AIR INFORMATION REVIEW

VOL 29, No. 4, September 2008 A quarterly newsletter from Air Infiltration and Ventilation Centre

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Online Access to Proceedings IBPSA

Dear reader,

We are pleased to announce to you that, as part of the collaboration agreement with IBPSA, the International Buildings Performance Simulation Association, we can now offer you on-line access to the full set of proceedings of IBPSA conferences from 1990 till 2007. This corresponds with some 1200 full conference papers in PDF format.

A substantial part of these conference papers have a direct link with ventilation and air infiltration processes in buildings and building components and offer a wealth of information.
Through this collaboration, we aim to provide more services to our readership.

We hope that you appreciate this new service,

Peter Wouters
Operating Agent AIVC

Jan Hensen
President IBPSA

New AIVC Publications

Technical Notes on ventilation in Czech Republic and Korea

The AIVC's collection of technical notes on subjects including ventilation, infiltration, indoor air movement, and measurement techniques has grown with two new reports on the ventilation in the Czech Republic and Korea. Questions like what are the climatic conditions, which standards are applicable, how is the evolution of ventilation systems in the different building types, how is the uptake by the market, what about energy efficiency, etc. are answered. Also an outlook towards the future is presented.

Read more on page 2

VIPs on trends in the building ventilation market in Japan, Korea & Czech Republic

As a major outcome of the International AIVC Workshop 2008 in Ghent, Belgium "Trends in national building ventilation markets and drivers for change" on 18-19 March 2008, several VIPs are being produced. Last issue we could already present the first VIPs on the trends in the building ventilation market in different countries and in this issue we are glad to announce 3 more; from Japan, Korea and the Czech Republic. These papers present recent changes in building regulations affecting ventilation, address issues of IAQ and energy and air-tightness within the national regulations.

Read more on page 3

Ventilation in the Czech Republic

AIVC Technical Note 63, 2008, 18 pp
P. Charvat

The current Czech legislation is not really a driver for change in building ventilation since it still considers natural ventilation by opening windows satisfactory in many (most) situations. Mechanical ventilation with heat recovery still remains rare in residential sector and no big change can be expected in the near future.

Mechanical ventilation with heat recovery in apartment buildings is quite exceptional. The main barriers in market penetration of balanced mechanical ventilation in the residential sector are the high costs of the systems and a low additional value perceived by an average customer. Balanced mechanical ventilation is typical for commercial buildings (shopping malls, banks, restaurants, etc.) However, balanced mechanical ventilation is often used in some parts of naturally ventilated buildings in order to meet ventilation requirements (e.g. kitchens, cafeterias, lecture halls or auditoriums in school buildings, operation theatres and labs in hospitals, etc.).

Integration of control and monitoring of different building systems and services becomes an issue in larger buildings and building complexes (e.g. university campuses). Building Management Systems are not yet commonly used in buildings but their application seems unavoidable in future as the building technologies become more sophisticated.

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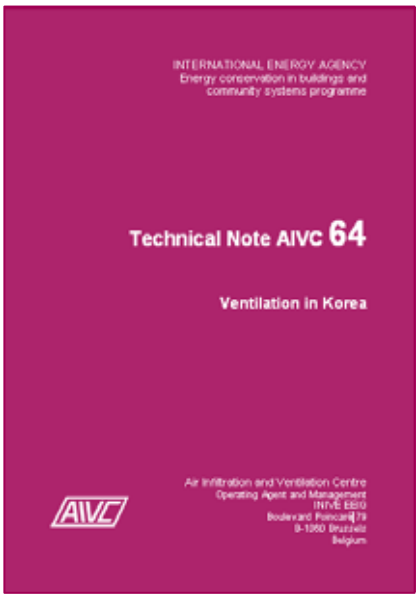
Ventilation in Korea

AIVC Technical Note 64, 2008, 19 pp
Yun-Gyu Lee, Sun-Sook Kim

Due to the rapid urbanisation and modernisation of Korea, the demand for housing has increased considerably more than in other countries. As a result, the apartment building has become the prevalent housing type in many cities and suburbs in Korea. Today, the demand for an improvement in the qualitative aspects of housing is growing considerably due to the increase in the housing supply rate.



With the exception of mechanical exhaust fans in bathrooms and kitchens, in the past, most residential buildings were not designed to be equipped with ventilation systems. Building ventilation was usually achieved by opening windows and doors.

Since the Korean Ministry of Environment enacted the 'Indoor air quality management act' for newly built apartment buildings and multi-purpose facilities in 2004, a variety of types of ventilation systems have been supplied in order to meet the mandatory ventilation requirements.

Since Korea has four distinct seasons, there is a wide variation in the range of outdoor temperatures throughout the year. The insulation standard for building envelopes, specified in the 'Equipment Standards for Buildings' section of the building regulations, was recently reinforced by more than 20 %. Since June 2001, eight types of high-energy consuming buildings, including offices and hospitals, have been mandated to apply a separate 'Design Standard for Energy Efficiency'.
In order for these buildings to meet the requirements specified in this standard, efforts must be made to increase the use of high efficiency energy products such as high efficiency gas boilers and refrigerators. Besides these mandatory regulations, government authorities are operating various types of voluntary certification and labeling programs.

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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.

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INIVE EEIG - Lozenberg 7 - BE-1932 Sint-Stevens-Woluwe - Belgium
Tel: +32.2.655.77.11 - Fax: +32.2.653.07.29 - *inive@bbri.be* - *www.inive.org*

Preparation: Christophe Delmotte, Sabrina Prieus & Peter Wouters - Editing: Erika Malu

Trends in the Japanese building ventilation market and drivers for changes

AIVC VIP 25, 2008, 16 pp
T. Sawachi, M. Tajima

There are two important surrounding conditions for the building ventilation market in Japan. Those are increasing social needs for higher environmental quality of indoor space and for lower energy consumption. Both of these are also common to other industrialised countries and areas. In order to respond to those needs, the system of regulations and standards needs to be developed further. Educational activity to transfer new knowledge to practitioners is needed. To reduce the environmental impact of the buildings and to enhance the indoor environmental quality with cost effectiveness the distance between the engineering field and society looks to become shorter.

In this paper, re-emerging or new problems which are being faced by experts in Japan are reviewed and introduced. The authors hope that it will be fruitful for experts in different countries to be able to share some of the problems and the strategies to solve them.

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Trends in the Korean building ventilation market and drivers for changes

AIVC VIP 26, 2008, 11 pp
Y. Lee, S. Kim

Apartment buildings are the most common type of residence in Korea, but since the 1970s it was difficult to supply fresh air due to airtight exterior walls that were constructed with energy conservation in mind. In addition to this problem, Sick House Syndrome and Multi Chemical Sensitivity issues arose from having used petrochemical building materials and furniture that often emit volatile organic compounds and formaldehyde with high possibilities.
In order to solve the Sick House Syndrome, the Korean Ministry of Environment passed a law on ventilation standards and likewise the Ministry of Construction and Transportation made it mandatory to install ventilation systems in apartment houses and multipurpose facilities, as well as propagate the ventilation standard suitable for a particular type of building design.
Lately, research on ventilation systems has become more widespread, and developments are being accelerated through technical cooperation between ventilation manufactures. The objective of this research and development is to meet the ventilation requirements as well as to pursue energy saving and sustainability by utilising mechanical and natural ventilation systems.

This paper briefly explains indoor air quality conditions of apartment buildings, the newly enacted regulation of ventilation and various ventilation systems available on the market in Korea.

AIVC Online Download the new VIP 26

Trends in the Czech building ventilation market and drivers for changes

AIVC VIP 27, 2008, 9 pp
P. Charvat

The building ventilation market in the Czech Republic concentrates around commercial buildings (shopping malls, banks, movie theatres, restaurants, airports, etc.), where balanced mechanical ventilation with heat recovery is mostly used (usually as part of the central air-conditioning systems).
The balanced mechanical ventilation systems are also used in newly built private office buildings, which very often have glass facades. The school buildings are usually naturally ventilated. Balanced mechanical ventilation is commonly used in lecture halls at universities but rarely used in offices and classrooms.
The regulations for residential ventilation are rather loose with natural ventilation by opening windows considered satisfactory in most situations.
Mechanical exhausts installed in residential buildings are not intended as whole-house or whole-apartment ventilation systems. The fans are manually controlled and they are usually used only during cooking or bathroom use.
Mechanical ventilation with heat recovery still remains rare in the residential sector and no big change can be expected in the near future.

