

Air quality

Indoor air quality guidelines

P T C Harrison

“Health-based standards exist for outdoor air, and there are good arguments for developing equivalent indoor air quality guidelines”

It seems self evident that if there are health based standards for outdoor air quality, there is no reason that there should not also be standards applied to the indoor environment. After all, it is indoors that we spend most of our time; the home environment is particularly important because potentially vulnerable people—including sick, elderly, and very young people—spend a very large proportion of time there. Considering the attention and resources currently directed to improving the quality of outdoor air, it is perhaps surprising that—in the United Kingdom at least—so little importance seems to have been given to the (non-industrial) indoor environment.

The indoor environment is important not only because of the amount of time spent inside buildings but because there are some very important indoor sources of pollution; including, for example, heating and cooking appliances, open fires, building and insulation materials, furniture, fabrics and furnishings, glues, cleaning products, other consumer products, and various biological sources—for example, house dust mites, fungi, and bacteria. There is also the inflow of polluted outdoor air through windows, evaporation of substances from water, and, in some locations, infiltration of radon and other gases into the building from the underlying soil and bedrock.

Important chemical pollutants include combustion products such as nitrogen dioxide, fine particles, and carbon monoxide, formaldehyde from furnishings and furniture (especially particle board constructions), volatile organic compounds from paints, glues, flooring materials, and consumer products, and organochlorines and other substances from pesticides used in the home. Tobacco smoking is of course an additional very important contributor to indoor pollution, and in some areas radon ingress is a problem. Radon is actually the only indoor pollutant for which an indoor standard (an “action level”) already exists. Some of these pollutants pose a real potential threat to human health and wellbeing. Moreover, it is clear that exposure to high peak concentrations of pollutants is likely to

be highly relevant for certain health end points; for nitrogen dioxide, for example, such exposures can occur very often in buildings where there is an indoor source—such as a gas cooker or an unflued kerosene heater.

Also, the drive over the past few decades to install energy efficiency measures—such as draught proofing in houses—has tended to reduce ventilation rates and thus raise exposure to indoor pollutants. Increased use of appliances, particle board furniture, and consumer products of various types have further increased the pollutant load in many homes.

The requirement for guidelines for indoor air was recognised back in 1991 by the House of Commons Select Committee, which, in its report on indoor pollution¹ recommended that the Government “develop guidelines and codes of practice for indoor air quality in buildings, which specifically identify exposure limits for an extended list of pollutants . . .”. Until now, the Government’s strategy on indoor air pollution has hinged on research, provision of information and advice to the public (through pamphlets), and application of building regulations for new buildings; but new developments are taking place, as is evident by the recent consideration given to guidelines for indoor air by the United Kingdom Department of Health Committee on the Medical Effects of Air Pollutants (COMEAP).*

Setting guidelines or standards for indoor air invokes some very intriguing and difficult issues. Certainly, for several reasons the indoor environment is not nearly so amenable to regulation as ambient air quality or air pollution in industrial workplaces. Some particularly pertinent questions that would need to be considered include:

- Where are the guidelines to apply (homes, offices, schools, public buildings, vehicles, etc)?
- What is the basis on which the guideline will be set (health, comfort)?

- Who is it that the guidelines would aim to “protect”?
- Who would be responsible for monitoring and regulating the named indoor pollutants?
- What would the legal implications be (for example, in the case of a tenant finding levels of pollutants exceeding the guidelines in their rented accommodation)?
- Should the guideline values be the same as those established for outdoor concentrations of the same pollutant or those used in the occupational setting?

Furthermore, there are important practical issues to be considered, associated with the establishment of monitoring protocols and the fact that people are generally resistant to “Nanny State” initiatives, and are likely to resent being told what to do in their own home. Moreover, opinion surveys repeatedly indicate that the public are largely unaware or unconcerned about indoor pollution. Unlike traffic pollution, it seems not to be important in people’s perceptions. Such points were particularly emphasised in discussions at a recent open meeting that looked closely at the consequences of setting indoor guideline values.†

However, set against such problems are the undoubted benefits that established guidelines on indoor air pollution would bring. For example (notwithstanding the advice and information on indoor air quality that has already been produced), it is clear that further information—including, where relevant, guideline values and how to keep below them—would be extremely valuable, not only to householders but to environmental health officers and others who are called in to investigate complaints about indoor air quality. In this context it would also be extremely useful to set down some normal (typical) concentration ranges for common pollutants. Such information would need to be accompanied by information on what the different concentrations imply and what action might need to be taken. Importantly, establishment of numerical guideline values would in turn allow the informed development of product emission standards—which is surely important if indoor concentrations of pollutants are to be controlled in a sustainable way. Certainly ventilation alone is unlikely to be sufficient. Finally, established guideline values could usefully be built into the housing health and safety rating system, which has been developed to replace the current housing fitness standard.

*<http://www.doh.gov.uk/comeap/issues.htm>

†<http://www.le.ac.uk/ieh/>

Needless to say, the idea of establishing indoor guideline values is not new. For some pollutants the World Health Organisation² has set health based limits which are explicitly applicable to the indoor environment, and several countries, including Germany, Norway, and Poland have described target concentrations for various pollutants. What is not clear, however, is how these limits have been used and applied. Experiences in Germany seem to have been negative because of problems connected with the litigation issue. Australia has taken the approach of using indicators of good air quality rather than defining quantitative limits. Activities in California are perhaps most informative³; here, under Proposition 65, a list of about 600 hazardous chemicals has been established and all businesses or product manufacturers are obliged to inform the public if these are present in a particular article. This is relevant to indoor air because some of the listed substances are ingredients of common consumer products; the labelling requirements then

allow consumers to make informed choices about the use of those products. There is a potential danger here, however, of confusing hazard with risk and causing hazard warning overload! California also has developed non-mandatory guidelines for volatile organic compounds, aimed at building professionals interested in reducing concentrations of volatile organic compounds in new construction; these are informative only and are intended to offer a rational framework for action. Also there are published guidance documents on formaldehyde and combustion pollutants in the home that give direction to the public on how to reduce exposures.

Although fraught with potential difficulties, the move to develop guidelines or detailed guidance on indoor air pollution has increased in pace; it is now being seriously considered by Government departments, and indeed a preliminary list of pollutants to be considered has been presented to COMEAP. These developments are warmly welcomed, and as

long as the downward spiral to litigation can be avoided, there seems to be every chance of indoor air guidelines being established that are both meaningful and useful and which could have a significant positive impact on public health.

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