

We all know the facts and yet, in 2003/06, almost one in two children 3 to 14 years of age in Germany (46.3%) lived in a household with at least one smoker (Figure 3), and almost one in six children who did not actively smoke (15.5%) was exposed to environmental tobacco smoke in his/her home on a daily basis (Figure 4). These are results from the German Federal Environment Agency's German Environmental Survey of Children (GerES IV; Becker et al. 2007, Schulz et al. 2004, Schulz et al. 2007a, Schulz et al. 2007b), the environmental module of the Health Interview and Examination Survey for Children and Adolescents (German acronym: KiGGS) carried out by the Robert Koch Institute.

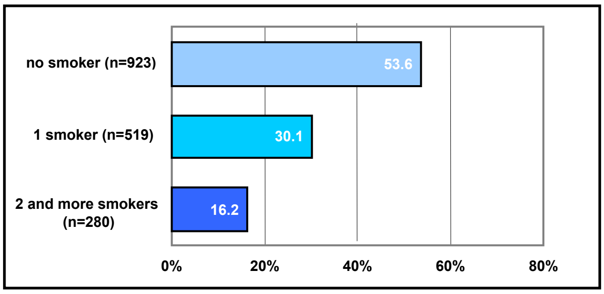

Figure 3: Number of smokers in the households of non-smoking children 3 to 14 years of age (as stated by their parents, n=1,722) and percentage of households

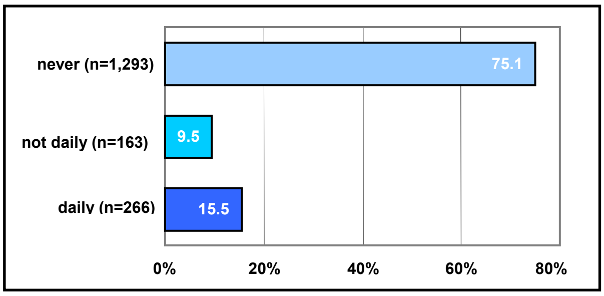

Figure 4: Frequencies of environmental tobacco smoke exposure of children 3 to 14 years of age (as stated by their parents, n=1,722) and percentage of households

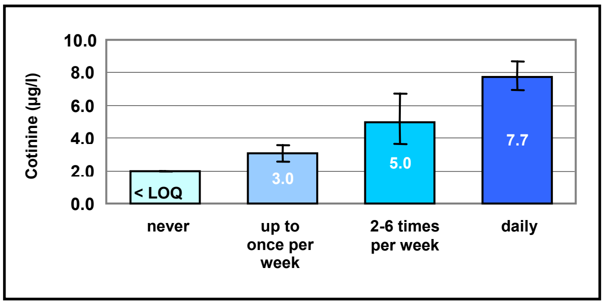

Figure 5: Cotinine levels in urine of non-smoking children 3 to 14 years of age (n=1,656) by frequency of ETS exposure in the home (as indicated by their parents); the values shown are geometric means and their 95% confidence intervals; LOQ = limit of quantification

Almost three out of four boys and girls aged 8 to 10 (70.8%) who do not actively smoke said that they spend time in rooms in which others smoke. One in five non-smoking children aged 11 to 14 (19.3%) even indicated that he/she is exposed to environmental tobacco smoke and associated health hazards daily. These are results of interviews carried out in the GerES IV. In addition, the Federal Environment Agency has measured a whole range of harmful substances contained in tobacco smoke and side stream smoke in the children's urine (Table 1) and in the air in their families' homes.

Table 1: Nicotine and cotinine (µg/l) in the urine of children in Germany 3 to 14 years of age (morning urine sample)

	LOQ	N	n < LOQ	% ≥ LOQ	P50	P95	GM
Smokers							
Nicotine	1	66	1	98	138	1.050	83.5
Cotinine	2	66	1	98	519	1.920	319
Nonsmokers							
Nicotine	1	1,656	968	42	< 1	12	1.1
Cotinine	2	1,656	840	49	< 2	16	2.1

Legend: LOQ = limit of quantification; N = size of sample; n < LOQ = number of values below LOQ; % ≥ LOQ = percentage of values above LOQ; P50, P95 = percentiles; GM = geometric mean; includes values below LOQ as LOQ/2