In this paper the main barriers to market penetration of balanced mechanical ventilation in the residential sector are determined. Also ventilation systems in commercial buildings (shopping malls, banks, restaurants, etc.) are discussed.

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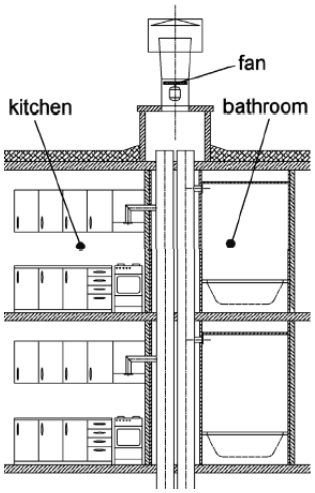

Ventilation system in a prefabricated reinforced-concrete building

IAQ and Ventilation Efficiency with Respect to Pollutants inside Automobiles

AIVC VIP 28, 2008, 7 pp
Hea-Jeong Kim, Yun-Gyu Lee

Recently, there has been a growing public concern over indoor air quality not only in buildings but also in vehicles. Since the vehicle is the main form of daily transportation for most people, of particular concern is the symptoms suffered by both drivers and passengers such as fatigue, headache, and eye stimulation caused by formaldehyde and volatile organic compounds (VOCs) emitted from the interior materials of newly assembled vehicles.
In order to address this problem, leading automobile manufacturers have voluntarily conducted the measurement and management of indoor air quality for new vehicles. Audi and Mercedes Benz use sensory tests carried out by a Nose Team to control the odours in new cars. Furthermore, ISO/WD 16000-26, which specifies automobile interior materials, is currently being included in ISO/TC146 /SC6.

In June 2007, the Korean government also proposed “The standard of indoor air quality new vehicle” and reported the results, which demonstrate that the harmful impact of chemical pollutants might be minimised by indoor air control strategies such as ventilation of the new vehicle within 90 days after it is manufactured. From the results, it can be seen that ventilation is as effective within a vehicle as it is in similarly enclosed spaces such as within buildings.

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Recent efforts of French professionals from the building sector to account for airtightness

A. Litvak, CDPEA
_____@_____
www._____

According to the recent conclusions of the "*Grenelle de l'Environnement" (www.legrenelle-environnement.fr)*, the energy performance of buildings has become very recently a major concern in France. As a matter of fact, building's airtightness is now explicitly considered as one of the two levers, with thermal bridges, that will lead French buildings toward higher energy efficiency constructions. Indeed, what used to be a confidential issue a few months ago has now become a *real* subject that French professionals thoroughly take into account. Yet, if it is very difficult to understand why changes happened so fast, it may be interesting to describe the conditions that led to this unexpected evolution and towards promising future results.

The *"Grenelle de l'Environnement"* is a multi-party debate that has gathered together, from July 2007 until December 2007, representatives of government and organisations (professional associations, non-governmental organisations), with the goal of unifying a position on environment-related policies. Among the 33 operational committees that have been set following the conclusions of the "*Grenelle de l'Environnement" last December 2007*, 4 committees deal exclusively with energy performance of buildings (EPB). Yet, among the major subjects of interest for EPB, building airtightness appears to be a common issue for most of French professionals of the whole building sector.

Such a sudden raise of consciousness is unexpected. In France, building airtightness has been neglected for a long time, leaving France behind common "best practices" observed in northern European countries, with high energy efficiency building standards. Although, since 2001, the French Thermal regulation requires explicit airtightness levels according to the type of building (single family dwellings, multi-family dwellings, non residential or large volume buildings), measurement controls are not mandatory. The French thermal regulations RT2000 and RT2005 explicitly account for the leakage index Q_{4Pa} [$m^3/h/m^2$], as the infiltration airflow rate at 4 Pa, divided by the whole building specific envelope area exposed to unheated and outside spaces, considered as the most susceptible to promote air leakage infiltrations.
Yet, in 2001, there was an urgent need pointed out by French specialists to better characterise the airtightness of whole building's performances and to determine sampling methods, in order to assess the building airtightness from individual measurements.
But until early 2007, very few people have been involved in R&D projects related with building airtightness. Moreover, one should know that less than 50 commercial instruments have been sold these last 3 years in the French market, where two airtightness measurement instruments dominate (the well known Blowerdoor® commercial instruments and the Permeascope®, a device designed by Aldes®).

Since June 2007, the new thermal regulation RT2005 label BBC-Effinergie standard requires a mandatory minimum leakage index Q_{4Pa} of 0.6 $m^3/h/m^2$ for single family dwellings, in order to achieve heating energy consumption in the order of 50 kWh/m^2/year. Following the results of the *"Grenelle de l'Environnement"*, the French ministry of sustainable development (MEDAD) plans to achieve an objective for the BBC-Effinergie standard of 130 000 dwellings per year in 2012 and 400 000 dwellings per year in 2020.

Indeed, achieving such an objective, would dramatically develop the French market of airtightness measurement.

In this context, an informal working group – the "Club Perméa" – consisting of actors involved in building airtightness issues, such as industry groups, research and development centres, regulation body (MEEDDAT), companies providing airtightness services, regulation labels Effinergie, etc. was initiated in April 2007, by CETE Sud-Ouest, a technical centre from MEEDDAT. It addresses issues such as how to measure multi-family building and how to assure quality measurements, in order to achieve the expected airtightness measurement market transformation.

By now, the different tasks that have been identified by these professionals are:
- The development of sampling methods, enabling the assessment of whole residential building airtightness from single family dwelling measurement (i.e., in apartments)
- The development of real scale 1:1 pedagogic standardised cells in order to increase, nationwide, the knowledge of professionals on airtightness building products and associated airtightness measurement techniques
- The development of quality management procedures for building airtightness measurement, as related to the EN 13829 norm and to the Quality Control procedure of the Annex 7 of the Thermal Regulation RT2005.
- The development of a professional certification for the control of the BBC-Effinergie label

However, work from this informal working group is still in progress and the first results should be available from the second semester of 2008.
These efforts have been presented at the First National Conference devoted to the impact of the envelope airtightness on the energy performance of buildings that took place in Bordeaux on 21 February 2008, during the 2nd AQUIBAT National Trade Fair.
The conference on envelope airtightness had an audience of more than 250 visitors.

Oral presentations dealt with energy impact of air infiltration, associated constructive pathologies and available technical means (e.g., metrology, construction products, etc…) to improve the energy performance of buildings. These oral contributions, a large exhibition featuring innovative construction products and measurement instruments provided added value to the conference. This conference was supported by the resource centre CDPEA devoted to the sustainable building construction and energy performance that has been recently created in Bordeaux. This centre is developed by the Association CDPEA (*Association pour la Construction Durable et la Performance Energétique en Aquitaine - CDPEA*), and came about from the common effort of the main regional key actors of the construction sector. As part of its own development strategy, CDPEA will focus on improving the technical quality of the building envelope, especially concerning the impact on the energy performance of building airtightness. The main goal of this resource centre is to steadily fill the gap between the best practices commonly used in northern European countries and the current French building professional applications.

The ongoing research led in France these last months under the working group initiated by CETE Sud-Ouest should lead to a series of promising results by 2008-2009. These results will possibly be presented during the next 4th European Blowerdoor symposium in 2009, that should then be a good opportunity for French actors to present their works and results to their European colleagues.

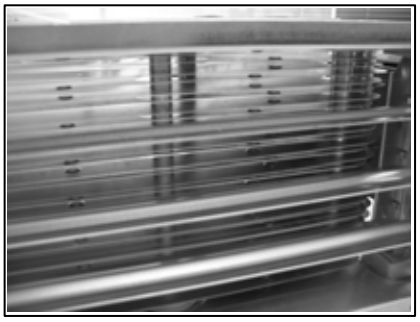
Towards a French standard for the assessment of residential air cleaners Efficiency

A. Ginestet, CETIAT, France

Within the space of few years, indoor air quality has become a growing concern for many people. As a result, residential air cleaning has become a buoyant market: various air cleaners can now be found in the shops, either as stand-alone portable devices or as part of air-conditioning terminal units.

