rehva

Federation of European Heating and Air-Conditioning Associations

rehva journal

July/December 2005 • 3rd & 4th Quarter

Clima 2005 and REHVA 48th General Assembly held in Lausanne Switzerland

Indoor Climate and Productivity

Preventing Legionella in HVAC Systems

Geo-Solar Village in Southern Hungary

The Energy Performance of Buildings Directive (EPBD) and Renewable Energy

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The views expressed in this journal are not necessary those hold by REHVA or its member Associations. REHVA will not be under any liability whatsoever in respect of contributed articles.

President's Letter

Increasing interest in REHVA's technical activities

Vision of the future of REHVA
I would like to present my sincere gratitude to the members for electing me as the president of REHVA, the biggest professional organisation in the area of Heating, Ventilation and Air-conditioning in the world. I will serve REHVA and its members with all my capacity during my three-year term. To be able to coordinate our efforts within REHVA organisation we have to vision, in the following I present my vision regarding the future of REHVA.

MISSION
REHVA´s task is to promote and develop economical, sustainable, energy efficient and healthy heating, ventilating and air conditioning services for the benefit of its member associations. REHVA co-operates with other organisations to fulfil its task. REHVA will accomplish its goal with various activities like seminars, journals, newsletters, website etc., and by participating in various projects and working groups.

MEMBERS
REHVA is recognised as a major international organisation in Europe for professional development and communication in the field of HVAC technology. The number of REHVA´s members grows from current 30 countries, to include all European countries. REHVA platforms is used actively as a forum for its individual personal members for communication and exchange of ideas. REHVA co-operates actively with other European organisations regarding energy issues, building construction, sustainable technology etc. To promote this co-operation REHVA has a number of non-voting supporting members and associate members. REHVA takes an advantage from the geographical and cultural diversity of its national member associations by transferring the ideas and know how from country to country. REHVA continues to recognize annually its most active members with awards.

RESEARCH
REHVA has an active research programme which is developed with and supported by the HVAC industry. REHVA´s research is open to all member countries. REHVA participates actively through its national member associations in the projects of framework programmes at EU.

TECHNICAL COMMITTEES AND GUIDEBOOKS
A number of task forces are working for technical advancement of HVAC technology in Europe. Task forces are working under technical and other permanent committees of REHVA. REHVA guidebooks are valuable basis for European standards and national building regulations. Guidebooks are translated in several languages, and used widely by professionals and in technical education. REHVA´s technical work has a significant influence on European standards, and regulations. REHVA is actively expanding its activity to the areas that are important for its members such as renewable energy sources, industrial ventilation, district heating, etc.

PUBLICATIONS
The REHVA journal is well known technical journal in Europe with a wide circulation. It serves HVAC professionals with high quality, reliable technical articles, and news from the HVAC industry. Manufacturers and vendors compete for advertisement space in the journal.
Electronic newsletters serve the members with the latest news in the HVAC field in Europe such as new EU standards, new directives related to the HVAC field, EU projects, and news from the federation and its member societies.

A comprehensive REHVA terminology is published and translated in most of REHVA languages, it is widely used in the industry.

REHVA´s website is well structured, and frequently visited by the individual members. The website is source of important up to date information of HVAC technology, events and products. HVAC companies compete to have information related their activities on REHVA web site.

EDUCATION
Web-based distant learning courses developed by REHVA experts are widely used in technical education on different levels. A network of teachers in HVAC is active, and work for harmonising the contents of HVAC education on various levels. Common European textbooks are prepared.
Student competitions are organised regularly to recognise good quality schools in Europe and attract best possible students to HVAC studies. REHVA is harmonising the technical and professional requirements for the HVAC designers and contractors on European level.

EU RELATIONS, PROJECTS AND CO-OPERATION
REHVA and its national member associations participate actively in several EU funded projects for technical development and dissemination. REHVA co-ordinates some of the most important European projects related to its expertise. REHVA co-operates actively with other organisations related to HVAC field such as International Energy Agency, CEN, IIR, CIB, ASHRAE, SHASE, EUROVENT etc.

Olli Seppänen
President of REHVA

Happy New Year,
Welcome to new President & New Goals…

Dear Members of National Association's and Readers;
We wish you a Merry Christmas and Happy New Year…

We welcome **Prof. Dr. Olli Seppanen** as new **President of Rehva** and wish him and new Board members success in their volunteer work…

During our General Assembly (GA) in Lausanne; Publishing Committee (PC) had annual meeting and had very fruitful meeting with new decisions. I thank to all participated. We are restructuring our organization and defined new PC Delegates from every NA. PC Delegates gives us ideas and support from 30 member countries; organizes the contribution of each NA to Rehva Publications. Newly, we have executive Publishing Committee on all Publicity of Rehva. Therefore; Maija Virta (Finland), Per Rasmussen (Denmark), Hakon Skistad (Norway), Egils Dzelzitis (Latvia) and Jan Aufderheijde (Netherlands) have been volunteer to help me in this Committee.

In order to publish better journal we have enlarged our Editorial Board and besides Prof.Dr Hikmet Karakoc; Dr. Ibrahim Cakmanus from Turkey joined more actively to the team and helping me on a day to day business for Rehva Journal… Thanks all friends for their hard work… As announced in previous issues; Rehva Journal is a unique European HVAC technical magazine for "Application Engineers". We will try to publish more articles to fulfill the interest of broader readers… We are also preparing "rehva journal" to be read online from our web site.

One of the most important decisions of the GA was on the membership status and "**Supporting Members**" **from the HVAC Industry** will join to Rehva for developing this sector and also for joining to rehvaclub meetings of leading HVAC experts. The brief conditions can be read at "news" section and followed at rehva website…

Rehva web site is also having new services for all visitors, please take a look at the new information. It is free to all, just click www.rehva.com

Rehva Journal is being followed by our Ashrae Friends and colleagues from all over the world. We will keep informing our readers about the HVAC Events from all over world enriching with the most important Conferences and Fairs…

We look forward to new goals and achievements together with our readers and integration with HVAC Industry in 2006… Your contribution will be appreciated… Please keep following and supporting "rehva journal" for better dissemination of the new developments in our industry…

Numan Sahin
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48th General Assembly of REHVA

REHVA's 48th General Assembly took place in Lausanne – Switzerland 7th- 8th of October 2005. Venue held in Hotel Mövenpick by the lake. After registration it started with general overview of REHVA Task Forces presented by Olli Seppanen _ Chairman of TC. Since the working period of 4 Board Members ended at this time, nomination of candidates for board members collected first and opening was made by REHVA President, Dusan Petras. After welcome address by SWKI President, Jobst Willers; collection of "Power of authorities" from delegates have been done. The GA started as usual with the "Confirmation of the minutes of the 47th General Assembly, Vilnius, Lithuania". Reports of the President, Dusan Petras, Financial report of year 2004 by Per Rasmussen, Report of the auditors, revised budget and estimated result for the year 2005 and the budget for the year 2006 has been presented and voted... Changes in the Articles/By-laws discussed and accepted. All reports are available on our web site. The election of the auditors and board members completed. Since Per Rasmussen could not be re-elected and Dusan Petras who served as President was re-eligible only for two years; GA elected only two board members to serve one more term; Peter Novak and Francis Allard and two new members; Marianne Lilja Wittbom and Zoltan Magyar. The "Standby board member" until the next general assembly is Koos Mast, having collected the most votes after the elected board members. The Budget 2006 was presented by the treasurer. The subscription fee proposed accepted as 2.400€, instead of 2.300€. The board reviewed the articles of the society and its bylaws, under the leadership of Peter Novak and with the precious help of Walter Knoll (TVVL), in order to reflect the evolution of REHVA and accepted by GA. The changes are also available on web site.

Most important change is a new category of membership "Supporting Member" status was added to the existing members (now called "regular" members). "Supporting Members are the industrial entities, which are known to have a good reputation and worked towards the goals of the Associations and the Federation. Peter Novak reminded that the rules for the Research Fund had been accepted at the last general assembly and are published on the website.

The Publishing, Technical and Education Committees met in parallel session on Saturday October 8th, morning. Discussions and conclusions from these meetings were then reported to the Assembly after the break as well as the report of actions of Region1 for the past year. Yuri Tabunschikov, President of ABOK, presented the venue and organization for the 49th general assembly to be held in Moscow in conjunction with Cold Climate Conference (May 21-24 2006). ASHRAE President, Lee BURGETT, addressed the assembly. He mentioned the meeting he had with the board two days before, where opportunities to share and collaborate with REHVA were discussed. Göran ROBERTSSON, Past President of EUROVENT/ CECOMAF thanked REHVA for inviting him to address the general assembly. IIR was represented by its Director, Didier Coulomb who addressed the assembly. The agreement of cooperation was signed two years ago between IIR and REHVA.

Prof. Dr. Olli Seppanen took over the Presidency from Prof. Dr. Dusan Petras (left)

The New Rehva Board is (left to right): Peter Novak (SITHOK, Slovenia), Numan Sahin (TTMD, Turkey), Michael Schmidt (VDI-TGA, Germany), Marianne Lilja Wittbom (SWEDVAC, Sweden), Olli Seppanen (FINVAC, Finland), Zoltan Magyar (ETE, Hungary), Francis Allard (AICVF, France)

CLIMA 2005 - REHVA World HVAC Congress

Lausanne, Switzerland, October 9th to 12th 2005

The beautiful lakeshore of Lake Geneva was the setting chosen for the 8th edition of the now renowned World HVAC Congress CLIMA 2005. Organized on behalf of REHVA by one of its member society every 3 years now, the congress was hosted this year in Lausanne by SWKI, the Swiss HVAC organization and was actively co-sponsored by ASHRAE, the American Society of Refrigerating and Air-Conditioning Engineers.

The 8th edition of this world congress offered an unrivalled international platform for scientists, engineers, experts in building technologies and industry leaders to exchange knowledge and experience on emerging technologies and improved means of measuring system performance, where for four days, Lausanne became the hub of the HVAC world. Some 300 speakers presented papers on the latest trends in building technology, simulation-based engineering and sustainable building construction. Attended by close to 500 participants from 41 different countries, ranging from Germany, United Kingdom, Czech Republic, Romania, Greece, USA, Japan, China, Singapore, and many more countries, this gathering of experts was once again a clear success.

Fifteen Technical Workshops

Additionally to the Plenary, Technical and Poster sessions, 15 Workshops were organized by REHVA, with the support of the European Commission (under Type 3 Action Program, Intelligent Energy Europe).