Nicotine and its main metabolite, **cotinine**, are common markers of tobacco smoke exposure (Benowitz 1996, Hoffmann et al. 2006). The GerES team identified non-smoking children and smoking children on the basis of urinary cotinine levels and information on the children's smoking habits given by them and their parents in the questionnaire (the question was addressed "only" to children aged 8 or older). The Federal Environment Agency uses specific criteria to distinguish children who smoke from non-smoking children. The following conditions apply to "non-smoking children": Child and parents state that child does not smoke, and the measured cotinine concentrations in urine are less than 90 µg/l. Based on these criteria, 66 children out of 1,722 children aged 3 to 14 included in the survey were identified as active smokers (3.9%). Most of these smoking children were 13-14 years of age (n = 60), and significantly more girls (n = 37) than boys (n = 23) were identified as active smokers. The youngest child was 9 years old and male. However, cotinine was also detected in the urine of non-smoking children (n = 1,656) exposed to environmental tobacco smoke, urinary cotinine levels increasing steadily with ETS exposure (Figure 5).

The Federal Environment Agency measured **benzene**, which is also a constituent of tobacco smoke, in indoor air in the children's homes. Since benzene is a carcinogen, it is subject to a minimisation rule which requires that contact with this substance be avoided as far as possible. The results show that tobacco smoke significantly impairs indoor air quality: the more often tobacco was smoked in the children's homes, the higher were the benzene levels in the homes' indoor air (Figure 6).

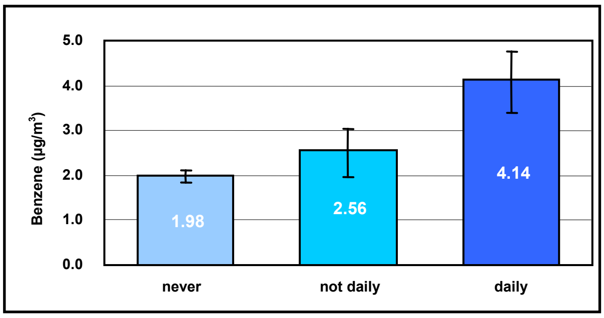

Figure 6: Benzene levels in indoor air (n=571, does not include the children who smoke) and frequency of exposure to environmental tabacco smoke in the home (as indicated by the parents); the values shown are geometric means and their 95% confidence intervals

In 45% of the households with daily ETS exposure, levels of the health-hazardous benzene in indoor air exceeded 5 µg/m³. This is the limit value for annual average benzene concentrations in outdoor air which from 2010 must not be exceeded in the EU to protect human health. In homes with less than daily ETS exposure, levels were found to exceed this value in 18% of cases. Indoor air benzene levels higher than 5 µg/m³ were measured in 8% of households with no ETS exposure. In addition to tobacco smoke, road traffic and motor vehicle facilities such as nearby garages are sources of benzene in indoor air.

For targeted intervention and prevention measures, the groups affected must be identified and informed in a way that is tailored to each group as closely as possible. In this context, it must be noted that the level of protection for non-smokers in Germany is rather low compared to that in neighbouring countries. For example, Germany does not (yet) have a ban on the national level on smoking in restaurants as introduced in other countries long ago. Initial evaluations of the GerES IV data show a clear correlation between parents' social status, their smoking habits and, as a consequence, their children's exposure to environmental tobacco smoke. Children from families with low social status have higher urinary cotinine levels than children from families with medium or high social status (Figure 7).

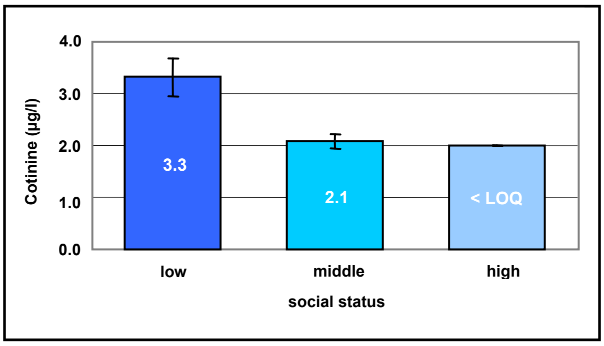

Figure 7: Cotinine levels in urine of non-smoking children (n=1,656) by social status; the values shown are geometric means and their 95% confidence intervals; LOQ = limit of quantification

In future and more in-depth evaluations of the GerES IV data, we will develop a differentiated profile of children exposed to ETS to enable us to suggest measures to protect these children's health.

