THE ECA (EUROPEAN COLLABORATIVE ACTION): "INDOOR AIR QUALITY AND ITS IMPACT ON MAN"

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ABSTRACT

The European Collaborative Action (ECA) on indoor air quality (IAQ) and its impact on man deals with all aspects of the indoor environment including temperature, humidity and other environmental factors which may interact with IAQ. Fourteen European countries, from both the European Union (EU) and EFTA, are participants in the ECA. Secretariat,scientific and managerial support is supplied by the Indoor Air Pollution Unit of the JRC Environment Institute. The ECA activities focus on sources of indoor air pollution,exposure to these pollutants and the health/comfort impact of IAQ in residential, public and non-industrial occupational indoor environments. The purpose of the action is to help construct and maintain healthy and energy efficient buildings within the EU. To this end the ECA has so far produced eleven reports dealing with key issues of indoor air pollution together with guidelines on investigations and measurement techniques and their validation. In the area of information and education on IAQ matters the ECA widely disseminates its reports, exchanges information with other organisations such as WHO and the NATO/CCMS pilot study on IAQ and sponsors international conferences in this field. In addition the ECA Steering Committee is continually reviewing ongoing work to help indentify and remedy deficiencies in our understanding of IAQ and its effects. Particular attention is currently dedicated to the evaluation of indoor source emissions, the reconciliation of IAQ and energy requirements and to an effect-related definition of the term "Total Volatile Organic Compounds" (TVOC).

KEYWORDS

Europe, multidisciplinary, collaboration.

INTRODUCTION

At the beginning of the 1980's the interest of the Commission of the European Communities (CEC) in indoor air quality (IAQ) was clearly indicated when IAQ research activity was included for the first time as a small component of the Environment Programme of the CEC Joint Research Centre (JRC) at Ispra, Italy. The IAQ research at the JRC(Ispra) has had a number of objectives the most important of those being: the increase of knowledge on organic pollutants in indoor air spaces, the development of adequate analytical techniques and the study of the emission of such

pollutants from products and materials used in the indoor environment.

From its very beginning,in addition to work associated with these objectives, IAQ research activity at the JRC(Ispra) was accompanied by efforts to encourage and organise collaboration between European scientists in this new and developing research field. The need to encourage and stimulate such collaboration at a European level was considered to be desirable for a number of reasons of which the following two were deemed to be the most important:

(i) Unlike the well established research fields in outdoor air and water quality there were no scientific structures dedicated to IAQ research. In a European context IAQ research took place in a scattered and uncoordinated manner. It was largely carried out by small groups in a wide range of institutions. The research was generally focussed on a single pollutant or discipline basis with little or no contact taking place with researchers in other disciplines. What collaboration that did exist between groups arose largely on a personal and adventitious basis.

(ii) Because it embraces both residential and occupational exposure of the population IAQ is an environmental issue which, probably more than any other, requires interdisciplinary collaboration. Collaboration is an obvious and desirable objective when the wide range of scientific/technical specialists which contribute to IAQ research is considered. This generally but not exclusively includes: architects, chemists,hygienists, epidemiologists, medical doctors, microbiologists, physicists, psychologists and toxicologists.

Towards the end of 1986, as a first step towards addressing the above needs the European Community Concerted Action "Indoor Air Quality and its Impact on Man" was established as part of the Community multiannual research programme for the protection of the environment (1986-1990). Towards the end of 1987 the concerted action broadened its base by becoming what is known as a COST project (COST 613/1). COST (**CO**-opération Européene dans la domain de la recherche **S**cientifique et **T**echnique) is the name give to a co-operative agreement between all European OECD countries and EU countries. Since the initial participation of Sweden and Switzerland in 1987 in COST 613/1 both Finland and Norway have joined the concerted action. In all fourteen countries both EU and other European OECD have been participating in the concerted action together with the JRC(Ispra) Environment Institute. The main focus or scope of the COST 613/1 project through its Concertation Committee was to address the question of which consequences for human health and comfort arise as result of air pollution in the non-industrial indoor environments of homes, schools etc (de Bortoli et al 1990). In 1991 the objectives and work of COST 613/1 were taken over and have continued since then as the European Collaborative Action (ECA) "Indoor Air Quality and its Impact on Man" (CEC 1993). This ECA and its activities will now be described in detail.

SCOPE, PURPOSE AND IMPLEMENTATION OF THE ECA

(a) Scope

The scope of the IAQ European Collaborative Action (ECA) is to determine which consequences for human health and comfort derive from air pollution and other indoor environmental factors within non-industrial indoor air spaces (homes, schools, offices etc).

(b) Purpose

The ultimate purpose of the ECA is to assist in the construction and to help maintain buildings

within the EU which are both healthy to their occupants and are also energy efficient. Like its COST 613/1 antecedent the ECA focusses its activities on the identification and characterisation of indoor air pollutant sources and emissions, ventilation, assessment of human exposure to these pollutants and the impact of IAQ on health/comfort. In order to assist EU services and other authorities in their mission to prevent pollution and to promote health, comfort and improved quality of life the ECA contributes to the necessary prenormative research. This is directly in keeping with the explicit statement in the 4th "Policy and Action Programme of the Environment 1987-1992" approved by the European Communities Council of Ministers in October 1987 that scientific research is an essential preparatory activity for almost any political action in the field of environmental protection. In addition it is to be noted the Programme specified that a major objective of an overall long-term strategy to reduce air pollution is to "identify the atmospheric pollutants (outdoor and indoors) of greatest concern from the standpoint of the protection of human health".

