

**Legislative Council Panel on Environmental Affairs
Indoor Air Quality Management Programme**

PURPOSE

This paper advises members on the progress of the Indoor Air Quality (IAQ) Management Programme.

BACKGROUND

2. We completed the trade and public consultation exercise on the proposed IAQ Management Programme in January 2000 and briefed members on 7 January 2000 about the proposed programme.

MAJOR COMMENTS

3. Major comments received during the public consultation included the following:
- a) **Earlier legislative control** - Waiting 3 years before commencing a comprehensive review of the need for further legislation was too long.
 - b) **Further smoking ban** - The Administration should strengthen existing legislative control on smoking by banning it both in public places and workplaces.
 - c) **Legislative control of public transport facility** - Legislative control on IAQ should be extended to public transport facilities.
 - d) **Level 3 of IAQ Objectives should be dropped or tightened up** - Level 3 of the IAQ Objectives was too lenient which failed to serve the intended purpose to improve IAQ. They should either be dropped or tightened up.

REVISED PROGRAMME AND IMPLEMENTATION PLAN

4. Taking into consideration comments from the public, we have revised the IAQ Management Programme and the implementation plan. Details are set out in the following paragraphs.

Earlier Review on Legislative Control

5. The government will start reviewing the existing legislation in parallel with the implementation of the voluntary IAQ certification scheme with a view to looking into the need for strengthening existing legislation or introducing new legislation to achieve the IAQ objective, and the option. The review would cover :

- (i) introduction of administrative control and strengthening of existing enforcement practices in the interim with a view to developing a regulatory framework for the control of IAQ;
- (ii) consideration of whether and how to legislate the annual certification scheme and the IAQ objectives; and
- (iii) enforcement arrangement and mechanism of legislative control.

Further Smoking Ban

6. The Administration has been working closely with the Hong Kong Council on Smoking and Health (COSHS) for the revision of the "Guidance Notes for the Management of Indoor Air Quality in Offices and Public Places" relating to the control of secondhand smoke or environmental tobacco smoke (ETS). Essentially, we recommend in the Guidance Notes that tobacco smoking should be prohibited in all buildings served by mechanical ventilation and air-conditioning system, or to have complete physical and ventilating separation of smoking areas in order to achieve minimum indoor air quality standards. In addition, we recommend employers to create a smoke-free workplace to protect the health of employees, through smoking bans and establishment of an appropriate smoking-ban policy through proper staff consultation.

7. On legislative control, the Administration is currently evaluating the effectiveness of the measures undertaken to-date to reduce the exposure of the public to passive smoking, in the context of a review of our smoking prevention strategy. As part of our review, we will consider the possibility of extending the ban on smoking to other indoor workplaces, and where feasible, consider the timing of implementation. Other measures such as setting up a Tobacco Control Office incorporated with an inspection team to actively enforce the Smoking (Public Health) Ordinance (Cap. 371) will be implemented after completion of all the necessary preparatory works on legal and administrative aspects. For workplaces, policy on smoking will be promulgated. A number of factors, however, need to be considered before deciding the way forward such as the expectation of the community and the enforceability of the proposal. The Government will work closely with the Hong Kong Council on Smoking and Health in these matters.

Legislative Control of Public Transport Facilities

8. We intend to develop a set of professional practice note for control of IAQ in the public transport facilities (PTF) within this year. In parallel we will assess the implementation as well as the form of appropriate legislation governing the air quality within the PTF.

Level 3 of IAQ Objectives to be Dropped

9. Taking into consideration comments from the public, we decide to drop the Level 3 Objectives from the IAQ Management Programme.

10. The details of the implementation plan of the IAQ Management Programme are attached in Appendix I for reference.

ADVICE SOUGHT

11. Members are invited to endorse the implementation plan of the IAQ Management Programme.

**Environment and Food Bureau
June 2000**

Implementation Plan for the Indoor Air Quality Management Programme

PURPOSE

This document sets out the implementation plan of the Indoor Air Quality (IAQ) Management Programme and how individual members of the community could work together to improve the IAQ of our indoor environment:

BACKGROUND

2. We spend more than 70 per cent of our time in an indoor environment. Good IAQ safeguards our health and contributes to our comfort and well-being. It can also improve productivity at the workplace. On the other hand, poor IAQ may lead to discomfort, ill health and, in workplace, absenteeism and low productivity.

