

EC Actions on Indoor Air Quality

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BACKGROUND

In the Sixth Environment Action Programme the European Commission's commitment to provide "an environment where the level of pollution does not give rise to harmful effects on human health and the environment", is clearly stated.

The European Commission, with strong support from the Member States and the European Parliament, has put forward the *European Environment and Health Strategy* (the Strategy) in June 2003 (1). This integrated Strategy for Environment and Health, known as the "SCALE initiative", had the ultimate objectives to reduce the disease burden caused by environmental factors in the EU, to identify and to prevent new health threats caused by environmental factors and to strengthen EU capacity for policymaking in this area. SCALE meant to be incremental in scope and to be implemented in consecutive phases. It is based on Scientific evidence, focused on Children and other vulnerable population groups, meant to raise Awareness, improve the situation by use of Legal instruments and ensure a continual Evaluation of the progress made.

The European Environment and Health Strategy was jointly issued by: the Directorates-General of Health (DG SANCO), Environment (DG ENV), Research (DG RTD) and the Joint Research Centre (DG JRC). It has a long-term vision seeking to address the links between poor health and environmental problems.

The European Environment and Health Strategy will be implemented in cycles, initially focusing on four priority diseases:

- childhood respiratory diseases, asthma, allergies
- neuro-developmental disorders
- childhood cancer
- endocrine disrupting effects

An Action Plan for 2004-2010 has been acknowledged for the implementation of this strategy during the first cycle. The preparation of this Action Plan was based on full stakeholder involvement. More than 300 experts were involved. Nine technical Working Groups (TWGs) and a Consultative Group were set up, consisting of

environment experts and health experts from Member States (Ministries of Health and Environment), academia, industry and major stakeholder organisations.

On 9 June 2004, the Commission adopted the *EU Environment & Health Action Plan 2004-2010 (EHAP)* (2). The action plan, which is based on the general orientations, set out in the Commission's June 2003 Communication, also served as the Commission's input to the Budapest European Environment and Health Ministerial conference (23-25 June 2004).

This work was lead by the Commissioners for Health, the Environment and Research and is being taken forward by the relevant Directorates General in the Commission (Health and consumer protection, Environment, Research and the Join Research Centre). The Action Plan has been developed in close cooperation with the World Health Organization (WHO) and is in line with their work on environment and health issues.

After the action plan was issued (June 2004) this was followed by a European Parliament report and resolution (rapporteur: Ms F. Ries, France MEP), which has been adopted early 2005.

With regard to indoor air quality the resolution:

- Welcomes the Commission's willingness to continue to act to put an end to smoking in enclosed spaces and encourages it to designate environmental tobacco smoke a class 1 carcinogen;
- Calls for research into the impact of new construction materials on health;
- Invite the Commission in cooperation with the Member States, to introduce a system for labelling the environmental and health effects of construction products and materials;
- Stresses that the quality of air inside buildings cannot be improved without a wide-ranging approach that takes into account the many sources of pollution: combustion apparatus, equipment and furniture and human activity, and **calls on the Commission to draft a Green Paper dealing specifically with domestic pollution.**

A conference organised by the Dutch Presidency and the Commission took place on the environment and health area in December 2004 at the Egmond aan Zee (The Netherlands). The conference had a session dedicated to the indoor air quality.

The main conclusions of the indoor air session concern:

- A European initiative to address indoor air pollution, starting with emphasis on the improvement of building products and ventilation system and further development and harmonisation of testing and labelling for building construction products enable people to identify low-emitting products;
- Smoking bans and other policies across Europe;
- Adequate elimination of combustion products generated indoor.

Another conference on Environment and Health has been organised and run in June 2005 by the Luxembourg Presidency. The conclusions were similar to the NL

conference with an added focus on environment and health ambulance. It was stressed that it is necessary to identify guidelines that favour the principle of precaution.

The EU Action Plan is an operational document setting out 13 key actions for the period until 2010, grouped around three broad categories:

- Improving the **information** chain by developing integrated environment and health information (actions 1-4). Measures include development of relevant health indicators, integrated monitoring of the environment and identification of different routes through which people are exposed, and bio-monitoring of humans.
- Filling the knowledge gap by strengthening **research** (actions 5-8). Actions focus on strengthening European research activities. This process is being implemented through the EU Research Framework Programmes.
- **Response**: review policies and improve communication (actions 9-13) concern the conclusions from the improved information and action. This will be done by, raising awareness, communicating better on risks, and training and educational activities.