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NOTES AND NEWS

Health Impact Assessment on the Benefits of Reducing $PM_{2.5}$ in 26 European Cities

Created in 1999 from the APHEA-2 project, the APHEIS programme was co-funded by the EC's Directorate General of Health and Consumer Protection and by APHEIS' partners. Nowadays, the APHEIS programme is coordinated by the Institut de Veille Sanitaire (InVS) in Saint-Maurice, France.

To fulfil its mission, APHEIS has assembled a European network of environment and health professionals and created an epidemiological surveillance system that generates health impact assessment (HIA) of outdoor air pollution on an ongoing basis and produces reports at periodical intervals.

The APHEIS programme uses standardised guidelines for data collection and HIA analysis to foster ongoing cross-fertilisation between multiple disciplines and regions to create skilled, local teams; enrich know-how and the quality of its findings; and explore important health impact assessment methodological issues. Using this approach, APHEIS has established a good basis for comparing HIA methods and findings between cities. This combination provides both local officials with standardised local data, analysis and knowledge for local decision making, and European officials with standardized local data analyzed to provide a global view for European policy making.

The APHEIS network made a first estimate of the health impact of different concentrations of $PM_{2.5}$ in European cities. The study used well-established methods and published results of research on the effects of current air pollution on public health. According to this project, all other things being equal, public policies that would reduce the $PM_{2.5}$ annual mean concentration from 20 to 15 µg/m^3 would postpone the annual deaths all ages by more than 5,500 including more than 3,500 deaths due to cardio-respiratory diseases and more than 600 deaths due to lung cancer, among 23 APHEIS cities in 11 European countries, amounting to about 36 millions inhabitants. Compared to the current situation, a sustained reduction of the annual mean values to 15 µg/m^3 $PM_{2.5}$ would translate into non-negligible gains in life expectancy. Depending on the city, life expectancy would be between one month and more than two years longer.

Very recently, the APHEIS network has updated this assessment for the Paris 2006 ISEE-ISEA conference, including the health impact of the new limit values currently under discussion at the European level. Twenty-six cities with about 41.5 million inhabitants located in 15 European countries participated in this study. Annual PM_{10} mean values ranged from 17 to 61 µg/m^3. The derived $PM_{2.5}$ values ranged from 7 to 43 µg/m^3. The results of HIA showed the benefits on postponed mortality for different scenarios (reduced annual $PM_{2.5}$ levels to 25, 20, 15 and 10 µg/m^3), particularly if the annual $PM_{2.5}$ concentrations were reduced to 10 µg/m^3. Further information on this study can be obtained from www.apheis.net .

The current draft of the common Council position on the new European Directive on ambient air quality (CAFÉ Strategy) proposes an annual average $PM_{2.5}$ concentration of 25 µg/m^3 by 2015, while the European Parliament propose an annual limit value of 20 µg/m^3 to be reached in 2010. In addition, the equivalent Environmental Protection Agency (EPA) standard for the United States is 15 µg/m^3, and the World Health Organization (WHO) guideline is 10 µg/m^3.

Sylvia Medina et al. on behalf of the APHEIS network
Institut de Veille Sanitaire
Saint-Maurice, France.

MEETINGS AND CONFERENCES

14th IUAPPA World Congress and 18th CASANZ Conference 9-13 September 2007 in Brisbane, Australia

The 14th International Union of Air Pollution and Environmental Protection Associations (IUAPPA) Congress combined with the 18th Clean Air Society of Australia and New Zealand (CASANZ) Biennial Conference was held at the Brisbane, Australia, Convention and Exhibition Centre between 9 and 13 September 2007. Although CASANZ hosted the conference, the addition of IUAPPA provided a major international aspect. There were approximately 450 delegates, from a wide range of countries, with every populated continent represented. The main focus of both IUAPPA and CASANZ is local and regional air pollution, but both organisations, and the conference, have connections to many other aspects and impacts associated with air quality. The purpose of this report is to provide highlights of the Conference. Details can be found on the conference web site, www.iuappa2007.com, and also the CASANZ web site, www.casanz.org.au.

