AIR INFORMATION REVIEW

Vol 23, no. 4, September 2002 A quarterly newsletter from the IEA Air Infiltration and Ventilation Centre

INSIDE

EDITORIAL

The nature of the building industry and the energy for buildings market means that strong emphasis must be given to technology transfer and dissemination if new and improved energy technologies are to make an appropriate impact.

Technology transfer and dissemination of ventilation related issues is one of the major objectives of the AIVC and the AIR newsletter.

In the wider context of energy efficiency and indoor climate in buildings, the European ENERBUILD Network is of particular importance. The Network (2001-2004) primarily comprises JOULE and CRAFT building-related energy R&D projects, and projects in the 5th EU framework programme. This issue covers the work and the deliverables of the ENERBUILD Network. A CD-ROM presenting the ENERBUILD results can be found on the back cover.

The outcome of the ENERBUILD Network will be given particular attention at the EPIC 2002 AIVC conference in Lyon (October 23-26). This conference, jointly organised by the AIVC and EPIC, also intends to make an important contribution to technology transfer and dissemination. About 150 papers will be presented during the various sessions. In addition, a total of 12 workshops are planned, including sessions on hybrid ventilation, air distribution systems, health and energy, natural ventilation in urban settlements, glazing and active facades, and IAQ criteria for sustainable buildings. The December issue of AIR will report on the outcome of this conference.

We wish you a pleasant read.

Peter Wouters
Operating Agent AIVC
Manager INIVE EEIG

EnerBuild RTD
Energy Environment & Sustainable Development
Thematic Network on Energy in the Built Environment

First announcement & call for papers
VENTILATION, HUMIDITY CONTROL and ENERGY
AIVC BETEC 2003 conference

Hamilton Crowne Plaza Hotel
Washington DC
United States of America
12 – 14 October 2003

AIR
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 and CD is to encourage and increase information exchange among ventilation researchers and practitioners worldwide.

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Contributions to AIR: Suggestions for contributions are welcomed.

Subscriptions: (See also the subscription form on page 15 or on the CD)

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GUIDE TO THE NEWSLETTER

Throughout the newsletter you will see *websites* and *email contacts*. A jump to the AIVC CD is shown with . Simply click to jump to the CD, to your chosen website, or send an email. For an overview of the contents of the CD click here .

NEWS FROM PRACTICE

Sampling and analysis of volatile organic compounds (VOCs) emitted by materials

Many building products, furnishings and household commodities emit organic compounds. These are known as very volatile organic compounds (VVOCs), volatile organic compounds (VOCs) or semi-volatile organic compounds (SVOCs). VOCs can be released from materials and products in the form of gases at room temperature. Classification is conducted according to boiling points in compliance with the WHO definition. Compounds boiling from 50°C to 260°C are called VOCs. Solvents, residual monomers, plasticizers, fire-proofing agents, processing aids, preservatives (biocides), and reaction and decomposition products are responsible for these emissions.

In addition, fungi, moulds, bacteria and other micro-organisms produce biological particles that can cause health problems. The term “sick building syndrome” (SBS) has been coined to describe the irritation or illness experienced by building occupants as a result of exposure to indoor air contaminants.

The problems caused by VOCs in buildings and other enclosed spaces have led to numerous investigations into their health impacts in various workplace, home and transport situations.

Controlling emissions by dealing with the pollution source is considered to be the optimum approach for indoor pollution control. This requires an understanding of the emissions (pollutant type, quantity and persistence), an exposure risk assessment and a knowledge of potential control strategies.

The main sources of emissions are identified by testing suspect materials under controlled conditions, whilst indoor air analyses are performed to evaluate the situation. Several techniques for sampling and analysing VOCs emitted by materials are available :

- Headspace analysis identifies the organic compounds present in the “headspace” or air above the material. Both static (closed container) and flow-through or dynamic headspace analyses are used.
- Environmental test chambers are used to characterise material emissions.
- The field and laboratory emission cell (FLEC) is a microchamber developed to meet the need for a portable testing device in research and product development of low-emitting materials, and for identifying emission sources in situ.
- Sampling bags (Tedlar bags) or vessels (glass, stainless steel) are used to collect large samples. In many studies, concentration levels in the air of compounds under investigation are so low that they need to be collected in greater concentrations before analysis. In general there are three ways of doing this:
  - Absorbing the compounds in a suitable liquid.
  - Condensing them at low temperatures (cryotrapping).
  - Adsorbing them on a porous solid material.

A full paper describing these techniques is available on the AIVC CD ().

INFO FROM PROJECTS

New ECBCS Bookshop Brochure

Website:

The IEA Energy Conservation in Buildings and Community Systems (ECBCS) Progamme have recently published their latest Bookshop brochure. This gives an overview of some of the latest publications from the Annexes and includes an order form. It emphasises how for many years, ECBCS have been writing High quality “Books for Building Sustainability”.

Active façades project

Website :

Striking developments in glass technology, domotics and HVAC systems have led to the use of active façades. These offer interesting architectural options (eg fully glazed façades) and can improve the indoor climate of a building by using active and/or passive techniques.

This technology is now getting a lot of attention, often involving discussions on its advantages and disadvantages. The performance (for example, in terms of energy use) achieved by buildings equipped with active façades has not been clearly established, particularly in those buildings using natural ventilation.

A Belgian project "Active Façade", is conducting an evaluation of the different forms of active fades. This two-year project, financed by the Ministry of Economic Affairs in Belgium, aims to assess the applicability of existing and future standards and regulations to active façades. Issues including acoustics, fire safety, stability, daylighting, energy and ventilation, are being investigated by the project through in-situ and laboratory measurements and the use of models. The final goal of the project is to develop a framework for assessing the performance of the different types of active façades.

A website has been developed that includes descriptions of the most commonly used active façade designs (double-skin façade, climate façade, louvre façade, etc). The website also includes descriptions of buildings equipped with active façades, a bibliography, a link to the COST C13 European project and details of the main relevant standards. The site contains interactive animations illustrating the different façade and ventilation concepts and allows the downloading of project documents.