Real technical advances have also been made.

The first residential air cleaners to be sold were addressing specific IAQ problems such as odours or tobacco smoke.



Example of an electrostatic (electronic) filter used in an air cleaner

Now, most of the commercially-available appliances use various advanced filtering techniques (HEPA or electronic filters for particles, photocatalysis for VOCs and biocontaminants, activated carbon or cold plasmas for gases, etc.), and thus can be considered as global solutions for IAQ improvement.
Apart from the questions of maintenance (e.g. frequency of changing filters), energy consumption or noise, the main problem is that consumers don't have any information on the actual efficiency of these systems in realistic configurations of building operation.

Some standardised test methods exist (ANSI/AHAM AC-1-2002 in the United States, JEM 1467 (1995) in Japan) but the shortcoming is first that these methods focus mainly on the problem of tobacco smoke, and secondly that they consider very high pollution loads. Moreover, it has been shown that oxidising techniques and high-voltage electronic filters can contribute to yield secondary harmful products (aldehydes, ozone) in indoor air; however, none of the existing test methods address this issue.

A French research project is under progress about a new test method to assess the efficiency and the harmlessness of residential air cleaners. It involves several French partners – CETIAT, CHRU de Strasbourg, EDF, LEPTIAB, LHVP and TERA Environnement - and is sponsored by ADEME (French Environment and Energy Management Agency) and by DGS (from the French Ministry of Health).

This study deals with a new test method for the efficiency of residential air cleaners. It considers various kinds of contaminants (gases, particles, biocontaminants and allergens) at concentrations that are representative of typical concentration levels found in indoor settings. Air cleaners are tested in such a way that their efficiency as well as their air flow rate are directly measured when they are installed within a "one pass" test rig. Finally the results are used to calculate the clean air delivery rate (CADR) of the air cleaners.

This new test method is going to be assessed and validated and two commercially available air cleaners tested.

Once achieved, the results of this study will be available as a basis for the definition of a standard on residential air cleaner's performance. This standardisation work was begun in France since a standardisation working group named "Air cleaner" has been officially created in December 2007. Three different committees from AFNOR jointly host this group: B44A (Photocatalysis), X43i (Indoor Air Quality) and X43c (Air Quality in Work Places). An experimental standard is expected to be published by the end of 2009.

EnVIE announces a strategy for IAQ and health for EU before the end of 2008

E. de Oliveira Fernandes
EnVIE project coordinator
www.envie-iaq.eu

EnVIE is a co-ordination action on indoor air quality and related health effects supported by the Sixth Framework R&D Program of the European Union with around 20 EU institutions, almost 50/50 from the technical and the health side. EnVIE purpose is to offer a set of strategies or policies for IAQ & Health. This will be the contents of a Report to be rendered by the end of October 2008.

EnVIE adopted an innovative concept, illustrated in the figure, as a way to cope with the diversity of perspectives and parameters or factors when trying to approach the issue IAQ *vs* health. The complexity with which those issues have been presented ended by being an obstacle to systematising the approach to the problem and the prioritisation of action.

Starting from the health effects and going top down to causes & sources, a link is assumed to be possible between those health effects and some listed exposures. Once the exposures are identified, it will be possible to reach the causes and then, the sources. Policies must give priority to source control and, ultimately, to ventilation. A discussion will be also on the level policies must be adopted, from EC to Member States but also identifying standardisation organisations and also professional associations or others.

The first draft of the proposal on policies will be presented publicly and discussed by a selected panel of scientists, stakeholders and policy makers in a Conference to be held in Brussels on 16-17 September. Through the comments from different perspectives, this final step will hopefully lead to a more clear and robust EnVIE proposal.

Safe indoor environments for 400 million Europeans involve not only building designers and regulators.

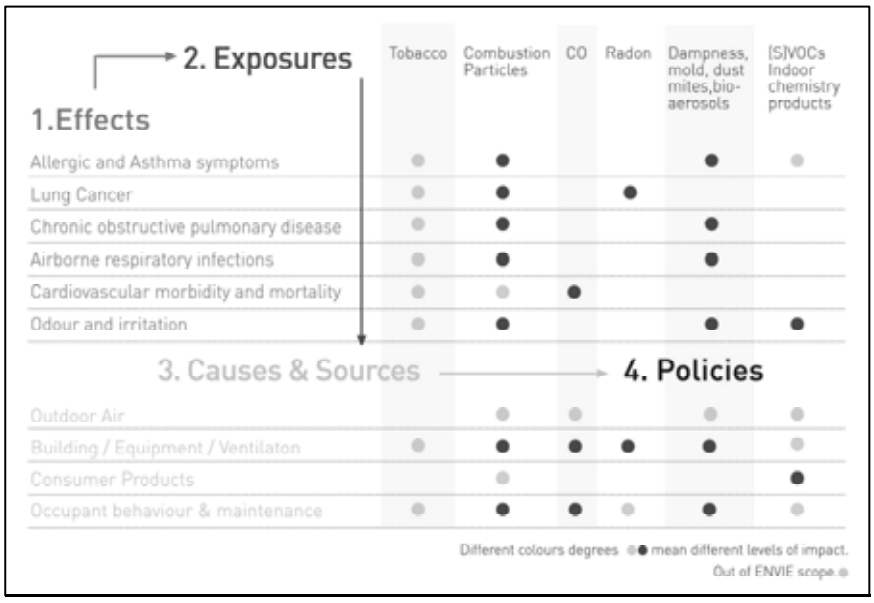
Involvement of building construction and maintenance professionals and building managers, their educators, professional associations and good practices is essential for success. In residential buildings a vast majority of indoor air problems can only be detected, assessed and remedies initiated by the occupants. Therefore, buildings should be fail-safe, i.e. no failure in its systems or equipment should create a danger which is not obvious to a lay person.

Former brewery converted to a student center

P. Charvat, M. Jicha
Brno University of Technology
_____@_____
www._____

One of the biggest opportunities for energy saving in the building sector lies in the energy retrofits of old buildings. Eight demonstration buildings in seven European countries have undergone energy retrofits within the framework of the BRITA in PuBs project Bringing Retrofit Innovation to Application in Public Buildings). One of these demonstration buildings is a former brewery located in the city of Brno in the Czech Republic.

The brewery, which was originally built in the 1770s, has been converted into a social and cultural center for students and academics of the Faculty of Mechanical Engineering of the Brno University of Technology.



'EnVIE method'

The original purpose of the building has been preserved in the name of the center, which is referred to as the Old Brewery (Stary Pivovar in Czech). Moreover, the architects succeeded in their effort to preserve the appearance of the Old Brewery as a building from the early industrial age. The social and cultural center incorporates a cafeteria, restaurant, student club, auditorium, two multi-purpose rooms, and 33 guest rooms. The total usable floor area of the Brewery after the retrofit is 2660 m^2.

The social and cultural center Old Brewery

Since the retrofit involved a complete change of the user profile, all HVAC systems had to be designed from scratch. Many energy saving measures were studied during the design phase but not all of them proved feasible.
There were spacious flooded cellars near the brewery and an idea was explored to use the flooded cellars as a reservoir for water-to-air heat pumps. A pumping test revealed that inflow of water to the cellars was insufficient for operation of the heat pumps. Moreover, such a solution (however interesting) would be difficult to replicate in other building retrofits. A heating plant with two condensing boilers was finally chosen as the heat source for space heating, ventilation and domestic hot water (DHW) heating.

Two different kinds of ventilation systems are used in the Old Brewery. Balanced mechanical ventilation is used in the cafeteria, restaurant, club, auditorium and multipurpose rooms and demand controlled hybrid ventilation is used in the guest rooms. Heating coils in the air handling units and the heat exchangers for DHW heating require a supply water temperature of up to 80 °C.

