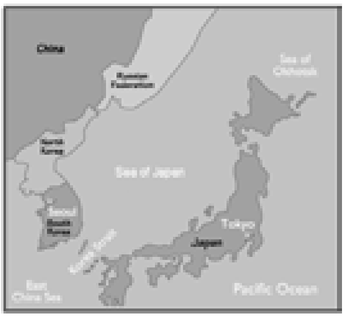
AIR

AIR INFORMATION REVIEW

VOL 28, No. 2, March 2007 A quarterly newsletter from the IEA Air Infiltration and Ventilation Centre

AIVC welcomes new member countries: Japan and South Korea



During the last months of 2006, the AIVC has welcomed with great pleasure Japan and South Korea as new AIVC member countries. These new members will clearly give new inputs to the AIVC. At the same time, it will be challenging for AIVC to provide the appropriate information.

Japan, (127 million inhabitants, 10th country by population) and South Korea (49 million inhabitants, 25th country by population) are among the bigger countries in the world. According to Wikipedia, the metropolitan areas of Tokyo (Greater Tokyo Area – 35 million inhabitants) and of Seoul (Seoul National Capital Area – 23 million inhabitants) are the 2 largest metropolitan areas in the world. It shows that the urban context is very important for both countries and that appropriate ventilation strategies in urban areas should be a top priority.

As a practical result of this new membership, the 2008 AIVC conference will be organised in Japan. The expected date is October 14 to 16 2008 and the conference will take place in Kyoto. More information will be given in the next issues of AIR.

 http://www.aivc.org

AIVC 2006 Conference Report

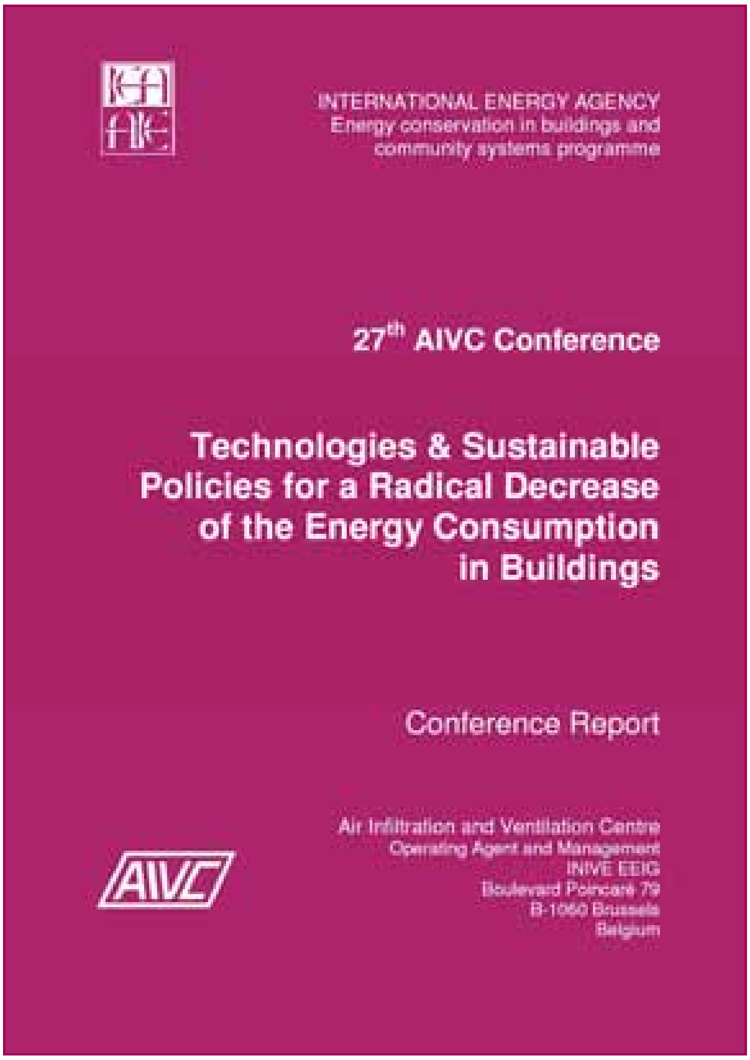
Lyon, France, November 2006

Ventilation is essential for meeting the health and air quality needs of occupants. However there is a significant energy and environmental penalty related to both the venting of thermally conditioned air and to the electrical load needed to drive mechanical systems. In practice, ventilation related energy can typically account for 50% of building energy use while buildings themselves can account for approximately 40% of total greenhouse gas emissions. There is hence much interest in improving the performance of ventilation systems. Sometimes there is also pressure to reduce ventilation rates but this could be in conflict with health and productivity needs.

The AIVC conference, held in conjunction with the EPIC conference in Lyon, France between 20th and 22nd November 2006 provided an opportunity to address these issues and provide substantive evidence on the vital need for ventilation. Papers were presented in 7 sessions in which all authors and presenters made key contributions. The conference report, written by Martin Liddament, covers a brief synopsis of each paper. The report is available online at http://www.aivc.org/medias/pdf/Conference2006-Report.pdf.

The summing-up of the conference by Martin Liddament was recorded on video and is also available online (http://www.managenergy.tv/me_portal/mst/_vi_wm_56_fr/1821/1826/index_player.html).

AIVC Online Technologies & Sustainable Policies for a Radical Decrease of the Energy Consumption in Buildings. Conference Report. EPIC 2006 AIVC Conference, Lyon, France. 16 pp.



AIR Information Review

The newsletter of the AIVC, the Air Infiltration and Ventilation Centre. This newsletter reports on air infiltration and ventilation related aspects of buildings, paying particular attention to energy issues. An important role of the AIVC and of this newsletter is to encourage and increase information exchange among ventilation researchers and practitioners worldwide.

Published by: Air Infiltration and Ventilation Centre - Operating Agent and Management
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A manual for the on-site air flow rate measurement for domestic ventilation systems in Japan

M. Tajima & T. Sawachi, NILIM (National Institute for Land and Infrastructure Management), Japan

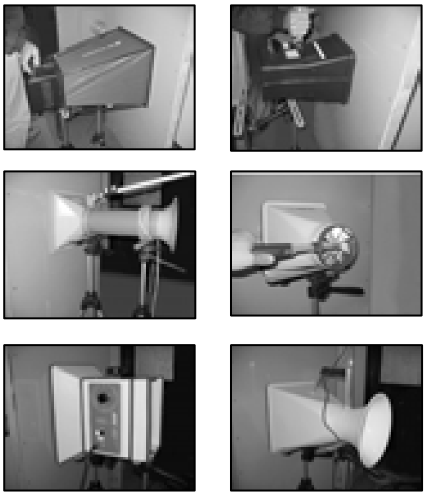
Since July 2003, the amended Japanese Building Standard Law requires low formaldehyde emission materials for interior finishing and whole house mechanical ventilation systems for newly built residential buildings to improve indoor air quality. Under the law, the mechanical ventilation system has to be able to supply and/or exhaust air at more than 0.5 h^{-1}.

In the context of this legislation, a research project for enhancing the reliability of domestic ventilation systems was carried out by the sponsorship of MLIT (Ministry of Land, Infrastructure and Transport, Japan). This research work was led by NILIM and BRI in a committee, of which the secretary was CHORD (Center for Housing Renovation and Dispute Settlement Support). One of the results is the *Manual for the on-site air flow rate measurement for domestic ventilation systems*, which shows practical techniques for air flow rate measurement.

The main objective of this manual is to present measuring methods and practical techniques for obtaining reliable results and for recording the results of these measurements. The target audience is not only experts but a wide range of professions who are related to the housing sector, e.g. installers, housing manufacturer and so on. Therefore, this manual is written in a simple style.