ERRICCA 2 - European Radon Research And Industry Collaboration Concerted Action

Website:

Radon is a naturally occurring colourless, odourless radioactive gas, which is found in small quantities in all soils and rocks, which mixes with air and rises to the surface where it is quickly diluted in the atmosphere. Concentrations in the open air are very low. However radon that enters enclosed spaces, such as buildings, can reach relatively high concentrations in some circumstances. The problem is that when radon decays it forms tiny radioactive particles which may be breathed into the lungs, and radiation from these particles can cause lung cancer over time. It is therefore important to try to reduce indoor radon levels to as low as is reasonably practicable.

European Radon Research and Industry Collaboration Concerted Action (ERRICCA 2), is establishing a European scientific led industrial forum aimed at reducing risks to health from radiation (principally radon) in the built environment. It brings together 35 organisations, including the majority of Europe's leading authorities in dealing with radon in the built environment. 20 countries are represented by the group which is considering the following topics and tasks:

- How to increase public awareness and confidence.
- Building materials - the development of common protocols for:
  - Measuring radon emanation from building materials.
  - Testing radon barrier materials.
- Protection of new buildings.
- Remediation measures for existing buildings.
- Common measurement and mapping protocols.
- The establishment of a European Radon Website.

These topics are being used as the basis for discussion within the new forum which is for the first time bringing together on a Europe wide basis scientific and industrial interests. The new forum is acting as a means for disseminating existing research findings to industry and the public, for clarifying industry needs for further research, and for undertaking collaborative work in common topic areas. It operates on two levels :-

European level – A European Forum, which brings together scientific and industrial representatives from 20 countries - each country providing one scientific and one industrial representative. The first European Meeting took place in the UK in February 2002 and the second is to take place in Athens in October 2002.

National level – A National Forum in each country to identify radon research and information needs and collaborate on research topics. The National Fora will feed ideas and issues into the European Forum and help disseminate output from the European Forum. The National Forum, which meets annually, is being aimed at radon scientists, national and local governmental representatives, remediation companies, house builders, building contractors, materials suppliers, equipment manufacturers, measurement companies and representatives from the property buying and selling industry. All the National Forums for 2002 will have taken place before the European Meeting in October.

Once established each Forum will be linked via the World Wide Web creating a network of radon information sources that will be freely accessible to anyone working in radon right across Europe. The European radon website is still to be established but information can be found on the BRE website, details of both of these sites are above.

ERRICCA 2 is extending the earlier work undertaken by the highly successful European Radon Research in Construction Concerted Action (ERRICCA) project.

STANDARDS & REGULATIONS

A New European Standard for Air Velocity Measurements

Website:

A new European standard on instrumentation for air velocity measurements was published recently. It was prepared by Technical Committee 156 of CEN (European Committee for Standardisation).

Its reference and title are:
EN 13182: *Ventilation for buildings – Instrumentation requirements for air velocity measurements in ventilated spaces*.

The standard describes air flow patterns in ventilated spaces, as the measurements may concern different zones – in the air supply jet/stream or in the occupied zone. The parameters of interest are mean velocity and turbulence intensity.

The main requirements of air velocity measuring instruments are specified in terms of their velocity range, temperature range, upper response frequency limit, and the influences of natural convection and of air temperature and density. The standard also gives requirements for the measuring period and sampling rate, and the equipment's calibration and accuracy.

ASHRAE Standards and Environmental Tobacco Smoke

Website: _____

During the ASHRAE 2002 Annual Meeting held in Honolulu in June 2002, it was decided that the odour and health effects associated with environmental tobacco smoke (ETS) will not be addressed in the next version of ASHRAE Standard 62.1P, *Ventilation and Acceptable Indoor Air Quality in Commercial, Institutional and High-Rise Residential Buildings.* This standard will apply only to non-smoking spaces in buildings.

This decision came after months of debate on what requirements the ASHRAE should place on the ventilation of smoking areas. In addition, the proposed standard will not comment on the health effects of ETS, which were considered to be outside the purpose of the standard.

The committee recommended that a separate publication be written to provide design guidance for spaces where ETS is present. The publication would be neither a standard nor a guideline.

Addendum 62*o* to Standard 62-2001, approved for publication at this meeting, provides design guidance for determining design ventilation rates for spaces where smoking occurs. The guidance addresses only the control of odours from ETS, not the health effects. It is provided as information only in an appendix that accompanies the standard and is not required for compliance. This addendum will remain in Standard 62 until the separate publication is written.

Addendum *62o* provides a method of determining the additional ventilation needed beyond that provided in a similar non-smoking area. Typically, the increase in ventilation is about 10 to 40 cfm/person over the non-smoking rate in spaces without heavy smoking. The actual increase will depend on the smoking rate and occupancy density of a particular space.

In addition, the addendum updates the standard's enforceable requirements. It addresses ventilation in smoking areas by requiring these areas to have more ventilation and air cleaning than comparable non-smoking areas. The section notes that, "specific ventilation rate requirements cannot be determined until cognizant authorities determine the concentration of smoke that achieves an acceptable level of risk." This section also states that air from smoking areas should not be recirculated nor transferred to non-smoking areas, and deletes smoking lounges from a table on outdoor air requirements for ventilation. In the same table, the requirements in spaces where smoking is assumed to occur have been lowered, and a footnote added explaining that the table applies to non-smoking areas.

Proposed addendum 62*g* to Standard 62-2001 would create requirements for classification, signage and separation of areas where smoking is permitted.

The Swiss label MINERGIE

Website: _____

Minergie is a quality label in Switzerland for new and refurbished buildings. It is supported by the Swiss Confederation, the Swiss Cantons and the Department along with of Trade and Industry.

Comfort is the central theme of the Minergie label. It is ensured by high-grade building envelopes and the systematic renewal of air. Energy consumption is used as the main indicator to quantify the required building quality. The Minergie label may only be used for buildings that actually meet the Minergie standard. For a house, the required energy consumption for heating, domestic hot water and ventilation, for example, is less than 42 kWh/m^2/year (according to standard SIA 380/1), the electricity consumption being multiplied by two for this calculation. A requirement also concerns the additional electricity consumption for domestic use, which should be less than 17 kWh/m^2/year.