It means that the return water temperature is too high for the condensing boilers to operate in the condensing mode. This problem was solved by dividing water supply into two loops, one for the air handling units and DHW heating and one for space heating. The space heating loop that operates at low water temperatures is connected to the flue gas heat exchangers of the boilers and thus enables recovery of latent heat from the flue gas.

The air handling units of the balanced mechanical ventilation system are fitted with cooling coils in order to provide space cooling in summer. Space cooling in guest rooms, with hybrid ventilation systems, is provided by a Variable Refrigerant Volume (VRV) air-conditioning system. The external units of the VRV system are located in the attic of the Old Brewery in order not to disrupt the historical appearance of the building. Outside air is drawn to the units through the louvre-covered openings in the facade and it is blown out trough the vertical ducts (chimneys).

A grid connected photovoltaic (PV) system with a peak output of 14 kW is installed on the roof of the Old Brewery. The building integrated photovoltaic systems could become a good compensation for the power demand of mechanical cooling.
A good match of the power production of the PV systems and the electric demand of mechanical cooling can be expected and thus the peak loads to the power grid could be reduced. One of the goals of the PV installation at the Old Brewery is to investigate how well the power production matches the consumption of the VRV air-conditioning system.

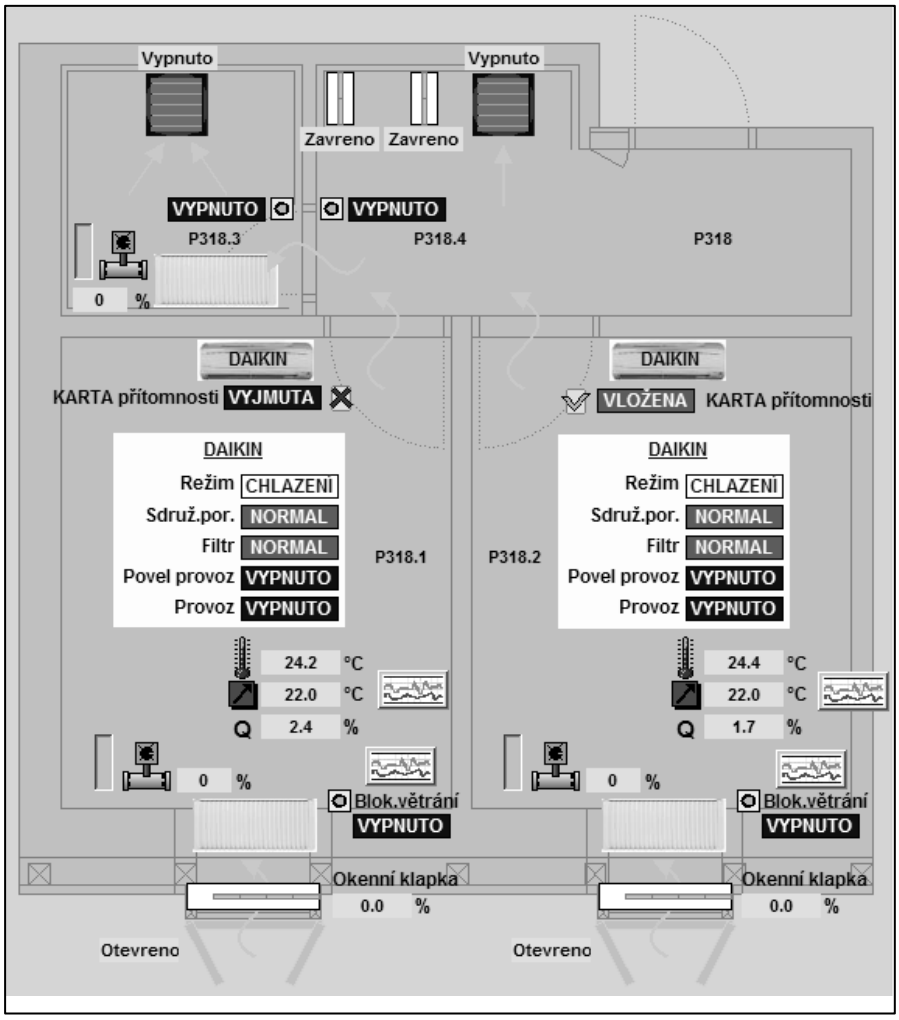
Probably the most innovative feature employed in the retrofit of the brewery is central control and monitoring of the building by the Building Management System (BMS). One of the advantages of the BMS is that information not directly related to indoor environmental conditions can be employed in the control of these conditions (e.g. information about occupancy from the access system can be used in controlling heating and cooling). The advantage of the integrated control by the BMS was employed in the guest rooms.

The BMS monitors the presence of the occupants, the opening of windows, air temperatures in the rooms, set point temperatures and the indoor air quality. Based on these inputs the BMS controls ventilation, heating and cooling.

The monitoring of occupancy was the most difficult task. The door to all accommodation units can only be opened by an access card. The problem is that most of the accommodation units have two rooms, each occupied by one person. It was necessary to determine which of the rooms is occupied. A card slot (similar to those used in the hotels) is installed in each room and the occupants are supposed to insert the card into the slot when they arrive in the room and remove it when they leave. When the card is inserted, the room is heated to the set point temperature; when the card is removed the room is heated to a lower temperature. Cooling shuts down completely when the card is removed.

Theoretically speaking, this approach should work quite well. The problem is that the card slot is not a card reader but a simple switch. Any card (or a piece of cardboard) inserted into the card slot means that the BMS considers the room occupied. This energy-saving feature relies on the accountability of the occupants in this point.

Other energy-saving features are more difficult to breach. There are servo-valves mounted on the radiators of the heating system that are fully controlled by the BMS. Heating and cooling of the room shuts down when the window is opened. The occupants can use the wall mounted space temperature modules to set the set point temperatures. They can also overrule the automatic control of hybrid ventilation (to increase the ventilation rate even if the indoor air quality in the room is acceptable).



BMS screen shot of one of the guest rooms

Ventilation of residential buildings: impacts on the occupants' respiratory health

F. Durier, CETIAT, France

Institut national de santé publique Québec

The following series of documents is from the Institut National de Santé Publique du Québec (INSPQ), a governmental organisation of Quebec Province created to improve the coordination, development and use of expertise in public health.

The main report in French (2006) describes different ventilation systems and requirements from ASHRAE standards and Canada/Quebec building codes. Information is then given about the direct and indirect links between ventilation and occupants' respiratory health.
Direct links are related to the impact of air renewal on respiratory health. Indirect links concern house dust mites, mould, VOCs, tight building syndrome.
These data from the bibliography are discussed from the point of view of the quality of the studies, the applicability of results to Quebec, the minimum ventilation rates and the ventilation efficiency.

The conclusion comprises eight recommendations from INSPQ to the Health Ministry of Quebec. They concern the ventilation of new and renovated buildings - which should be mechanical as a complement to natural ventilation, the ventilation of apartment buildings - in which ventilation rates should be the same as in individual houses. They also recommend that the minimum airflow rates in standards and regulations be evaluated from a public health standpoint. They suggest that a best practices guide is written and training sessions are organised for the ventilation contractors and the construction/renovation industry. They also suggest an awareness and information campaign about indoor air quality for the general public. Finally, the recommendations ask for scientific studies in order to evaluate actual indoor air quality in Quebec dwellings and to compare the impacts of different ventilation strategies and air change rates on occupants' respiratory symptoms.

This main report is available together with a summary document in English and in French.
Both documents can be downloaded at: www._____

ASHRAE Publishes New Guidance on Commissioning Process

Specific tasks to successfully implement the commissioning process for HVAC&R systems and assemblies are featured in a new guideline from ASHRAE.

ASHRAE Guideline 1.1, HVAC&R Technical Requirements for the Commissioning Process, describes the technical requirements for the application of the commissioning process described in ASHRAE Guideline 0-2005 that will verify that the HVAC&R systems achieve the owner's project requirements.

"The quality-oriented process outlined in the guideline provides improved quality and greater cost effectiveness compared to commissioning as currently practiced by many commissioning providers," Walter Grondzik, secretary of the committee that wrote the guideline, said. "One problem with the current practice is that 100 percent checking is performed during the construction phase of the project delivery process, and this checking usually focuses on limited or targeted systems. Quality-based sampling is not used, and so the current approach has limited quality-based random inspection procedures."