The integrated environment and health information system aims to determine exposure to the main pollutants, the health impacts of that exposure, and the sources of the exposure. Current work tries to identify how far existing information can answer these questions, and/or what modifications to information requirements are cost-effective and feasible. A number of initiatives support this analysis, including the ENHIS projects launched under the Public Health Programme and coordinated by the WHO in addition to and Environment & Health work within JRC. In the framework of actions 1 to 4 of the Action Plan, after a broad stakeholders consultation, the Commission has undertaken an extensive **review of current environment and health information and monitoring systems** in 2006 (3). The review makes concrete recommendations for increasing linkage and integration between existing systems, enhancing efforts on research and human bio-monitoring, and improving data collection procedures, which are formulated in 14 concrete tasks. Implementation of the tasks mentioned in the Environment & Health Information Review and Implementation Plan has started.

To implement Task 5 on Indoor Air, DG ENV funded a study on "*Ranking of indoor air health problems using health impact assessment*", starting in January 2007. This study will be carried out by VITO (Belgium) over 10 months (see Chapter 6 below).

The European Commission in close cooperation with Member States also succeeded in concentrating **research** funding on priority actions highlighted in the Action Plan such as research on priority diseases and on environment and health interactions in the Sixth Framework Programme of Research (FP6) (2002-2006) (4). Both Council and Parliament supported the need for further efforts in this area under the Seventh Framework Programme of Research (FP7) (2007-2013) (5), such as human bio-monitoring, **indoor air quality** and long-term health impacts of early exposures to environmental stressors. The Commission will continue to devote efforts to exploit the outcomes of the projects and their usefulness for possible policy action. Translating these results into policy action is a long-term priority and will increase in prominence during the implementation of the Action Plan.

The concrete actions in terms of “response” will be further defined and developed as our understanding improves. Response will be more effective after full understanding on how environmental factors are responsible for health problems. This involves completing the knowledge and information chain. Work is, however, being carried out on three main areas:

- **Indoor air quality**
- Training of professionals
- Electromagnetic fields

EC ACTIONS ON INDOOR AIR QUALITY

Improving indoor air quality was done by several activities under Action 12 of the EU Environment and Health Action Plan 2004-2010. This action contains 2 key elements:

- Addressing environmental tobacco smoke (ETS) and,
- Developing networks and guidelines on other factors affecting indoor air quality (dampness, mould, building material, indoor effects of outdoor emission and their health implication) by using research and exchange of best practice.

Concerning indoor air quality, there has been considerable expectation for actions at Community level. While activities on ETS are now taken forward both on the Community and Member States level, the more general issue is how to best deal with the indoor environment as a whole.

Concerning ETS, in January 2007, the Commission adopted the Green paper “Towards a Europe free from tobacco smoke: policy options at EU level” (6) and launched a broad consultation process, on the best way to tackle passive smoking in the EU. Currently, the Commission is preparing a follow-up initiative on smoke-free environments, due to be adopted in 2008. The Commission is also preparing a report on the implementation of the Council Recommendation 2003/54/EC (7) on the prevention of smoking and on initiatives to improve tobacco control including a detailed analysis of national anti-smoking policies and regulations. At international level, the Commission contributed to the development of guidelines on the protection from exposure to tobacco smoke in the context of the WHO Framework Convention for Tobacco Control (8). The document will be adopted at the second Conference of the Parties to the Convention in July 2007.

DG SANCO: co-ordinated action on Indoor Air Quality

In May 2005 DG SANCO mandated the Scientific Committee on Health and environmental Risks (SCHER) to deliver an opinion on a possible risk assessment strategy to support policy on the indoor air issue, to identify potential areas of concern in relation to the different pollutants and to consider risks associated with the use of air fresheners. The SCHER issued a separate opinion (9) on air fresheners on 27

January 2006. With regard “Risk Assessment on Indoor Air Quality”, the Committee issued an opinion for public consultation on January 2007 (10). This latter opinion is under adoption.