The measuring instruments focused upon in this manual are the air flow measuring instruments with a hood or a funnel, which can be used to measure the air flow rate through the terminal devices. This kind of measuring instruments have recently becoming popular in Japan. The point measurement with manometer or the pressure drop method is not explained in detail, because the point measurement method is not well suited to the typical ducts in Japan, whose diameters are less or equal than 100mm, whereas the terminal devices applying for pressure drop method are not popular in Japan. However, these methods are considered as useful, and the outline is just described in this manual.

Practical knowledge, as collected in tests of devices and field investigations in residential buildings, helped in the writing of this manual. The tests were executed in the laboratory for several measuring instruments with a variety of terminals (examples are shown in Figures 1 and 2). Part of the experimental results are given in Figure 3, which shows the relationships between the reference air flow rate and measured air flow rate for each measuring instrument. In the case of the terminal devices for supply side, some instruments give larger relative errors when compared with exhaust conditions. Moreover, most of the instruments give a better accuracy when using larger hoods even for supply conditions.

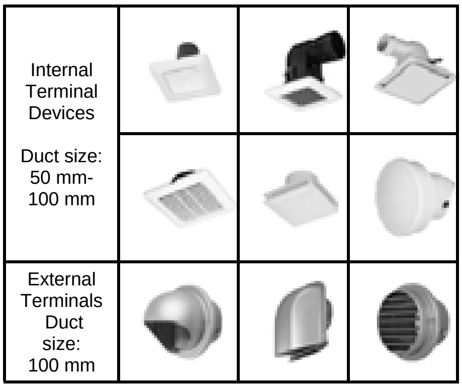


Examples of air flow measuring instruments tested in the laboratory

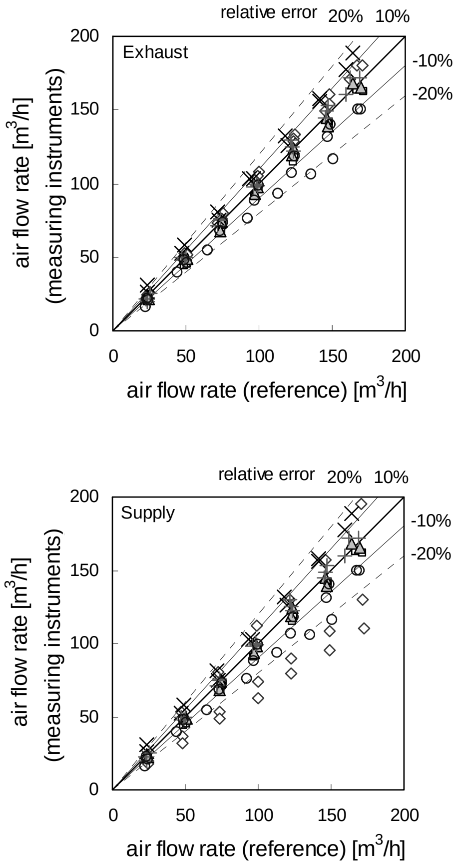
The structure of the manual is as follows:

- Aims of air flow rate measuring
- Techniques to use measuring instruments with a hood
  - Preparation to the measurement
  - Measuring at supply air terminals
  - Measuring at exhaust air terminals
- Errors of measurement
- Recording format sheet as an example

This manual is now available on the website http://www - in Japanese - and is used by lots of engineers. Air flow rate measuring of domestic ventilation system is not yet mandatory as a part of inspection checks in Japan. However, the air flow measurements (as described in this manual) of all newly installed ventilation systems is being recommended in order to increase the reliability of domestic ventilation systems.



Examples of terminals used in the laboratory test



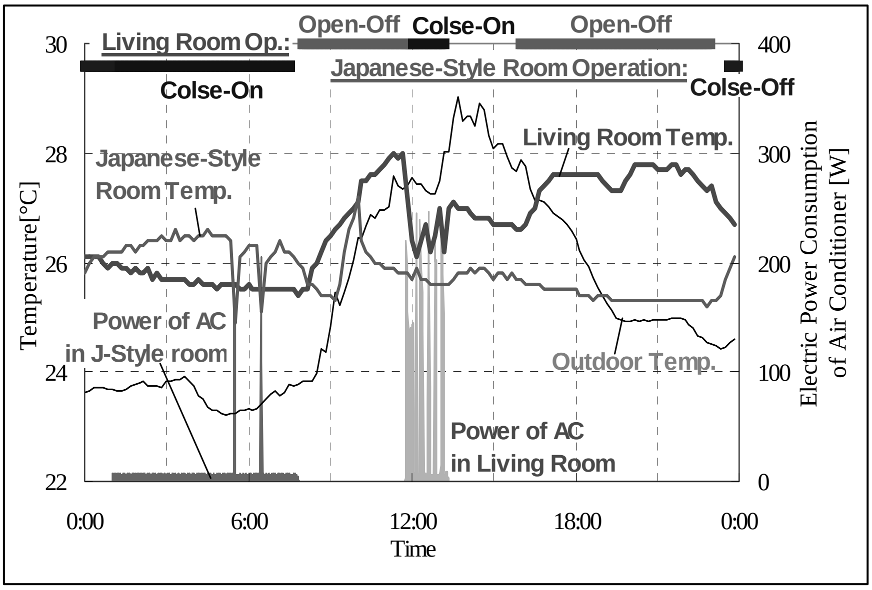
Experimental results for the relationships between the reference air flow rate and measured air flow rate with variety of measuring instruments (used for the terminals connected to 100mm duct)

Experimental Study on Energy Saving Effect of Natural Ventilation in Japanese Residential Building

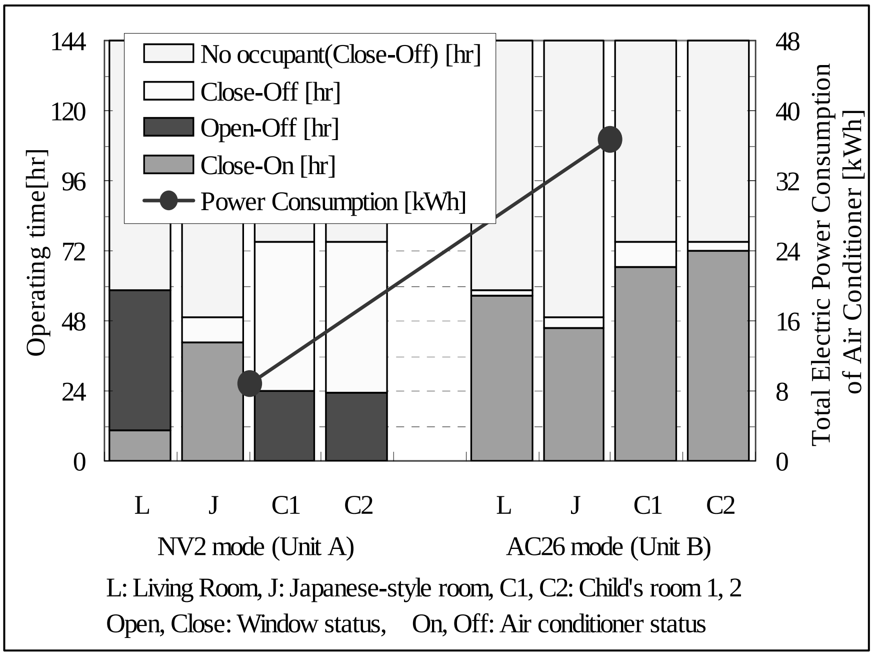
S. Nishizawa, Dr. - NILIM (National Institute for Land and Infrastructure Management), Japan
H. Habara, Dr. - BRI (Building Research Institute), Japan

In Japan, natural ventilation using large windows has traditionally been used for cooling in the summer and medium season. But recently, air conditioners have become popular during the hot and humid summer period in most parts of Japan, and the cooling energy consumption has continued to rise. Natural ventilation is considered as a key method for reducing the cooling energy consumption, as global warming and the heat island have become serious problems. However, there is insufficient knowledge to quantitatively evaluate the effect of natural ventilation. This lack of knowledge is one of the problems in popularising the technology.
NILIM (National Institute for Land and Infrastructure Management) and BRI (Building Research Institute) jointly developed a facility of integrated energy systems in an experimental residential building, and we examined the effectiveness of various energy saving techniques and systems (air conditioning, hot water supply, lighting, mechanical ventilation, home electric appliances and so on). And we also experimented about the natural ventilation in the last hot and mild season, and validate experimentally step by step the effect on the reduction of cooling energy consumption using natural ventilation. This article discusses the experimental results.