The Minergie Standard is widely accepted in Switzerland because it leaves complete freedom both in design and choice of materials and products. 1800 buildings have received the Minergie label. They represent 680,000 m^2 of offices and 700,000 m^2 of housing. The Minergie website gives more information about this label.

The recommended ventilation systems in Minergie buildings include mechanical supply and exhaust systems with heat recovery or heat pump, mechanical exhaust with or without heat pump for domestic hot water, and supply and exhaust room ventilation with heat recovery. Airing through automatic opening windows is also mentioned. Two brochures describe the Minergie ventilation systems, one in French (🗐) and the other in German (🗐).

ENERBUILD

EnerBuild RTD – Thematic Network on Energy in the Built Environment 🗐

Website: _____

"The building sector offers one of the largest single potentials for energy efficiency and should thus be a major focus for action."
Towards a strategy for the rational use of energy, EC COM(98)246 29 April 1998

The characteristics of the European building industry and the energy market require that very deliberate emphasis must be given to technology transfer and dissemination if new and improved energy technologies are to have the appropriate impact. European Commission-sponsored Research and Technological Development (RTD) programmes during the past quarter century have made important contributions to advancing innovative technologies and concepts. Developing on this important foundation, the EnerBuild RTD Thematic Network provides impetus to the process of bringing about change in the energy efficiency of European buildings. EnerBuild is supported by the European Commission, DG Research.

To enhance co-operation among energy RTD projects addressing the built environment supported in the EC's Fourth and Fifth Framework programmes, the EnerBuild RTD Thematic Network has the following objectives:

- To deliver the results of past and current research to potential users in the most important sectors with the greatest dissemination potential, with the overall objective of reducing emissions and improving the energy efficiency of the built environment in Europe.
- To facilitate and encourage collaboration, co-operation and exchange among EC-supported research projects and researchers.
- To help maintain the technical and industrial content of future European energy-related building research and to

contribute to the identifications of future research priorities.
- To form links with relevant targeted research and demonstration actions and other Thematic Networks with a view to maximising the effectiveness of the problem-solving effort.
- To minimise overlap and facilitate communications between national and EC-funded activities.
- To encourage the formation of new RTD partnerships between stakeholders in construction including industry, designers, developers and researchers.
- To evaluate the effectiveness of different strategies and media in disseminating RTD results and supporting innovation in the European building sector.

The Network primarily includes JOULE and CRAFT building-related energy R&D projects, and Fifth Framework Programme (FP5) projects particularly within Key Action 6. Projects have been allocated to six technology groups each coordinated by an internationally-respected expert, and considerable emphasis is accorded to inter-group opportunities and horizontal dimensions such as socio-economic and other cross-cutting objectives at the European level. The entire process is guided by a Steering Committee that decides on strategic matters and includes senior representatives of European industrial, professional and research federations and associations.

A diverse but integrated series of measures aims to:
- Identify potential winning technologies.
- Target markets and study their requirements.
- Identify and implement coherent technology transfer and promotion strategies.
- Evaluate the results.

The Network promotes close linkages between the key European market actors and the European Commission's building-related energy RTD activities, full use of the synergies between some of the objectives of industry associations and the Commission's objectives, and a wider, cost-effective dissemination of the best available energy technologies in the building sector. Thus, it advances Community social and environmental objectives while delivering European added value to the work of the EU's leading building researchers, and contributing to economic development and the strengthening of competitiveness and the technological base of European construction.

The Network was extended to include 17 participants from the Newly Associated States in mid-2002 with the following objectives:
- To raise awareness and promote NAS participation in the European Commission programmes on building-related energy research.
- To assist the NAS in the process of upgrading their construction industry, including materials manufacturing, to a comparable level of competitiveness to other EU Member States, prior to entry into the European Union.
- To address non-technical barriers to the take-up of research results.
- To examine the characteristics of the expanded EU market, technological, economic, social and educational dimensions, as it relates to building energy research.
- To identify potential target market sectors on the basis of potential benefits.
- To develop and regularly update a joint RTD strategy which is aimed at achieving the Network objectives and to identify the need for new RTD activities and studies.

AIRINSTRUCT

Integration of Advanced Ventilation Building Components and Structures for Reduction of Energy Consumption in Buildings

The AIRinSTRUCT project was based on the common requirement of the participating SMEs companies for a precise understanding of the thermal performance of the Ventilated building components, namely: Ventilated roof, Ventilated wall, Solar Roof and Dynamic Insulation, and was performed according to the following objectives:
- To research and develop innovative Ventilated building components by addressing the common problem of the air flow and heat transfer processes within these structures.
- To investigate the range of construction types that these technologies could be applied to.
- To determine their combined winter/ summer performance for heating/ cooling.
- To develop a methodology and computer tool for evaluating the incorporation of Ventilated structures as retrofit options for existing buildings.
- To identify the possibilities for integration of these components - or their design philosophies - with each other and within the building envelope.

- To investigate the performance and suitability of these components at different climates.
- To ensure results and 'buildability' of the systems.

The monitoring of the Solar Roof provided useful data for derivation of a simplified model. Testing of the Ventilated roof, showed that Ventilated roof components can be a very promising solution for the Mediterranean countries, especially during summer where the ventilation air gap actively interacts with the ambient conditions. The addition of a radiant barrier in the gap of the Ventilated roof improves the performance of the component. Ventilated wall components can ameliorate the energy needs of the building in both summer and winter periods. The application of a ventilation gap is a significant feature enhancing the overall thermal performance of a wall. It was also found that the addition of a radiant barrier improves even more the performance of the Ventilated wall, except for summer night-time conditions.