In order to co-ordinate possible actions, DG SANCO established in October 2006 an expert working group to follow up the opinions of the Scientific Committee and to fulfil the expectations from the political side, Member States and other stakeholders who asked the Commission to use a wide approach and take concrete actions on a number of pollutants/areas (Parliament Resolution (11), Dutch and Luxembourg Presidency conferences in December 2004 and June 2005). The expert group (composed by external independent experts, and representative of the EU Member States, NGOs and Industry) has been mandated to provide a forum for the exchange of best practice and information, to advise the Commission on EU programmes and policies related to indoor air quality and to give opinions on actions aimed at reducing relevant pollutant concentrations. The working group will have to follow main recommendations of relevant projects (such as the DG JRC INDEX report) and the future opinion of the SCHER committee.

The first meeting held on 27 October 2006 in Luxembourg, where a tentative work plan for the group has been discussed. Discussion has been focussed on three main themes:

- Information and education to the public on practice to improve indoor air quality;
- Guidance for EU MS and exchange on best practices to lower/reduce pollutants concentration of priority compounds;
- Linking different EU strategies relevant to the field of indoor air quality.

In the second meeting held on 25 May 2007 in Luxembourg, a draft work plan for the experts group was discussed. It consists of four actions on: (a) Information and education to the public; (b) working together with the MS on issues related to priority pollutants; (c) working with manufacturers and constructors and (d) co-ordinate European Commission activities. The list of topics suggested to be included in each action along with a detailed work plan should be finalised by September/October 2007 and the actions should be implemented till 2010.

A number of projects in the field of indoor air quality have been funded under the DG SANCO public health programme. The main projects funded are:

- The INDEX project (“*Critical appraisal of setting and implementation of indoor exposure limits in EU*”) (http://ec.europa.eu/health/ph_projects/2002/pollution/fp_pollution_2002_exs_02.pdf), co-ordinated by DG JRC (2002-2004), identified a list of “priority compounds” on the basis of health impact criteria. Five compounds (formaldehyde, carbon monoxide, nitrogen dioxide, benzene and naphthalene) have been identified as high priority and suggestions and recommendations on potential exposure limits and actions have been formulated.
- The THADE project (“*Towards Health Air in Dwellings in Europe*”) (<http://www.efanet.org/activities/documents/THADEReport.pdf>), co-ordinated by

the European federation of Asthma and Allergy (2001-2003), investigated the association among indoor air pollutants and respiratory diseases. Several recommendations have been formulated for international, national and local level to improve air quality in dwellings. The results of this project confirmed that air pollution in dwellings is a relevant health problem. It is a complex problem that must be addressed at European and international levels, and it involves the medical profession, scientific societies, patients' organizations, lawmakers, architects and the building industry.

- The HESE project ("*Health Effects of Schools Environment*"), co-ordinated by the University of Siena (2002-2005) (<http://www.hese.info>), highlighted the high presence of particulate, moulds, and allergens related to poor ventilation, which appears to be extremely common in European classrooms. Poor ventilation is likely to increase airway inflammation and the risk of asthma in allergic children and could even increase the risk of sensitisation in healthy schoolchildren.
- The BUMA project ("*Prioritization of BUilding MAterials as indoor pollution sources*"), co-ordinated by the University of Western Macedonia and the State General Laboratories of Cyprus (2006-2009), (<http://www.buma-project.eu>). The project main objectives are: (i) the formation of a comprehensive database containing up-to-date quantified emitted compounds by construction products and other building materials; (ii) the classification and prioritisation of building materials from the developed database with respect to hazardous compounds emission factors and the relevant exposure levels; (iii) the creation of an Indoor exposure expert modelling system linked to the above mentioned data base; (iv) the production of relevant guidelines for policy-making actions.
- The HealthyAIR project, ("*Network of actions and activities that address the effect of construction products on Indoor Air*"), co-ordinated by the TNO Build Environment and Geosciences (The Netherlands) (2006-2009) aims at defining, initiating and developing activities that improve indoor air quality and reduce exposure to indoor air pollution sources, in particular of construction products.

DG Enterprise & Industry: Indoor air and construction materials

According to Annex I of the Construction Products Directive (CPD), construction products must satisfy specified essential requirements, where the works are subject to notified regulations containing such requirements. To comply with Essential Requirement no 3 (hygiene, health and the environment - ER3), the construction works must be designed and built in such a way that they will not be a threat to the hygiene or health of the occupants or neighbours. Therefore, standardisation work under the CPD provides harmonised test methods with regard to the performance of a construction product.