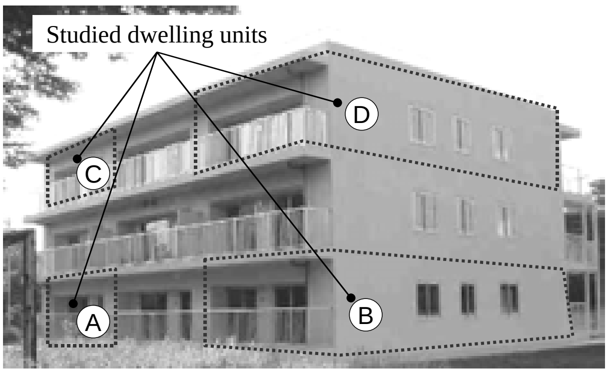
Experimental Building
The building was built on an open site, and surrounding buildings have little influence to block the wind. In four units of the building, the remote control system is incorporated to imitate the occupants' lifestyle. Following the schedule of one family (One family consists of 4 or 2 persons), the system controls on/off of all appliances and equipments (including faucet and shower), open and close the cover on the bathtub, simulate the heat and moisture generation from human bodies and cooking. Moreover, the system also controls the opening and closing of windows and curtains.



Temperature & electric demand for Living room and Japanese-style room of Unit A (mode: NV2, Date: 9 September 2006)



Operating time and Energy consumption (6 - 11 September)



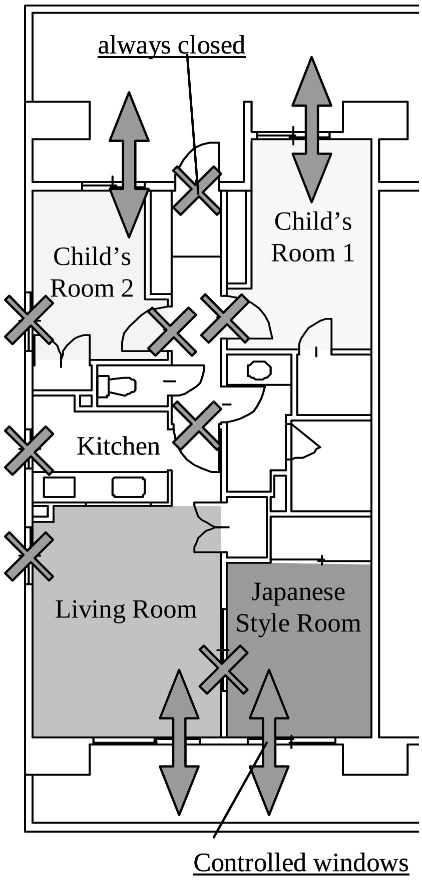
- Location: on the premises of Building Research Institute, Tsukuba
- Construction method: Reinforced Concrete
- Number of stories: 3 stories above ground
- Number of units: 9 units (approximately 73 m^2 per unit)
- Building height: 9.6 m

The monitoring system stores the measurement data such as energy consumption, temperature, humidity and wind velocity.
One unit consists of 4 rooms: Living room, Japanese-style room, Child's room 1 and Child's room 2. Each room has 1 window and 1 air conditioner.

Operation of Window and Air Conditioner
Last summer, single sided ventilation was experimented, whereby windows and air conditioning were controlled by the remote system, and all internal doors were always closed. The basic operation rules for natural ventilation and air-conditioning, which are drawn from normal Japanese behavior, are as follows:

- If there are no occupants in the room, the window is closed and the air conditioning is off.
- During 5 minutes after occupants enter the room : window is in open position, unless outdoor wind velocity is above 10 m/s.
- From 5 minutes after occupants have entered the room: room temperature is measured every 5 minutes to decide on the window position and use of air conditioning (the checking time is changed at occupants' bedtime and the remote system checks the room temperature every 1 hour).
  - If Room temperature < 20°C: Window is closed. Air conditioning is kept off.
  - 20°C < Room Temperature < 28°C: Window is opened. Air conditioning is kept off.
  - 28°C > Room Temp. : Window is closed. Air conditioning is turned on.
- Once air conditioning is turned on, it continues working until all occupants are out of the room.

The operation mode conducted during last summer was the AC mode and NV mode. AC is the mode that only the air conditioner is used for temperature control, and consists of three modes (AC24, AC26, AC28), which have different target room temperature during cooling (Target temp. is 26°C for mode AC26). NV is the natural ventilation mode that both air conditioning and natural ventilation are available. The use of natural ventilation is permitted all day long in NV1, while it is prohibited during sleeping hours in NV2.



Plan of the unit: Opening pattern under single sided ventilation at present

First Results
One result of NV2 mode (for Living room and Japanese-style room of Unit A on Sep.9, 2006) is shown in next figure.
Temperature, energy consumption and other data were measured under operating window and air conditioner. And the total time allocation and energy consumption of NV2 and AC26 is shown for 6 days (Sep. 6 – 11). In this period, 81% of total operating time of air conditioning is reduced in Living room by using natural ventilation, and 76% of the total energy consumption of air conditioner is reduced in a unit.

Next steps
The next steps consist of a more in depth analysis of the experimental results. Experiments for cross ventilation, in which higher ventilation rate are expected, are planned during the 2007 summer. The energy conservation effect of natural ventilation will be examined in relation with outdoor temperature and ventilation rate.

Ventilation related workshops at Clima 2007 Congress

The official congress of REHVA, Clima 2007, which is co-sponsored by the AIVC, will be held in Helsinki from 11 to 14 June 2007.

In the framework of this conference, some 20 workshops are organised.

- WS 1 Web Based Learning Tool for the Energy Performance Buildings Directive
- WS 2 Indoor Climate and Ventilation of Schools
- WS 3 Building Services for the Changing Demands of Office Buildings
- WS 4 Indoor Environmental Quality and Productivity: Challenges for Future Work
- WS 5 Indoor Environment in Implementation of EPBD
- WS 6 Inspection Methods of Air Conditioning and Ventilation Systems According to the EPBD
- WS 7 How to Evaluate the Impact of Inspections and Advice Programmes for Boilers
- WS 8 Promotion Renewable Heating and Cooling Technologies for Buildings
- WS 9 Enhanced Use of Weather Data and Forecasts
- WS 10 Advanced Sustainable Energy Technologies for Cooling and Heating Applications
- WS 11 Low Temperature Heating and High Temperature Cooling
- WS 12 Performance of Air Distribution Systems in Non-isothermal Conditions
- WS 13 Effects of product certification on energy efficiency
- WS 15 Economics of Energy Savings Potential in Europe
- WS 16 Resource Savings with Polygeneration (electricity, heating, cooling)
- WS 17 Integration of IAQ Sensors in HVAC Components and Installations
- WS 18 Performance of Heating Systems in Respect of Indoor Climate and Energy Use
- WS 19 Energy Efficient Solutions for Restaurants
- WS 20 Performance Metrics for Demand and Supply in the Building Lifecycle Process