The purpose of these technical workshops was to disseminate the latest information and get feedback from the participants on subjects such as: New European Standards for Inspection of Air Conditioning Systems for Energy Efficiency; Evaluation of Cost Effectiveness of Indoor Climate, Energy Efficiency and Ventilation – Development of Distance Training; and Data Base for European High Quality Low Energy Buildings.

The subjects chosen for these workshops, chaired by prominent European experts, converged with the objectives set by the European Union in, e.g., the Green Paper on Security of Energy Supply, the European Directive on Energy Performance in Buildings, the EU commitments such as Kyoto's towards improved energy efficiency and the adoption of renewable energy sources.

More than a scientific congress…

Beyond a scientific congress, CLIMA is also a formidable opportunity for peers to reunite and enjoy memorable get together events and reinvent the world with old friends.

Some of the highlights of CLIMA2005 were of course the cocktail reception held in the unique setting of the Olympic Museum of Lausanne, a place packed with history and emotions where tribute is paid to the marriage of sport, art and culture which Baron de Coubertin called "Olympism." And what to say of the charms of glittering Lake Geneva, the ship gliding smoothly to take congress attendees to the timeless splendour of Casino of Montreux where a splendid dinner and a chance of bigger wealth awaited them.

Next REHVA CLIMA 2007, Helsinki, Finland, June 10th-14th 2007: Well Being Indoors

The 9th REHVA World Congress will offer the same opportunities to scientists, industry, building owners, consultants, engineers, architects and policy-makers: A platform for the exchange of scientific knowledge and technical solutions, and one on one personal contact. The congress will cover all the aspects of HVAC technology including building automation in all types of buildings. According to congress organizers, "the focus will be on improving well being in buildings in a sustainable manner by applying the latest research results and technical innovations into practice." To learn more, visit www.clima2007.org.

To obtain the papers presented at CLIMA 2005 or presentations and discussions from the REHVA Workshops for information on next CLIMA 2007, Helsinki, contact info@rehva.com.

REHVA Conguratulates and send best wishes to Neville Billington; REHVA's Past President on his 90th Birthday…

Neville Billington from United Kingdom used to be the second President of Rehva between 1976-1978 after the acceptance of the Articles of Associations in 1970; even though Rehva was founded in 1964...

Clima 2007 Ambassadors have met in Lausanne during 2005 Congress for the preperation in all member countries.

Professor Fanger Receives his 12th Honorary Doctorate

Professor P. Ole Fanger Technical University of Denmark has been awarded Honorary Professor at the Chinese Elite University, Harbin Institute of Technology (HIT), which has the largest and one of the highest ranking HVAC departments in China. The rare honour was given in recognition of Fanger's unique contributions to indoor environmental engineering. This is Professor Fanger's 12th Honorary Doctorate/Professorship during the last four years.

Professor P. Ole Fanger is awarded Honorary Professor by HIT Vice-President Sun Heyi

REHVA 2005 AWARDS

Rehva Awards Committee has announced the Award Winners during the GA of 2005 in Lausanne. The awards has been given at the Gala Dinner at Lausanne at a wonderful atmosphere with our thanks Swiss Friends and Organizing Committee. The Winners and Awards are follows with photos but only Prof. Dr. - Ing. Tibor RAKOCZY was absent to receive his "REHVA PROFESSIONAL AWARD FOR DESIGN… Our congratulations to all; for their outstanding work and achievements in the field of Heating, Ventilation and Air Conditioning.

Gold Medal 2005 conferred on Prof.Dr. Branislav Todorovic.

Rehva Honorary Fellow Ben Bronsema.

Rehva Honorary Presidency Nicolas Gomez.

Rehva Young Researcher Award Dr. Sci., Jarek Kurnitski.

REHVA has started new SUPPORTING MEMBERSHIP for the HVAC INDUSTRY

The services for the Supporting Members of REHVA:

1. A free copy of each REHVA Guidebook and new publications within a year.
2. Having the name of the company and link on Rehva website to supporting member's website as supporting members.
3. Having the name and free half page advertisement in Rehva journal once a year. Special pricing for upgrading.
4. Receive results of European projects Rehva is involved in (such as: Distant Training Courses on energy efficient ventilation; a CD with the database of European high quality and energy efficient buildings; an Electronic Training Tool on the Energy Performance Building Directive).
5. Right to participate in REHVA annual General Assembly and technical seminar and to become member of rehvaclub of top HVAC experts.
6. Receive 10 copies of REHVA quarterly Journal.
7. Receive the electronic copy of REHVA Newsletter.

Please contact Rehva Secretariat for the membership application form and learning the details and annual fee.

Merry Christmas and Happy New Year to HVAC World

Indoor Climate and Productivity

Olli Seppänen[1] and William J Fisk[2]

[1] Helsinki University of Technology, Finland
[2] Lawrence Berkeley National Laboratory, USA

1. Introduction

There is increasing evidence that indoor environmental conditions substantially influence health and performance. Macro-economic estimates show that the potential benefits from indoor environmental improvements for the society are high. Some calculations show that the estimated cost of poor indoor environment is higher than energy costs of heating and ventilation of the same buildings. A few sample calculations have also shown that many measures to improve indoor air environment are cost-effective when the health and productivity benefits resulting from an improved indoor climate are included into the calculations. There is an obvious need to develop tools and models so that economic outcomes of health and performance can be integrated in cost benefit calculations with initial, energy and maintenance costs. The use of such models would be expected to lead to improved indoor environments, health and productivity. In this paper we present estimates of some quantitative linkages for cost benefit calculations namely between ventilation rate and sick leave, ventilation rate and performance, perceived air quality and performance, temperature and performance. We also suggest that a link between SBS symptoms and performance exists. This summary is based on papers by Seppänen & Fisk 2005a, b and Seppänen et al. 2005.

2. Ventilation Rates and Short Term Sick Leave

Earlier summaries show that the prevalence of some types of communicable respiratory diseases is higher under conditions with lower ventilation rates. In our earlier paper (Fisk et al. 2003) a quantitative relationship between ventilation rate and sick leave was estimated combining published field data and a theoretical model of airborne transmission of respiratory infections. The model (Figure 1) accounts for the effects of ventilation, filtration, and particle deposition on airborne concentrations of infectious particles and for the feedback process by which more disease transmission in a building leads to more sick occupants who are sources of infectious particles. The theoretical model is calibrated, i.e., fit to several sets of empirical data, resulting in different curves relating ventilation rates with illness prevalence.

To illustrate how the illness or absence rate is predicted to vary with ventilation rate per person in an office building, Figure 2 provides a re-plot of two of the curves in Figure 1, assuming an occupant density of 2900 ft^3 (83 m^3) per person, which was derived using data from a survey of 100 U.S. office buildings.

3. Ventilation Rates and Performance

Ventilation affects productivity indirectly through its impact on short-term sick leave due to infectious diseases, but also directly. To establish the relation between ventilation rate and performance we identified relevant workplace studies and studies with data collected in controlled laboratory environment. We normalised the data from the studies by calculating the change in performance per increase of 10 L/s-person in ventilation rate (Figure 3).

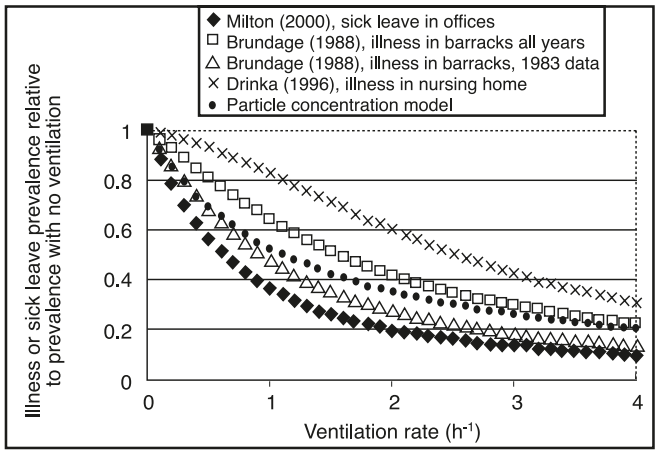

Figure 1. Predicted trends in illness of sick leave versus ventilation rate (from Fisk et al. 2003).

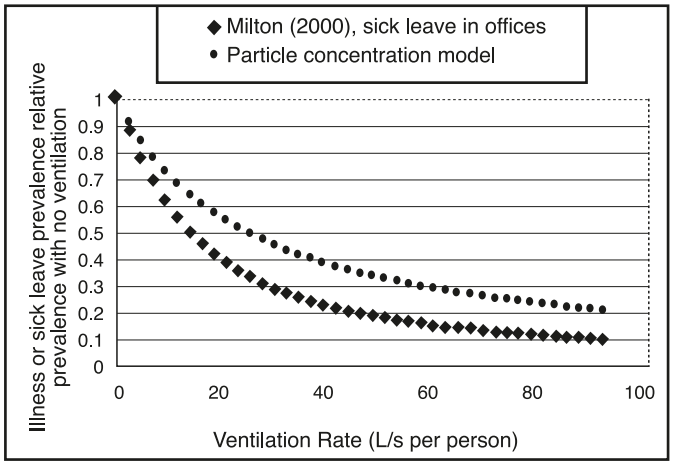

Figure 2. Predicted trends in illness or sick leave versus ventilation rate per person (from Fisk et al. 2003).

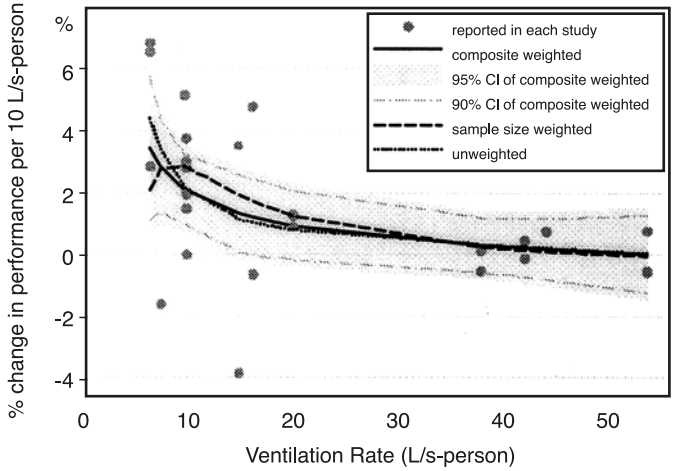

Figure 3. Percentage change in performance per 10 L/s-person versus average ventilation rate, fitted with 2-degree fractional polynomial regression models. Assessments of each data point is adjusted for the mid point of reported range of ventilation with equation (2). One outlier data point (43.8% at 7.5 L/s-person) is excluded (from Seppänen at al. 2005).