Based on mandate M/366 developed by the Commission's Expert Group on Dangerous Substances (EGDS), CEN/TC 351 has started its work on horizontal test methods early 2006. The first technical reports are expected to be due for the CEN voting procedure by the end of 2007.

In the second half of 2007 the expert group will assess a first set of product standards for construction products under the Construction Products Directive (CPD) and the mandates for these products for possible amendments to include relevant requirements for ER3 wherever necessary. Based on the amended mandates, references to (harmonised) test/measurement methods for relevant dangerous substances covered by EU or notified national regulations will be added to the harmonised product standards (whenever necessary). It is expected that the first mandates for construction products assessed by the expert group and including all relevant requirements for ER3 will be sent to CEN by the end of 2008.

General comment: The current chemical policy through dangerous substances, dangerous preparation and limitation directives allow to deal with dangerous substances from the legislative side. In addition, industry's current own activities under the Responsible Care and Product Stewardship Programmes are recognised and provide a starting point for other detailed industrial activities.

DG JRC funded indoor air quality related projects

- The European Collaborative Action (ECA) "*Urban Air, Indoor Environment and Human Exposure*" (formerly "Indoor Air Quality & its impact on Man" is running since 1986 by the DG JRC (<http://www.jrc.cec.eu.int/pce/pce-sa-expotools07-eca.html>). The focus of this activity is urban & indoor air pollution exposure assessment, seen as part of environmental risk assessment in support of urban and indoor air quality management. Work within ECA addresses urban outdoor and indoor sources of pollution, interaction between outdoor and indoor air quality of buildings, and exposure to pollutants from outdoor and indoor sources in relation to health and comfort. This can be a basis for integrated urban air quality management to minimise exposures to air pollutants. So far 25 state-of-the-art reports have been published. ECA recent activities include:
 - In 2005, ECA issued the report no. 24 on a "*Harmonisation of existing indoor material emissions labelling systems in the EU: inventory of existing schemes*". This report critically reviews and discusses recent developments concerning the indoor material labelling schemes at European level.
 - In 2006, ECA issued the milestone report no. 25 on "*Strategies to determine and control the contributions of indoor air pollution to total inhalation exposure (STRATEX)*". This report collates the respective information and describes the strategies to determine population exposure to indoor air pollutants. Its major goal is to emphasise the importance of the contribution of indoor air to total air exposure. Taking this contribution into account is a prerequisite for sound risk assessment of air pollution. The strategies described in this report should be considered as a framework that may have to be adapted to specific situations by policy makers, risk assessors and risk managers.
 - In May 2007, a new ECA WG 26 started on "*Ozone-Initiated Chemistry and Its impact on Indoor Air Quality and Human Health*". This WG will summarise the current state-of-the-art concerning indoor air pollution and

health due to chemical reactions occurring indoors and to prioritise research goals for the future.

- The AIRMEX project ("*European Indoor Air Monitoring and Exposure Assessment Project*"), (<http://www.jrc.ec.europa.eu/project/airmex/index.htm>), funded by the DG JRC (2003-) aims at: (i) identifying and quantifying the main air pollutants in public buildings, including schools and kindergartens; (ii) identifying the main sources of these pollutants; and (iii) estimating people's exposure and evaluating possible health effects due to chronic exposure to these pollutants, especially for children.). In the frame of the AIRMEX project measuring campaigns in Catania (I), Athens (GR), Arnhem and Nijmegen (NL), Brussels (B), Milan (I), Thessaloniki (GR), Nicosia (CY) and Leipzig (D) were carried out to estimate indoor/outdoor relationships and personal exposure concentrations for selected volatile organic compounds (aromatics, carbonyls, terpenes). To complete the picture in characterising the factors affecting well-being and health, measurements for biological pollution indoors focusing on allergenic bacteria and fungi and on inflammatory response have started in 2006.

DG TREN, Energy and Transport, Directorate D: "New and Renewable Energy Sources, Energy Efficiency and Innovation"

The Annex of the Energy Performance of Buildings Directive (EPBD) (12) lists indoor climatic conditions, including outdoor climate as one of the issues that should be taken into account when calculating the energy performance of a building. Airtightness is also mentioned in the annex. CEN (European Committee for Standardisation) has been mandated by the Commission to develop a set of standards to calculate the energy performance of a building. One of these standards specifically deals with the criteria for the indoor environment. A paper prepared by a CEN author explains the role of indoor climate and the Directive, and concludes:

The new directive for energy performance of buildings requires considerations of the indoor environment. It must therefore not be possible to fulfil requirements for the energy performance by decreasing the indoor environmental quality.