AIVC Online Workshop description
@ ***http://www***

Indoor Air Quality Emission Simulation Software

The air quality in enclosed spaces is primarily influenced by two types of sources: by the presence and activity of people, animals and plants, which emit a variety of chemical and biological substances, like CO_2, odours, bacteria, viruses etc., and by the emissions from all kinds of building materials and interior equipment like furniture, electronic devices, etc. Building materials can emit a wide spectrum of substances, mostly volatile organic compounds (VOC), but also inorganic compounds like radon. In recent years, there has been much focus on the reduction of VOC emissions from building materials, especially those containing and emitting high quantities of VOC, like paints, furnishings, multi-component and multi-layer materials, in which often VOC-containing glues are involved. Those emissions can impact adversely the indoor air quality for extended periods of time, sometimes for months and years. It is common sense that, concerning the VOC, the most efficient strategy to maintain a good indoor air quality is to reduce the emissions at their source by selecting 'low-emission' materials. A good way to go is to characterize building materials by labels as 'low-emitting' and/or environmentally friendly. For labelling purposes, materials are tested under standardized conditions in terms of temperature, relative humidity, air exchange rate, and product loading (the exposed surface area of material in relation to the volume of the test chamber). The criterion for pass or fail is either a certain concentration [mg per m^3] or an emission rate [mg per m^2 and hour] under the chosen standardized test condition. Labelling is a valid procedure to help a consumer select materials. However, at their current levels of development, labels have limitations, as they do not give detailed information regarding expected impact on Indoor Air Quality (IAQ).

In 2006, the NRC's Institute for Research in Construction (NRC-IRC) in partnership with the public and the private sectors [for complete list of contributing partners see http://

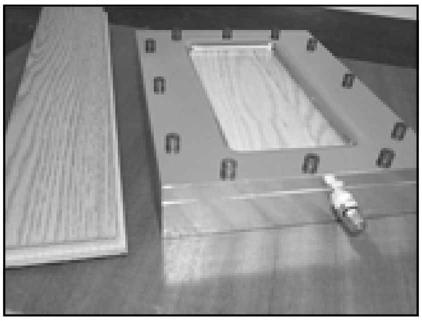
released the 'The Indoor Air Quality Emission Simulation Tool' (IA-QUEST), which is a combined emission database and simulation software for the prediction of VOC concentrations in indoor environments.

The software tool provides the following features and possibilities:

1. Selection of different building materials from a database of 69 building materials commonly used in North America. Also any combination of these building materials can be chosen for the prediction for the IAQ in terms of VOC concentration, which reflects a 'real' indoor environment with a multitude of emission sources.

2. Entry of the surface area of every chosen material, reflecting the real situation in the simulated zone. This feature goes beyond the normal scope of labelling systems, which usually operate with a 'standard' load, with respect to the ratio between the surfaces of the material to the (test) room volume.

NRC researchers are investigating the quantity and composition of emissions for commonly used building materials that are a major source of indoor chemical pollutants



Pre-finished hardwood flooring is tested for VOCs. The IA-QUEST database contains emission characteristics of commonly used building and furnishing materials

3. Selection of the ventilation rate and the ventilation regime. For the simulation of the expected concentrations, different ventilation rates can be modelled, and various ventilation regimes can be addressed, e.g. day/night or week/weekend schedules in the ventilation rate. This feature also goes beyond the traditional capabilities of labelling schemes, which assume a constant ventilation rate, e.g., at 0.5 air exchanges per hour. In many modern buildings the effective ventilation rate is often lower, due to air tightness and/or the high percentage of re-circulated and mostly unpurified air.

4. Simulation of processes during a construction or a retrofit of a building can be modelled with respect to the expected concentrations. For example, different building materials with their respective emission spectrum can be entered in the simulation in a certain time schedule, and simultaneously the ventilation rate can be altered according to the progress of the construction or refurbishment. As a further example, during renovation of a particular zone of an office building, the impact of new building materials or furnishings may be simulated under various ventilation conditions (at typical levels during normal working hours, during evening/weekend HVAC set-back periods, or alternatively with elevated ventilation in an attempt to reduce VOC levels due to the renovation). By simulating these various scenarios, the relative impact of the renovation may be evaluated.

5. Simulation of the decay of concentration after insertion or application of a new building material or paint. It gets more and more important to monitor the decay of the concentration of VOC in indoor environments, as often 'traditional' VOC are replaced by less volatile or "semi"-VOCs, i.e., VOC with a higher boiling point, causing initially moderate concentrations, but with comparatively long decay times. Within the given boundary conditions, decay rates of VOC can be predicted with the software. This might become of interest in public buildings, where a refurbishment takes place over the weekend, and decisions have to be made regarding the earliest time for employees to safely return to their offices and workplaces.

6. Balancing out IAQ and cost-effectiveness. Products labelled or certified as 'low-emitting' are often a challenge to the budget needed for the construction or refurbishment activity. An upgrade to a more costly material may not necessarily lead to significant improvement of IAQ for several reasons.

For example, other emission sources in the space may also emit the same compound. Labelled products do not necessarily provide the information needed, as they are usually based on a fail/pass criterion. If, e.g. the target value of a label is 1000 mg/m^3, products which passes the labelling process may include those that emit quantities of VOCs causing 990 mg/m^3, as well as products that contribute only 10 mg/m^3 under the given test conditions. Such a label will fail to distinguish between these materials. With the software tool more detailed information can be derived for the selection of materials and the optimization of the use of the available budget.

7. Avoidance of certain VOCs, either known of suspected of being harmful. To avoid certain chemical emissions the building materials in the database can be screened for the emission of specific VOCs.

The software tool IA-QUEST also comprises an extensive, searchable database of the VOC emissions of individual building materials, together with their chemical and physical properties, chemical name synonyms, occupational limit values, known threshold concentrations for odour, irritancy, and reported chronic reference exposure levels.