Based on the estimated polynomial models, the performance at all ventilation rates relative to the performance at a reference ventilation rates of 6.5 L/s-person and 10 L/s-person were calculated and plotted in Figure 4.

4. Perceived Air Quality and Performance

Sensory evaluations of air quality with the olf-decipol concept have been used as indicators of air quality since 1988 when they was first introduced in 1988. Sensory evaluation is an integrated measure of air quality as sensed by human senses (olfactory and facial nerves).k. There is a consistent relationship (Figure 5). The pollution sources in the experiments were a carpet removed from a sick building, pollutants from computer display terminals and from typical building materials.

5. Temperature and Performance

While the effects of temperature on comfort are broadly recognized, the effects on worker productivity have received much less attention. For this linkage, we assembled existing information on how temperature affects performance so that these effects could be incorporated in cost benefit calculations related to building design and operation.

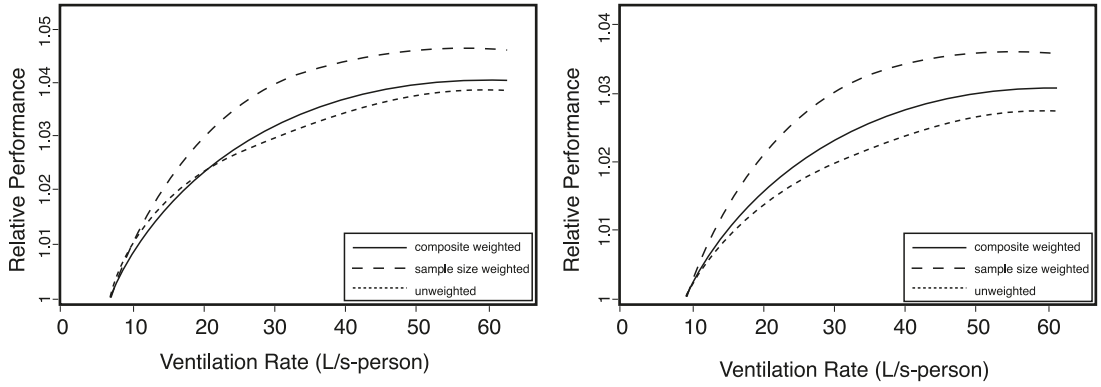

Figure 4. Relative performance in relation to the reference value at 6.5 L/s-person (left) and 10 L/s-person (right) versus average ventilation rate.

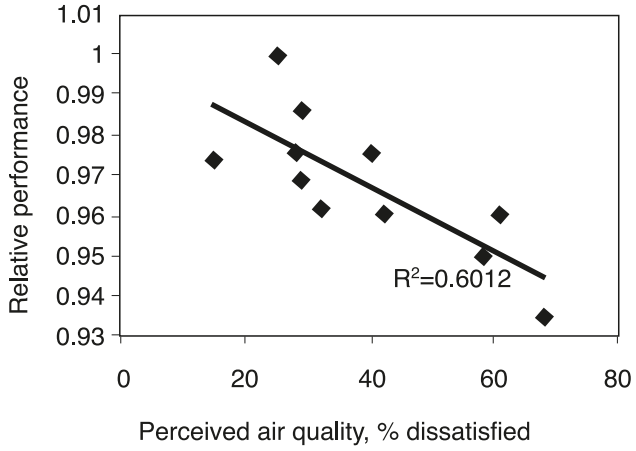

Figure 5. Relative change in performance of text-typing depending on perceived air quality expressed as percentage of dissatisfied with air quality by non-adapted persons (from Bako-Biro 2004).

We analysed 150 assessments of performance from 26 studies. We calculated from all studies the percentage performance change with an increase in temperature of each assessment and divided that by temperature range of the assessment, yielding a slope in the performance-temperature relationship. The number derived by this way indicates percentage change in performance per degree increase in temperature, positive values indicate increases in performance with increasing temperature, and negative values indicate decreases in performance with increasing temperature (Figure 6). From this relationship we further developed a curve of performance in relation to maximum performance (Figure 7). For example, at the temperature of 30°C the performance is 90% of the maximum performance at 21.6°C, i.e. the reduction in performance is 10%.

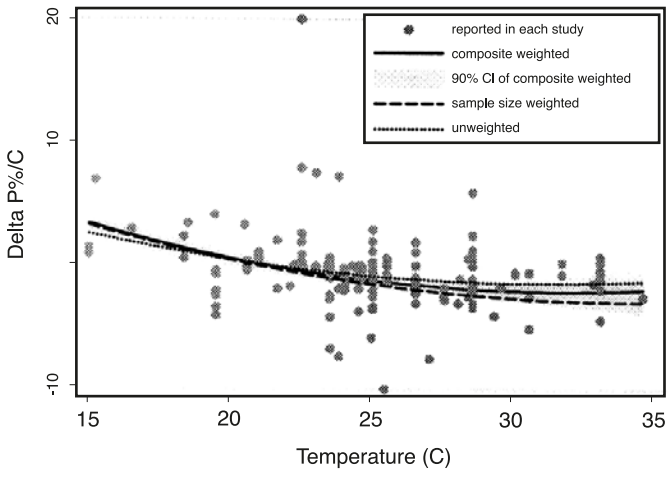

Figure 6. Change in performance (Delta P% per °C) vs. temperature. Positive values indicate improved performance and negative values deteriorated performance with increased temperature. The chart has 150 data points from 26 studies (from Seppänen and Fisk 2005a).

6. SBS-Symptoms and Performance

In many prior studies, characteristics of buildings and indoor environments have been linked to the prevalence of building-related SBS-symptoms experienced by the occupants of the building.

We identified 24 studies which simultaneously reported the prevalence or intensity of SBS symptoms and a measure of work performance. From those, eight were field experiments and nine were cross sectional field studies. Two of the studies with objective performance data suggest a relationship of SBS symptoms and performance. Niemela et al. (2004) suggest, based on data form a call center, that an average reduction of 7.4 %-points in the prevalence of weekly central nervous symptoms correspond with a 1.1% increase in productivity. Tham and Willem (2004) report a linear relationship between intensity of mean score of neurobehavioral symptoms and average talk time (a measure of work speed) in a call center. The talk time improved (shortened) 5% per 10 points change in intensity of symptoms. The intensity of symptoms was measured with an analog-visual scale from 0 to 100.

7. Conclusions

For cost-benefit analyses leading to improved IEQ, health and productivity, it is not sufficient to have information demonstrating a statistically-significant association between an IEQ condition and health or performance, the size of that effect must be estimated quantitatively. In this paper we have shown that it is possible, with existing data, to estimate quantitative relationships between ventilation rate and illness-caused absence, and to estimate quantitatively how work performance relates with ventilation rate, air temperature, and perceived air quality.

These resulting quantitative relationships have a high level of uncertainty; however, use of these relationships may be preferable to the current practice which ignores health and performance related productivity in decisions about building design or operation.

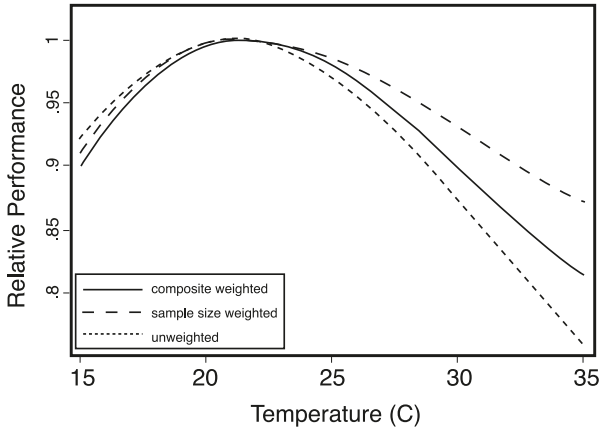

Figure 7. Relative performance vs. temperature derived from the curve in Figure 6. Maximum performance is set equal to 1 at the temperatures where the corresponding curves in the Figure 6 cross the horizontal axis (from Seppänen and Fisk 2005a).

Acknowledgements

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"SUPPORTING MEMBERS" of REHVA

General Assambly of Rehva; newly accepted Articles & Bylaws allow Rehva to invite "Supporting Members". We thank to first three companies for supporting Rehva;

- Swegon - Sweden
- Halton - Finland
- Holger Andreason - Denmark

Please read the news on page 4 and the brief conditions on page 7.

Preventing Legionella in HVAC Systems

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Abstract

Air-conditioning plants can sometimes be found to contain a bacteria which will flourish during the treatment process, passage and diffusion of the air. This bacteria causes a disease known as legionellosis, showing its dramatic effects in recent years by causing frequent deaths in Italy and the rest of the world. The subject has been undervalued in many ways and has health, legal, technical and social aspects, inasmuch as many types of ventilation and water systems are now to be found in every area of daily use. It is therefore opportune to discuss the risks inherent in this disease. This article aims to develop the topic, investigating the conditions in which the bacteria develops and increases, those persons and areas at risk and finally the techniques for prevention and elimination of the bacteria. The object is to provide useful information simply and precisely, thereby allowing the reader to give it an appropriate significance and the ability to decide what action to take to protect his own health and that of others.

Keywords: HVAC, Legionellosis, Legionella Pneumophila.

1. Introduction

Every sort of infection caused by the different kinds of aerobic gram-negative bacteria of the legionella type is described by the term legionellosis. Until now over thirty species have been identified; of these Legionella Pneumophila is the most dangerous, to which 90% of cases of legionellosis are attributed [1]. Legionella infections are rightly held to be a growing public health problem, to the extent of being placed under special

Figure 1. Tegionella Premmophila.

observation by the World Health Organisation (WHO) and by the European Community through the European Working Group for Legionella Infections (EWGLI). The principal source of legionella infection is stagnant fresh water, either in natural holders such as ponds and canals or artificial ones such as reservoirs, water plants, water heaters, heating and air-conditioning systems (temperature between 25 and 45°C). Entry to the human organism occurs only by air, through small

Figure 2. Filter of contanniates plan.