Indoor air quality is a fairly important component of Intelligent Energy Europe-supported projects, such as SAVE, Altener, STEER, etc. There is a pre-requisite that air quality is given in all Eco-buildings projects and all Concerto projects (together with comfort, health, well-being, acceptance of inhabitants, etc). The Construction Products Directive is under amendment and it is envisaged to include energy efficiency aspects in it.

The site for accessing the new searchable database for these projects is IntelleBase (<http://europa.eu.int/comm/energy/iebase/introduction.cfm>). IntelleBase is the European Commission's public dissemination database for non-technological projects supported by the Community in the field of energy efficiency (SAVE programme) and renewable energy sources (ALTENER programme). Here detailed and summarised information on most of the 700 SAVE and ALTENER projects from 1996 and onwards can be found. An information source on EPBD and related

European Activities can be found on the EPBD Buildings Platform (<http://www.buildingsplatform.eu/>).

Several energy-related building demonstration projects in the Eco-Buildings and Sustainable Development programmes in the 6th RTD Framework Program deal with indoor air quality and indoor climate. These can be found on the CORDIS project database: <http://www.cordis.lu/fp6/projects.htm#search>.

DG RTD: Funding schemes for Indoor Air Quality in FP7 + past projects funded in previous FPs related to Indoor Air Quality

Research on “Environment and Health” was given greater prominence in the **5th EU Research and Technological Development Framework Programme (FP5)** with the development of a specific ‘key action’ within the Quality of Life and Management of Living Resources programme, effectively building on limited research actions undertaken in FP4 and earlier. The remit of the ‘Environment and Health’ key action was broad with its’ aims being to:

- determine how environmental factors contribute to health problems such as allergies, respiratory diseases, neurodegenerative diseases, and cancer, with a view to reducing harmful effects;
- develop and improve methods for assessing the health risk due to environmental hazards; and
- inform the public on links between environment and health, and to provide a scientific basis for legislation on environmental hazards.

A total of more than 20 EU supported research project under this key action considered the health impact of air quality, primarily with respect to ambient air pollution but some also taking into account issues related to indoor air quality.

- AIRALLERG (*Effects of outdoor and indoor air pollution on the development of allergic disease in children* - http://ec.europa.eu/research/quality-of-life/ka4/pdf/report_airallerg_en.pdf);
- ECHRS II (*European Community Respiratory Health Survey*) (<http://www.ecrhs.org>);
- HELIOS (*Biomarkers for the non-invasive assessment of acute and chronic effects of air pollutants on the respiratory epithelium*) (http://ec.europa.eu/research/quality-of-life/ka4/pdf/report_helios_en.pdf);
- MOCALEX (*Measurement of occupational allergen exposure*) (http://ec.europa.eu/research/quality-of-life/ka4/pdf/report_mocalex_en.pdf);
- PATY (*Combined analyses of cross-sectional studies on respiratory health of children and air pollution*) (<http://www.lshtm.ac.uk/pehru/paty>);
- RUIPOH (“*Relationship between ultrafine and fine particulate matter in indoor and outdoor air and respiratory health*” - http://ec.europa.eu/research/quality-of-life/ka4/pdf/report_rupioh_en.pdf);
- CHILDRENGENONETWORK (*European Network on children’s susceptibility and exposure to environmental genotoxicants*) (http://ec.europa.eu/research/quality-of-life/ka4/pdf/report_childrengenonetwork_en.pdf);

- GEN-AIR (*Molecular changes and genetic susceptibility in relation to air pollution and environmental tobacco smoke: a case-control study in non-smokers nested in the epic investigation*) (http://ec.europa.eu/research/quality-of-life/ka4/pdf/report_gen-air_en.pdf); AIRNET (*A thematic network on air pollution and health*) (http://ec.europa.eu/research/quality-of-life/ka4/pdf/report_airnet_en.pdf);
- E21-4AYC (*“Environmental influences and infection as aetiological agencies in atopy and asthma in young children”* - http://ec.europa.eu/research/quality-of-life/ka4/pdf/report_e21-4yc_en.pdf);
- PINCHE (*“Policy interpretation network on children's health and environment”* - (<http://www.pinche.hvdgm.nl>))

Research topics included: development of biomarkers and predictive toxicology for selected air pollutants; chemical and biological characterisation of particulate matter air pollution (primarily from car exhaust); cohort and epidemiological studies and air pollution; impact on vulnerable groups such as children; comparison of indoor and outdoor air quality and respiratory health, etc. A further 13 projects were supported on environmental influence on the development of asthma and allergies, many including air quality/airborne allergens within the scope of the investigations.