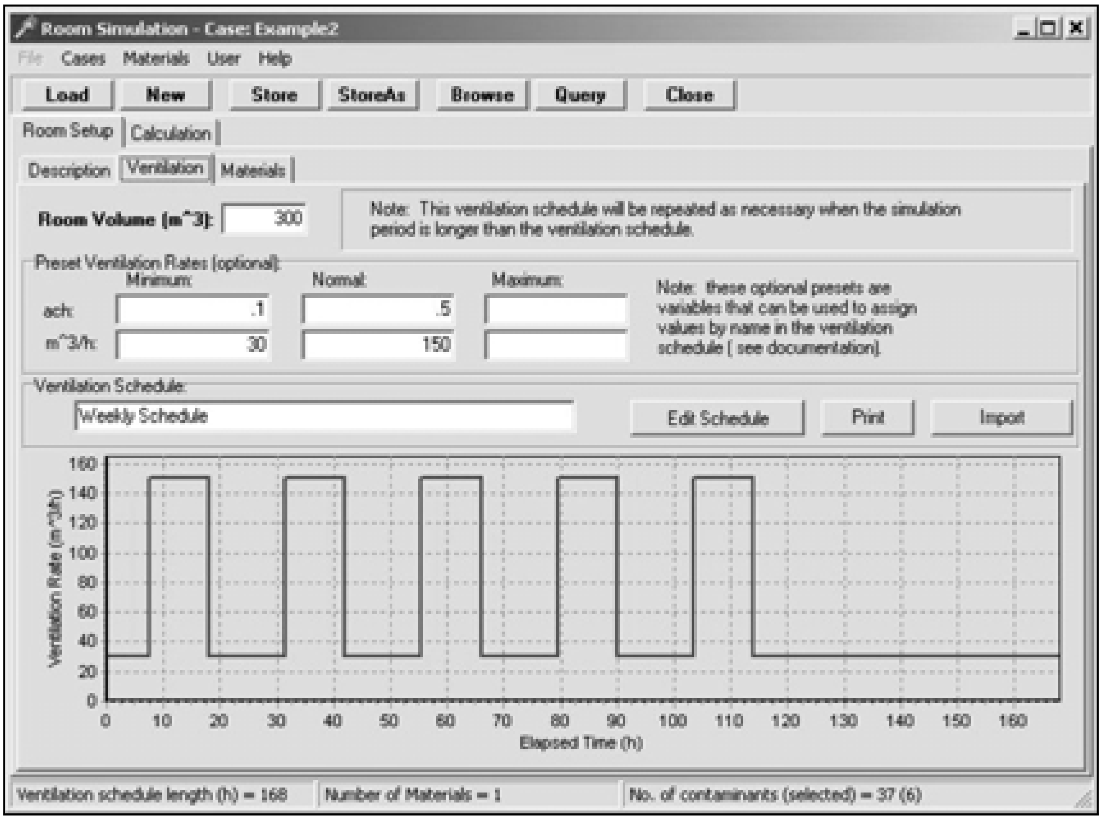
On the technical side, data needed to calculate the emission rates, which are the basis for the simulation, are derived from standard emission tests performed at NRC using electro-polished stainless steel chambers. The testing follows strict protocols based on ASTM standard D 5116, using a chamber temperature of 23ºC and a relative humidity of 50%. The chamber loading reflected typical indoor conditions (for most cases it was between 0.4 and 0.73 m^2/m^3) , and the air exchange rate was 1 per hour. With airflow simulations, it was ensured that the air distribution throughout the chambers was homogenous. For "wet" material, where evaporative emission dominates during the initial test period, a specialized dual-chamber system was employed to carefully control the airflow immediately above the test specimen. The emission characteristics are specified as coefficients of source models, which are empirical equations such as power-law decay, peak, and constant model.

The choice of a source model was decided based on R^2 values as a result of curve-fitting as well as visual inspection.

The software tool might be useful for building designers, engineers and managers to estimate the contaminant concentration levels for various design options, for product manufacturers interested in evaluating and improving existing products or developing new products, for researchers in testing laboratories or for indoor air quality consulting firms to update their emission test data and/or provide consulting services to their clients.

IA-QUEST may be downloaded free of charge: to learn more about the software, to examine the usefulness in your application area: please visit the National Research Council Canada website at http://

The software requires Microsoft Windows (98, XP, NT 4.0 or 2000) with a minimum of 16 MB RAM memory and 20 MB hard disk space. Up to now the software has been downloaded ~400 times, in 37 countries, with a steadily increasing trend.



Users specify volume and ventilation schedule for space to be simulated, then select building materials from the database

The authors appreciate any feedback regarding functionality, user-friendliness and help functions.

We plan on continually upgrading the capabilities of the tool itself, e.g., by adding new modules. Such modules may be an air filtration model, which allows the prediction of the effectiveness of air cleaning under certain scenarios, e.g. for a specific VOC spectrum and specific VOC concentrations. The underlying database will be updated as well, as new and improved building materials appear on the market.
This is also a possibility for the manufacturers of environmentally-friendly and healthy building products to include their products in the database. Currently only NRC-tested materials are included in the database, but we plan to release a quality-assurance protocol, that will allow externally-tested products to find their way into the database. Results obtained from external testing will be clearly identified.

We want to highlight as well, that the software was developed under strict testing and quality assurance protocols.

However, the results are only valid under certain boundary conditions, in terms of accuracy of the emission testing as well as in terms of other physical and chemical limitations.
Particularly, caution should be taken when long-term emissions are predicted as the software is based on short-term emission testing. Please also have a look at the disclaimer http://

IA-QUEST Publications
(note IA-QUEST was originally referred to as "MEDB-IAQ" for Material Emissions DataBase and Indoor Air Quality simulation program):

- Biesenthal, T.A.; Magee, R.J.; Bodalal, A.; Lusztyk, E.; Brouzes, M.A.; Nong, G.; Shaw, C.Y.; 2002; Upscaling of material emissions: comparison of small and full-scale chamber results and evaluation of an IAQ simulation model; http://
- Magee, R.J.; Bodalal, A.; Biesenthal, T.A.; Lusztyk, E.; Brouzes, M.A.; Shaw, C.Y.; 2002; Prediction of VOC concentration profiles in a newly constructed house using small chamber data and an IAQ simulation program; http://
- Won, D.Y.; Magee, R.J.; Yang, W.; Lusztyk, E.; Nong, G.; Shaw, C.Y.; 2005; A Material emission database for 90 target VOCs; http://
- Won, D.Y.; Shaw, C.Y.; 2004; Investigation of building materials as VOC sources in indoor air; http://
- Zhang, J.S.; Shaw, C.Y.; An, Y.; Huang, Y.T.; 1999; MEDB-IAQ: a material emission database and indoor air quality simulation program; Indoor Air 99 (Edinburgh, Scotland, 8/8/99), pp. 634-639, September 01, 1999
- Zhang, J.S.; Zhu, J.P.; Magee, R.J.; Lusztyk, E.; Yan, A.; Shaw, C.Y.; 1999; A Database of VOC emissions from building materials; First NSF International Conference on Indoor Air Health (Denver, Colorado, 5/3/99), pp. 87-96, May 04, 1999.

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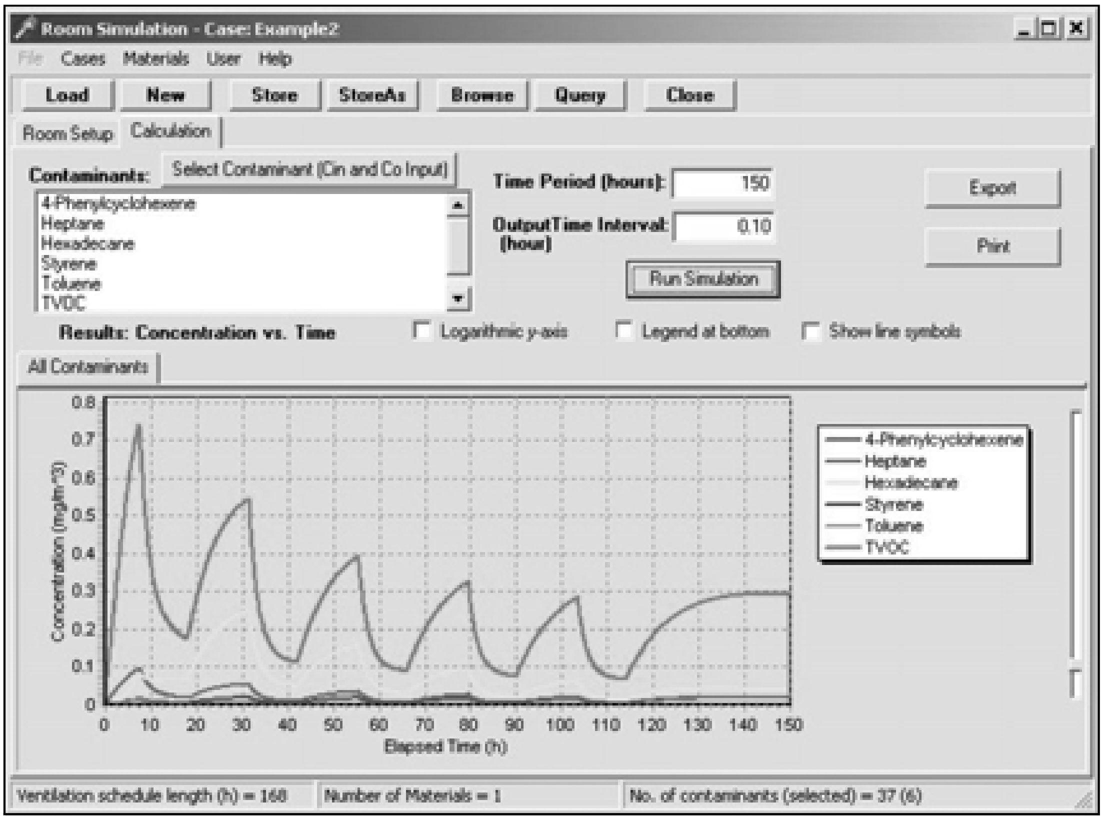