The Conference programme was divided into 5 concurrent sessions per day. Topics included air quality and health, atmospheric process methods, model performance, urban transport, climate change, greenhouse issues, international and regional air quality, particulates, atmospheric chemistry, air toxics, indoor air quality, and air pollution management. Keynote presentations highlighted these topics, with international experts providing overviews of specific air pollution problems. A special session on fine particulates and their problems emphasized international concern about particulate matter, both on the regional and international scale. This report focuses on the keynote speakers, the particulate special workshop, and the final plenary session, to provide a flavour of the Conference.

Keynote Speakers

Ian Lowe (Australian Conservation Foundation) provided a beginning to the conference by emphasising the importance of partnership initiatives in sustaining clean atmospheres. He spoke from the point of view of climate change and global warming, using several recent international reports in support. These included the Millennium Assessment Report (2005), which focused on potential impacts from global warming, the Stern Report (2006) which assessed economic impacts, and the Carbon Equity Project (2007), which provided possibilities for a sustainable energy future. Business leaders and governments are realizing the potential problem and, slowly, are acting. Much more needs to be done.

Alan Lloyd (International Council on Clean Transport - ICCT) summarised the role of transport emissions in air pollution, public health and climate change, focusing on how past lessons can lead to future actions. Transport fleets are the major source of air pollution in most cities of the world, creating photochemical smog and fine particulate problems. The goal of the ICCT is zero pollution/zero emissions from transport, through use of alternatives to fossil fuels. A variety of approaches is needed, including setting low carbon fuel standards, fuel substitutions, public education, and political enforcement.

Veerabadram Ramanathan (University of California) focused on the Atmospheric Brown Cloud (ABC) pollution problems evident over South and Southeast Asia, but also in other parts of the world. The particulate and gaseous pollution contributing to the ABC, from a wide range of sources in many countries, can cause major health and visibility problems. Sunlight is decreased at the surface, and there is a possible 20% reduction in monsoon rainfall. ABCs create global dimming, helping counter greenhouse warming, but long range transport creates problems in many parts of the world.

Bebet Gozin and Cornie Huizenga (Philippines) described the Clean Air Initiative program for the countries of Southeast Asia (CAI-Asia). CAI-Asia supports air quality management initiatives and education, focusing on reducing air pollution in cities, encouraging use of clean fuels and energy management. Biennial Better Air Quality workshops are organized to allow international communications and progress reports by researchers and member countries.

Richard Mills (IUAPPA) and Johan Kuylenstierna (Stockholm Environment Institute) provided an overview of the challenge of regional, hemispheric and global air pollution. Topics included an introduction to the United Nations Convention of Long Range Transport of Air Pollution (UNECE CLRTAP), and a discussion of the role of the Global Atmospheric Pollution Forum. Major projects of the latter include mitigating the impacts of air pollution on health, economic development and environment in developing countries, and completing an emissions inventory manual for developing countries. The relevant web site is www.gapforum.org.

Andy Pitman (University of New South Wales) assessed the current understanding of global warming and impacts on climate change and variability. While scenarios can provide a reasonable estimate of future warming and climate change on a global scale, it is much harder to estimate regional scale impacts. Regional air pollution, such as photochemical smog and nitrogen dioxide, are rarely mentioned in relation to global warming, but mitigation methods reducing one must affect the other. More research is needed here.

Joel Schwartz (Harvard University) described relationships between air pollution and public health, emphasising that genes can show how people react to air pollution. Results are now available from very large population cohort studies, such as APHENA, a project encompassing 150 cities. For example, an increase in concentration of PM_{10} by 10 µg/m^3 can lead to an increase in public mortality of 0.5 to 1.2%. Black carbon concentrations increase the susceptibility to heart attacks. Exposure, age, and any pre-existing disease are critical aspects to consider.