Under the **6th RTD Framework Programme**, a co-ordination action on “*Indoor Air Quality and Health Effects (EnVIE)*”, co-ordinated by IDMEC (Portugal) (2004-2008), has been supported under the ‘Scientific Support to Policies’ programme. EnVIE is designed to interface science and policy making in the field of indoor air quality and will collect and interpret scientific knowledge from on-going research, in particular from EU funded projects and the Joint Research Centre’s activities. The output of the coordination action will be to elaborate policy relevant recommendations based on a better understanding of the health impacts of indoor air quality. More specifically, it will: (a) increase the understanding of the Europe-wide public health impacts of indoor air quality; (b) identify the most widespread and significant indoor causes for these health impacts; (c) evaluate the existing and optional building and housing related policies for controlling them; and (d) address in particular how indoor air quality might contribute to the observed rise in asthma and respiratory allergy, together other acute and chronic health impacts. Further information concerning this project can be found at: <http://www.envie-iaq.eu/>.

- The PRONET project (*“Pollution reduction options network”* - <http://www.proneteurope.eu>), aims at facilitating the exchange and evaluation of interventions on environment and health exposure reduction measures on a regional level, and promote implementation of successful initiatives in other regions of Europe. The focus on the exchange of useful practices in two areas: (i) the reduction of traffic-related health hazards; and (ii) improvement of indoor air quality.
- The CAIR4HEALTH Specific Support Action (*“Clean air for health - research needs for sustainable development policies”* - website under construction) will, among others, aim at strengthening and exploitation of research results obtained by European and other projects related to air quality and health impacts. Its main goal is to provide research support for several air quality-related policies in the EU. The

focus will be on ambient air issues although indoor air quality will be touched upon.

- The GA2LEN network of excellence (“*Global allergy and asthma European network*” - <http://www.ga2len.com>) has established an international network of European centres of excellence conducting specific integrated multidisciplinary research programmes on issues relating to environment (including outdoor and indoor pollution), nutrition, lifestyle (including occupation), infections and genetic susceptibility.
- The GABRIEL integrated project (“*A multidisciplinary study to identify the genetic and environmental causes of asthma in the European Community*” - <http://www.gabriel-fp6.org>) aims at the identification of how genes and the environment cause the development of asthma and of both risk and protective factors, with the long-term aim of preventing the illness. The environmental stressors considered include indoor air pollution.
- The ECNIS network of excellence (“*Environmental cancer risk, nutrition and individual susceptibility*” – <http://www.ecnis.org>), is focused on environmental causes of cancer, which include pollutants in indoor air.
- The EUROLYMPH (Collaborative European action into environmental, nutritional and genetic factors in non-Hodgkin's lymphoma aetiology - no website) also considers indoor pollutants as risk factors for lymphoma.
- The NOMIRACLE integrated project (“*Novel methods for integrated risk assessment of cumulative stressors in Europe*”- <http://viso.jrc.it/nomiracle>) is developing a research framework for the description and interpretation of cumulative exposures and effects. It includes the development of methods for explicit modelling of exposure and risk in space and time (specifically, a temporal model for the indoor air pollution with volatile organic compounds).
- The INTARESE project (“*Integrated assessment of health risks of environmental stressors in Europe*” – <http://www.intarese.org>) is an ambitious project aiming at producing a new integrated risk assessment framework, based on the full chain approach (causal chain spanning sources of pollution, releases into various media, dispersion and transport, exposure medium inhalation/dermal contact/ingestion, intake, uptake, dose, health effects and impacts), based on three existing frameworks with differing approaches and aims. One policy area of concern included is housing: includes the effects both separately and in combination of environmental tobacco smoke, indoor air pollution (e.g., from cooking and heating, moulds, furnishings etc), noise and indoor climate (including temperature and dampness) on acute and chronic health (respiratory illness, cardiovascular illness, winter mortality and infant mortality).
- The ENVIRISK project (“*Assessing the risks of environmental stressors: Contribution to the development of integrating methodology*” - <http://envirisk.nilu.no>) will attempt at integrating the modelling of environmental releases, dispersion and human activity into an exposure modelling framework, and to provide the necessary interfaces for its integration with health effects modelling

into an integrated environmental health risk modelling framework. Indoor air pollution is included.