IA-QUEST calculates the concentration profiles of multiple VOCs during a designated time period in a room. Simulation results appear in graphs with zoom-in and zoom-out features

Indoor Air Quality in fifty Residences in Athens

M. Santamouris
Group Building Environmental Studies, Physics Department, University of Athens, Athens, Greece

Measurements of indoor pollutants were performed in 50 residences in Athens. The concentration of CO2, CO, TVOC's and PM2.5, PM10 was measured together with indoor temperature and humidity. Previous research of indoor air quality problems in Greece has shown that the selected pollutants are the most important ones. The ventilation rate was estimated using continuous CO_2 measurements. The indoor CO_2 concentrations were continuously monitored, as well as the indoor production rate by occupancy (based on the number of occupants present in the rooms). This information allows an estimation of the instant air change rate by solving the mass balance equation.
The impact of the ventilation rate as well as of the main indoor pollution sources like tobacco smoking has been analysed.

Ventilation rates of dwellings
Concerning ventilation of the dwellings, almost the totality of residential buildings in Greece is naturally ventilated. During the measurement period, all openings remained closed and ventilation was achieved only through infiltration. This is the standard occupation pattern found in residential buildings during the winter period. The measurements in the 50 residences indicate that the infiltration rate of dwellings in Athens varies between 0.5 to 1.5 h^{-1} as a function of the quality of the envelope. The mean measured air flow rate in the 50 dwellings was close to $1.1h^{-1}$. Almost 95% of the dwellings presented an average flow rate below $2h^{-1}$.

CO_2 levels in dwellings
The maximum measured concentration of the carbon dioxide in the 50 dwellings varied between 400 to 1800 ppm. In almost 70 % of the houses the maximum concentration exceeded 600 ppm, while in 25 % of the dwellings exceeded 1000 ppm.

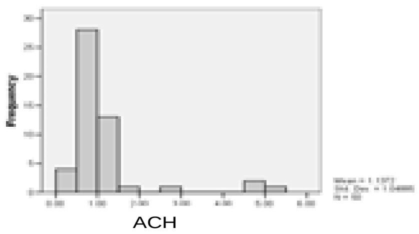
CO levels in dwellings
The measured concentration of CO on all 50 dwellings was low.
Only in one case indoor CO concentration exceeded the threshold of 9 ppm set by USEPA for 8 hours. The mean maximum concentration was close to 3.5 ppm. Almost 25 % of the dwellings presented a maximum ??? concentration below 1 ppm, 50 % below 2.5 ppm and 80 % below 6.3 ppm. A very clear correlation is found between the maximum indoor concentration of carbon monoxide and the calculated ventilation rate of the dwellings.

TVOC in dwellings
The TVOC measurements have shown that :

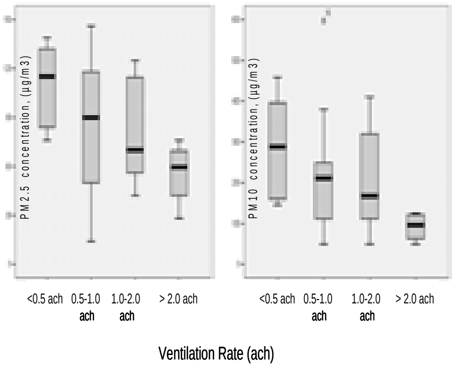
- only in 5 % of the dwellings, indoor concentrations are below the low limit of 0.05 ppm.
- Almost in 90 % of the dwellings the concentration is between 0.05 and 0.8 ppm, i.e. levels that may cause discomfort,
- in 5 % of the households concentrations are sometimes higher than 0.8 ppm, i.e. respiratory problems may occur.

Not a clear correlation between the TVOC's concentration and the ventilation is found. This is mainly because of the variability of the strength of indoor sources in the various dwellings. Finally, it is found that tobacco smoking increases highly the TVOC's concentration inside the dwellings.

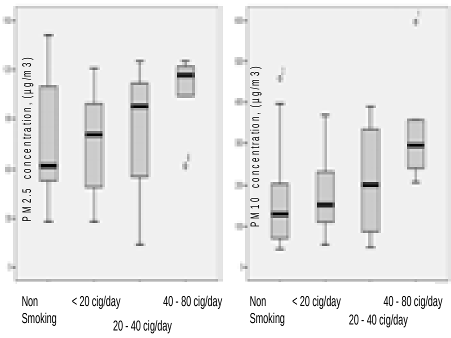
Particles in dwellings
Very high concentrations of PM10 and PM2.5 have been measured. In particular, only 16 % of the dwellings present a concentration below the threshold value of 65 µg/m³
Concerning the impact of ventilation on the concentration of PM's, a very clear correlation is found, for both PM2.5 and PM10. Finally, it is found that that smoking contributes highly to the indoor concentration of PM2.5 and PM10.



Frequency Distribution of the ventilation rate, (ach), for the 50 dwellings



Variation of the PM2.5 and PM10 concentration as a function of the ventilation rate



Variability of the Indoor PM2.5 and PM10 concentrations for various smoking levels

Conclusions
It is evident that indoor pollution is a major problem for dwellings in Athens. The combined impact of the measured pollutants may have an important influence on the health and well being of citizens. Given that a very clear correlation between the indoor pollutants and the ventilation rate has been found, increased ventilation rates may contribute highly to improve indoor environmental quality of households.
The full paper on this research will appear in one of the next issues of the International Journal of Ventilation.

ASHRAE Publishes User's Manual for Standard 62.2

A new book from ASHRAE will aid users in designing and constructing homes and apartments that comply with its residential ventilation and indoor air quality standard.

The User's Manual is the first for ASHRAE Standard 62.2-2004, Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings, which provides the minimum requirements necessary to achieve acceptable indoor air quality for dwellings.

The manual was co-developed by the Indoor Air Quality Association.
"The 62.2 User's Manual will provide HVAC engineers and IAQ consultants with practical information to ensure that ventilation positively affects the indoor environment," Robert G. Baker, IAQA president and ASHRAE Member, said. "IAQA was pleased to be a co-sponsor of this dynamic publication."

The manual explains how to comply with all the requirements of the standard, provides examples illustrating specific methods of complying with sections of the standard, and includes background material explaining why many of the requirements of the standard exist, according to Roger Hedrick, who co-authored the book. The manual is targeted toward builders and subcontractors, but will also be useful for code officials, researchers, and interested homeowners.

"The manual has been developed as a document that will accompany Standard 62.2 and provide guidance for applying its requirements to the design and construction of residential buildings," David Grimsrud, chair of the Standard 62.2 committee, said. "It serves as a guide to clarifying issues for users."