3. To improve the IAQ in office buildings and public places, the Administration has set up an inter-departmental IAQ Management Group to oversee the implementation of IAQ programme. The IAQ Management Group is chaired by the Environment and Food Bureau and consists of other 3 bureaux and 9 departments as at Annex A. The IAQ Management Group completed a trade and public consultation exercise on the proposed IAQ programme in January 2000.

IAQ MANAGEMENT PROGRAMME

4. Taking into consideration comments received during the consultation exercise, we have revised the implementation plan for improving the IAQ of our indoor environment as follows :-

- (a) launching a public education and publicity campaign to promote public awareness of IAQ;
- (b) setting up an IAQ information centre to disseminate information and reference materials related to IAQ;
- (c) adopting a set of IAQ Objectives as a common benchmark for evaluating and assessing IAQ;
- (d) publishing a set of Guidance Notes for the better management of IAQ in offices and public places;
- (e) promulgating a voluntary IAQ certification scheme and invite owners and management of premises including the government buildings to participate in the scheme;

- (f) conducting a review of legislative framework for the control of IAQ in parallel with the implementation of the voluntary IAQ certification scheme; and
- (g) publishing a set of professional practice notes for public transport facilities.

5. Details of the Management Programme and its implementation plan are given as follows :

(a) *Public education and publicity campaign*

6. People are concerned with their own health. However, most people do not have a clear sense of the significant health risks of indoor pollution, nor do they know what they can do to reduce risk for respiratory illnesses, cancer, and other serious diseases caused by indoor pollutant exposure. Solution to indoor air pollution starts with education. To accomplish this, a public education and publicity campaign was launched to raise public awareness and assist the public to take reasonable measures to reduce the risks to their health from indoor air pollution. This included a series of publicity pamphlets designed to educate the public on the problems and adverse health effects of pollutants, and offer practical advice on how to minimize exposure to them. Six pamphlets and two booklets have been published so far, namely:

Pamphlets

- Indoor Air Quality and You;
- Biological Contaminants and You;
- Environmental Tobacco Smoke and You;
- Formaldehyde and You;
- Radon and You; and
- Volatile Organic Compounds and You

Booklets

- Improve the Indoor Air Quality in Your Building; and
- Improve the Indoor Air Quality in Your Home.

Besides, radio voiceover was launched to increase the public awareness of IAQ issues.

7. The Management Group will take a proactive approach to providing a wide range of information about indoor air-related risks, as well as the steps to reduce them, through the use of public awareness campaigns, guidance document dissemination, training course delivery, the operation of hotlines and IAQ Information Centre, a web site and related outreach efforts. These efforts are aimed at a broad audience. We reckon the IAQ can be improved most rapidly if all parties involved become more knowledgeable, so that the impetus for change comes from all directions.

8. Furthermore, given the control of IAQ is a multi-disciplinary subject covering public health, occupational hygiene, engineering standards, and building management etc., competent professionals from various disciplines are needed in the marketplace to help implement the IAQ Management Programme. In this respect, the IAQ Management Group has invited the professional and educational institutions to organise seminars, workshops, or courses on total

management of IAQ to train up the IAQ related professionals. Where necessary, members of IAQ Management Group will participate and share the experience in managing IAQ in government premises.

(b) Setting up an IAQ Information Centre

9. An IAQ Information Centre will be set up this year to provide information to foster understanding and action to improve IAQ. Through the operation of the Centre, information on IAQ will be disseminated to the public as well as the professionals. The Centre will serve the following functions:

- a) making information on IAQ, including information on health effects, environmental impacts, pollution prevention methods, and indoor environmental-friendly products widely and easily accessible;
- b) providing technical advice to the professionals on IAQ matters including making available to them the relevant reference materials and a telephone hotline for answering any enquiry related to IAQ;
- c) acquainting professionals with the IAQ certification scheme;
- d) setting up an internet webpage for public viewing of the latest local and overseas development in IAQ;
- e) exhibiting IAQ related products to facilitate easy identification of indoor-air-quality-friendly materials; and
- f) liaising and collaborating with professional and educational institutes on the promotion of IAQ matters.

