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rehva journal

March 2006 1st Quarter

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President's Letter

Wellcome to Supporters of REHVA...



As you may know the new articles and by-laws of REHVA make it possible also for private companies and other organizations to join REHVA as supporters of REHVA. This possibility will improve the communication between REHVA and HVAC- industry. Some companies have joined already, please visit our website www.rehva.com.

I would like to invite all member of REHVA to attract supporters to REHVA. We are looking specifically for multinational companies who would benefit the cooperation with an international organization like REHVA.

REHVA services to Supporters include

- * Free copy of each REHVA Guidebooks and reports
- * Name of the company in REHVA website under heading "Supporters"
- * Free publicity in the REHVA journal
- * Right to participate (one Representative and Spouse) to annual REHVA General Assembly and related technical seminars
- * Membership in **rehvaclub** where supporters can meet the leaders and delegates of REHVA national associations, leading scientists and experts of the HVAC world and other distinguished supporters during general assembly and special events.

This action is coordinated by REHVA Supporting Members Committee: Jan Afderheide (NL), Nicolas Gomez Gil (E), Marianne Lilja Wittbom (S), Renato Merrati (I), Per Rasmussen (DK), Numan Sahin (TR), Miro Trawnika, (CH), Maija Virta (FIN). Ms Siru Lönnqvist from FINVAC assists this committee (siru.lonnqvist@vvsfinland.fi).

One area of cooperation within REHVA members and supporters is the EU-projects. REHVA is participating now in several projects which are related to Energy Performance Building Directive (EPBD). Most recent one is the EPBD-platform project, where REHVA is a member in team that develops on the request of commission a specific platform for exchanging information related to EPBD. The services for the platform will be useful for all REHVA members. The papers dealing with implementation of EPBD will be translated in several REHVA languages and are available for publication in journals of REHVA members. Some papers will be published also in the REHVA journal. Zoltan Magyar (HU) is coordinating the translation and dissemination activity of EPBD-platform project within REHVA.

To get more information visit the website: www.buildingsplatform.org and later in the spring www.epbd.eu. REHVA journal starts the active follow up the implementation of EPBD with this issue and will keep you informed during next three years.

Olli Seppänen
President of Rehva
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rehva journal's role on EPBD



The most popular HVAC related issue in Europe in this time is Energy Performance of Buildings Directive (EPBD). We have reserved this issue especially for this topic and most of the articles are related to the subject. Rehva Journal also takes part in dissemination of the information coming from the Projects supported by European Commission where Rehva is project partner... We will continue having EPBD related articles in the next issues and publish Zoltan Magyar's article in the next one.

Publishing Committee of Rehva and our member VDI-TGA from Germany have organized a Panel Discussion to be held during the Light & Building Fair on 23rd of April... The representatives of the leading Building Management Companies and the experts will discuss the The role of Building Management Systems on EPBD between 15.00 - 17.30 hours. We invite all members of our sector to participate to this free activity. The place will be announced during the fair. We expect this gathering to bring new ideas for our performance in realisation of Buildings Directive...

In the next issues; we will concentrate on the following subjects; having 4 issues at the end of each quarter of a year. We will appreciate your close follow up and sending articles in these subjects:

- Heat Pumps and Applications (also covers using Earth)
- Architect-Engineer Cooperation for Environmental (Green) Buildings and Natural Ventilation,
- Low Temperature Heating- High Temperature Cooling
- Maintenance and Cleaning of HVAC Systems and the impact on Energy Efficiency and Hygiene
- Energy Usage and Efficiency in Buildings and Environmental Impact

Further issues will be:

- Renewable Energy sources and applications in Buildings
- HVAC in High Rise Buildings
- Indoor Air Quality and Effect on Working Performance
- Safety in Buildings and Fire Protection
- Hygiene in Sanitary and Plumbing

Although we have the priority in the written schedule, Editorial Committee decided to leave the writers free to write anytime they are willing to write an article... we will gather the related ones whenever ready...

Rehva Journal is getting better and being distributed in nearly 30 countries... Look forward to see our readers with us and develop the journal together...

Very truly yours,

Numan Sahin

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49th General Assembly of REHVA

To be held in Moscow, Russia, from May 18th to May 20th 2006, Tentative program is given below:

18th May: Meeting

19th May: Registration, meetings of Rehva Committees, and Meetings of working groups.

20th May: Official port (annual report, financial report, Rehva vision, budget etc.).

Scanvac Young Researchers Award for Miimu Airaksinen

Dr. Miimu Airaksinen was presented with the Young Researchers Award 2005 of Scanvac at FinVAC meeting in Mikkeli, Finland. Miimu Airaksinen is Senior Special Researcher at VTT AFATechnical Research Centre of Finland.

Airaksinen completed her doctoral dissertation in 2003 with the topic Moisture and Fungal Spore Transport in Outdoor Air-ventilated Crawl Spaces in Cold Climate.

Today she is one of the leading experts in energy-efficiency in building design and construction in Finland.