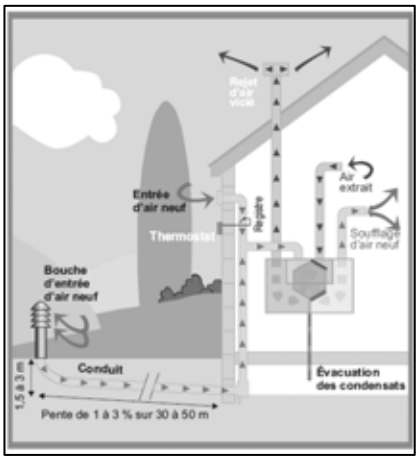
The guideline contains more than 100 pages of annexes, providing concrete examples of forms and documents to assist the commissioning team and owners in their efforts to deliver quality buildings that meet the owner' s project requirements. Twenty-five sample checklists, covering pre-design, design and construction, are included along with a sample owner's project requirements verification test procedure.

The cost of ASHRAE Guideline 1.1, HVAC&R Technical Requirements for the Commissioning Process, is $69 ($55, ASHRAE members).

To order, contact ASHRAE Customer Service at 1-800-527-4723 (United States and Canada) or 404-636-8400 (worldwide) or visit at www._____.

Earth to Air Heat Exchangers: New Information Booklet

This new guide from CETIAT is intended to inform about design and installation of earth to air heat exchangers. Such exchangers use the energy of the ground near its surface to heat or cool fresh air for buildings ventilation. This guide is comprised of four parts: structure and operation of an earth to air heat exchanger, design, installation, connection to the ventilation system in the building. An annex provides information about available products on the market.



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This guide (in French) can be downloaded for free at the following address: www._____

IAQVEC 2007 proceedings are available online

The proceedings of the 6th International Conference on Indoor Air Quality, Ventilation & Energy Conservation in Buildings (IAQVEC 2007) from Oct. 28 to 31 in Sendai, Japan, are now available online: www.inive.org/_____

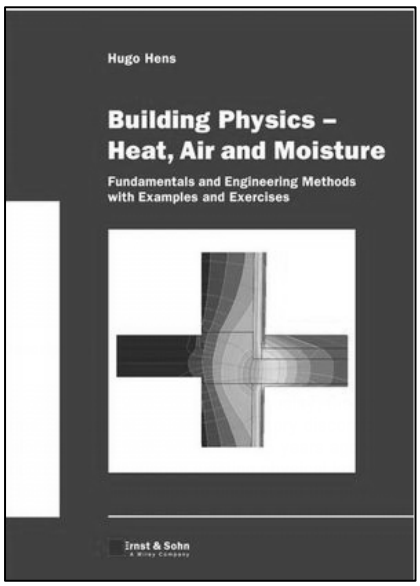
For more info on the conference go to www._____

New book: Building Physics – Heat, Air and Moisture

by H.S.L.C. Hens

Bad experiences with construction quality, the energy crises of 1973 and 1979, complaints about 'sick buildings', thermal, acoustical, visual and olfactory discomfort, the move towards more sustainability, have all accelerated the development of a field, which until 35 years ago was hardly more than an academic exercise: building physics.

Through the application of existing physical knowledge and the combination with information coming from other disciplines, the field helps to understand the physical performance of building components, buildings and the built environment, and translates it into correct design and construction.



This book is the result of thirty years teaching, research and consultancy activity of the author.

The book discusses the theory behind the heat and mass transport in and through building components. Steady and non steady state heat conduction, heat convection and thermal radiation are discussed in depth, followed by typical building-related thermal concepts such as reference temperatures, surface film coefficients, the thermal transmissivity, the solar transmissivity, thermal bridging and the periodic thermal properties.

Water vapour and water vapour flow and moisture flow in and through building materials and building components is analysed in depth, along with several engineering concepts which allow a first order analysis of phenomena such as the vapour balance, the mold, mildew and dust mites risk, surface condensation, sorption, capillary suction, rain absorption and drying. In a last section, heat and mass transfer are combined into one overall model staying closest to the real hygrothermal response of building components, as observed in field experiments.
To order the book : http://_____

Results from the Forum "Evaluation of Performance of Advanced Ventilation Systems"

O. Seppänen, REHVA

Indoor Air 2008

The 11th International congress on Indoor Air Quality and Climate (Indoor Air 2008) was held in Copenhagen 18-22 August. In connection of the congress AdVent-project and REHVA organised a forum to discuss the need for European Guidelines and standards on ventilation.

Four presentations were given by European experts:
- P. Warren, Brunel University, UK - The expected results of AdVent project and problems in evaluation of ventilation
- P. Heiselberg, Aalborg University, Denmark - What characterizes the performance of advanced ventilation technologies?
- J. Kurnitski, Helsinki University of Technology, Finland - Possibilities to measure the performance of ventilation?
- F. Allard, University of LaRochelle, France - How to proceed towards performance/air quality based ventilation?

About 70 experts from all over the world attended the forum and discussed selected topics. The forum was chaired by Olli Seppänen from REHVA, Jarek Kurnitski from Helsinki University of Technology acted as a secretary of the forum. In the following the questions and major conclusions from the discussion are presented.

Topic 1 - What are the most important criteria when evaluating the performance of ventilation in respect of air quality?
- Perception of occupants is more important than the measured physical result, i.e. occupants can be used as "sensors".
- Different measurement protocols for different ventilation system types are needed for different ventilations systems, but the same questionnaire should be used.
- Air diffusion varies depending on occupancy. – more measurement points and longer measurements needed
- Ventilation efficiency is to be measured in representative measurement points?
- The difficulty is how to select the representative points.
- Long term air velocity measurements are needed particularly in buildings with natural ventilation?

Topic 2 - How to compare performance of mechanical and natural ventilation systems? Do we need different criteria for mechanical, hybrid and natural ventilation systems?
- Similar criteria should be set in respect of performance but the question is how to set the criteria when indoor environment varies like in a naturally ventilated building.
- One possibility is to count the excess hours out of the preset range as is proposed in the informative annex of European standard EN 15251, and give an indoor air environmental foot print of the building
- One scientific base criteria could be the exposure to pollutants based on frequency analyse of concentrations and occupancy pattern, and based on exposure calculate the doze during a specified period and/or maximum concentrations – the problem is how to do that in practise – more basic research is needed?

Topic 3 - Do we know enough to replace ventilation standards with real indoor air quality standards?
- The conclusion was that there is not yet enough understanding on the effects of indoor air pollutants to replace an IAQ standard but a method parallel to prescriptive standards on air quality based method should be developed also for European conditions. The use of IAQ based methods should be encouraged.

- CO_2 - concentration is not appropriate as a performance indicator of ventilation, as the concentrations with typical ventilation rates in offices are so low. Compare to productivity data.
- Different quality levels of ventilation should be addressed in more specific ways.

The final conclusion was that work for better criteria for performance of ventilation is needed, and that REHVA should take initiatives in this area. The work is needed for the near future to evaluate current ventilations systems but also for the long term to develop and evaluate ventilation based on air quality.

Outcomes 5th Windsor Conference:

Air Conditioning and the low-carbon cooling challenge
Windsor, UK, 27-29 July 2008

This was the fifth Windsor Conference held at the Cumberland Lodge Conference Centre in Windsor Great Park (Previous conferences were held in 1994, 2001, 2004 and 2006). The conferences are relatively small but are very International (this conference had 77 delegates from 18 countries and all continents). Significant groups of delegates came from Japan, Brazil, Iran and the USA as well as European countries such as Germany, Portugal and of course the UK. Delegates also came from India, China, Nigeria, Argentina, Australia, Austria, the Netherlands, Switzerland, Italy, Latvia and Greece. Although the largest group of delegates were academics, there were a number of both delegates and speakers from engineering consultancies such as Arup, Faber Maunsell, KOA, Nigeria and BBA, the Netherlands as well as ASHRAE and AC manufacturers Daikin.