RTD Project Co-ordinator:
Dr Argiro DIMOUDI

AIRLESS

Air Handling System, R+D and Design for Improved IAQ

In the ideal case an HVAC-system provides "healthy" air and air with a certain temperature and humidity, with the lowest possible annoyance (odour, noise, draught, temperature changes) and the lowest possible energy consumption. Knowledge on why, when and how pollution is caused by HVAC-systems is still largely unidentified. Therefore, the project AIRLESS was executed. Concluded was that main sources and reasons for pollution in a ventilation system may vary considerable depending on the type of construction, use and maintenance of the system. In normal comfort ventilation systems the filters and the ducts seem to be the most common sources of pollution, especially odours. If humidifiers and ro-

tating heat exchangers are used, they are also suspected to be remarkable pollution sources especially if not constructed and maintained properly. The pollution load caused by the heating and cooling coils seems to be less notable. And the effect of airflow on the pollution effect of HVAC-system components seems to be less important.

Protocols for testing the pollution effect of components of HVAC-systems were developed and used to test 18 HVAC-components. The test data were incorporated in the database SOPHIE. A method named DAHU was developed to measure airflow rates and leakage in HVAC-system. Experiments showed that dysfunction of air handling units, often not suspected when using classical commissioning methods, can easily be detected and quantified using this methodology. To keep pollution away from an HVAC-system, a "new" maintenance guideline was developed, based on the existing VDI 6022, including cleanliness criteria and measures to ensure/maintain acceptable air quality. Having defined pollution contribution per component, the intention was to develop a model to predict the pollution caused by a system to be installed. All three defined hypothesises as basis for such a model were however rejected, leaving no basis for developing a model to predict perceived air quality. The correlation found between the total mass of oil residues (in contact with supply airflow) and odour intensity of ducts offered, however, a good basis for the development of a model for addition of sources. Strategies to decrease the pollution caused by a total HVAC-system together with strategies to lower the energy consumption were defined.

And finally, dissemination and exploitation activities were executed, comprising among others of workshop for industry and professions.

RTD Project Co-ordinator:
Dr P M BLUYSSEN

PRECIS

Assessing the Potential for Renewable Energy in Cities

The key objective of PRECis was to evaluate the potential of renewable energy in cities by exploring the relationships between urban form and energy / environmental performance. Key energy and environmental characteristics of cities depend on urban form, as is the case with individual buildings. However, energy use of urban buildings is also critically dependent on the urban microclimate which in turn is related to both the urban form and energy use (for transport and buildings). A polluted urban microclimate will significantly reduce the potential for low energy strategies such as natural ventilation. Similarly, dense urban forms may reduce access to sunlight, daylight and air movement – all of which are key factors determining building energy use.

The key outcomes of the project can be summarised as follows:

- Development of expertise in the general field of energy and environmental analysis at the urban scale – though much debated this is a relatively new research field.
- Computer-based and physical analysis techniques that can be used to assess the energy and environmental characteristics of urban form.
- Application and validation of the techniques on a large number of real and theoretical urban case studies.

Fundamentally, the work has demonstrated that urban form and environmental performance are and can be intimately and explicitly related. This knowledge has enabled the developent of simplified tools that exploit such relationships using innovative image processing techniques. These techniques can be applied to any configuration of urban form (existing or new) and provide explicit energy and environmental performance characteristics.

RTD Project Co-ordinator:
Dr Koen STEEMERS

PV-COOLING

Design, Realisation, Tests & Comparative Analysis of Low Electric Consumption PV Cooling Systems

The objective was to develop low electricity consumption, photovoltaic-powered cooling systems for dwellings and office building of 50m^2 to 250m^2 floor area in Mediterranean and developing countries with cooling output to electrical power input ratios better than 20. Two systems have been developed, one using PV and evaporative air-cooling with rotary and vertical fixed pads, and the other using PV and ground cooling through buried pipes.
The systems developed in the project can provide cooling in small to medium sized buildings in warm, dry climates, reducing indoor temperatures by between 3K and 7K below the outdoor dry bulb temperature. However, this may not be sufficient when outdoor temperatures are high. Nevertheless, the system can make a useful contribution to improved indoor comfort conditions using only renewable energy while minimising the need to use conventional air-conditioning systems thus reducing the associated fossil fuel use and environmental impact. In the case of buildings with large heat loads, the systems developed can be coupled with other systems including: night cooling; mechanical ventilation; and conventional air-conditioning systems, thus reducing their energy use.

RTD Project Co-ordinator:
Mr Eric MICHEL

PV-VENT

Low Cost Energy Efficient PV-ventilation in Retrofit Housing

This project addressed the research and application of a PV system that combines electricity and heat production. In particular, the integration of heat recovery powered by the PV cells, from which excess heat is also drawn, has shown good technical potential. Depending on the size of the installation, payback periods of between 7 and 12 years are achieved. Furthermore, the system can achieve a noise reduction of 25dB. Systems have been installed and are particularly well represented in the form of retrofit applications.
Apart from the technical analysis aspects, the following were outcomes of this project:

A series of case studies, largely retrofit
An architectural competition with a focus on the integration of PV-VENT
A taxonomy of PV Vent systems
Design notes for architects and engineers.

RTD Project Co-ordinator:
Mr Peder Vejsig PEDERSEN

SOLAR ROOF VENTILATION
Linear Static Ventilation of Solar Roof

This project results from the development of a new concept in the exploitation of solar energy.

Conventional, flat solar thermal panels have been modified using new materials and may be integrated into the design of buildings to function both actively and passively. The collector system captures solar energy for heating while at the same time dissipating unnecessary and unused energy to assist building cooling.

The Enercom solar roof can replace part of a conventional roof, glazed solar panels, thermal roof insulation and the condenser of air-to-air heat pump or cooling tower required by conventional air-conditioning systems.

RTD Project Co-ordinator:
Mr Jose GALAN

SOLVENT
Development of a Ventilated Solar Screen Glazing System

The SOLVENT window was designed to improve visual and thermal comfort in sunny conditions – without compromising overall energy performance in winter or summer. The benefits of the glazing system are realized mainly through the conversion of short wave (solar) radiation to convective heat and long wave radiation.