- The HEIMTSA integrated project (*“Health and environment integrated methodology and toolbox for scenario assessment”* - website under construction) will consider human exposures (e.g., outdoor and indoor air pollution, water, noise, odour, metals, dioxins) by multiple routes, using new methods (exposure scenarios and probabilistic modelling), including consumer exposure to facilitate applications of the full-chain approach.
- 2-FUN (*“Full-chain and uncertainty approaches for assessing health risks in future environmental scenarios”* - <http://www.2-fun.org>) includes a case study in Poland the aim of which is an environmental sources assessment of children exposed to toxic metals and verification of the intermediate results through the use of a monitoring dataset in the environment (already existing). Indoor sources of pollutants will be considered.
- DROPS (*“Development of macro and sectoral economic models aiming to evaluate the role of public health externalities on society”* - <http://www.nilu.no/DROPS>) has as the overall objective a full-chain analysis related to impact of health protection measures related to priority pollutants as identified by the European Environment and Health Action Plan, in order to support the development of cost-effective policy measures against pollution-related diseases and their wider impacts. Extension of existing methodologies and models to provide an impact-pathway-based model for evaluation of the role of public health externalities on society, made operational for the selected compounds will be carried out, and the focus will be on ozone, heavy metals (mercury, cadmium, arsenic, nickel, lead), polychlorinated biphenyls (PCBs), dioxins and indoor air pollution.

Under the **7th RTD Framework Programme**, projects related to health impacts of exposure to indoor air pollutants will be funded in the first place by the Environment and Health activity under the Environment theme of the Cooperation programme. The Environment theme has two topics open in the first call for proposals related to indoor air quality: Performance indicators for health, comfort and safety of the indoor built environment, and Indoor air pollution in Europe: an emerging environmental issue. Fifteen proposals were received in this area and are under evaluation.

DG ENV: Ranking of indoor air health problems using health impact assessment

In 2007 DG ENV launched a project on “ranking of indoor air health problems using health impact assessment”. The project is carried out by VITO (Belgium) who organised a Workshop on this issue on 29-30 March 2007 in Brussels. In the Workshop, an attempt was made to discuss with the policy makers and experts from the EU MS about indoor air quality in order to provide:

- (a) recommendations for future (EU-wide) policies;
- (b) recommendations on strategies to control and monitor indoor air quality;
- (c) a focused list of priorities for further research.

Three cornerstones for an indoor air policy could be: (1) *indoor air quality guidelines*, (2) *indoor air monitoring programmes* and (3) *sanitation plans*. Although a complete uniform policy is not the way to go, standardisation should be attempted where possible. The emissions from a particular building material for instance, should be regulated to the same level in all MS. A standardized EU labelling system could be the best way forward to enhance indoor air quality. However, labelling alone might be insufficient and not reach people who do not understand the labels. At an EU- level, monitoring programs exist on a project basis, awaiting implementation of monitoring programs by the member states. There are no standardised methodologies available. An example of this is the AIRMEX project (DG JRC). Standardised methodologies should be developed to conduct uniform Europe wide monitoring programs.

An overview of explicit (INDEX, SCHER opinion, DG SANCO Indoor Air expert working group) or implicit (THADE) prioritisation of indoor air chemicals performed in former EU projects (see chapter 1) or working groups was performed. The WHO work on development of indoor air quality guidelines is also considered. Taking into account the common prioritisation from SCHER, INDEX, THADE, WHO and the DG SANCO Indoor Air expert working group for *ETS, formaldehyde, CO, particles, NO₂, benzene, naphthalene, moulds, mites, dampness/moisture and CO₂ (as proxy for ventilation)*, a recommendation was made to focus the indoor air policy in the EU on these compounds at first stage.