The cost of the 62.2 User's Manual is $45 ($36, ASHRAE members). To order, contact ASHRAE Customer Service at 1-800-527-4723 (United States and Canada) or 404-636-8400 (worldwide), fax 404-321-5478, by mail at 1791 Tullie Circle NE, Atlanta, GA 30329, or visit the ASHRAE.org Bookstore at http://www

ASHRAE Votes to Withdraw Proposed Change to Residential Ventilation Standard

S. J Emmerich, Vice-Chair of ASHRAE SSPC 62.2

Infiltration Credit
In the September issue of AIR, Max Sherman described a proposed change to ASHRAE's residential ventilation standard that was soon to be released for public review. Currently, Standard 62.2 assumes a portion of ventilation is provided by infiltration and requires the rest to be provided by mechanical means. Older homes that were measured to be quite leaky could take an additional credit for infiltration and provide less or even no mechanical ventilation. Addendum J would have deleted any mention of infiltration from Section 4 of the standard. The change was proposed to address some members' concerns that the current language regarding an infiltration credit was unclear – particularly in regard to its application to new vs. existing houses and the potential misunderstanding that the committee intended for mechanical ventilation to be increased if a house was measured to be tighter than the assumed level of infiltration.

Public review commenters objected to the proposed change for a variety of reasons. One objection was that the addendum left no provision to deal with leaky existing houses. Another potentially more serious issue was that the change had an unintended consequence of making it possible for even fairly tight homes to meet the standard without any mechanical ventilation at all. In the end, the committee was persuaded that this unintended consequence was real and that Addendum J should be withdrawn. This committee action will be voted on by letter ballot before it becomes official.

After withdrawing Addendum J, the committee discussed other potential changes to Section 4 of the standard to remedy the unclear language that remained a concern. While agreeing in principle to a change that would somewhat modify the current infiltration credit, the committee decided to spend more time developing new language. In the meantime, the committee agreed to issue an interpretation that should help ensure proper application of the current requirements.

Window Exception
In its current version, Standard 62.2 allows an exception to the requirement for mechanical ventilation in a limited set of mild U.S. climates if local authorities determine window operation is an acceptable substitute. Since then, a new study (Price and Sherman 2006) by Lawrence Berkeley National Laboratory provided new data that convinced the committee that many occupants do not open windows frequently even in mild climates, and an addendum deleting the exception was published for public review. A commenter provided additional data from a National Association of Home Builders Research Center survey (NAHBRC 2006). However, the committee felt the new data supported the deletion of the exception and rejected the comment. The new addendum will now become part of the standard.

HVAC Systems in Garages
Another controversial issue addressed by Standard 62.2 is the location of HVAC systems in attached garages. Since both HVAC equipment cabinets and their associated ductwork are typically quite leaky, installing such equipment in garages introduces a substantial risk that contaminants from sources in garages will be transported into adjacent living spaces thus compromising IAQ. Currently, the standard allows HVAC systems and return ducts in garages but requires them to meet a leakage limit. A motion to prohibit the practice entirely failed. In the end, the only action taken by the committee at this time was to issue an interpretation clarifying the test method options allowed for proving the tightness of the duct system.

NAHBRC. 2006. *Homeowner Indoor Air Quality Opinion Survey and Field Testing Protocol Development Phase 1*. NAHB Research Center, Inc.
P. N. Price, M. H. Sherman. 2006. *Ventilation Behavior and Household Characteristics in New California Houses*, Lawrence Berkeley Laboratory Report LBNL-49620.

Workair 2007

29-31 May 2007, Helsinki

The quality of the indoor environment (IEQ) plays an increasingly significant role in well-being at workplaces. To make improvements to IEQ, one has to know not only how to identify and manage indoor environment problems, but also how to maintain good indoor air quality, and design and build healthy buildings for the future. Although much research has been carried out on IEQ during recent years, too many questions remain unresolved. The improvement of IEQ requires multi-professional experts, proper tools, acceptable methods and best practices for preventing, examining and managing the problems.

WorkAir 2007 is an international conference in which the quality of indoor air and the environment of occupational settings is the main focus. It is designed for professionals who operate in workplaces which are either planning indoor environment improvements or struggling with the problems. Its aim is to provide them with practical knowledge and tools for IEQ problems. The Conference also highlights the newest and most advanced information on workplaces IEQ, and addresses special issues such as the reduction of occupational exposure to environmental tobacco smoke.
In this Conference, the focus is on the quality of indoor air and the environment in non-industrial workplaces such as offices, schools, day care centres and hospitals. The term "Indoor air" (the air we breathe) has been expanded to "Indoor environment" which we feel more sufficiently covers the current topics in occupational settings.

The aim is to discuss how to identify and manage indoor environment problems, to find good practices for solving these problems, how to design and manage them, how work performance, productivity and indoor air are connected to each other, and what the impact of the indoor environment is on well-being at work.

The target audience include all experts, researchers in the field, and representatives of real estate and other private companies, decision-makers and social partners interested in these issues to join the discussion on indoor air and occupational health and safety, and well-being and productivity.

The main themes of the Conference will be introduced by keynote speakers, and all interested parties are invited to actively participate through oral and poster communications.
@ http://www

EuroAcademy on Ventilation and Indoor Climate

The project "EuroAcademy on Ventilation and Indoor Climate" (CLIMACADEMY) started in 2006 with the financial support of the European Commission (Marie Curie Actions). The main aim of the project is to support and facilitate the strengthening of the European Research Area in the filed of Ventilation and Indoor Climate.

The objective of the project is to organize a series of events: 7 training courses in the field, for a period of 4 years (2006-2009). The event organizer is the Center for Research and Design in Human Comfort, Energy and Environment (CERDECEN), Technical University of Sofia, Bulgaria. The courses take place in Bulgaria, in the mountain resort of Pamorovo in a 4 star hotel with all facilities for useful work and pleasant stay.

The "Marie Curie" program gives grants to 40 participants in the course, being:

- young researchers up to 4 years after the M.Sc. graduation or Ph.D students (37 grants)
- young researchers with experience between 4 and 10 years after M.Sc. graduation or Ph.D. degree (3 grants).

The grants cover all expenses (travel and living allowance) plus course fee and course proceedings.

Each of the courses include two parts:

- Educational part (lectures in the morning sessions from leading professors and researchers in the filed)
- Open Seminar Sessions (presentation from the participating researchers on their current research work, followed by discussions).

Both lectures and presentations are included in the Course Proceedings.

The First CLIMACADEMY Course on "Indoor Air Quality and Thermal Comfort" was held from 19 to 27 of October 2006. The course was very successful: 15 European countries and 26 European research centres and universities had their representatives in the course.

The coming CLIMACADEMY courses are:

- Individually Controlled Environment (08.05.2007 - 13.05.2007)
- Industrial Ventilation (18.10.2007 - 26.10.2007)
- Integrated Analysis of Building Envelope and Indoor Environment (06.05.2008 - 11.05.2008)
- CFD Based Design of Indoor Environment (16.10.2008 - 24.10.2008)
- IAQ and Human Body Exposure (05.05.2009 - 10.05.2009)
- Experimental Assessment of Indoor Environment Parameters (15.10.2009 - 23.10.2009)

Director of CLIMACADEMY is Prof. Dr. D.Sc. Peter Stankov (Bulgaria). Course Director of the 2nd CLIMACADEMY Course is Prof. Dr. Arsen Melikov (Denmark).
For more detailed information, please, visit the web-page of CLIMACADEMY - http://www

AIVC Conference 2007

Crete Island, Greece, 27-29 September 2007

Building Low Energy Cooling and Advanced Ventilation Technologies in the 21st Century

The joint 2nd Palenc and the **28th AIVC Conference** aims to focus on the advanced low energy cooling and ventilation technologies for buildings.

Increased living standards, deterioration of thermal conditions in the urban environment and non-appropriate architecture design has caused huge penetration of air conditioning in many parts of the world and not only in hot climates. Such a condition has a very serious impact on the peak electricity demand of the countries and the corresponding energy consumption. Intensive research carried out during the last years has allowed the development of new technologies, components, materials and techniques that allow the cooling demands of buildings to be decreased or even eliminated. In parallel, very low energy consumption for cooling new generation buildings have been realized and monitored.