Interregional Dialogue on the Problems of Airborne Particulate Matter

A special session on particulate matter (PM) was held. Four speakers provided a range of particulate topics, and there was lively discussion from the audience. PM has many different sources all over the world. It is one of the two major air pollutants of concern in cities (the other being tropospheric ozone). PM_{10} is light enough to be transported long distances, affecting the air quality thousands of kilometers from the source. The chemistry, size and concentration of PM has important implications for human health. Strategies and policies for control differ from region to region. One of the purposes of the session was to discover if strategies in one part of the world can be applied successfully elsewhere.

Johan Kuylenstierna (Stockholm Environmental Institute) provided an inter-regional perspective on PM. He reviewed the importance of major sources (industry, biomass burning, transport, waste incineration, residential, sea-salt, wind blown dust) and how these can differ in importance in different regions of the world. Differing control strategies and policies are needed depending on the mix of sources. Health aspects are reviewed in a current report from the World Health Organization (Health Aspects of Air Pollution 2006).

Tim Hanley (US EPA) presented an overview of particulate monitoring in the United States. After a brief history of legislation and measurements associated with particulate sizes, he discussed coordination of networks between federal, state, and independent agencies. PM_{10} and $PM_{2.5}$ mass and chemistry are important to help with control strategies and to support decision making. The United States have 1206 PM monitors scattered around the country, with about half located in urban areas. He commented on the challenges of network design and proper siting.

Jeff Clark (U.S. Air and Waste Management Association) reviewed the United Nations Convention of Long Range Transport of Air Pollution (UNECE CLRTAP), its purposes, and its goals. A thematic strategy adopted in 2005 is to focus on PM, to substantially reduce health impacts beyond existing strategies. This involves setting new standards, and an international understanding of how particulates affect human health. An expert group is also exploring ways to reduce PM emissions from sources, and how to implement them through existing or new protocols.

Mike Gilroy (U.S. Puget Sound Clean Air Agency) provided a practical example of PM monitoring in a coastal region of the State of Washington. The focus is on fine particles. The monitoring must be relevant to the public, to the decision-making agencies, and also the scientific community. It must characterise air quality in small regions and public neighbourhoods, provide measurements to support abatement measures, and be understood by the public. The monitoring instruments must be practical to use, and also take measurements that represent the particulate characteristics of concern. Monitoring locations must allow episodes to be identified which require curtailment activities (i.e. limit residential wood burning on days when high PM levels occur). Networks must provide as accurate a data set as possible, but also be flexible to keep up with new monitoring technology.

Frank Murray (Murdoch University, Western Australia) addressed policies to reduce particulates, associated with air quality management. He emphasised differences in sources, abilities, resources, and priorities in different parts of the world will cause variations in approach. Policy tools must match the circumstances. There are some generic approaches, however. These include command and control (legislation and licensing), strategic planning, encouraging self-regulation, setting pollution reduction targets, economic instruments (polluter pays, cap and trade), and education. Challenges vary according to scale, but there have been major successes (i.e. removing lead from petrol). Communication, and sharing strategies and technologies, are critical to success.

Final Plenary Session

The final plenary session encouraged dialog from delegates about priorities. Question such as: is there a need for global agreement?, what steps are needed to build consensus?, and is there a need for global air pollution assessments?, provided a direction for discussion. Brief presentations by Cornie Huizenga, Johan Kuylenstierna, and Lars Nordberg set a background. Emphasis was on international reliability of information, cooperation, harmonisation of good practices, and good communication. Audience comments ranged from the need to minimise duplication of effort, to the critical importance of education to develop knowledge and understanding. The need for cooperative efforts between the air quality and climate change research communities to better understand relationships between the two problems was emphasised. Finally, the need for cooperative effort between organisations which represent air pollution researchers and decision makers was suggested. Such organisations include IUAPPA, IGAC (International Global Atmospheric Chemistry program), IUGG (International Union of Geology and Geophysics) and so forth. A unified approach might gain better international recognition for both the problems created by air pollution, and the possible solutions.

Howard Bridgman
Clean Air Society of Australia and New Zealand
Editor, Clean Air and Environmental Quality

PUBLICATIONS

WHO

The World Health Report 2007 – A Safer Future: Global Public Health Security in the 21st Century

WHO Publications, Geneva, Switzerland 2007, 96 pages, ISBN 978 92 4 156344 4, available in English, French, Spanish, Arabic and Russian language, also available through the web: http://www.who.int/whr/2007/whr07_en.pdf.