Figure 3. Circular diffuser.

drops of contaminated water forming what amounts to a 'microbic spray' [2]. Taps and showers can also emit higher concentrations of bacteria when they are first used after a short period of disuse. In recent years important bacteria 'vehicles' have been identified in HVAC systems, particularly those which are centralised and lack regular maintenance. In particular, highly efficient direct cooling systems have traditionally been used. However, these have suffered from such well known problems as Legionnaire's Disease, which is transported in the droplets in the output air in cooling systems [3]. Once the bacteria have entered the organism they reach the lungs where unfortunately the phagocytes of the alveolar macrophages are incapable of either killing them or inhibiting their growth. The Legionella succeed in evading the microbe-killing mechanism of the phagocytes and instead multiply within them until causing their breakdown, with a resulting release of further bacteria to infect other cells [4]. Legionellosis presents itself in various forms. The severest forms of the infection can cause an average fatality rate of 30-50% where hospital infections are involved, and appears as a pneumonia hard to distinguish from other types of respiratory infection. In the United States it is maintained that there are at least 25,000 cases of Legionellosis each year [5]. In France 85 cases occurred during the winter of 2003-2004, of which 13 were fatal [6]. In Italy about 150 cases are notified each year, although there are good reasons to believe that actual cases are at least 10 times greater [7]. One of the main reasons why the disease is underrated can certainly be attributed to the fact that the clinical characteristics of Legionellosis do not permit a clear distinction between the various forms of pneumonia, whether atypical or bacterial.

2. Techniques and Methods of Prevention

Techniques to prevent the increase and spread of Legionella must be carefully considered and put into effect during the stages of planning, installing, operating and mantaining the systems. Even if these methods cannot guarantee that a system or part thereof are entirely free of Legionella, they will contribute to reducing its proliferation and thus the prospect of cre-

Figure 4. Encrustations in heat exchanger.

ating severe bacterial pollution. An effective primary preventive measure lies in the regular and frequent maintenance of plants and reservoirs, as well as a periodic review of the condition of critical points of buildings at risk, such as hospitals, nursing and retirement homes, prisons, barracks, tourist establishments, offices, sports grounds and premises catering for seasonal activities.

We also list below some specific preventative measures for air-conditioning plants:

- Position the air intake of air-conditioning plants so that the air discharged from towers and evaporative condensers is prevented from entering buildings.
- Ensure the efficiency of the drip separators of cooling towers and evaporative condensers.
- Ensure the external air filters are kept dry, as water drops and condensation on the filters provide the ideal environment for diffusing bacteria in air-conditioned premises.
- Provide effective cleaning of the internal surfaces of ducts avoiding damage to the outer cover. A nozzle with asymmetical holes connected to a flexible hose and emitting highly compressed air (up to 300 m3/h) can be used for such cleaning purposes. The rapid passage of air creates a sort of 'blade' of air which detaches dirt from the inner surfaces of the ducting; the asymmetry of the holes gives rise to rotation and thus to a flow through the whole length of the hose of up to 30 metres [7].
- Establish a register to keep a record of both ordinary and extraordinary maintenance of water systems and air-conditioning plants.
- Regularly inspect the system to check the state of ducting, cleanliness and maintenance of humidifiers and evaporation towers.
- Change filters at pre-arranged intervals; regularly clean all parts of the humidifier thoroughly.
- Arrange regular microbiological analysis to check on the presence of Legionella.
- Plan, construct and install ventilation systems, bearing in mind the following maintenance requirements: ensure an efficient drainage for cleaning fluids; avoid the use of heating insulation inside the ducts, given the difficulty of adequately cleaning such insulation; provide components placed at the beginning and end of the ducting (shutters, heat exchangers etc.) with appropriate apertures of a size to permit cleaning as well as rapid and easy removal and replacement; ensure that maintenance personnel are supplied with instructions for removing and replacing components; use adequately strong materials for flexible ducts which will permit mechanical cleaning; use removable terminals (covers, anemostats).
- Soundproofing materials normally used tend to be porous and fibrous, therefore retaining dirt and being difficult to clean. It is therefore advisable to use materials less likely to present these problems even if they result in a greater surface area and higher costs. Complying with the manufacturer's advice about distances between such equipment and the humidifiers is also recommended.

Figure 6. Fan before and after the treatment.

Figure 7. Shutter before and after the treatment.

- If external air intakes are placed on non-protected vertical walls, their size must be appropriate for speeds of no more than 2 m/s and they must have efficient safeguards to prevent the penetration of water. The distance between these inlets and possible sources of pollution must be checked.
- Install Eurovent EU7 filters where the air treatment unit begins and EU8/199 filters at the end, and after the silencers if these are fitted [7]. Filters of at least EU7 type must be fitted on air uptake systems. The cost of an efficient filtration is lower than that of cleaning the components of distribution networks.
- Thermal exchange batteries can emit unpleasant odours due to encrustations which develop on the inner surfaces, particularly with hot batteries. Frequent cleaning with brushes or aspiration is required to eliminate this, especially when high temperatures occur. With cold batteries, finned surfaces and condensation collection tanks are the places where microorganisms and moulds proliferate. Inclined tanks should be installed to avoid stagnation, manufactured with anticorrosive materials to facilitate cleaning.

3. Methods of Anti-bacterial Control in Ventilation Systems

The first step consists of a careful examination of the state of the system. Through a visual or video inspection the main problems of hygiene and maintenance within the system can be identified. More specifically measurements can be taken by extracting airborne dust or by monitoring the airborne microbiological agents present on internal walls of the air treatment unit. Samples of water can also be taken for appropriate laboratory analysis. Some of the principal treatments to be applied to air-conditioning plants are described below.

3.1 Biocidal Treatment for Cooling Tower Tanks

The circuit should be emptied, plentifully flushed with water and refilled with the addition of an antibacterial product selected from commercial products. There are two main groups of chemical biocides: oxidizers (bromine, chlorine, iodine, etc.) and nonoxidizers (bromonitropropanediol, carbamates, isothiazolones, etc.). Both oxidizers and nonoxidizers can undergo chemical reactions with materials in the water that decrease their effectivenes. Some biocides react with components of some scale and corrosions inhibitors to render both compounds less effective for their intended purpose. Selection of corrosions/scale inhibitors as well as the biocide requires a knowledge of water chemistry, a basic understanding of water microbiology and specific information about the system. It is generally good practice to regurarly alternate the biocides used for a cooling water system to avoid the selection and growth of resistant strains of microbes.

The alternating biocide approach has been emphasized with the rationale that the population that survives the

Figure 8. Duct before and after the treatment.

biocide treatment one week is susceptible to the alternate biocide a week or two later. Alternating the dose and frequency of the same biocide is also used to achieve this goal [8].

Maintenance: Add the antibacterial product at weekly intervals, possibly employing an automatic system such as a peristaltic pump with timer.

Suggested analyses: An analysis of all bacteria present should be carried out at least every month.

3.2 Cleansing Treatment for air Filters

- Air filters should be cleaned either by immersion or spraying.
- By immersion: prepare a disinfectant solution and immerse the filters for at least 20 minutes, allow to dry.
- By spraying: spray the disinfectant solution until the filter is completely wet, allow to dry before restarting the system.
- It is also advisable to have regular analyses carried out to check for bacteria.

3.3 Treatment for Cleaning Fan Coils and Condensation Tanks

Remove the guard from the fan coil and spray the interior, the radiating element and the condensation collecting tank with an antibacterial product.

3.4 Treatment for Air-conditioning Ducts and Unit

Treatment consists of:

- Cleaning of all ducting through the intake, using a micro-spray and a solution of antibacterial product directly into the air being drawn in.
- Cleaning of the water used in humidifying air with a measure of antibacterial product added to the water holding tanks.

3.5 Treatment of Ventilation Ducts

Treatment consists of two different operations: cleaning and disinfection:

- Cleaning by means of a tecnonetair, an instrument consisting of a probe with a head angled at 45° to the rear which is introduced within the ducts and expels compressed air, keeping all the material found within the ducts in suspension. An L-shaped plate is attached to the mouth of the probe and connected to an extracting tank. The joint action of the compressed air emitted by the probe and the low pressure caused by the extractor guarantees the complete removal of all dirt present in the ducts.
- Disinfection can be carried out by two different methods:
- Using a small self-propelled robot supporting a module containing a lamp emitting shortwave ultra-

violet rays, these rays striking microorganisms such as bacteria, moulds and yeasts at the base of their multiplication systems, rendering them inactive and then destroying them. This method provides complete disinfection of all microorganisms which might appear in the air and on the surfaces of the ducts. A computer will calculate the time of exposure necessary to completely eliminate any possible source of infection.

- Through spraying, using a small self-propelled robot and a wide-spectrum disinfectant, for example, based on quaternary ammonium salts diluted to about 2%, which are very efficient in dealing with the majority of pathogenic organisms.

At the conclusion of each method of antibacterial treatment:

- Films and digital photographs must be repeated at the same places.
- Measurements of the quality of air dispersed by every ventilation duct treated must be carried out.
- Measurements must be taken of the microbiological elements dispersed in the air from each treated duct.
- Microbiological samples must be taken from the internal surfaces of treated ducts.
- A technical report must be produced with new pictures and the data of new analyses relating to the operations undertaken and results obtained.
- A report must be drawn up giving relevant data on the system, its condition before and after treatment, the operations undertaken, the products used, etc. This information will be contained in a register for detailing ordinary and extraordinary maintenance of water and air-conditioning systems.

4. Conclusions

The actions described here emphasise that the safest and most efficient method of avoiding the spread of Legionella is to replace systems installed with no consideration of how to control these bacteria with systems where it is possible to control their spread and accomplish their destruction. This will be possible through appropriate planning, construction and maintenance of the systems, through adopting advanced solutions as described above. All this implies a distinct stage of development in plant design and installation in this sector, inasmuch as it confronts an issue of the greatest scientific, technical, legal and above all social concern. It must not be forgotten that:

- If the subject is not discussed clearly and specifically, no-one - employer, administrator, those responsible for prevention and protection services, householders, etc. - will believe or think it necessary to carry out the necessary activities to safeguard their own health or that of the community.
- A greater clarity and decisiveness is needed to establish regulations of checks and maintenance of water and ventilation systems.
- More information and training is needed on the subject so that correct treatment procedures can be undertaken only by specialised firms with qualified personnel, who know the subject and who possess the relevant equipment, tools and products. At the same time it is essential that those whose systems are treated are able to understand the reasons why it is necessary and how it should be carried out.
- Anyone subject to the infection can themselves undertake treatment procedures without the necessary initial training and associated knowledge.

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Geo-Solar Village in Southern Hungary

Abstract

Geothermal energy comes to the surface from small-enthalpy thermal springs in Hungary. The Southern part of the country has the best capabilities where several thermal springs supplying medicinal water operate. A reference village with a spa and modern dwellings with passive solar energy utilization will be established in Zsombó. The thermal spring provides for the bath, and also the basic heat supply of the buildings is solved by geothermal energy. Fossil energy should only be used for covering the peak heat demands in winter.