(c) Adopting a set of IAQ Objectives for evaluating and assessing IAQ

10. It was originally proposed that a set of 3-level IAQ Objectives should be adopted to act as the common benchmark for evaluating and assessing IAQ. These objectives should be comparable to the international standards and yet should allow flexibility and can encourage building owners to go for the best air quality. Views expressed by the public during the public consultation were that the Level 3 IAQ Objectives which set out the minimum acceptable standards, were too lenient to protect a more diverse target population which included the young and the aged. It also failed to serve the intended purpose to improve IAQ that efforts should not only to prevent illness, they should help us reach our full potential for good health and productivity. Having considered public's views, the Management Group decides to drop the Level 3 Objectives. The revised IAQ Objectives is as follows:

- Level 1** - represents very good IAQ that a high-class and comfortable building should have.
- Level 2** - represents the IAQ that provides protection to the public at large including the very young and the aged.

Table 1 lists out the IAQ parameters and their 2-level IAQ Objectives. For office buildings and public places, building owners and management of these premises as well as employers should aim to achieve Level 1 or 2 of the IAQ Objectives.

(d) Publish a set of Guidance Notes for offices and public places

11. A set of draft Guidance Notes entitled "Guidance Notes for the Management of Indoor Air Quality in Offices and Public Places" was prepared to define and specify the procedures, measures and methodologies that should be followed to evaluate IAQ as well as to achieve and maintain the IAQ standards. The Guidance Notes provided comprehensive guidelines in improving IAQ through ventilation system design, operation and maintenance of ventilation system, selection of building materials, building construction and design, building uses and layout, selection of appliances and equipment, housekeeping and cleaning. It also set out an IAQ management strategy which included the allocation of responsibility to appropriate persons to look after the IAQ matters, and the procedures for investigation of IAQ complaints.

Further smoking ban

12. Most of the feedback from various parties on the draft Guidance Notes are technical in nature and would be addressed when finalising the Guidance Notes. The indoor air pollutant which received much attention during the consultation of the IAQ programme was secondhand smoke or environmental tobacco smoking (ETS) due to their potential impact on our health. It is widely accepted in the scientific and public health communities that ETS poses significant risks to children and adults. To minimize its effects to other occupants, the Guidance Notes set out good practices and requirements to reduce its impact. Other than the tobacco trades and the hospitality sectors including restaurants and hotels, many comments received on the draft Guidance Notes have expressed concern as to why smoking is still permitted in many public places and they also viewed that the Government should strengthen the existing legislative control on smoking ban, both in public places and workplaces.

13. The Government has been working closely with the Hong Kong Council on Smoking and Health (COSH) for the revision of the Guidance Notes relating to the control of "environmental tobacco smoke" (ETS). Essentially, we recommend in the Guidance Notes that tobacco smoking should be prohibited in all buildings served by mechanical ventilation and air-conditioning system, or to have complete physical and ventilating separation of smoking areas in order to achieve minimum indoor air quality standards. In addition, we recommend employers to create a smoke-free workplace to protect the health of employees, through smoking bans and establishment of an appropriate smoking-ban policy through proper staff consultation.

14. On legislative control, the Government is currently evaluating the effectiveness of the measures undertaken to-date to reduce the exposure of the public to passive smoking, in the context of a review of our smoking prevention strategy. As part of the review, the Government will consider the possibility of extending the ban on smoking to other indoor workplaces, and where feasible, consider the timing of implementation. Other measures such as setting up a Tobacco Control Office incorporated with an inspection team to actively enforce the Smoking (Public Health) Ordinance (Cap. 371) will be implemented after completion of all the necessary preparatory works on legal and administrative aspects. For workplaces, policy on smoking will be promulgated. A number of factors, however, need to be considered before deciding the way forward such as the expectation of the community and the enforceability of the proposal. The Government will work closely with the Hong Kong Council on Smoking and Health in these matters.

(e) Promulgating a Voluntary IAQ Certification Scheme

Government taking the lead

15. To demonstrate commitment to promoting the IAQ Management Programme, the Government is taking the lead by implementing a trial scheme to survey 70 government buildings served by mechanical ventilation and air-conditioning systems in year 2000; to certify those buildings which are in compliance with Level 1 or Level 2 Objectives in accordance with the Guidance Notes; and display the certificate at prominent places to show that they are in compliance with the Objectives.