The World Health Report 2007 - A safer future: global public health security in the 21st century marks a turning point in the history of public health, and signals what could be one of the biggest advances in health security in half a century. It shows how the world is at increasing risk of disease outbreaks, epidemics, industrial accidents, natural disasters and other health emergencies which can rapidly become threats to global public health security.

The report explains how the revised International Health Regulations (2005), which came into force this year, help countries to work together to identify risks and act to contain and control them. The regulations are needed because no single country, regardless of capability or wealth, can protect itself from outbreaks and other hazards without the cooperation of others.

The report says the prospect of a safer future is within reach - and that this is both a collective aspiration and a mutual responsibility.

Health Relevance of Particulate Matter from various Sources – Report on a WHO Workshop, Bonn, Germany, 26-27 March 2007

WHO Regional Office for Europe, Copenhagen, Denmark 2007, 26 pages, EUR/07/5067587, also available through the web:
http://www.euro.who.int/Document/E90672.pdf.

Identification of the physical and chemical characteristics of particulate matter (PM) to determine its toxicity could facilitate targeted abatement policies and more effective control measures to reduce the burden of disease due to air pollution. A WHO workshop evaluated the progress in research on this important issue. The participants concluded that current knowledge does not allow specific quantification of the health effects of emissions from different sources or of individual PM components. It is therefore appropriate that current risk assessment practices consider particles of different sizes, from different sources and with different composition, as equally hazardous to health.

The available evidence on the hazardous nature of combustion-related PM (from both mobile and stationary sources), however, is more consistent than for PM from other sources. Better understanding of the role of various characteristics of PM will require better characterization of the population exposure to the source-specific pollution, as well as improvement and widening of the scope of health outcomes studied.

Children's Health and the Environment in Europe - A Baseline Assessment

D. Dalbokova, M. Krzyzanowski, S. Lloyd, WHO Regional Office for Europe, Copenhagen, Denmark 2007, 125 pages, ISBN 978 92 890 7297 7, EU/06/5067821, also available through the web: http://www.euro.who.int/Document/E90767.pdf.

This publication gives an overview of the establishment of an environment and health information system in Europe, whose aim is to provide up-to-date and reliable information about public health and the environment as well as the outcomes of methodological work.

It presents information on the scientific basis, framework and scope of the system together with plans for future developments. The system's main product is an indicator-based assessment of children's health and the environment in the WHO European Region in the context of the Children's Environment and Health Action Plan for Europe. This assessment provides a baseline against which the progress and effects of action taken can be evaluated at the Fifth Ministerial Conference on Environment and Health scheduled for 2009.

Targeted at policy-makers, public health professionals, epidemiologists and environmental science professionals, this publication offers a basis for action to prevent diseases and promote healthy environments.

Environment and Health Risks from Climate Change and Variability in Italy

T. Wolf, B. Menne, WHO Regional Office for Europe, Copenhagen, Denmark 2007, 114 pages, ISBN 978 92 890 72946, also available through the web:
http://www.euro.who.int/document/E90707.pdf.

The World Health Organization (WHO) and the Italian Agency for Environmental Protection and Technical Services (APAT) are collaborating on a project on climate change and health. This report is one of the results of this project.

Climate change is already having an effect in Italy, as elsewhere. The global effects of an increasing concentration of greenhouse gases in the atmosphere are reflected in the growing number of extreme weather events, such as heat-waves and intensive rainfall. These have various consequences for the health of the population, both directly in terms of mortality and morbidity, and indirectly through changes in the ecosystem.

As there has been, as yet, no systematic national climate change impact assessment in Italy, this report is a preliminary evaluation of the situation, using international and national literature and with the help of expert advice. The aim is to assess the potential risks of climate change to human health in Italy, to see what adaptive and preventive measures are available and to suggest what may be additionally needed.

Principles for Evaluating Health Risks in Children Associated with Exposure to Chemicals

The International Programme on Chemical Safety, WHO 2006, Environmental Health Criteria 237, 351 pages, ISBN 92 4 157237 X, available through the web: http://www.who.int/ipcs/publications/ehc/ehc237.pdf.