One of two prototypes of the SOLVENT glazing system, 60 by 60 cm display model

The system requires an innovative reversible frame, incorporating two glazing assemblies: a clear glazing to provide a weatherproof seal, and an absorptive glazing to provide solar control. The two glazing assemblies and a ventilated channel between them rotate together through 180° to enable a transformation from winter mode to summer mode.

Its performance may be evaluated against three criteria:

Visual comfort: Simulations show that in such climates, the use of absorptive glass in the SOLVENT window results in reduced levels of illumination, lower values of the Daylight Glare Index (DGI) and a higher Visual Comfort Probability (VCP) compared with a clear-glazed window of similar size.

Thermal comfort: The SOLVENT window absorbs incoming solar radiation. Though the glass temperature may be as high as 50°C in the winter mode, Mean Radiant Temperature near the window is substantially lower than in a space with an otherwise similar clear-glazed window.

Energy balance: Detailed energy balance measurements showed that if the air flow between the two glazing components is not obstructed, the thermal insulation provided by the clear-glazed element is not compromised. In the sample tested, the thermal conductivity (U-value) in both winter and summer modes was 1.1 W/m^{2}K; solar transmittance (g) in winter was 0.68, but rotating the window to the summer configuration reduced this value to only 0.36.

RTD Project Co-ordinator:
Evyatar ERELL & Yair ETZION

S.O.S
Self Openings & Shadings

Project Outline
S.O.S has developed a system that can provide autonomous, automatic, control of daylight, shading, glare and ventilation opening at each window in response to local conditions immediate to that window and the needs of occupants in the rooms it serves. The system detects occupancy and responds to users' needs for daylight, ventilation and glare reduction but can optimise solar gain even if the room is temporarily unoccupied. The system is dynamic and responds to the position of the sun in relation to the window, daylight availability, the changing needs of occupants for daylight, glare control or control of sun spots on the work-plane, ventilation and to the need for space heating, It can be fitted to a range of window types (top, bottom, or side hung) and can accommodate a range of shading systems (screens, awnings, venetian blinds, etc.). Power for the actuating motor is supplied by a dedicated photovoltaic panel with battery back-up.

RTD Project Co-ordinator:
Mr Serge JAURÉ, Archimedes

TIP-VENT
Towards Improved Performances of Mechanical Ventilation Systems

The main aim of the TIP-Vent project was to provide a significant contribution to the creation of improved boundary conditions for the application of mechanical ventilation systems with good levels of performance. The project has led to a better understanding of the true performance of ventilation systems, why they perform as they do and what improvements are achievable. One major conclusion is that ventilation systems often perform very badly in terms of energy-efficiency, indoor air quality, draughts and noise levels.

A TIP-Vent Source Book that synthesises the findings of the participating organisations has been produced. The Source Book and the complete task reports are available on CD-Rom from:

New system for ducts in concrete floors

RTD Project Co-ordinator:
Dr Peter WOUTERS

TRIPLESAVE

Integrated System for Daylighting, Natural Ventilation and Solar Heating

Objectives
The work aims to develop and assess the performance of a unit combining light pipe technology and passive stack ventilation by utilizing the light pipe as an exhaust stack. This system is further integrated with an energy transmission system, either for heating or cooling.

Results
A full-scale pilot system has been constructed and tested. The major potential areas of application appear to be in educational buildings and in offices. Case studies show that in suitable buildings there is considerable potential for lighting energy savings using the light-vent pipe.

The manufacturing costs of the system are greatly influenced by the size of the light pipe and profitability varies according to location. Estimated simple pay-back times vary from 6 to 16 years. However, further development of the light collector could considerably improve these pay-back times.

An installed and tested prototype

RTD Project Co-ordinator:
Kai SIREN

WEB

Wind Energy for the Built Environment

The focus of project WEB has been the development of wind enhancement and integration techniques which improve the annual energy yield per installation by concentrating the low to moderate wind speeds (2-5 m/s) typical of most urban areas in Europe. This has involved balancing and reconciling aesthetic, aerodynamic, architectural, environmental and structural issues. These techniques have been successfully demonstrated during the project in field-tests of a small-scale prototype building or wind concentrator with an integrated Horizontal Axis Wind Turbine (HAWT) and a Vertical Axis Wind Turbine (VAWT). Draft guidance for Urban Wind Energy Conversion System (UWECS) developments has also been produced that addresses the conceptual design process and includes methodologies for predicting energy yield and assessing external and internal environmental impacts and costs.

RTD Project Co-ordinator:
Sinisa Stankovic & Neil Campbell

ENERBUILD RTD RTD Projects

THEMATIC GROUP 1:
Solar technologies

IMAGE – Performance optimisation of advanced glazing systems in practical applications: Mr R. Cohen:

SUITCASE – Portable, versatile and multi-functional monitoring system that assures the energy output of low cost thermal solar facilities: Mr J. de Blas:

S.O.S – Self Openings and Shadings: Mr S. Jauré:

CODEC - Collector for Desiccative and Evaporative Cooling. Mr R. Rudischer:

SPECTRUM :
Dr G. Longobardi:
Heat Pipe Solar Absorber -
Mr S. Knowles:

SOLAR LOUVRE - Building integrated cooler: Mr D. Robertson:

THEMATIC GROUP 2:
Lighting

SMART GLAS - High performance variable solar control glazing: Mr D. Strickler:

SATELLIGHT - Processing of Meteosat data for the production of high quality daylight and solar radiation data available on a WWW internet server:
Prof. M. Fontoynont:

EULISP - Evaluation and user assessment of lighting systems performance:
Dr K. Voss / Mr J. Wienold:

ARTHELIO - Intelligent and energy-optimised lighting systems based on the combination of daylight and the artificial light of sulphur lamps:
Prof. H. Kaase:

TRIPLESAVE - Integrated system for daylighting, natural ventilation and solar heating: Prof. K. Siren:

SMART WINDOW - Polymer network liquid crystal with reflective, scattered and clear states:
Mr M. Casamassima / Mr P. Sixou:

DIAL-EUROPE - European integrated daylight design tool:
Mr M. McEvoy / Mr R. Southall:

HIGH EFFICIENCY HOE - Holographic optical elements (HOE) for high efficiency illumination, solar control and photovoltaic power in buildings: Dr D. Wagner:

THEMATIC GROUP 3:
Mechanical heating and cooling

AHP-NH3 - Advanced cycles and replacement working fluids in heat pumps :
Prof. J. T. McMullan:

HEAHP - Heating / Cooling with RES; efficient PV cooling systems:
Mr J. De BLAS :

TIP-VENT - Towards improved performances of mechanical ventilation systems: Mr P. Wouters: _____

SOLHEATCOOL- Study and development of heating/cooling systems using renewable energy. Mr E. Michel: _____

PV-COOLING - Design, realisation, tests, comparative analysis of low electric consumption. PV cooling systems: Mr E. Michel: _____

ABSOCOMP - CFC free heat pump: Mr D. Bohne: _____

SOLAR ROOF VENTILATION - Linear Static ventilation of solar roof: Mr J. Galan: _____

PREDICTIVE Control of Heating and Cooling in Individual and Networked Buildings: Dr L. Jankovic: _____

SMARTHOMES - On-line energy services for smart homes: Mr A. Lindstroem: _____

AIRCOOL - absorption cooling of buildings with integrated PV/solar air heating facades: Prof. U. Eicker: _____

THEMATIC GROUP 4:
PV in buildings

PRIDE - Low cost PV Facades Dr T. Bruton: _____

BIMODE - Bi-functional Photovoltaic modules for building integration: Dr T. Bruton: _____

PRIDE - Prefabrication of roof integrated PV systems; also **PRESCRIPT** - Pre-standardisation activities for the certification of roofs and facades with integrated PV modules; **PV en face** - Quality low-cost PV facades: Mr M. Van Schalkwijk: _____

Static PV concentrator: Mr E. Perezagua: _____

IMPACT - PV active temperature control : Mr R. Hacker: _____

BIPV Convert - Converters for building integrated PV systems: Mr P. Redi: _____

PV-THERMAL - Highly integrated PV/thermal/Structural building components : Prof. A. Bignozzi: _____

HIPERB - High performance PV in Buildings : Dr. J. Springer: _____

THEMATIC GROUP 5
Building components

Solar Power Envelope: Mr S. Ostergaard Jensen: _____

EVAC GL - Durable peak performance evacuated glazing: Prof. B. Norton: _____

RAPID: Dynamic building energy performance assessment: Dr A. D. Irving: _____

Design study and experimental evaluation of an integrated solar façade: Dr D. Infield: _____

HILIT - Insulating, light transmitting aerogel glazing: Mr K. Jensen: _____

Solar building facades - Mr M. Kohel / Mr W. Krause: _____

TH. DIODE WALL - Design study of thermal diode wall: Dr P. Kew: _____

Design of multi-functional ventilated facade: Dr C. Miquel: _____

SOLAR-COLLECT - Façade/roof integrated PV: Mr W. Eisenmann: _____

SWIFT - Switchable Façade technology : Dr W. Platzer: _____

SOLVENT - Development of a ventilated solar screen glazing system: Mr E. Erell: _____

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THEMATIC GROUP 6
Building and urban design

APISCO - Application of plants to improve Summer thermal comfort in buildings: Mr Ph. Malbranche: _____

PRECIS - Assessing the potential for renewable energy in cities: Dr K. Steemers: _____

WEB - Wind energy for the built environment: Mr S. Stankovic: _____

AIR INstruct - Integration of Advanced Ventilation Building Components and Structures for reduction of energy consumption in Buildings: Ms J. Lazari: _____

PV-VENT - Low cost energy efficient PV-ventilation in retrofit housing : Mr P. V. Pedersen: _____

MATHIS - Materials for healthy indoor spaces: Prof. E. de Oliveria Fernandes: _____

AIRLESS - Air handling system, R+D and design for improved IAQ: Dr P. M. Bluyssen: _____

ETIAQ - Energy Technologies and indoor air quality: Mr H. Zibetti: _____

CLEAN-AIR - dedicated electronic noses for enhanced performance of medium/large size air conditioning system: Mr A. Riello: _____

URBVENT - Natural ventilation in Urban areas - potential assessment and optimal façade design: Prof. F. Allard: _____

BOOKSHOP

Variability and susceptibility in human response to occupational exposure to chemicals in the UK

Website:

Institute for Environment and Health, April 2002, 155 pp
ISBN 1 899110 36 4

One of the goals of ventilation is to evacuate pollutants from buildings. However, depending on the emission rate, air flow rate and ventilation efficiency, a certain amount of pollutants (volatile organic compounds, dust, micro-organisms, tobacco smoke ...) will remain inside. People present in buildings will therefore be exposed to various pollutants, which can be detrimental to health.

The UK Health and Safety Executive commissioned the MRC Institute for Environment and Health to organise a workshop to examine the existing state of knowledge of variability and susceptibility in the response of the UK workforce to occupational exposure to chemicals. A report of the workshop was recently published, which took into account a range of factors starting with the changing demography of the UK workforce in terms of gender, ethnicity and age, together with its biological variability for inherent factors such as physiology, xenobiotic metabolism and genetic polymorphism. Superimposed on this are acquired lifestyle factors and characteristics such as obesity, medication, existing health status and the use of tobacco and alcohol. Also considered was the possibility that an older population will, in future, make up a greater proportion of the UK workforce.

It was concluded that variability and susceptibility in the working population is unlikely to be significantly different from that in the general adult population.

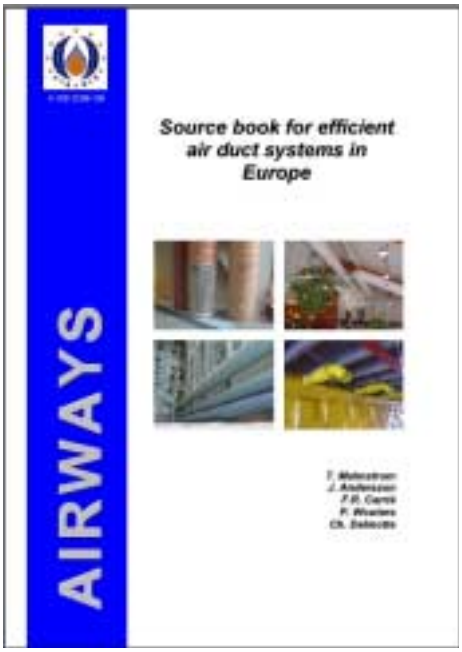
Thirteen recommendations were made to enable knowledge gaps to be filled.