The Conference organised by the Network for Comfort and Energy Use in Buildings (NCEUB) and the Low Energy Architecture Research Unit (LEARN) and was sponsored by the Teaching In Architecture network, AIVC, INIVE and the EPBD Buildings Platform.

The theme running through all the Windsor conferences is the recognition that the comfort and behaviour of occupants is a crucial consideration for the energy use of buildings. At the centre of all the Windsor conferences was a need to augment the 'pure' physics of the building by including the interaction between occupants and buildings into building energy evaluation. Thus important themes of this conference were the ways in which human behaviour could be incorporated realistically in building simulations, how people actually use air conditioning and how comfort and overheating can be defined. The residential venue for the conference encourages serious scientific discussion and debate amongst the delegates well beyond the presentations and interdisciplinarity is encouraged by having a single session without workshops.

The 50 speakers presented an enormous variety of papers and included well known experts from all over the world. Eduardo Maldonado (EPBD Development Group and the University of Porto, Portugal) presented an important paper about the results of EPBD implementation in Portuguese housing suggesting that energy savings may well exceed expectation.

Richard de Dear of MacQuarrie University, spoke about how the utility companies in Australia are now so concerned about peak energy demand in summer, when 10 % of generation capacity is used less than 2 % of the time, that they are considering drastic new approaches to peak electricity demand management including direct intervention to control customers' compressors.

Prof Kevin Lomas of de Montfort University, UK gave a fascinating description of a hybrid advanced naturally ventilated building in the United States and how detailed monitoring of the ventilation system highlighted weaknesses and suggested solutions.
Stephen Turner is an engineer and the chair of the ASHRAE committee comfort standards and he gave a paper on ASHRAE's thermal comfort standards looking to the ways in which ASHRAE Standards should develop and addressing questions such as:
- When is heating or air-conditioning essential?
- What conditions should be provided?
- Can adaptive behaviour influence air-conditioned and naturally ventilated buildings?
- How can thermal comfort standards support more sustainable buildings?
- How can Standards for comfort, indoor air quality, and energy be better correlated?

Group photograph

Delegates enjoy a joke

In an after-dinner speech on the second day, practising architect Ashok Lall who also teaches at the School of Habitat Studies in Delhi considered ways of reducing or avoiding air-conditioning demand in India, particularly by the application of simple passive strategies such as shading and night ventilation together with low-energy mechanical devices such as fans and evaporative coolers which are already widely available. Gail Brager of the University of California in Berkeley looked at what effect a mixed-mode or hybrid system of cooling has on building occupant satisfaction. She shows that this approach which allows the building design to determine indoor conditions except in particularly cold or hot conditions, does not lead to an inferior indoor environment, and can indeed provide conditions which are superior to full-on air conditioning whilst showing considerable savings in energy use.

Two papers addressed the actual use of air conditioning in buildings and its implication for energy use. Roger Hitchins of the UK Building Research Establishment summarised analyses of the potential environmental impact of room air conditioner carried out for the European Commission in support of the Energy-using Products Directive. He reported that about half the cooling need of buildings in Europe is met by room air conditioners – the rest being met by central systems. The paper assesses the likely market for such products over the next 25 years, the consequent environmental impacts and the scope for reducing the global warming impacts.
Prof Yi Jiang of Tsinghua University in Beijing reported o a study of energy consumption by domestic cooling in China. Results from 641 homes were analysed and it was found that small split units used far less energy than large multi-unit central air conditioners. This seems to be because any individual unit is not always in use and occupancy may be a key factor.
Worryingly the use of energy is greater among younger occupants, suggesting that cooling use may increase in future.

A key concern, certainly among European building scientists is the increasing likelihood of overheating in buildings as the earth warms.

Jake Hacker of Arup UK and Fergus Nicol of LEARN and the NCEUB both spoke on the problems of summertime overheating prediction.
Jake's presentation was concerned with the ways in which the risk of overheating can be predicted using simulation and on problems with the weather files and software used for predicting potential problems. Fergus was introducing a paper which has developed from discussions in the Overheating Task Force of the Chartered Institution of Building Services Engineers (CIBSE) about how overheating can be defined using the results from field surveys.

This short article has introduced a small number of the excellent contributions to the conference.

A full list of the papers presented (most of them downloadable) can be found on the NCEUB website at www._____

A full listing of the abstracts of the papers can be found at http://_____

The information on this page is provided in collaboration with NCEUB, the Network for Comfort and Energy Use in Buildings. For more information, visit www.nceub.org.uk/

AIVC Conference 2008

Kyoto, Japan, 14-16 October 2008

From 14 to 16 October 2008, the 29th AIVC Conference will be held at the International Conference Center, Kyoto, Japan. The conference will provide a the opportunity for researchers and engineers worldwide to convene for '**Advanced building ventilation and environmental technology for addressing climate change issues**'.

Among the topics are: natural, mechanical and hybrid ventilation, air filtering, HVAC systems for (non-) residential buildings, thermal environment, regulation and control issues, commissioning, envelope air tightness, condensation prevention, energy retrofitting, computer simulation, post occupancy evaluation and surveys, case study buildings, etc.

The Conference is held at the same place where the Kyoto Protocol was signed on 11 December 1997. From that date on, developed countries recognised they are principally responsible for the current high levels of green house gas (GHG) emissions in the atmosphere.

The Protocol entered into force on 16 February 2005 and committed the industrialised countries to stabilize GHG emissions. 180 nations have ratified the treaty to date.

For more info on the Protocol and its monitoring:
http://unfccc.int/kyoto_protocol/items/2830.php
We hope you are now fully convinced to come to this event and we look forward to welcome you there!
To register: www.aivc2008.jp

AIVC's Interview with Dr. Morad Atif

Dr. Morad Atif has always been fascinated by science, especially innovations in science and how to make them real – how to bring them into our every day living environment. His entire educational and professional background has been dedicated to the science, innovation, and practice in the built environment, specifically the environmental and energy aspects of buildings. He is the Director of the Indoor Environment Research Program, at the National Research Council's Institute for Research in Construction (NRC-IRC), where he is also a member of the Management Team, and the Director responsible for the Canadian Center for Housing Technology. The NRC-IRC's Indoor Environment Research Program integrates expertise from several disciplines and aims at developing technologies for a sustainable, healthy, and acceptable indoor environment. This is done through a focus on acoustics, ventilation, air quality, and lighting.

You are man of many talents and wear many hats in the areas of energy and indoor climate. Can you list for us some of the key roles you play?

I currently chair the International Energy Agency's Implementing Agreement for Energy Conservation for Buildings and Communities Systems (ECBCS), which is a research collaborative agreement among 25 OECD countries. Since 1998, I have also been a member of the Federal Steering Committee, overseeing the strategic and operational aspects of two Federal Research Programs on buildings and communities: Panel for Energy Research and Development, and the EcoEnergy Technology and Innovation and Technology.

My educational background includes a professional degree in architectural practice, a Master's degree at University of California, Los Angeles, and a PhD degree at Texas A&M University, where
I later joined the faculty staff for three years.
Prior to my current leadership position, my research activities and publications were focused on the prediction, lab and on-site day lighting and thermal performance of buildings.

IRC has done a lot of research related to ventilation, indoor air quality and air tightness over the years. What do you look on as some of your key accomplishments? And what are the most exciting research projects currently underway?

Research priorities and accomplishments by NRC-IRC in ventilation/air leakage and IAQ, have been responsive to the evolving priorities of the building sector. In the 1980's, we developed the standards and tools in the application of tracer gas for assessing ventilation effectiveness, air movement, and air leakage. These methods have been adopted for research and on-site applications. We then released three guides for ventilation and indoor air quality for office buildings that help designers, building managers, and engineers identify optimum solutions. Our research thrusts evolved in the 1990's to more emphasis on source control. As a result, we released the most comprehensive material emission database and indoor air simulation tool of its kind -IA-QUEST. The database contains VOC concentrations (99 compounds) for more than 65 materials. The work also led to some new ASTM standards for the design and testing of Material Emission Chambers.

From assessment, then source control, we have fine-tuned our research outlook to include the well-being of the people who inhabit the built environment. One example would be our research on how classroom acoustics can inhibit children's learning. We have developed solutions that designers can access on our web site. We have recently launched major initiatives to address ventilation and health, indoor mould, and subjective aspects of indoor air quality and ventilation.