(c) Implementation

A **Steering Committee** is responsible for the work performed by the ECA. It is composed of representatives from all participating countries, the JRC (Ispra) and other Commission Services. It decides the working programme and discusses and evaluates the work carried out. Because the ECA has no research funds of its own it cannot directly support IAQ research. The ECA through its Steering Committee in achieving its own objectives does, however, give indirect but tangible support to European IAQ research efforts in a number of ways. The **Steering Committee** in particular

- prepares reports for widespread dissemination which summarise available knowledge of important issues of indoor air quality;
- identifies IAQ related research within the participating countries and the major research needs;
- establishes **Working Groups** for specific and well defined tasks such as the development and/or validation of guidelines;
- provides for the exchange of information and facilitates collaboration with other international and national organisations which are active in the field of indoor air quality (e.g. NATO/CCMS,U.S.EPA and WHO).

From the very start in 1986, through the period of the COST 613/1 phase and now in the ECA phase the Indoor Pollution Unit of the JRC's Environment Institute has supplied the secretariat as well as the scientific and managerial support to this IAQ action.

ECA WORK UP TO THE PRESENT

Information and educational activities

Up to the present the work carried out by the European Collaborative Action (and its antecedent the former Concerted Action COST 613/1) has been summarised in **eleven reports** which have been published by the Commission of the European Communities (ECA 1988, 1989a,b,c,d., 1990, 1991a,b,c., 1992, 1993a,b,c) More than a thousand of each of these reports have been produced and have been widely distributed.

Five have been in the form of **Summary Reports** summarising essential information on important aspects of IAQ:

Report no 1. "Radon in Indoor Air"

Report no 3. "Indoor Pollution by NO_2 in European Countries"
Report no 7. "Indoor Air Pollution by Formaldehyde in European Countries"
Report no 10. "Effects of Indoor Air Pollution on Public Health"
Report no 12. "Biological Particles in Indoor Environments"

Five **Guidelines** have also been published as follows:

Report no 2. "Formaldehyde emissions from wood based materials: guideline for the establishment of steady state concentrations in test chambers"

Report no 4. " Sick Building Syndrome (SBS) - a practical guide"
Report no 6. " Strategy for sampling chemical substances in indoor air"
Report no 8. " Guideline for the characteristization of volatile organic compounds (VOCs) emitted from indoor materials and products using small test chambers"
Report no 11. " Guidelines for ventilation requirements in buildings"

(Reports No 1 and 2 are now out of print but updated versions are in preparation).
In addition a report on the results of an **interlaboratory comparison exercise** and a **project inventory** on IAQ research in the countries participating in the ECA have been published :

Report no 13. " Determination of VOCs emitted from indoor materials and products - Interlaboratory comparison of small chamber measurements"

Report no 9. " Project inventory -2nd edition"

Copies of these reports are available from the Environment Institute, CEC/JRC (Ispra,Italy).

As part of its information/education objective the ECA has organised a number of seminars dealing with both its own activities and with major issues in IAQ and its impact on man. A seminar as part of the Eurocourse series on "Chemical,microbiological,health and comfort aspects of IAQ - state of the art in SBS" was also organised (Knoppel and Wolkoff 1992). The ECA is also a sponsor of the triennial international conferences on IAQ and Climate. The most recent of these took place in Helsinski in 1993 at which ECA Steering Committee members served as advisors, session chairmen,workshop organisers and invited speakers. ECA Steering Committee members have also played similar roles in the present workshop on Indoor Air in Brisbane whose objectives have been endorsed by the CEC.

ONGOING AND FUTURE WORK

At present five **Working Groups** are dealing with the following subject areas:

(a) Procedures to evaluate building materials (initially limited to flooring materials) in regard to their emissions. Proposals are being prepared, by three sub-groups and a co-ordinating group, for chemical and sensory characterisation of organic emissions, for their toxicological evaluation, for exposure assessment on the basis of emission data and models for predicting prevalence of discomfort and for risk assessment.

(b) Identification of ways by which good IAQ may be integrated with safe and efficient energy usage.

(c) Experience with and recommendations for the design of intervention studies in cases of "Sick Building Syndrome".

(d) Strategies for measurements of volatile organic compounds (VOCs) in indoor air.

(e) The establishment of a definition and guideline value for "total volatile organic compounds" (TVOCs). This work is being carried out in collaboration with WHO Europe. It will analyse the question as to whether the concept of TVOV is meaningful from an effect point of view. If found to be so the questions will be addressed as to which combination of VOCs is the best as an indicator of exposure and the ways in which such a combination should be measured.

Future work is envisaged for establishing methodologies for identifying high risk population groups (in collaboration with ECA "Air Pollution Epidemiology"), for traffic related indoor pollution problems and for the impact of smoking on IAQ.

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