See Executive summary on the AIVC-CD ().

Source book for efficient air duct systems in Europe ()

Website:

Ventilation, air conditioning and air heating systems are of vital importance to the health and comfort of residents and other building users. However, there exists a substantial body of literature that shows that HVAC systems' performance can be greatly affected by inferior quality ductwork. To avoid these problems, it is important to pay greater attention to the design, construction, installation, and maintenance of ductwork systems, bearing in mind that the primary functions of the HVAC systems must be fulfilled.



The European AIRWAYS project (which ran from December 1999 to December 2001 and was partly supported by the European Save II programme) was set up to provide design guidance and maintain efficient air duct systems, and to bring to light the energy saving opportunities in parallel with health, safety, and comfort issues.

The results of this work have been published in a book targeted at decision-makers concerned with indoor climate issues, including policy makers, architects, and designers. It provides condensed information on better air duct system design and how this can be achieved. Check lists of important design issues are available for use in the practical design of duct systems.

The first part of the book gives an overview of different ventilation principles and components used in duct systems. It explains why and how a ductwork system should be carefully designed and describes how less energy can be used with the duct system. It also gives examples on how better ductwork can be introduced in Europe, and discusses the cost elements and whether a good quality ductwork really costs more than one of lower quality.

The second part shows different ways of integrating a duct system into the building, how to reduce noise transmission and fire hazards, system flow and tightness characteristics, and maintenance requirements. It compares space requirements and costs for circular and rectangular ducts.

The third part describes duct manufacture and installation and also how the quality of the system is controlled before taking it into operation. It points out the importance of maintaining the duct systems during its lifetime.

The fourth part presents several illustrated practical examples and case studies of duct installations, good and bad.

Finally, the last part of the book comprises a large number of ductwork checklists that can be used by the different operatives from the programming phase to operation and maintenance. The checklists are intended to be used in the practical design of duct systems.

The publication is available on a CD-ROM that includes a literature survey, as well as an annex report presenting the results of an inquiry into the tools actually used in Europe for the design of air duct systems.

Health and Indoor Environment

RSEIN (Recherche Santé Environnement INtérieur) is a network of experts involved in research programmes in the field of "Health and Indoor Environment" in France. RSEIN regularly publishes a bulletin in French which reviews the news and papers in this field. The bulletin is sponsored by the Ministry of Ecology & Sustainable Development and the Ministry of Health. The two first publications of this scientific review are available on the CD (🗐).

Study on Airborne biocontamination: knowledge and practice in France

This report presents the status of airborne biocontamination measures in France in residential and commercial buildings. This study has been carried out by AIR & BIO for ADEME.

The full report (in French) is available on the AIVC CD (🗐).

IP3/02 Whole life performance of domestic automatic window controls

Website:

Automatic window controls generally work well and user satisfaction is high, but poor installation can lead to faillure or the need for maintenance.

Cooling buildings in London. Overcoming the heat island (BR 431)

Website:

Presents the results of a unique long-term monitoring experiment to measure air temperature at 80 sites spread around London. A design tool on a diskette is included with this publication to allow designers to modify temperature data from Bracknell for calculating peak summertime cooling loads at 80 London locations. A range of techniques is given to reduce the effects of the urban heat island by careful design of buildings and their surroundings.

Indoor Air qualtiy in homes in England

Website:

A report of a survey of 876 homes in England to extend and refine knowledge of baseline levels of indoor air pollutants in homes, to identify any regional differences in pollutant levels and to allow a detailed analysis of factors associated with high pollutant concentrations.

Thermal insulation: avoiding risks (BR 262, 2002 Edition)

Website:

An update of the guide firs produced in 1989 and extensively revised in 1994. It continues to highlight the links between risks, causes and solutions, and now includes a number of revisions resulting from developments in research, changes in materials, construction techniques and Building Regulations. This guide has been prepared to support the Building Regulations for the conservation of fuel and power.

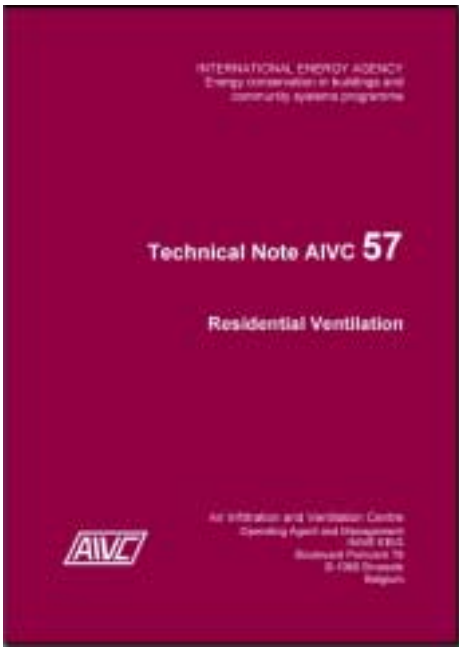
NEW AIVC TECHNICAL NOTE

AIVC Technical Note 57, 2002, 70 pp, Peter Concannon (🗐)

Ventilation is the exchange of stale polluted air with fresh, relatively clean, air (usually from outside). This air change can occur via incidental air paths in the building fabric (usually referred to as Infiltration) or via purpose provided routes (usually referred to as ventilation).
Ventilation is required for a number of reasons; to remove pollutants from the indoor environment, to provide oxygen for combustion devices and to provide oxygen for human metabolism.

When ventilation occurs energy will also be transferred between the building and the external environment. It is estimated that ventilation losses are around 33% for the combined residential and service building sectors for 13 OECD countries.