Key words: geothermal energy, passive solar energy, spa, thermal spring, geothermal gradient.

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1. Introduction

The geothermal gradient with its value of 90.4 mW/m^2 is on average in Hungary; thermal water supplies lying deep constitute great energy reserves. In the Southern part of the country thermal waters with well head temperatures of 90-100°C are used in agriculture, however, they are hardly applied for heating dwellings and buildings. That is why two professors of the Budapest University of Technology and Economics, Dr. Kuba Gellért and Dr. Kontra Jenö developed the plans of a geo-solar village by combining utilizations after a deep thermal spring supplying medicinal water had been completed.

This thermal spring produces water of a temperature of 75 °C with a capacity of 1,200 l/min controlled by a diving pump. This ensures a peak heat capacity of 3.45 MW. In the peak season in winter the heat supply system is supplemented by a gas burning peak furnace, and later heat and electricity production with gas engine will be realized.

There are great traditions of geothermal energy utilization in Southern part of Hungary. Due to the known geothermal capabilities, the solution was obvious to build the heat and hot water supply of the planned spa with the related facilities - public buildings - on geothermal energy, which can be run with extraordinarily low operating costs.

2. Safe Heat Supply

In the first phase, the spa and bath with the hotel facilities are to be erected as per the architectural concept. The sufficient heat and water quantity for this complex can be provided from one single thermal spring.

The safe heat supply and the optimum utilization of the geothermal energy clearly necessitate planning a supplementary (peak) heat production unit • Making use of the advantageous circumstances • On the basis of the available piped natural gas with a double function:

- A gas fired furnace provides thermal energy for heating the bath with the related buildings when the daily mean temperature is -5 °C or below (statistically, there are 13 such days in a year);
- It is able to ensure the heat supply of the complete system in the case of a temporary breakdown in the geothermal energy supply.

Bringing geothermal energy to surface (its "production") is not accompanied by any burning reaction, i.e. it does not pollute the environment with combustion products. In this case, thermal water is the heat carrying medium that does not have any substances damaging the environment. Water's salt content is not essential, after an adequate dilution it can be placed on the surface.

3. Geothermal Energy Supply System

As shown in the theoretical block diagram, water comes to surface by diving pump production. This solution offers a double advantage:

- Production well yield is larger than in the case of a self-pressure well.
- Adjustable water removal through pump operation control.

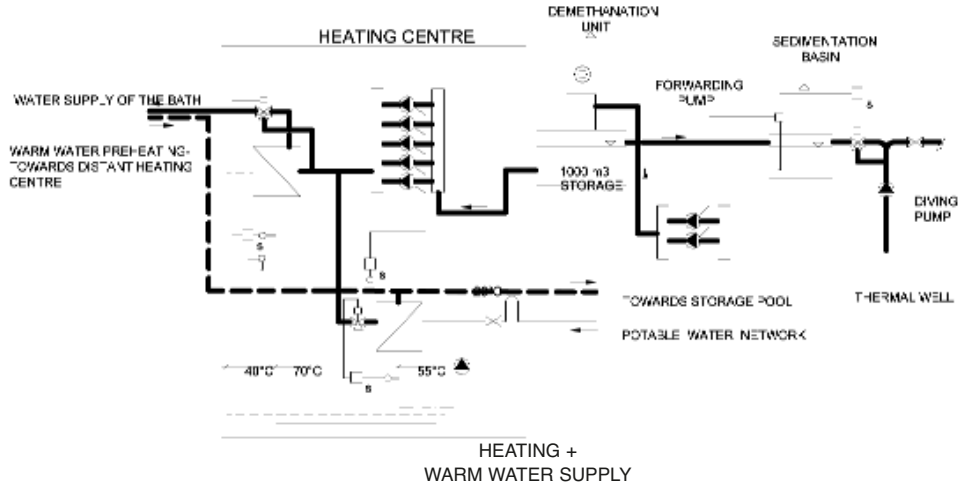

Figure 1. Theoretical block diagram of geothermal system.

4. Heating Systems

- Heating at 80/60°C temperature is practically possible in peak furnace operation only.
- With thermal water alone, heating at intermediate temperatures, e.g. 70/65°C, 65/50°C can be operated.

As heat transfer appliances, radiators with enlarged surface (convection) are used that can be still operated economically at these temperatures. At a temperature level below this we design heating with radiation at low temperatures, the temperature range to be utilized is 50/30 °C. This means that the water flowing away from the heating system has a nominal temperature of 30°C. This can be still used for particular heating purposes (sidewalks, garages, etc.). This small-volume heat utilization has a supplementary nature; on the long run, the system can be enhanced by a heat pump.

5. Heat and Water Utilization off the Heating Season Water Supply of the Bath and Spa

As therapy is the main profile of the bath, a roofed warm bathing pool with medicinal warm water of 35 °C shall be operated. It has a flow-through system just like the warm bathing pool roofed partially. Pools are filled and emptied at prescribed intervals on a defined schedule and under strict water quality control. Planned water recirculation: 150/200 m^3/h.

In addition to all this, a thermal water demand arises also during therapies (tubs, tangentors, etc.), concentrated mainly forenoon when treatments are carried out. Demand: 1-1.1 m^3/d, person.

The planned central heating can be divided into two systems:

- Basic heating.
- Supplementary convection heating and ventilation.

The basic heating is realized by radiation heating at a low temperature (floor, ceiling, etc.); it is based on a heat carrier at a temperature below 50°C.

Supplementary convection heating is planned by radiators with enlarged surfaces (heating of benches).

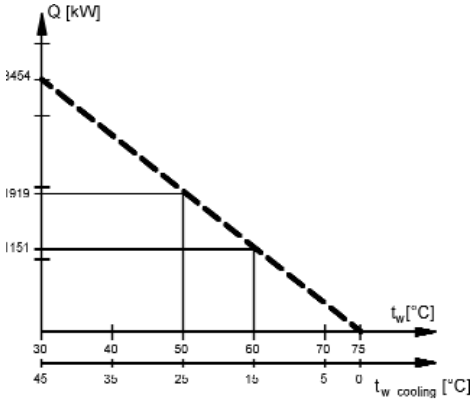

Figure 2. Theoretical heat capacity of the thermal well (on the primary side).

6. This New Heating System as Reference

Quite few geothermal heat utilization systems have been operated for dwellings and communal use in Hungary until now. These operating systems are no complex utilisation systems, as a rule, they work seasonally only. Advantages attainable by this design include:

- Optimum heat demand quantity that can be covered by one thermal well.
- Heating systems at intermediate and low temperatures operate at a low thermal energy operating cost level (25-30% operating costs as compared with fossil energy carriers).

- New architectural design resulting in small specific heat demands.
- Passive utilization of solar energy to be taken into consideration not only when dimensioning but also in annual heat energy consumption.
- Measurable heat consumption serving as basis for a correct financial settlement.

Theoretical heat capacity of the thermal well is illustrated below:

We remark here that, in addition to the heat supply of heating of buildings, also the warm water supply is ensured by geothermal energy. In winter, this comprises bath and hotel, and a part of dwellings, and in summer, that of the complex facility. This is the basis of the complete thermal water utilization during the year.

Alternatively, the production of hot water in summer can be solved by active utilization of solar energy leading to savings in thermal water exploitation.

Thermal efficiency

Heating demands:

Dwellings	:	6,800 kW
Hotel	:	3,300 kW
Bath	:	245 kW

In summer:

2,200 flats (hot water production)	:	2,640 kW
Bath (periodic water addition)	:	50 kW
Geothermal heat equivalent in total	:	2,690 kW

7. Basic Architectural Principles

Available on he spot hot thermal spring (curative water) and local particularities such as the considerable number of sunny hours per day, the abundant and great variety of fruits and vegetables and other positive potentialities make it possible to set up and run a resort-rest-regeneration centre.

The geo-solar village is situated in downtown Zsombo, not far from the newly bored thermal well and it is separated from the existing settlement of the village with a green zone. An 88 room hotel with its relating service places serves as a centre of the geo-solar village which centre is surrounded by apartment buildings offering various solutions for accommodation. The combined shopping centre will be joint to the very centre of the settlement. The central heart of the geo-solar village is taken by public objects which may be expanded northwest in step one, while the residential area surrounding the centre may be expanded partly northwest, partly northwards.

8. Undetected House – With Built in Garret Space

This type of house is suitable to lodge 2-6 people. It can also be built in two steps. The ground floor may offer full comfort for two people. In the case of a higher demand for full comfort the bedrooms can either be built simultaneously in the garret space or later on in step two.

All types of buildings make a passive use of the solar energy which, owing to the well known great number of sunny hours, means a considerable decrease in heat energy during the in-between seasons and has a favourably stimulating influence on the psyche by the great luminous efficiency. This effect is reached because of the glass-surfaces functioning selectively which allows an undisturbed penetration of solar and luminous energy in the fall-winter-spring season, but excludes the heat up of the premises in the summer time.

The structures have been chosen with regard to the most modern achievements of geo-architecture, that is only natural, traditional material is used which material does not have a toxic effect on the human body. So the basic material is terracotta, adobe (sun-dried brick), mud wall, wood, burnt tile, glass. The coverings are free from dissolvent. Ony natural material is used, plastics and lacquers are not.

The Energy Performance of Buildings Directive (EPBD) and Renewable Energy

Results of the European Altener Research Project 'Build-On-RES"

1. Introduction

The European Altener research project 'Build-On-RES' has spelled out the possibilities for combining the introduction of the new or revised energy performance regulations required by the Energy Performance of Buildings Directive (EPBD) with incentives to encourage the use of renewable energy. All EU member states must implement the EPBD by 2006, but before doing so, they will have to develop energy performance regulations and requirements. In addition, starting from 2006, an energy certificate will have to be produced whenever new buildings are delivered or existing buildings are sold or leased. Finally, all heating and climate-control systems will be subject to regular screening. The introduction of (reviewed) energy performance regulations paves the way for, amongst others, extra incentives for renewable energy, such as a 'renewable energy' accreditation to accompany the energy certificate; or an explicit indication of the share of renewable energy in the output of the energy performance calculation. The European research project Build-On-RES studied the track record of such incentives and looked for opportunities to create synergy between the promotion of renewable energy and the implementation of the EU Energy Performance of Buildings Directive.