As part of Canada's Clean Air Agenda, we have been successful in securing support on a new indoor air research initiative, which, among others, includes:

- Three-year field study to correlate indoor air and ventilation rates to respiratory symptoms in homes in collaboration with l'Institut national de sante publique du Quebec;
- Evaluation protocols for IAQ products
- New national IAQ committee.

We have also recently built competencies, with our IRC colleagues in building envelope, to address indoor mould detection and mitigation. We continue to address the energy efficiency and ventilation effectiveness of advanced ventilation systems in homes and office buildings, through field and lab work. Longstanding research thrusts continue to be the development of indoor environment solutions for office buildings that integrate the subjective, health, and physical aspects for not only to IAQ and ventilation, but also acoustics and lighting.

Canada has in the past been at the forefront of energy efficient buildings. Where is Canada today?

The energy consumption in buildings – in Canada and most countries- represents a significant percentage of the total energy consumption (35-40 %). The policies and priorities for energy efficiency in buildings are developed and addressed by (Ministry) Natural Resources Canada. As a Steering Committee member of the Panel for Energy Research and Development – Buildings and Communities-, I can provide key drivers and strategic research priorities. Just as in most OECD and other countries, there are demands for drastic improvement of energy efficiency and clean energy, while addressing industry concerns on indoor health, rising construction costs, and the fragmented nature of the construction sector. Large climatic differences across Canada, and cold winters, bring other conflicting priorities such as indoor air quality, durability, etc. into consideration. In Canada the industry is also facing demands for benchmarking and rating of building performance, even though it is widely known that there are major knowledge gaps.

In the Steering Committee, we identified a balanced research approach for:

- Support of decision-making, and integrated approach
- Integration of promising key products and systems (e.g., HVAC, LED);
- Effective integration of new energy sources and renewables (e.g., co-generation and fuel cell, etc.)

As a researcher what areas are you the most interested in? What are you most proud of? What would you like to accomplish in the future?
I have evolved, in the last 10 years, into research management and leadership, where I lead and manage the NRC-IRC's Indoor Environment Program and contribute to the management of the NRC-IRC. The strong team and multi-disciplinary culture in the Institute, along with commitment to research excellence and to our clients/ stakeholders, has made it possible to fulfill my passion for developing well-adopted and science-based technologies and tools.
In the last 8 years or so, I am pleased to mention that the Indoor Environment Program has developed more than 10 widely-adopted tools and software for lighting, IAQ, and acoustics; while responding to evolving thrusts on energy, quality, and health. On a more personal note, I managed a multi-disciplinary and large research project on large glazed spaces before my appointment as a Director. In this project, we came up with major findings from our long-term on-site measurement ventilation, day lighting, and acoustics performance of atrium buildings. My specific expertise was on the measured and day lighting/lighting performance. We had to develop and implement rigorous monitoring protocols using tracer gas, measuring reverberation time and lighting consumption, temperature and Relative Humidity profiles, among others. The results shed light on the limitations of existing models, and the unsubstantiated performance, leading to new guidelines.

Global Climate change, increased energy demand and ever-decreasing availability of fossil fuels are key drivers for sustainability. What is the outlook for the buildings sector generally?
I have addressed some aspects of this in the third question. Overall, there has been a significant focus on energy research in buildings for the last 40 years or more. However, the significant demand to reduce environmental footprints of buildings started only in the late 1990's. Recently, there are many instances in the literature where "sustainability" is used to refer to the overall performance of buildings. R&D, among others, will have to play a major role to help the sector address these challenges. Of major relevance, R&D should primarily support the performance indicators for environmental loadings. This would mean developing reliable standards and regulation and finding methods of effective integration and exploitation of material science and IT in building envelope and O&M of buildings. Lastly, demonstration of proof of concept of energy efficient and sustainable technologies in real case studies is critical to technology adoption in the building sector.

The ECBCS Executive Committee, which you chair, is the administrative home of the AIVC within the International Energy Agency. Other than the AIVC, what are the key activities related to ventilation and indoor climate currently underway?
The ECBCS just completed research projects of relevance to ventilation and indoor climate. These include: whole moisture building performance; application of low exergy in heating and cooling; and HVAC commissioning tools. As of now, the ECBCS has 10 projects (Annexes) underway, three of which are directly linked to ventilation and indoor climate: cost effective commissioning of existing, and low energy buildings; reversible A/C and heat pumps; assessment tools of energy retrofit measures in office buildings (including ventilation).

The AIVC is one of IEA's information centers. What are the benefits and challenges to ECBCS in being responsible for AIVC? What can our readers do to help you?
The AIVC complements ECBCS well on one of our core missions, which is to develop and disseminate reliable and applied energy solutions to the building industry. It is an effective forum for communication of the ventilation/air leakage-related technologies from ECBCS projects to the practitioners and the research community. The ECBCS governing structure drawn from 25 countries ensures that current building and R&D trends are captured in committee or expert meetings. This helps AIVC define a comprehensive and responsive program plan, and extend its network, stakeholders, and regional application and influence. Finally, ventilation and air leakage are directly related to building envelope and to HVAC they have a direct impact on energy consumption as well as indoor climate, both of which are core topics in the ECBCS.

The Committee have supported the enthusiasm of AIVC readers and members, who helped the AIVC evolve into the most reliable authority on ventilation information. A more sustained and engaged participation in AIVC workshops, and feedback on the content of our products and deliverables will help us to continue to meet our readership and industry demands and interests.

The AIVC has evolved over the almost 30 years of its existence. Looking forward does it still serve a purpose in the global community? What should the AIVC be doing to be most useful to the global community? What is the ECBCS role in making this happen?
The ECBCS has a new strategic plan every five years, to ensure that we address current priorities of national programs and industry with respect to energy and to the environmental impacts on buildings and communities. The AIVC also has periodic reviews of business plans to adapt to the ECBCS plan, and to the current trends in ventilation. The AIVC has evolved in the areas covering ventilation and air leakage, exploiting IT in the technology transfer, introducing new products such as VIP and databases. A big change has also been the engagement of industry and the scientific community in AIVC workshops and forums, followed by the release of resulting outcomes to a broader community. The ECBCS oversees the strategic directions of AIVC, along with the AIVC leaders, and works to increase projects and outputs on ventilation and air leakage. We will continue to promote AIVC as a leading authority on ventilation information in ECBCS countries and worldwide.

As an expert who understands both the policy and technical aspects of the complex subjects we deal with, what final message would you like to give our readers?
The issue of indoor air and ventilation is strongly linked to energy, environment, and health. There has been more emphasis on R&D on energy aspects of ventilation as opposed to health and environmental impacts. Furthermore, there are still major science gaps in the topic that make it difficult to reliably revise longstanding ventilation practices, standards, regulations, and policies. The issue of indoor air requires a multi-disciplinary approach, including, indoor and surface chemistry, engineering, human behavior and health. We must apply this multi-disciplinary approach if we want better outcomes for the practice and science of ventilation.

Thank you very much for the interview.

Building Physics Symposium Leuven, Belgium, 29-31 October 2008

The Laboratory of Building Physics of the Katholieke Universiteit of Leuven, Belgium, organizes the Building Physics Syposium in honour of Professor Hugo Hens. The objective of the conference is to provide researchers and PhD students a forum to share and discuss the most recent and significant developments in building physics.

The following topics will be addressed:
- Advanced modelling of the building physics issues
- Hygrothermal performance - heat, air and moisture transfer in the building envelope
- Energy performance and energy efficiency
- Durability, sustainability and reliability
- Whole building modelling
- Developments in envelope materials and systems
- Interior environment - indoor air quality, acoustics, lighting

More info can be found on the conference website.

Call for papers

Roomvent 2009 Conference Busan, Korea, 24-27 May 2009

The Roomvent 2009 Conference is the leading conference in the area of air distribution in rooms. The 11th Roomvent Conference will provide scientists, industry, consultants, engineers, architects and policy-makers a comprehensive overview for the exchange of scientific knowledge and technical solutions. The conference is organised by the Korea Air Cleaning Association, the Architectural Institute of Korea, the Korea Institute Architectural Environment & Building System and the Korea Society for Indoor Environment.

