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UK Government Initiatives on Indoor Air Quality in the Home

Whilst much public interest and concern continue to be directed at the effects of outdoor air pollution, there is a growing tide of scientific opinion that the quality of air in the home environment is of equal or greater significance to human health and well-being. Certainly it is known that personal exposure to many common air pollutants is driven by indoor exposure. This has resulted in increasing research interest and, importantly, heightened awareness among regulators and policy makers in the relevant Government Departments. Indeed, for the last 5 years or so, the Department of the Environment (DOE) has been sponsoring important monitoring work by the Building Research Establishment, a UK Government agency, to determine baseline pollution levels in dwellings, including a large sample of homes in the Avon area of South West England. This is being done to allow an assessment of the risk to health of common pollutants to people in their home and allow the Government to set an appropriate policy. It will also provide important information on relationships between, e.g., pollutant levels and house type, age, location. Parallel to these activities are studies specifically commissioned by the DOE to look at ventilation requirements for the purposes of the Building Regulations and related statutes, and other projects looking at occupants' health diaries, pollutant modelling and material emissions. The basic aim of this work is to characterise and reduce indoor air pollution with the goal of improving quality of life [1].

Although by 1991 this research and monitoring work was already well established, the publication in that year of the Select Committee Report on Indoor Pollution [2] and the Government's subsequent response [3] served to

focus attention on the importance of the indoor environment. A number of new initiatives resulted, including the strengthening of the Interdepartmental Liaison Group on Indoor Air Quality and increased determination within the DOE to look seriously at the consequences for health and well-being of exposure at home to common indoor air pollutants. The establishment in 1993 of the Medical Research Council (MRC) Institute for Environment and Health (IEH), with the backing of both the DOE and Department of Health (DH), provided a facility through which the Departments could readily investigate health end-points. The first two reports from the IEH on air pollution and health [4, 5], while concentrating on outdoor air pollution, fully acknowledged the part played by indoor air quality and encouraged more research on the role of indoor pollution and the assessment of *total* personal exposure to gaseous pollutants. The call for research proposals on air pollution and respiratory disease issued by IEH on behalf of DOE, DH and MRC following publication of the second report, included clear directions as to the importance of indoor air quality.

Meanwhile, the DH's Committee on the Medical Effects of Air Pollutants (COMEAP) began to take a closer interest in the part played by indoor pollutants, specifically acknowledging this in their report on air pollution and asthma [6]. The role of indoor air quality in asthma was further examined in the IEH report 'Understanding Asthma' [7]. Also, the Department of the Environment's Expert Panel on Air Quality Standards (EPAQS), which is directed to recommend standards for outdoor air, always acknowledges in its reports situations where significant indoor exposures can occur. One such example was car-

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bon monoxide [8]. Indeed, the lethal effects of acute carbon monoxide poisoning in the home have recently been highlighted by the Health and Safety Executive (HSE) (the regulatory body responsible for the Gas Safety Regulations affecting the use of gas appliances in the home), through an important public health campaign, and DOE and HSE together are currently studying the issue of CO detectors for homes.

Work also carries on apace in Europe through the CEC's European Concerted Action programme on 'Indoor Air Quality and Its Impact on Man', on which the UK Government has important representation, and also the NATO/CCMS pilot study on indoor air pollution.

The important results emanating from the DOE's monitoring work in 174 homes in the Avon area have recently been published [9], together with an assessment by IEH of the consequences for health of exposure to the measured pollutants at levels typically found in UK homes [10]. This first phase of work addressed nitrogen dioxide, formaldehyde, volatile organic compounds, house dust mites, bacteria and fungi. Further phases of the programme will look at other pollutants, including CO and fine particles (PM₁₀), and will measure pollutant levels in a wider sample of homes. PM₁₀ as an outdoor pollutant is receiving much attention as a possible cause of increased mortality and morbidity in cities; yet, again, indoor sources of particulate matter are probably extremely important, and a 'personal cloud' effect whereby personal exposure exceeds that expected from static monitoring has already been described [11]. Also of particular current interest is the possible potentiation of responses to indoor allergens such as house dust mites by concomitant exposure to irritant gases like NO₂ [12]. The DOE's future work on air quality in homes is being guided by an expert research steering group, set up specifically to ensure that good quality science is conducted on behalf of the Department to help it develop its indoor air quality policy. The MRC and the DH are also contributing to the knowledge base by funding important studies centring on the health effects of indoor pollutants.

In May this year, the DOE produced its new strategy on indoor air policy. This stemmed from a commitment [13] to publish a strategy for improving indoor air quality, and will complement the DOE strategy document on outdoor air quality [14] and the development of the UK's National Environmental Health Action Plan. Unlike outdoor air, the quality of air inside the home is not particularly amenable to control through regulatory means, but there are still important improvements that can be achieved through public information and guidance and

the minimising of releases of pollutants from built materials and consumer products. The first will build on guidance already published [15, 16]; the second will result in voluntary or other measures to regulate pollutant emissions indoors.

While the focus of public attention may, for a while at least, remain on outdoor air quality, notably traffic pollution, it is important that Government Departments, agencies and the research councils responsible for funding key projects continue to devote appropriate attention to the indoor environment. This, after all, is where we spend the vast majority of our time, and the quality of the air in our homes could have a significant impact on health and well-being. There is particular concern for potentially vulnerable or susceptible groups such as the very young, the sick (especially, perhaps, those with pre-existing respiratory disease) and the elderly, who spend a disproportionately large amount of time indoors at home. Within the scientific community too there is the requirement to consider fully the role of indoor pollution. It will no longer be acceptable, for example, to conduct epidemiological studies on the health effects of NO₂ assuming that exposure is only from outdoors and ignoring the enormous confounding of indoor sources, especially in countries like the UK where cooking with gas is extremely common, or to assume generally that personal exposure relates directly to concentrations measured at a few outdoor static sampling stations.

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