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2. About Build-On-RES

When the European Commission first sent out signals in 2001 that it wanted to introduce European regulations for conserving energy in buildings, the OTB Research Institute at Delft University of Technology grasped the opportunity to set up a European research project. The aim of this project was to find ways of combining energy performance regulations with incentives for using renewable energy. The project ran from 2002 to 2004 and involved DBUR (Denmark), CSTB (France), 3E (Belgium), the University of Liverpool (UK) and EBM consultancy (Netherlands) besides the OTB. It was split into several sub-projects, each with its own project leader, which would ultimately lead to the end product. The sub-projects included 1) inventories of the current energy regulations for new and existing buildings in the participating countries; 2) inventories and analyses of current examples of renewable energy incentives which are linked to energy (performance) regulations; and 3) inventories of typologies of building regulations. All of this resulted in a basic framework which suggests ways in which renewable energy can be promoted when new or revised energy performance regulations are being introduced.

3. Inventories of the Current Energy Regulations

The project began with an inventory of the energy regulations in the five participating countries [1]. Figure 1 shows that energy regulations are in place in the Netherlands, France and England & Wales . France introduced them in 2001. The French system differs fundamentally from the Dutch system: in France adherence to energy performance requirements falls under the principle of 'good workmanship' and is not governed by a system in which calculations are approved or checks are performed to confirm that these requirements have been met. In England & Wales, energy performance regulations – commonly referred to as SAP (Standard Assessment Procedure) – have been around since 1992. However, SAP exists alongside two other systems for measuring energy performance. SAP is seldom used in practice because it is regarded as relatively complex compared with the other two systems, one based on insulation requirements for building components and one on a heat loss calculation. A broader European study revealed that

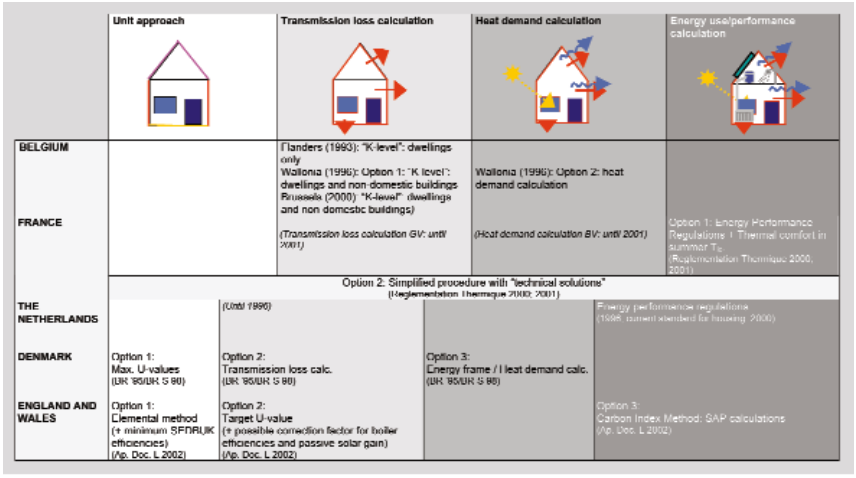

Figure 1. Energy regulations for new housing in five EU member states, situation in 2004 (based on framework in (Beerepoot, M., 2002b)).

the Netherlands is unique in Europe, as the only country which has experience of energy performance regulations as the sole means of regulating energy [2]. Figure 1 also shows considerable differences in the type of energy regulations in each country. So far, in Flanders (Belgium) the energy performance requirements for buildings have been based on heat loss calculations; hence, only the insulation of the shell of a building is considered, and there are no requirements for ventilation or heating.

The research revealed that some initial steps have recently been taken to formulate energy performance requirements for existing housing [3]. England & Wales and Germany have started imposing minimum levels of insulation when building components are renewed. Germany has gone farther by setting a maximum U value of 1.5 W/m^{2}K for replacement glass and a minimum RC value of 3.5 m^{2}K/W when constructional alterations are made to a roof. The German regulations also state that heating systems dating from before 1978 must be replaced by December 2006 and that heated space adjacent to an unheated attic must be fitted with roof insulation by the same date. In England & Wales insulation requirements have been formulated for replacement windows and doors and standards have been set for the yield from replacement heating systems. England & Wales monitors these requirements by awarding certificates to the firms that fit the components and systems. The certification system is managed by trade organizations, such as FENSA for glass and doors, and CORGI for heating systems. Denmark is also turning its attention to existing buildings, but has not imposed any energy performance requirements. However, it has applied an obligatory system of energy labelling since 1997: every building, when sold or leased, must have an energy label indicating its average expected energy consumption compared with an energy performance calculation. The Danish system of energy labels is largely similar to the energy certification system for existing buildings in the EPBD.

Figure 2: Importance attached to renewable energy applications in each of the five countries (situation 2003).

	Belgium: Fland, Wall, Brussels	France	The Netherlands	Denmark	England and Wales		
Renewable energy tech. building level	*K-level method ('93, '85, '00)*	*Methode de calcul Th-C (introduced 2001)*	*Energy Performance Standard (1996)*	*Energy Frame Method (1995)*	*Elemental Method (updated 2002)*	*Target U-value (updated 2002)*	*SAP calculation (introd. '95, updated '02)*
Passive solar	-	Pas. solar	Pas. solar	Pas. solar		Pas. solar	Pas. solar
Solar thermal system (hot water)	-	Solar thermal system (hot water): Feb 04	Solar thermal system (hot water)	-			Solar thermal system (hot water)
Solar thermal system (space heating)	-	Solar thermal system (space heating) Feb 04	Solar thermal system (space heating)	-			-
Solar electrical systems (PV)	-	-	Solar electrical systems (PV)	-			-
Wind turbine small scale	-	-	-	-			-
Geothermal heat pump		Geothermal heat pump	Geothermal heat pump		*Concessions: if heat pump used, boiler efficiency need not be considered*	*Concessions: if heat pump used, boiler efficiency need not be considered*	Geothermal heat pump
Bio mass furnace	-	-	-	-	*Concessions: if biomass used, boiler efficiency need not be considered*	*Concessions: if biomass used, boiler efficiency need not be considered*	-

4. Attention to Renewable Energy in Energy Regulations

The energy performance calculation takes account of the yields from installations that deliver heating, hot tap water and ventilation. It does not automatically cover all types of installations. The Build-On-RES inventory of openings for including renewable energy in current energy (performance) calculations revealed wide differences in the importance that each country attaches to renewable energy applications [4], [5].

Figure 2 shows that the current regulations in Belgium accord no importance whatsoever to renewable energy while the Danish regulations rate only the utilization of passive solar energy. In England & Wales there are three methods for fulfilling the energy regulations. The third method, SAP, consists of an energy performance calculation. The first and second methods make allowances for exceptional cases, if a heat pump is used or a form of biomass. These were designed with the specific aim of promoting the use of these technologies. SAP covers the utilization of passive solar energy, solar thermal systems for hot tap water, and heat pumps. Solar thermal systems that help to heat space are not rated in SAP, nor are photovoltaic systems. The French method was introduced in 2001, but it was not until 2004 that it could be used for calculating the input of solar thermal systems (for tap water and heating).This procedure is not, however, incorporated in the general energy performance calculation but is based on the 'f chart' principle, which is fairly complex compared with NEN 5128 in the Netherlands. The Dutch method is the only one that addresses photovoltaic systems besides other applications like passive solar energy, solar thermal systems and heat pumps. The Dutch system therefore offers the most possibilities for rating renewable energy applications. In the longer term the French energy performance system is also expected to rate the application of photovoltaic systems. When this happens it will place France on an equal footing with the Netherlands.

The characteristics of methods for calculating energy performance were also inventoried and analysed in the Build-On-RES project. Significant differences came to light. The English method, SAP, asks the user only for the number of square metres of collector surface in the case of, say, a solar thermal system. Other conceivable factors – such as angles, orientations, yields – remain constant. The French method, on the other hand, asks the user for a whole range of information, including heat storage characteristics such as the volume and the heat loss coefficient of the reservoir. It can also incorporate specific features of the collector – the heat loss coefficient and the solar gain factor – though these are also covered by default values. The Dutch method for housing – NEN 5128 – is positioned midway between the English and French method. The factors influencing solar thermal systems are limited to collector surface, orientation and angle, shadow and yield resulting from the heating needs of a building. The general basis for calculating the contribution of solar thermal systems is the 'solar load ratio'

in the Netherlands, Belgium and England & Wales, and the 'f chart' in France. The German method – which was also studied – is based on a totally different principle involving a simulation-based correlation.

5. Framework for Incorporating Renewable Energy Incentives in Energy Performance Regulations

The implementation of the EPBD will demand a response from all the member states, including those which have already enacted parts of the directive (e.g. the Netherlands). The renewed focus on energy regulations in all the EU member states should create scope for synergy in the promotion of renewable energy. The Build-On-RES project strove to identify synergy opportunities, concentrating particularly on ways in which current or future energy policy can be used, combined or adjusted without too much effort in order to boost the use of renewable energy. Policy instruments were split into three categories: regulatory (legislation), financial and communicative; searches were performed to uncover already existing examples in Europe and to spot new windows of opportunity. We found two examples of regulatory instruments that can be combined with energy performance regulations relating to renewable sources: one in Finland and one in Germany. Finland introduced energy performance regulations in 2003. One of the conditions is that any energy which is consumed over and above the set level must be generated from renewable sources. Details of this regulation are hard to find, but it is not inconceivable that the Finnish method does not yet rate solar thermal or solar electric systems and that this condition is a means of according them an implicit value. The German system, which dates from 2001, includes a rule which says that if the input from renewable sources exceeds 70% of the total energy consumption, there is no need to meet the energy performance requirements. The original intention behind this rule was to provide a means for rating renewable energy applications when the system was still in its infancy and there were no definitive arrangements in this area. Now, it could also be regarded as an incentive for innovative applications of renewable energy. Though, strictly speaking, a wind turbine in a building does not figure in the energy performance calculations, it can still be rated under this rule. A more developed form of regulatory policy which has not yet been applied is to give preferential treatment to renewable energy sources in the calculation core of the energy performance. It has occasionally been said that the Dutch method delivers inordinately good results for heat supply and that this is partly due to political choices. Something like this could also apply to renewable energy applications.

Generally speaking, the introduction of regulatory policy is often slow and sluggish. Target groups are difficult to win over and the policy needs a support base in order to be effective. But an example from Barcelona tells a different story. In 2000 Barcelona introduced a policy under which all new buildings had to be fitted with solar thermal systems capable of meeting at least 60% of the hot tap water needs. Close attention was paid to building a support base. In 18 months the collector surface in the city rose from 1650 m^2 to 14027 m^2 and continued to grow afterwards at the same pace.