World Health Statistics 2007

WHO Publications, Geneva, Switzerland 2007, 86 pages, ISBN 978 92 4 156340 6, available through the web: http://www.who.int/whosis/whostat2007.pdf.

World health statistics 2007 presents the most recent health statistics for WHO's 193 Member States. This third edition includes a section with 10 highlights of global health statistics for the past year as well as an expanded set of 50 health statistics.

OTHERS

Environmental Indicators and Indicator-based Assessment Reports

United Nations Publications, Economic Commission for Europe, Geneva, Switzerland 2007, 104 pages, ISBN 978 92 1 116961 4, $20.00 also available in Russian language.

The present publication contains the Guidelines for the Application of Environmental Indicators in Eastern Europe, Caucasus and Central Asia and the Guidelines for the Preparation of Indicator-based Environment Assessment Reports in Eastern Europe, Caucasus and Central Asia. These Guidelines cover indicators that were recommended as important from the viewpoint of national and international requirements, as understandable to the public and as supported, to the extent possible, by international methodological guidance.

Environmental Policy and Public Health

B. L. Johnson, CRC Press, London, United Kingdom 2007, 496 pages, ISBN 084 93 8434 6, $79.95.

Advances in environmental protection and public health result from democratic processes that debate environmental health concerns and propose legislative and other policy solutions. Delineating the delicate relationship between environmental policy and public health, Environmental Policy and Public Health explores the development of environmental health policies, the statutes that address public health concerns about specific environmental hazards, and policy issues that impact environmental health programs. Covering the fundamentals of environmental policy, this concise guide identifies the steps in environmental policy making, the federal government's environmental health structure, and the general environmental status. It focuses on environmental hazards, including air contamination, water pollution, unsafe food, pesticides and toxic substances, and hazardous waste that have been associated with degraded human health. The book provides a unique description of international environmental health organizations and programs and describes how risk assessment has become an integral policy in environmental health legislation. Presenting a historical perspective of how environmental health has evolved, Environmental Policy and Public Health is the first book to bridge human health concerns and environmental protection. The book relates the relationship between controlling environmental hazards and the impact on human health and public health practice. It outlines how environmental justice has evolved and has been integrated into government environmental policies.

Building Products: Determining and Avoiding Pollutants and Odours

The 100-page brochure with information on emissions from construction products is free of charge and is aimed at do-it-yourselfers, architects, civil engineers, and staff members in public health offices, building supervisory boards, and environmental authorities. The brochure is the result of a project carried out jointly by the Federal Institute for Materials Research and Testing (BAM), the Hermann-Rietschel-Institute of the Technical University of Berlin, and the Federal Environment Agency (UBA). The brochure is available (in German language only via the web at http://www.umweltdaten.de/publikationen/fpdf-l/3123.pdf. A print version of the new brochure is available free of charge from: Gemeinnützige Werkstätten Bonn, In den Wiesen 1-3, 53227 Bonn, or by addressing an e-mail to info@umweltbundesamt.de.

Luxembourg Conference on Environment and Health and Indoor Air Quality

R. Baden, J. Huss, Health Ministry of Luxembourg 2005, 265 pages, 80% of abstracts are in English language, €16,-, available at http://www.akut.lu/reader/reader_N.htm.

In June 2005 under the Luxembourg Presidency of the European Union, the Health Minister, Mars di Bartholomeo, organised a Conference on Environmental Health and Indoor Air Quality that gathered many of the specialists working in the different European Member States.

UBA Jahresbericht 2006

Umweltbundesamt, Dessau-Roßlau, Germany 2007, 131 pages, an issue in English language is expected to be published soon, available through the web: http://www.umweltdaten.de/publikationen/fpdf-l/3307.pdf.

Environmental Data for Germany: Practicing Sustainability – Protecting Natural Resources and the Environment

Umweltbundesamt, Dessau-Roßlau, Germany 2007, 124 pages, available through the web: http://www.umweltdaten.de/publikationen/fpdf-l/3245.pdf.

This new brochure provides figures and facts about the use of natural resources in Germany. Indicators and trends show the areas in which efficiency gains are emerging and those in which resource efficiency still needs to be increased.