16. The Government will conduct survey for the remaining government buildings in 2001/2002. If improvement work is needed, the Government will devise improvement plan with a view to complying with at least the Level 2 Objectives as soon as possible. Other government actions include designing air-conditioning and ventilation installations of new government facilities which aims to achieve Level 1 of the recommended IAQ Objectives as delineated in Table 1.

Voluntary participation by private sectors

17. Private sector buildings which are served by mechanical ventilation and air-conditioning systems will also be invited to participate in the IAQ certification scheme on a voluntary basis in the second half of 2000. They need to employ suitably qualified personnel to assess the IAQ of their premises against the IAQ Objectives. The IAQ will be assessed and improvement works will be conducted where necessary. Buildings complying with the target IAQ Objectives may put up certificates at prominent places to show that they are in compliance. The premises awarded with an IAQ certificate will be made known to the public through the Internet homepage of the IAQ Information Centre. It is expected that many of the high quality buildings will participate in the scheme to show that they are among buildings of the best quality, thus encouraging other buildings to follow suit.

18. The benefits of certification include:

- Users can understand the quality of the indoor air;
- Good management practices will be recognised; and
- Incentives are provided for building owners to seek to achieve the best level of IAQ.

19. For IAQ assessment, all the IAQ parameters, including temperature, relative humidity, air movement, carbon dioxide, carbon monoxide, nitrogen dioxide, ozone, formaldehyde, total volatile organic compounds (TVOCs), respirable suspended particulates (RSP), radon, and total bacterial counts have to be measured and certified annually.

20. The certification will generally be made on the basis of a building as a unit. However, if a shopping mall or a scheduled premises such as restaurant or cinema forms part of the building, they will be certified separately. Details of the sampling requirements are contained in the Guidance Notes and details of the application procedure and the certification requirements

will be set out in the following documents to be published by the IAQ Management Group soon:

- "A Guide for the Participation in the Indoor Air Quality Certification Scheme";
- "A Guide for Indoor Air Quality Certification".

(f) *Reviewing legislative framework for the control of IAQ*

21. The government will start reviewing the existing legislation in parallel with the implementation of the voluntary IAQ certification scheme with a view to looking into the need for strengthening existing legislation or introducing new legislation to achieve the IAQ objective, and the option. The review would cover :

- (i) introduction of administrative control and strengthening of existing enforcement practices in the interim with a view to developing a regulatory framework for the control of IAQ;
- (ii) consideration of whether and how to legislate the annual certification scheme and the IAQ objectives; and
- (iii) enforcement arrangement and mechanism of legislative control.

(g) *Publishing a set of Professional Practice Notes for Public transport facilities*

22. For public transport facilities such as Mass Transit Railway, East Rail, Light Rail, air-conditioned buses and ferries, there is no existing legislation governing their IAQ and we are not aware of any legislation overseas governing the air quality within the public transport facilities. After careful consideration, the Administration considers that it is more appropriate to develop a set of professional practice notes by end of 2000, and to take two years to assess its implementation as well as the form of legislation that best suits the purpose.

23. On the basis of the above paragraphs, we have set out a time-table for implementing the IAQ Management Programme which is summarised in Table 2.

JOINT EFFORTS FOR BETTER IAQ

24. Indoor air problems are mainly related to inadequate design, improper operation and maintenance of mechanical ventilation and air-conditioning systems, and use of inappropriate building materials, finishes, carpets and paints during construction and renovation, and office equipment in buildings. Many of the problems associated with poor IAQ can be avoided from occurring in the first place if all the concerned parties develop and implement an integrated strategy for the indoor environment, and which is far more cost-effective than remediating problems and treating illnesses after they occur.

25. While the Government has a crucial role to play in promoting and steering the overall development of the IAQ Management Programme, trade and industry also need to make their contributions to achieve better IAQ. For example, manufacturers and suppliers of materials and

furnishings can make as much effort as possible to reduce the levels of emissions from, and to provide relevant information about, their products so that people can choose to buy or specify the materials which they want.

26. Architects and the owners and managers of buildings can have an important and direct impact on IAQ if they show due concern for improved design, operation and maintenance of buildings. The public can often improve IAQ if provided with appropriate information aimed at a better understanding of factors that influence exposure. Improving IAQ is therefore a shared responsibility that everyone should contribute. Annex B summarises the roles of the trades in improving the IAQ.