Another idea, which originated in Italy but is still to be implemented, is to allow the purchase of a PV system only if an air-conditioning system is purchased at the same time. This rule would apply to climates with high cooling needs in the summer and ensure that the peak cooling consumption would more or less coincide with the peak yield of PV systems and thus spread the burden in power plants in the summer.

Closer to home we found another example, once mooted by the former State Secretary for Housing, Johan Remkes. Remkes took the view that the energy regulations for buildings were too limited in the long term and advocated the introduction of energy performance requirements for entire building sites. This would create more openings for the deployment of efficient generation technology, such as biomass plants or wind turbines. In effect, a very useful instrument for the utilization of renewable energy! At the moment, we already have the EPL (energy performance calculations for locations), which is a voluntary instrument, used by local authorities amongst others. So it would be simple enough to raise the status of the EPL.

The use of renewable energy is often encouraged by setting up subsidy systems. One major disadvantage of this approach is, however, the 'free-rider effect', whereby part of the cash ends up with people or organizations who would have bought the product anyway. Some studies have shown that, in the case of recently developed products in particular, only a small percentage of the purchase is inspired by the availability of a subsidy [6]. Research has also revealed that the amount of paperwork that one needs to wade through to obtain a subsidy is generally regarded as tiresome; this may go some way to explaining why people do not bother to apply [7]. Build-On-RES strongly recommends that subsidies be granted to genuinely innovative (sustainable) technologies and that the administrative procedures be simplified. This could be achieved if, for example, the subsidy application form were submitted along with the application for the building permit, instead of separately to an energy company or another organization. Another possible option is to grant a subsidy if renewable energy accounts for more than a fixed percentage of the energy performance requirement (x%). This could then be reflected in the energy performance calculations.

We can quote many examples of Dutch communicative policy instruments which are geared to encouraging the use of sustainable energy. These include, amongst others, information brochures and Novem's Sustainable Energy Scans. Build-On-RES suggests developing a special accreditation for buildings which make above-average use of renewable energy sources. This accreditation could be easily linked to the previously mentioned energy certificate which, starting from 2006, will have to be produced upon the sale or lease of every dwelling. The EU directive also requires that a feasibility study be conduct-

ed for alternative energy systems in buildings with a floor surface of > 1000 m^2. This feasibility study can, of course, be extended to include smaller buildings. Another option is to explicitly stress the share of renewable energy in dwellings, as calculated in the EPC. At present, it is impossible for a layman to understand the share of renewable energy in the results of the EPC. It would be easy enough to explicitly include this figure in the output of the EPN calculation. It might also be appreciated by potential buyers or tenants.

6. Synergy Between Renewable Energy and Energy Performance Regulations

The European Build-On-RES research project has resulted in recommendations for policy-makers who are working on the implementation of the EPBD [8]. Some of these recommendations relate to concrete, technical aspects of the energy performance regulations; others concern additional policy measures, mostly combined with the energy performance calculation or the energy performance certificate.

In the Netherlands the targets for the share of renewable sources in overall energy consumption (5% by 2010 and 10% by 2020) are a long way from being achieved. The implementation of the EPBD can be used in the Netherlands as a springboard for extra incentives. In fact, it would be a lost opportunity to neglect the issue of renewable energy at this moment in time. The Build-On-RES partners therefore urge the Dutch players to give serious consideration to the recommendations of the project.

Build-On-RES has formulated the following recommendations for the energy performance calculations. If adopted, these recommendations could result in extra incentives to promote the use of renewable energy:

- The calculations for renewable energy applications should be incorporated in the general energy performance calculations to ensure that equal attention is paid to renewable and conventional energy systems (already in place in the Netherlands, but nowhere else).
- The method for calculating energy performance must make provision for the use of future renewable energy innovations in buildings, such as wind turbines and biomass 'plants'. A start could be made by copying the German system which dispenses with the need to meet the energy performance requirement if over 70% of the energy needs are covered by renewable sources.
- The share of renewable energy in the energy consumption of private dwellings must be explicitly highlighted in the output of the energy performance calculations.
- Finally, preferential treatment could be applied to renewable energy applications in the core of the energy performance calculation, or the authorities could make it obligatory to cover a percentage of the energy needs with renewable energy. These may sound like far-reaching forms of regulation, but they could offer realistic options, given the crucial importance of renewable energy in a climate-neutral energy infrastructure (in the longer term).

Build-On RES has formulated the following recommendations for flanking policy. If adopted these recommendations could result in extra incentives to promote the use of renewable energy:

- A simple incentive can be created by developing a 'renewable energy accreditation' for above-average use of renewable energy. This accreditation can be easily linked to the future energy certificate, which will become mandatory in 2006 for each dwelling that is being sold or let.
- Subsidy application procedures for building-related renewable energy systems should be simple and should be processed through the same channels as applications for building permits.
- It is worth considering an overall system for subsidizing renewable energy: a subsidy would be granted if a fixed percentage (x%) of the energy needs were covered by renewable energy. This could be reflected in the energy performance calculations.

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ASHRAE WINTER MEETING
Jan 14 - 18, 2006 Chicago, USA

The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) will hold its 2006 Winter Meeting in Chicago. The meeting will take place Jan. 14-18, 2006, with the ASHRAE Headquarter Hotel at the Palmer House Hilton, Advance registration for the 2006 ASHRAE Winter Meeting will be $635 ($375, ASHRAE members).

For more information about the 2006 Winter Meeting, visit www.ashrae.org/chicago.

For more information about the AHR Expo, visit www.ahrexpo.com

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REHVA Seminar: The Role of Building Manegement Systems on EPBD (Energy Performance Building Directive) at L&B Fair

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It continues the tradition of being the third biggest exhibition of HVAC sector in the world, with 41.600 m^2 net exhibition area and 1670 exhibititors. Over 70.000 visitors are expceted to visit the exhibition.
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May 8 - 10, 2006, Istanbul, TURKEY

Deadlines;
Paper due 31 January 2006

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17th AIR-CONDITIONING and VENTILATION CONFERENCE 2006 May 17 - 19, PRAGUE, CZECH REPUCLIC

Deadlines;
Paper due 06 January 2006

Contact:
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COLD CLIMATE HVAC
May 21 - 24, 2006 Moscow, Russia

The main goal of the conference is to discuss and give recommendations for improvement of indoor environment quality, functionality and economy both in new and refurbished buildings.

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IWEERB 2007
January 15-16th, 2007 Harbin, China

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ABOK Russia

ABOK is the organizer of the 5th International Conference on Cold Climate – Heating, Ventilating and Air-Conditioning in Moscow "Cold Climate HVAC 2006" May 21-24, 2006 www.abok.ru/CC2006

Yuri Tabunshikov
President

Russian Association of Engineers for Heating, Ventilation, Air-Conditioning, Heat Supply and Building Thermal Physics "ABOK" is a public organization, which implements its activity independently and for the purpose of advancing the arts and sciences of heating, ventilation, air-conditioning for the benefit of the general public, positive effect on the environment and natural resources, to protect the interests of future generations.

ABOK Association has President, 5 vise-presidents, president council - 10 members, 40 board members. In it's structure ABOK has 8 technical committees on directions of HVAC activities and standard committee.

Facts About ABOK

- ABOK was founded in 1990.
- ABOK has regional branches in St. Petersburg, Volgograd, Ekaterinburg, Krasnodar, Perm, Rostov-on-Don, Nizhniy Novgorod, Novosibirsk, Ukraina (Odessa).
- ABOK has collective members and individual members. Collective members – 303 organizations in HVAC field: engineering, designing institutes, produces, universities, trading companies, installing and other companies.
- ABOK is a member of Federation of European Heating and Air-Conditioning Associations (REHVA) since 1990 and associate member of American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE) since 1991.
- ABOK publish 3 journals:

  • "ABOK Journal" (Heating, Ventilation, Air Conditioning), - since 1990, 13000 issues 8 times a year

  • "Energosberezhenie" (Energy saving technologies), is published jointly with the Department for Energy Moscow Government since 1995, 13000 issues 6 times a year.

  •"Santechnika" (Plumbing and Sewerage) since 1999, 10000 issues 6 times a year.

  Journals are distributed to 980 cities of Russia as well as to Russian speaking specialists in Ukraine, Belorussia, Azerbaijan . Latvia, Lithuania, Estonia, Finland, USA, Moldova, Kazakhstan, Armenia, Georgia, Tadjikistan, Canada, Denmark.

Figure 1. Cold Climate HVAC Conference in Moscow

  • Every year ABOK publish "Catalogue of ABOK members", 7000 issues.

- ABOK has participated in the design of the First Demonstration Energy Efficient Building in Russia.

  Since it was founded ABOK held 8 ABOK Congresses and more than 200 conferences, seminars, symposiums and forums for specialists.

Figure 2. "ABOK Journal" "Energosberezhenie" "Santechnika".

Figure 3: Conferences and Exhibitions "Moscow - Energy Efficient City"

- ABOK together with the Moscow City Government, initiated and organized 22 Conferences and Exhibitions "Moscow - Energy Efficient City" and 5 international symposiums “Power Engineering of Large Cities”.
- ABOK together with EHI - Association of the European Heating Industry (Germany) organized 9 European ABOK-EHI Symposiums "Modern HVAC systems. The Technologies of Intelligent Building" in the course of the exhibition SHK "Plumbing, heating, air conditioning"
- **Professional training**

  ABOK activity in professional training includes holding workshops "Design engineering and regulation documents" and "Effective heating, ventilating, air conditioning and district heating systems", "Modern HVAC systems for high-rise buildings. ABOK establishes post-graduate study and training course for raising the skill level of HVAC specialists.
- Is developing Standards and Guidebooks:

  • "Residential and public buildings. Air exchange rate"

Figure 4: ABOK Workshop

  • "Orthodox Temples. Heating, ventilation, air conditioning"

  • "Building Automation and Control Systems. Common positions"

  • "Technical recommendations for air exchange in flats of multi-storey buildings"

  • "Thermodynamic Properties of Moist Air "

  • “The manual for calculation the heat consumption of maintained residential buildings”
- Publishes a series of books in HVAC field "Technical library of ABOK"

  • English – Russian and Russian – English Dictionary of heating, Ventilating and Air Conditioning.