Environmental Health Monitoring System in the Czech Republic – Summary Report 2006

National Institute of Public Health, Prague, Czech Republic 2007, 100 pages, ISBN 80 7071 279 5, also available through the web: www.szu.cz/chzpa/sumrep.htm.

Environmental Health Monitoring System in the Czech Republic is a comprehensive system of collection, processing and evaluation of data on environmental effects on public health in the Czech Republic. Since 1994, a summary of principal findings has been annually published. The newest issue of the Summary Report 2007 provides latest information on environmental quality, population exposure estimates and health risk assessment in the Czech Republic.

Luftgütemessungen und meteorologische Messungen – Jahresbericht Hintergrundmessnetz Umweltbundesamt 2006

W. Spangl et al., Umweltbundesamt Vienna, Austria 2007, 92 pages, ISBN 3 85457 901 2, also available through the web: http://www.umweltbundesamt.at/fileadmin/site/publikationen/REP0103.pdf.

Jahresbericht der Luftgütemessungen in Österreich 2006

W. Spangl et al., Umweltbundesamt Vienna, Austria 2007, 190 pages, ISBN 3 85457 902 0, also available through the web: http://www.umweltbundesamt.at/fileadmin/site/publikationen/REP0104.pdf.

COMING EVENTS

2008

January 2008

Airmon 2008 – Sixth International Symposium on Modern Principles for Air Monitoring and Biomonitoring
27-31 January, Geilo, Norway.
For more information, see: http://www.airmon.se.

March 2008

Fifth Healthy Housing Conference
17-19 March, University of Warwick, Coventry, UK.
For more information, see:
http://go.warwick.ac.uk/healthyhousing.

May 2008

10th World Congress in Environmental Health
11-16 May, Brisbane, Australia. For more information, see: http://www.ifeh2008.org/index.php.

June 2008

Second International Conference on Environmental Toxicology 2008
4-6 June, Granada, Spain. For more information, see: http://www.wessex.ac.uk/conferences/2008/toxic08/index.html.

Air & Waste Management Association's 101st Annual Conference & Exhibition
24-27 June, Portland, Oregon, USA. For more information, see: http://www.awma.org/ACE2008/.

August 2008

Fifth Society of Environmental Toxicology and Chemistry (SETAC) World Congress
3-7 August, Sydney, Australia. For more information, see: http://www.setac2008.com/.

Indoor Air 2008 – 11th Int. Conference on Indoor Air Quality and Climate
17-22 August, Copenhagen, Denmark.
For more information, see: www.indoorair2008.org.

September 2008

14th Conference on Urban Transport 2008
1-3 September, Malta. For more information, see: http://www.wessex.ac.uk/conferences/2008/urban08/index.html.

Air Pollution 2008 - 16th International Conference on Modelling, Monitoring and Management of Air Pollution
22-24 September, Skiathos, Greece.
For more information, see:
http://www.wessex.ac.uk/conferences/2008/air08/.

The Sustainable City 2008 – Fifth Intternational Conference on Urban Regeneration and Sustainability
24-26 September, Skiathos, Greece.
For more information, see:
http://www.wessex.ac.uk/city2008rem2b.html.

Inhaled Particles X Conference 2008
23-25 September, Manchester, United Kingdom.
For more information, see:
http://www.bohs.org/newsArticle.aspx?newsItem=50.

October 2008

20th Conference of the International Society for Environmental Epidemiology (ISEE): Exposure and Health in a Global Environment
12-16 October, Pasadena, California, USA.
For more information, see:
http://www.iseepi.org/conferences/current.html.

2009

August 2009

21st Conference of the International Society for Environmental Epidemiology (ISEE) – Food and Global Health
25-28 August, Dublin, Ireland.
For more information, see: http://www.isee2009.ie.

EDITORS' NOTE

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

The NEWSLETTER is published twice a year, circulated in 1700 issues, and distributed to readers in more than 50 countries. The NEWSLETTER does not constitute formal publication; it should not be reviewed, abstracted or quoted without prior permission. Authors alone are responsible for their articles.

Cover cartoon by Prof Michael Wagner, Berlin

Published by

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http://www.umweltbundesamt.de/whocc/titel/titel21.htm