**Indoor Air Quality Management Group
The Government of the Hong Kong Special Administrative Region
June 2000**

Membership list of the inter-departmental Indoor Air Quality Management Group

- Environment and Food Bureau
- Education and Manpower Bureau
- Health and Welfare Bureau
- Works Bureau
- Architectural Services Department
- Buildings Department
- Customs and Excise Department
- Department of Health
- Electrical and Mechanical Services Department
- Environmental Protection Department
- Fire Services Department
- Food and Environmental Hygiene Department
- Labour Department

Roles of the Trades in Improving Indoor Air Quality

The trades that have their potential roles in improving IAQ are summarized below :

BUILDERS AND ARCHITECTS

Builders and architects can work to design and build structures that eliminate indoor environmental problems. By thinking about the quality of the indoor environment in the design stage, in construction practices, and in renovation, builders and architects can have a substantial impact on the health and safety of the building occupants. Builders and architects can help achieve safe indoor environments by selecting building materials that will not release harmful levels of toxic chemicals into occupied indoor environments (either when the materials are new or as they age) and by designing buildings to be in compliance with indoor air quality ventilation standards. During the renovation of occupied buildings, builders and architects can help protect the safety of tenants by isolating them from pollutants generated during construction work.

BUILDING OWNERS, MANAGEMENT, AND ENGINEERS

Building owners, management and engineers ensure good indoor environmental quality by properly operating and maintaining buildings. Building owners, managers, and engineers can foster a good indoor environment by adopting ventilation maintenance procedures to eliminate and prevent contamination and ensure an adequate supply of clean air to occupants; using zone ventilation or local exhaust for indoor sources; developing specific procedures for use of cleaning solvents, paints, pesticides, and other products and materials within the building; and abiding by recognized standards of care for building maintenance. Their role includes establishing a process to educate building occupants about their roles in maintaining good indoor environmental quality and encouraging an active exchange of information about indoor environmental problems. They can develop and adopt formal protocols to investigate indoor environmental complaints from occupants, thereby encouraging an atmosphere of trust.

MANUFACTURING INDUSTRIES

Manufacturers can ensure good indoor environments by designing products and materials that eliminate toxic chemicals and reduce emissions of other pollutants to safe levels. These include consumer and commercial products, building materials, office equipment, and furniture. Manufacturers can also label their products so that they will be properly used and maintained. Manufacturers and suppliers can conduct research and adopt test procedures (e.g. emission test procedures) and standards to ensure that the products and materials that they sell are safe for use in indoor environments.

ENVIRONMENTAL AND HEALTH PROFESSIONALS

Environmental consultants respond to hazards and complaints in problem buildings. They may work closely with building owners, managers, and engineers or individual homeowners to investigate indoor environmental quality issues. Professionals in these firms span a broad range of occupations, including occupational hygienists, mechanical (ventilation) engineers and technicians, micro-biologists, architects, chemists, air pollution scientists, abatement personnel, and others. The services of most of these firms include evaluations of ventilation systems,

measurement of indoor pollutants, and characterization and mitigation of the sources of pollutants in buildings. Through these efforts, they can be instrumental in turning a problem building into a healthy building.

UNIONS

Unions can protect human health indoors by ensuring a clean and healthy indoor environment for their members. They can work with building owners, management, and engineers to ensure that employees are afforded an optimum work environment. If problems occur, they can come to the aid of employees who feel that they have been improperly exposed to pollutants in their work-places and can work with building designers, owners, managers, and engineers in the design and operation of healthy workplaces.

RESEARCH ORGANIZATIONS

Scientific research organizations address a wide range of issues related to indoor environments, including proper building design and operation, health and comfort impacts of poor indoor environments, measurements of indoor pollutants and the characterization of emissions. from products and materials used indoors, and exposure mitigation (e.g., ventilation, air cleaning, source control, and individual behaviors).

INDIVIDUALS

Individuals are the strongest force in protecting human health indoors. Consumers protect their own health and the health of those around them by properly maintaining their homes and making informed choices about consumer goods and services. Building occupants (e.g., office workers) do the same by properly using products and equipment within the building. With knowledge, individuals can take many actions to avoid personal exposures.