Other EU projects

- WHO project on “*Development of WHO guidelines for Indoor Air Quality*” (http://www.euro.who.int/Document/AIQ/IAQ_mtgrep_Bonn_Oct06.pdf). In October 23-24, 2006 the corresponding WHO WG met in Bonn and reviewed the general approach to the guidelines’ formulation, discussed their scope and format, and agreed on the general contents of the background material. Initial recommendations were proposed addressing guidelines for specific agents/substances, biological agents and combustion of fuels indoor.
- EXPOLIS-INDEX (“*Human Exposure Patterns for Health Risk Assessment: Indoor Determinants of Personal Exposures in the European EXPOLIS Population in Athens, Basel, Grenoble, Milan, Helsinki, Oxford, and Prague*”), funded by CEFIC/LRI (2002-2004), (http://www.ktl.fi/expolis/EXPOLIS-INDEX2004/EXPOLIS-INDEX_FINAL_REPORT.pdf). The EXPOLIS-INDEX study investigated the factors which determine human exposures to air pollutants in indoor environments. This information is crucial to assess the health risks related to indoor exposures and to propose mitigation strategies for harmful indoor contaminants. To achieve these goals, measurements of pollutant concentrations on person and air pollution levels in homes, at work and outdoors must be combined with information on time spent in indoor and outdoor locations.

A detailed record of current and past projects in indoor air quality can be found in the IERIE database that contains over 200 different projects related to indoor air pollution (13).

The Commission will continue supporting research activities on indoor air quality through the Commission funding programmes. Future actions will focus on information to the public and professionals, exchange of best practices at national and local level and on coordination of ongoing policies/strategies linked to the indoor air quality. The Commission will also take into consideration the WHO recommended guidelines and consider if specific action is necessary in order to avoid potential hazardous exposures, particularly in schools or places where children spend time.

DISCUSSION, CONCLUSIONS & RECOMMENDATIONS

In the period 2007-2010, the Commission in close cooperation with Member States will continue to implement the various actions foreseen in the Environment and Health Action Plan 2004-2010. To this end, the Commission will maintain its focus on the integration of environment and health concerns into other policy areas as well as on the integration of the many actors involved. A *strengthened cooperation* between environment policy, health policy and the corresponding research fields is one of the major achievements over the last 3 years. This is leading to the development of an integrated environment and health policy field, which must be taken up by a range of policy areas such as transport, energy, chemicals, employment. In order to strengthen EU capacity for policymaking in the area of environment and health, the Commission will gradually step up its effort to exploit the outcomes of research projects and other information gathering efforts and their translation into policy action, in particular for issues such as indoor and outdoor air as well as climate change and health, where integration is deemed essential. To achieve this goal, an integrated approach is needed within the framework of the Community's Sustainable Development Strategy.

In contrast to the well-elaborated and implemented EU ambient air policies (under the form of the Air Quality framework directive 1996), an integrated EU policy on indoor air quality is not yet available. Currently, indoor air quality is fragmentally tackled in sector oriented policies, but, an overall, integrated indoor air policy at the EU level is still missing. However, as with ambient air, envisaging such a similar framework for indoor air might be useful as guidance for both research and future action plans. The main EU directives including explicitly an indoor air quality aspect, or indirectly regulate indoor air quality are:

- ❖ the construction products directive 89/106/EEC Essential Requirement N°3 "Hygiene, Health and the Environment"
- ❖ the energy performance of buildings directive 2002/91/EC
- ❖ the gas appliances directive 1990/396/EEC
- ❖ the heating appliances directive 1992/42/CEE
- ❖ the eco-design directive 2005/32/EC
- ❖ the dangerous substance directive 1976/646/EEC
- ❖ the general product safety directive 2001/95/EC

The REACH regulation (2006/121/EEC) is also expected to influence indoor air quality. Other EU instruments contributing to good indoor air quality are the eco-labels.

In the VITO's Workshop it was discussed that the establishment of an integrated and optimised/harmonised framework on indoor air might be a future objective for the EC that should:

- Improve the coherence between the existing legislation. The focus of this framework should be on major, essential components, to protect the people for common pollutants.
- Take into account all related EU directives dealing with indoor air, ambient air and energy (as not only influence each other but also contribute to the total human exposure in indoor environments). Harmonisation of these EU directives is necessary. A consistent review of existing legislation is needed to optimise/harmonize the current directives.
- Include an information platform for increasing the public awareness of indoor air and for stimulating the improvement of human behaviour in private indoor spaces.
- Form a common basis for EU regulations, however, the best measures to be undertaken and its optimal implementation should not be uniform across the EU MS to account for differences in cultural habits and climate conditions.

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