Ventilation in buildings permits to decrease the cooling demand, improve comfort conditions and decrease indoor pollution. A wide range of research activities carried out over the last years, has permitted to develop advanced ventilation systems that highly satisfy the above requirements.

There is in many countries increased interest in regulations to cover the issue of summer comfort, air conditioning and peak power control, e.g. the European Energy Performance of Buildings Directive asks from the Member States to undertake all the necessary measures in order to decrease the energy consumption caused by air conditioning and improve indoor environmental conditions (air quality, summer comfort, ...). Passive and low energy cooling strategies provide interesting options.

The scope of this Conference includes all aspects of technology and building design, dealing with ventilation and passive cooling techniques to improve the environmental performance of buildings. Papers related on ventilation, solar control, thermal mass, thermal comfort, urban microclimate landscaping, low energy architecture, innovative components and materials, standardization and legislation, advanced and alternative air conditioners, demand side management, etc. are welcomed. The main aims are to present and discuss the state of research and applications dealing with ventilation and cooling and also to assess the results achieved almost two years after the application of the European Energy Performance of Buildings Directive.

Topics

- Passive cooling techniques
- Ventilation for cooling
- Solar control
- Thermal mass
- Natural ventilation
- Hybrid ventilation
- Heat protection techniques
- Advanced control systems and techniques
- Innovative material and components
- Ground cooling
- Evaporative cooling
- Radiative cooling
- Microclimate
- Heat island
- Canyon effect
- Applications in social housing
- Demand side management
- Legislation and in particular results from the application of the European Directive
- Education & distance learning
- Climatic responsive architecture
- Thermal comfort
- Indoor environmental quality
- High efficiency air conditioners

Venue

The Conference will take place at Aldemar Knossos Royal Village, Limenas Hersonissou, Crete. Knossos Royal Village is one of the six hotel units of the Aldemar.

Travel with Aldemar and sample some of the most unique "flavours in the world" against the background of the Aegean Sea accompanied by the sounds of traditional Greek music. Savour the tastes of various gastronomic specialities in a luxurious atmosphere with top-quality service surrounded by exceptional natural beauty. Explore traditional Greek summer tastes. Experience moments full of..."sea", on the beach, in a hospitable and fresh atmosphere.

The conference centre is located on the grounds of Knossos Royal Village and it can cater for groups of up to 900 people.
Visit the conference website:
@ http://palenc2007.conferences.gr

Notification for paper acceptance

15 March 2007

Final papers due

31 May 2007

REGISTRATION FEES	From 1 February 2007 Until 30 April 2007	After 1 May 2007 On site
Participant	540 euro	590 euro
Student	270 euro	295 euro
Guest	25 euro	25 euro

Important Note for authors:
Authors should pay the full registration by 30 April 2007 to ensure that their paper will appear in the programme and will be included in the Proceedings.

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- Air Infiltration and Ventilation Centre
- Energy Conservation In Buildings And Community Systems

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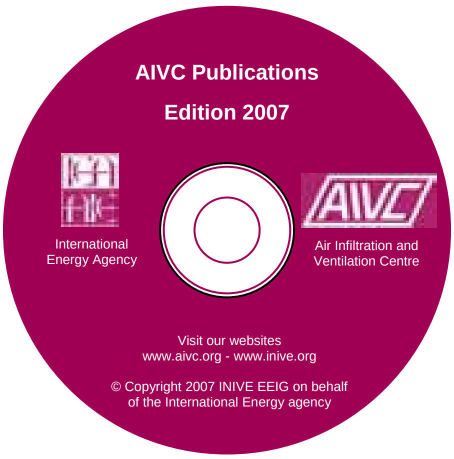

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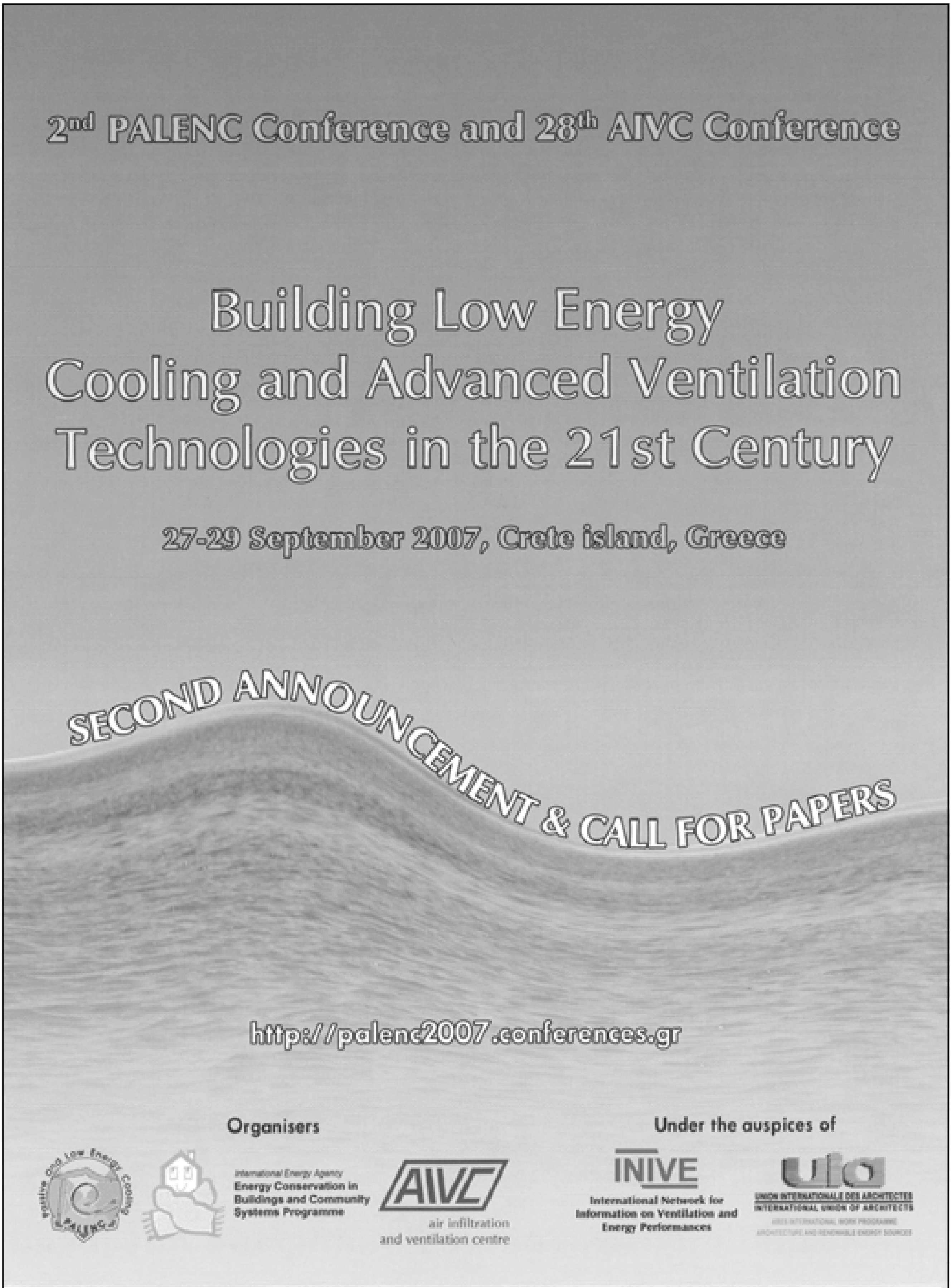

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