The deadline for papers is 15 December 2008.

The conference topics are:
- Thermal Environment & Energy
- Room Air Conditioning
- Ventilation
- CFD & Modeling
- Indoor Air Technology
- Measurement method & Case studies
- Control strategies & Policy - Architectural environment performance
- Computational design tools
- Education and training

…

Roomvent 2009 is sponsored by AIVC.
To register: www._____
Contact: info@_____

Call for abstracts

5th International Workshop on Energy and Environment of Residential Buildings 3rd International Conference on Built Environment and Public Health Guilin, China, 27-29 May 2009

Reducing energy consumption in buildings and improving built and indoor environment for health are two closely related and challenging issues. EERB-BEPH 2009 aims to improve indoor and built environment, energy utilisation and health by means of an "integrated approach", considering the building and occupants as a coupled system. We hope to document the most recent research advances in indoor air quality, ventilation, energy conservation and public health related to indoor air; and to provide a platform for participants from around the world to exchange ideas. EERB-BEPH 2009 should be of interest to scientists, research students, government officials, engineers, architects, industrial hygienists, building owners, building consultants and facilities managers.

Conference Themes
The EERB-BEPH 2009 topics will be organised into sessions according to the number and scope of the papers in each topic. Appropriate selection of topics will facilitate an effective review of the submitted abstracts and organisation of the sessions.

EERB 2009:
- Thermal comfort and indoor environment (including IAQ)
- Energy conservation and energy efficiency
- Heating, ventilation and air-conditioning strategies
- Energy related environmental impact of residential buildings
- Biomass, kangs and passive solar design for rural housing
- Assessment of sustainable residential buildings, life cycle analysis

BEPH 2009:
- Air pollution investigation, measurement and prediction
- Exposure analysis and risk assessment
- Epidemiologic and toxicological studies
- Characteristics of sources and sinks
- Source apportionment methodology
- Thermal comfort
- Pollution control and purification

Key Dates

- Abstract submission	10/09/2008
- Notification of acceptance	10/10/2008
- Full paper submission	10/12/2008
- Final camera-ready manuscript	10/02/2009
- Early-bird registration	25/02/2009

Conference website:
www._____

Call for abstracts

IBPSA's 11th Worldwide International Conference and Exhibition on Building Simulation Glasgow, Scotland, 27-30 July 2009

L. Degelman, Chair, Public-Relations committee of IBPSA

_____@_____

The main event for the coming year is IBPSA's 11th worldwide International Conference and Exhibition in 2009. The University of Strathclyde has been selected to host the conference in Glasgow, Scotland's largest City. It has a worldwide reputation as a welcoming city and is firmly established and experienced as a major centre for conferences and international events.

For more information, look at www._____

Conference Themes
The conference organizers are seeking high quality papers and will limit the number of peer-reviewed oral presentations. Submissions will therefore be rigorously peer-reviewed. Simulation-based papers on the following themes are welcomed:

1. advances in building physics
2. human aspects of the indoor environment
3. building services
4. commissioning and operation
5. energy capture and conversion
6. advances in applications
7. validation and calibration
8. software issues
9. simulation in design practice
10. regulation/code compliance
11. application day case studies*

One day of the conference will be devoted to practical applications, particularly focusing on simulation in practice with illustrative case studies. Therefore, a limited number of additional papers will be invited in order to enable practitioners to demonstrate the benefits flowing from the recent upsurge in the use of simulation in building design.

If you wish to contribute such a paper, please ensure it is marked as an application day case study in the abstract submission.

Abstracts should be in plain text and no more than 500 words. They should describe clearly the research objectives and new knowledge arising from the research.

For instructions on how to submit your abstract, go to: www._____ .

Conference accommodation will be offered on campus in dormitories and in nearby hotels and can be booked through the conference website www._____

Key Dates

- Abstracts due 22/09/2008
- Abstract acceptance 01/11/2008
- Full papers due 01/02/2009
- Paper reviews provided to authors 01/04/2009
- Deadline for revised paper 15/04/2009
- Deadline for final formatted papers 22/04/2009
- Final acceptance Notification 01/05/2009
- Deadline for conference pre-registration 15/05/2009
- BS '09 Conference 27-30/07/2009

The Air Information Newsletter as well as the proceedings of the AIVC conferences can be ordered by filling in the Order Form which is online available at: www.aivc.org/medias/pdf/AIVC_order.pdf

AIVC Contacts

Belgium
- P. Wouters & Ch. Delmotte
  Belgian Building Research Institute
  aivc@bbri.be
  www.bbri.be

Czech Republic
- M. Jicha
  Technicka 2
  jicha@fme.vutbr.cz
- I. Plockova
  Ministry of Industry and Trade
  Construction dept.
  plockova@mpo.cz

Denmark
- P. Heiselberg
  Aalborg University
  Indoor Environmental Engineering
  ph@civil.auc.dk
- B. W. Olesen
  Technical University of Denmark
  bwo@mek.dtu.dk

France
- P. Deroubaix
  ADEME
  Département Bâtiment et Collectivités
  pierre.deroubaix@ademe.fr
  www.ademe.fr
- Contact for the diffusion of AIR in France: francois.durier@cetiat.fr

Greece
- M. Santamouris
  Building Environmental Studies
  Applied Physics Section
  Department of Physics
  University of Athens
  msantam@phys.uoa.gr
  grbes.phys.uoa.gr

Japan
- T. Sawachi
  National Institute for Land and Infrastructure Management - NILIM
  sawachi-t92ta@nilim.go.jp
  www.nilim.go.jp/english/eindex.htm
- H. Osawa
  Building Research Institute
  osawa@kenken.go.jp
  www.kenken.go.jp/english/index.html

Republic of Korea
- Yun-Gyu Lee
  Building & Urban Research Department
  Korea Institute of Construction Technology - KICT
  yglee@kict.re.kr
  www.kict.re.kr

Norway
- P. Schild
  SINTEF Building Research
  aivc@sintef.no
  www.sintef.no/byggforsk

Netherlands
- W. Borsboom
  TNO Built Environment and Geosciences
  www.bouw.tno.nl

USA
- M. Sherman
  Lawrence Berkeley National Laboratory
  mhsherman@lbl.gov
  www.lbl.gov

Operating Agent
- INIVE eeig
  P. Wouters & Ch. Delmotte
  inive@bbri.be
  www.inive.org

Information on AIVC supported conferences and events

29th AIVC Conference, Kyoto, October 2008

The 29th AIVC conference will be held in Kyoto (Japan) 14-16 October 2008.
The conference will cover a wide range of ventilation related topics whereby specific attention will be given to building ventilation and environmental technologies addressing climate change issues.

More information: www.aivc2008.jp

Building Physics Symposium, Leuven, October 2008

The Laboratory of Building Physics of the Katholieke Universiteit of Leuven, Belgium, is organising the Building Physics Symposium on recent developments in Building Physics in honour of Professor Hugo Hens. The objective of the conference is to provide researchers and PhD students a forum to share and discuss the most recent and significant developments in building physics.

More information: www._____

ROOMVENT Conference, Busan, May 2009

The ROOMVENT 2009 conference from 24 to 27 May 2009 in Busan, South Korea is the leading event in the area of air distribution in rooms. A wide range of topics will be covered including modelling, simulation, design, control and applications of the air distribution systems and buildings.

More information: www._____

EERB-BEPH Conference, Guilin, May 2009

The Fifth International Workshop on Energy and Environment of Residential Buildings (EERB) and the Third International Conference on Built Environment and Public Health (BEPH) will be held from 27-29 May 2009 in Guilin, Guangxi Province, China. It is jointly organised by the Hunan University, the University of Hong Kong and the Tsinghua University.

More information: www._____

IBPSA Conference and Exhibition, Glasgow, July 2009

The 11th International Building Performance Simulation Association (IPBSA) Conference and Exhibition will take place in Glasgow, Scotland, from 27-30 July 2009. The conference highlights building simulation and one day of the conference will be devoted to practical applications, particularly focusing on simulation in practice with illustrative case studies.

More information: www._____