  • Building Automation and Control Systems. Terms and Definitions English - German - Russian Dictionary

  • HVAC Design Guide for Tall Commercial Buildings (Translation from English) Donald E. Ross

  • Industrial Emissions into atmosphere. Engineering calculations and inventory making Kvashnin I. M.

  • Displacement ventilation in non-industrial premises. REHVA guidebook (Russian version)

  • ASHRAE Terminology of Heating, Ventilation, Air Conditioning and Refrigeration (Russian version)

  • Manual for assessment the economic efficiency of the investments in the energy efficient actions. Tabunshikov Yu.A.

  • Ventilation of multi-storey apartment houses, Livchak I.F, Naumov A.L

  • Others

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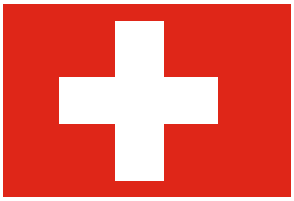
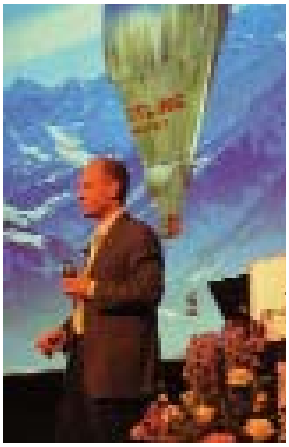
SWKI Swetzerland

(Swiss Society of Heating and Airconditioning Engineers)





SWKI was founded in 1962 and has emerged from the Swiss section of ASHRAE (The American Society of Heating, Refrigerating and Air Conditioning Engineers Inc. Atlanta). SWKI is affiliated with ASHRAE and REHVA.

SWKI is responsible for the national guidelines and standards in the field of Heating and Air Conditioning. All guidelines and standards are available in German and French. In order to achieve the goals of a professional organisation there are at least three full assemblies each year, where technical meetings and seminars are held, excursions are held and the general assembly takes place.

SWKI treats issues in workgroups and technical task force teams according to specific subjects. Delegates are nominated to participate in national and international committees of other societies, associations or governmental institutions to support specific HVAC or HVAC related issues.

Each member is bound to lend his expertise to the Society and according to his abilities to participate in workgroups or committees. The chairman of each workgroup informs the Board of the Society on a regular basis about the progress of the task. The aim of these efforts is to issue SSHVACE - standards, rules, and regulations.

At the moment the following tasks for new or revised standards are ongoing:

- Guideline for Metering Concept.

- Standard for Maintenance.
- Standard for Ventilation in Hospitals.
- Standard for Hydraulic Standards for Controls.
- Standard for Heat Recovery AC and Ventilation Systems.
- Standard for Ventilation of Indoor Pools.
- Standard for Smoke Extraction.
- Standard for District Heating.
- Standard for Cooling Towers.
- Standard for Phase Change Thermal Storage.

Gradually the number of members increased. At this moment SWKI has 570 individual members. Further information is given in the homepage (www.swki.ch).

CLIMA 2005

SWKI has been the organizer of the 8th REHVA World Congress from the 9. – 012. October 2005.

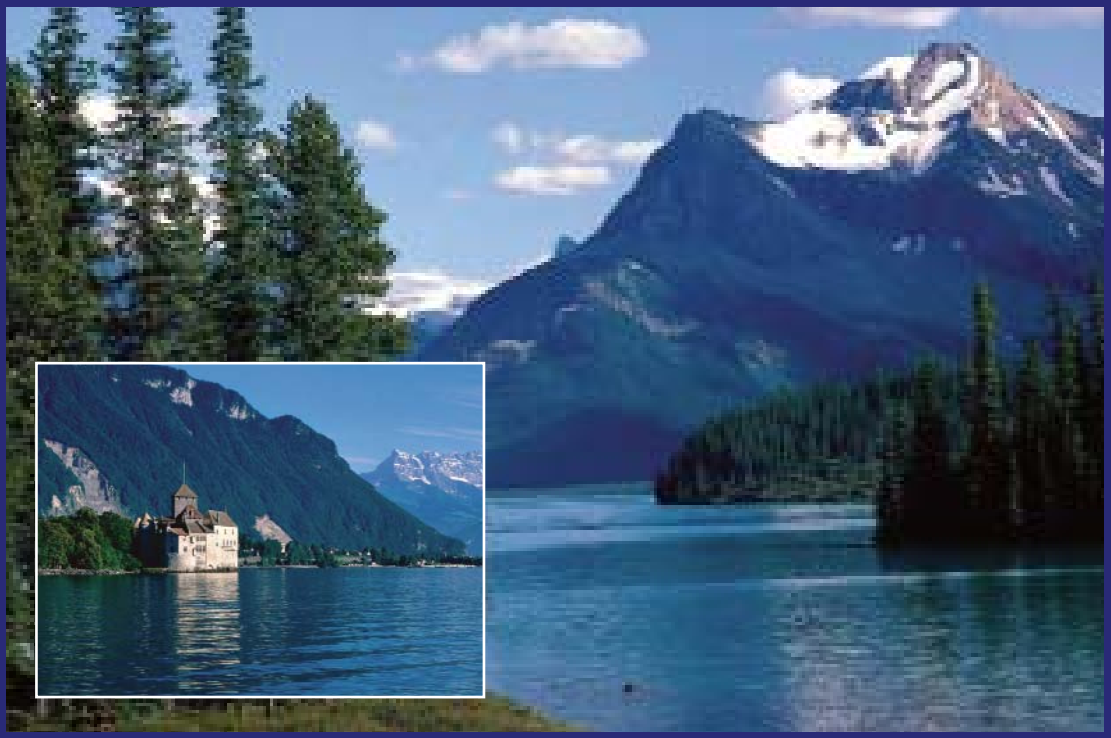
It was a great challenge for our society to organize this event for our foreign expert colleagues. After the ending of the congress we were happy to receive positiv feedbacks and also got several rewarding letters.

For all participants and therefore also for SWKI this congress has been a big success.

GA of REHVA

On October 7th/8th, 2005 SWKI was hosting the General Assembly of REHVA with delegates of the national societies from all over Europe.

All meetings and sessions took place at the „Möwenpick“ Hotel in Lausanne (Ouchy, Lausanne’s harbour). Supported by gorgeous autumnal weather we were able to experience a successful General Assembly.



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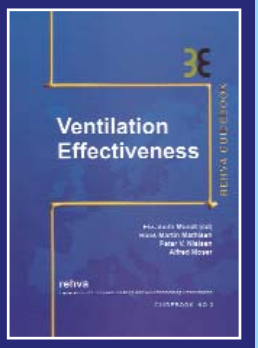
REHVA TECHNICAL MEMORANDUM

Rehva started new publication line in red colour, named "TECHNICAL MEMORANDUM" for disseminating the summary of the Seminars organised by Rehva. The first Book MEMO 1/2005 cover CEN Standarts for implementation of EPBD organised in Lausanne, Switzerland on 8 October 2005... The Seminar has been supported by the European Commission under the Intelligent Energy Europe Programme. The book covers the presentations of Jaap Hogeling, Caude-Alain Roulet, Gerhard Zweifel, Jorma Railio, Bjarne Olesen, Bjarne Olesen and Atze Boestra, Farancis Allard.

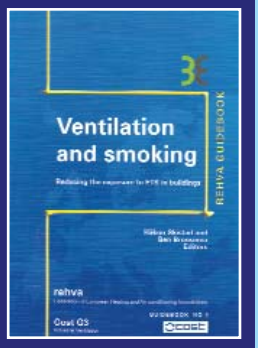
REHVA GUIDEBOOKS



- **NO: 1 Displacement Ventilation**
- **NO: 2 Ventilation Effectiveness**
- **NO: 3 ELECTROSTATIC PRECIPITATORS FOR INDUSTRIAL VENTILATION**

This book was initiated within the EU-activity of Cost G3, "Industrial Ventilation", The activity was established in 1996 and terminated in 2003. The aim of this activity was to collect the best available knowledge on industrial ventilation, and disseminate it to engineers and scientists in Europe and the rest of the world. The first result of this activity was the "Design Guidebook" which contains fundamental knowledge on industrial ventilation.

The industrial ventilation activity is continuing within Rehva, which carries on the publication of guidebooks on industrial ventilation.

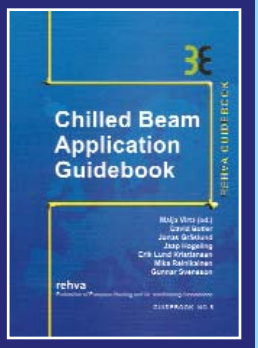


- **NO: 4 VENTILATION AND SMOKING - Minimizing the exposure to ETS in buildings**

Tobacco smoking harms not only the smoker, but also constitutes a health risk and a nuisance for the people exposed to the environmental tobacco smoke. More and more countries put a ban on tobacco smoking, thereby eliminating the source of the problems.

Until tobacco smoking is exterminated from the earth, there is a need for knowledge, on the techniques on how to reduce exposure to environmental tobacco smoke (ETS).

Rehva does by no means intend to promote tobacco smoking, or neglect the health risks of tobacco smoke. But we realise that, until tobacco smoking is exterminated from the earth, there is a need for knowledge on the techniques on how to protect non-smokers againsts ETS as well as to reduce the nuisance for the smoker himself.



- **NO: 5 CHILLED BEAM COOLING**

The chilled beam systems are primarily used for cooling and ventilation in spaces, where good indoor environmental quality and individual space control are appreciated and where the internal moisture loads are moderate. Chilled beam systems are dedicated outdoor air systems. They can also be used for heating.

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WellBeing Indoors

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Specific congress themes:

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- Ecological domestic water and waste systems
- Building energy management systems
- ICT and intelligent buildings

Important dates

- Call for papers Feb 2006
- Dead-line for abstracts 15 Oct 2006 (max 300 words, mail to info@clima2007.org)
- Dead-line for papers 15 Mar 2007

Finlandia Hall

The congress will take place in the Finlandia Hall, the leading concert and congress venue in Finland. It is an excellent environment for the Clima 2007 event. The venue is within walking distance from hotels and the city centre of Helsinki. The Finlandia Hall provides excellent possibilities to organize satellite events and meetings.

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AIVC Air Infiltration and Ventilation Centre
ASHRAE American Society of Heating, Refrigerating and Air-Conditioning Engineers
CIB International Council for Research and Innovation in Building and Construction
SCANVAC Scandinavian Federation of Heating, Ventilating and Sanitary Engineering Associations
SHASE The Society of Heating, Air-Conditioning and Sanitary Engineers of Japan

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