Table 1: IAQ Objectives for Office Buildings & Public Places in Hong Kong ^a

Parameter	Unit	8-hour average ⁱ (at 25°C and 101.325 kPa)	
		Level 1	Level 2
Carbon Dioxide (CO ₂)	ppm	< 800 ^b	< 1,000 ^c
Carbon Monoxide (CO)	µg/m ³	< 2,000 ^c	< 10,000 ^{d, g}
Respirable Suspended Particulates (RSP)	µg/m ³	< 20 ^c	< 180 ^g
Nitrogen Dioxide (NO ₂)	µg/m ³	< 40 ^d	< 150 ^g
Ozone (O ₃)	µg/m ³	< 50 ^c	< 120 ^d
Formaldehyde (HCHO)	µg/m ³	< 30 ^c	< 100 ^d
Total Volatile Organic Compounds (TVOC)	µg/m ³	< 200 ^c	< 600 ^c
Radon (Rn)	Bq/m ³	< 150 ^j	< 200 ^{c, e}
Airborne Bacteria	Cfu/m ³	< 500 ^{f, h}	< 1,000 ^{f, h}
Room Temperature	°C	20 - 25.5	< 25.5
Relative Humidity	%	40 - 70	< 70
Air movement	M/s	< 0.2	< 0.3

Legends:

- a. Labour Department adopts Occupational Exposure Limits as the indoor air quality standards for workplaces. The following is quoted from the "A Reference Note on Occupational Exposure Limits (OEL) for Chemical Substances in the Work Environment" published by the Labour Department:

Parameter	CO ₂	CO	NO ₂	O ₃	HCHO
Concentration	< 5,000 ppm	< 29,000 µg/m ³	< 5,600 µg/m ³	< 200 µg/m ³	< 370 µg/m ³
Time average	8-hour	8-hour	8-hour	15-minutes	15-minute

- b. USEPA (1996), Maximum Allowable Air Concentration Standards for EPA Buildings
- c. Finnish Society of Indoor Air Quality and Climate (1995), *Classification of Indoor Climate, Construction, and Finishing Materials*
- d. WHO (1999), *Guidelines for Air Quality*
- e. EPD (1995), *Radon and You*
- f. ACGIH (1995), *Air Sampling Instruments for Evaluation of Atmospheric Contaminants* (100 – 1,000 cfu/m³ = intermediate e.g. general indoor and outdoor concentrations)
- g. EPD (1987), Hong Kong Air Quality Objectives under the Air Pollution Control Ordinance (Cap. 311)
- h. The exceedance of bacterial count does not necessarily imply health risk but serve as an indicator for further investigation.
- i. In some cases, it may not be practical to take 8-hour continuous measurements. . In these circumstances, surrogate measurement such as average of four half-an-hour measurements conducted at four time slots evenly distributed over the day is also acceptable for office buildings. For public places, short-term sampling covering the worst case scenario such as measurements during periods of highest occupancy (e.g. 12:00 hrs. – 15:00 hrs. for restaurants) should be used.
- j. USEPA guidelines for new and existing residential premises

Table 2: Schedule for the Implementation of the IAQ Management Programme

Timing	Implementation Elements
From November 1999 onwards	<ul style="list-style-type: none"> • Public education and publicity campaign was launched to promote public awareness of the importance of IAQ through distribution of publicity pamphlets and radio voiceover.
Year 2000	<ul style="list-style-type: none"> • Government taking the lead to carry out a trial scheme to survey 70 government buildings served by mechanical ventilation and air conditioning systems and certify those premises in compliance with the Level 1 or Level 2 objectives. The Government has already started the survey. • Invitation of the private sector buildings to voluntarily participate in the IAQ certification scheme. • Review of the existing legislation with a view to strengthening the enforcement practice, and considering how to legislate the IAQ certification scheme and IAQ Objectives. • Setting up of an IAQ information centre for dissemination of information and reference materials related to IAQ. • Invitation of the relevant professional and educational institutions to provide necessary training to the relevant personnel to support the IAQ programme. • Preparation of practice notes specifically for transport facilities such as the rails, public buses and ferries.
Years 2001/2002	<ul style="list-style-type: none"> • Subject to a review of the trial scheme in 2000, the government will conduct survey for the remaining government buildings and to certify those buildings in compliance with Level 1 or Level 2 objectives.