Conflicting requirements therefore exist for ventilation between the need to provide fresh air and the need to minimise energy consumption.



This Technical Note aims to provide information on residential ventilation systems and how these can be applied to meet the conflicting needs of fresh air and minimised energy consumption.

As well as considering energy consumptions, indoor air quality, occupant interaction with the ventilation system, safety, sighting of inlets, comfort, noise, visual appearance, reliability and commissioning are also covered.

MEETINGS & EVENTS

Hybrid ventilation 2002 An Integrated Solution for Ventilation, Health and Energy

Many advances have been made in ventilating office and educational buildings, both naturally and mechanically. The next logical step is the development of ventilation concepts that use and combine the best features from each system into a new ventilation system – ***Hybrid Ventilation***.

In 1998, an international research project entitled *Hybrid Ventilation in New and Retrofitted Office and Educational Buildings* was commenced under the auspices of the International Energy Agency (IEA) by the implementing agreement: Energy Conservation in Buildings and Community Systems (ECBCS). The main objectives of this international project are:

- To develop control strategies and performance analysis methods.
- To select suitable measurement techniques for hybrid ventilation in these buildings.
- To promote energy- and cost- effective hybrid ventilation system in these buildings.
- To demonstrate the performance of existing hybrid ventilated buildings.

The fourth forum organized within the framework of this project was held in May 2002 in Montreal, Canada. About 25 papers related to the major outcomes and technologies were presented and are available on the AIVC CD (🗐).

Full proceedings are available (🗐)

CONFERENCE CALENDAR

Click here 🗐 for a list of forthcoming conferences on ventilation, energy efficiency, and other topics.

Renewable Energy Solutions Trade Show and Conference
6-8 November 2002
São Paulo, Brazil
WBE Media
Flavia Giomo or Thorvald van der Zee
Tel: +55.11.38.73.76.14
e-mail: _____

The 3rd International Conference on Decision Making in Urban and Civil Engineering
6-8 November 2002
London, United Kingdom
Centre d'Energétique
Ecole des Mines de Paris
Bruno Peuportier
60, Bd St Michel
FR-75272 Paris
Cedex 06
France
Tel: +33.1.40.51.91.51
Fax: +33.1.46.34.24.91
e-mail: _____or _____

European Research 2002
11-13 November 2002
Brussels, Belgium
European Commission
Information and Communication Unit
Tel: +32.2.295.99.71
Fax: +32.2.295.82.20
e-mail: _____
website: _____

Light & Lighting 2002 International Conference
28-30 November 2002
Bucharest, Romania
WCRE, C/o EUROSOLAR e.V.
Faiser Friedrich-Str, 11
DE-53113 Bonn
Germany
Fax: +49.228.36.12.79
e-mail: _____
website: _____

ABT 2002 International Conference on Advances in Building Technology
4-6 December 2002
Hong Kong
Conference Secretariat
The Hong Kong Polytechnic University
Faculty of Construction and Land Use
Hung Hom
Hong Kong SAR, China
Tel: +852.27.66.50.33
Fax: +852.23.62.25.74
e-mail: _____
website: _____

SSB 2002: 6th International Conference on System Simulation in Buildings
16-18 December 2002
Liège, Belgium
Monique Drianne
Laboratory of Thermodynamics
University of Liège
Campus du Sart-Tilman, Bâtiment B49
BE-4000 Liège
Belgium
Tel: +32.4.366.48.00
Fax: +32.4.366.48.12
e-mail: _____
website: _____

Environment & Energy 2003
Exhibition and Conference
2-5 February 2003
Abu Dhabi International Conference Centre, Environment & Energy 2003
PO Box 5546, Abu Dhabi
United Arab Emirates
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CLEAN 2003
20-23 February 2003
Bangalore, India
Pradeep Deviah & Associates Pvt. Ltd
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Frazer Town, Bangalore, 560 005
India
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website: _____

Power-Gen Europe 2003
6-8 May 2003
Messe Düsseldorf, Germany
e-mail: _____
website: _____

First Istanbul International Conference on Energy Environment and Economy
Istanbul, Turkey
7-9 May 2003 or 14-16 May 2003
Istanbul Technical University (Turkey), Clean Energy Research Institute - University of Miami (USA), Clean Energy Foundation (Turkey), Water Foundation (Turkey) Scientific and Technical Research Council of Turkey (TUBITAK)

Third World Conference on Photovoltaic Energy Conversion
12-16 May 2003
Prof. K. Kurokawa, Osaka, Japan
e-mail: _____

ISES 2003
14-19 June 2003
Göteborg, Sweden
ISES 2003 World Congress – Secretariat
Chalmers University of Technology
Building Services Engineering
Jan-Olof Dalenback
SE-412 96 Göteborg
Sweden
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e-mail: _____

Cold Climate HVAC 2003
15-18 June 2003
Trondheim, Norway
e-mail: _____

Healthy Buildings 2003 –
Energy Efficient Healthy Buildings
13-17 July 2003
Signapore
Conference Secretariat
Healthy Buildings 2003
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National University of Signapore, 4
Architecture Drive, Signapore 117566
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5-8 August 2003
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Ventilation 2003 Office Research Group of Human Environment Engineering
Division of Urban and Environmental Engineering Graduate School of Engineering
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Sapporo , 060-8628, Japan
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e-mail: _____website: _____

Building Simulation 2003 8th International Building Performance Simulation Association International Conference and Exhibition
11-14 August 2003
Technische Universiteit Eindhoven
For more information & pre-registration:
e-mail: _____
website: _____

Research in Building Physics
14-18 September 2003
Leuven, Belgium
Rita Peys
Technologisch Insituut
c/o Ingenieurshuis KVIV
Desguinlei 214
BE-2018 Antwerpen
Belgium
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First announcement & call for papers

VENTILATION, HUMIDITY CONTROL and ENERGY

AIVC BETEC 2003 conference

Hamilton Crowne Plaza Hotel
Washington DC
United States of America
12 – 14 October 2003

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Other countries

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