Sustainability Focus of ASHRAE Satellite Broadcast

Information about building sustainability principles, practices and emerging concepts will be presented in the free April 19, 2006, satellite broadcast and Webcast, Sustainability and the Building Environment. The program will take place from 1-4 p.m. EDT.

Registration opens today for satellite broadcast site coordinators and Webcast participants. Registration opens March 15 for satellite broadcast site participants. To register or for more information, visit www.ashrae.org/green-buildingsbroadcast.

European Building Performance Directive Concerted Action

European Building Performance Directive Concerted Action: an instrument to improve the good implementation of the Directive.

The European Directive on the Energy Performance of Buildings poses significant challenges for EU Members States in term of the practical details of the transposition. The European Commission has consequently established a series of initiatives to try to overcome these difficulties and move towards a certain degree of harmonisation on a voluntary basis.

One of the main initiatives towards promoting the dialogue between the Members States is the Concerted Action (CA), funded by the 'Intelligent Energy-Europe' Program of DG TREN.

<http://www.epbd-ca.org/>

IMPORTANT NEW EUROVENT DOCUMENT 6/8

Recommendation for calculation of energy consumption for air handling units.

During the work on Life Cycle Cost of Air Handling Units the participants in the Eurovent WG 6C realised that it was necessary to specify exactly how to calculate the energy consumption. It was decided that a specific Eurovent Recommendation will be prepared. The draft has been extensively discussed by the Group and the Recommendation was finalised and published as Eurovent Document 6/8.

The basic purpose of this Recommendation is to prescribe a model for all energy calculations so that results from different manufactures will be comparable. The energy costs will form the main part in a Life Cycle Cost calculation. A software program for these energy calculations is available in conjunction with the recommendations. The program can also be used for validation of similar calculations in other applications e.g. suppliers software programs.

The guides and software provides a tool for providing consistent interpretations of the calculated energy costs. As engineering judgment is required for entering data and assumptions are made in the analysis this software does not provide 100% accuracy. It is important that all input data and assumptions are detailed when documenting the analysis or presenting the results of an analysis to a third party. When using the Eurovent software this data is presented along with the results.

The document is available for free down loading from the Eurovent/Cecomaf website. A CD-rom with the software needed for calculation is included with the printed Recommendation and may be obtained from Eurovent Office in Paris for 100 €.

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COLD CLIMATE HVAC

"5th International Cold Climate Heating, Ventilating and Air-conditioning Conference" organized by ABOK will directly follow REHVA General Assembly, from May, 21st - 24th 2006. contact: www.abok.ru/cc2006.



Prof. Dr. Francis Allard received Honorary Doctorate from Romania

Francis ALLARD, professor at La Rochelle University, France, and director of the LEPTAB (Laboratoire d'Etudes des Phenomenes de Transfert Appliques au Batiment) laboratory since 1992, has received on the 4th of July 2005 the title of Doctor Honoris Causa from the Technical University of Civil Engineering Bucharest, Romania. Professor ALLARD is also vice-president of the REHVA association since 2002. The scientific council of TUCEB appreciates the research work of M. ALLARD focused on thermal and mass transfer phenomena within the buildings, together with their application to the control of ambient parameters of the enclosed occupied spaces, in order to assure thermal and acoustic comfort or good indoor air quality.

REHVA participates in the project as a leader for dissemination.



REHVA's Next World Congress will be organized by FINVAC in Helsinki - Finland, during 10-14 June 2007

Dead-line for abstracts 15 Oct 2006

Dead-line for papers 15 Mar 2007

Contact: www.clima2007.org, info@clima2007.org

EIE-project ENPER-EXIST

The fifth newsletter of the EIE-project ENPER-EXIST (Applying the EPBD to improve the Energy Performance requirements to Existing Buildings) is ready and will inform you with additional information and interesting links on the following items in connection with the EPBD:

- Belgium (Flemish region): Implementation of the energy performance regulation on the 1st of January
 - Read more about the status of implementation of the EPBD in the Flemish Region and the draft of their energy certificate [here](#).
 - Programme of the 2nd workshop of ENPER-EXIST at EPBD conference in Budapest, May 2006 ENPER-EXIST will hold its second workshop as a joined event together with EPA-NR and EP-Label at the EPBD conference in Budapest. The title of the workshop is "Asset, tailored, operational - Is there a preferred rating method?". Study the planned programme [here](#).
 - The EPBD Buildings Platform A new EU project to support the EPBD implementation in the Member States was started at the beginning of 2006. The newsletter offers information on the planned work.
 - ENPER-EXIST insights: WP5 Dissemination . Learn about the total offer on dissemination within the ENPER-EXIST project.
 - Summary of the 1st Eco-buildings symposium in Berlin. On November 2005 the first common symposium of the EU 6FP eco-buildings projects "BRITA in PuBs", "SARA", "Demohouse" and "Eco-culture" took place in Berlin. For those not being able to attend, read [here](#) the summary of the event.
 - 3. EnSan-Symposium on "Raumluftechnik im Bestand" (air-conditioning systems in existing buildings)
 - Find information on the 3rd symposium of the German demonstration project ENOB, which will be organised in March in Stuttgart including a link to the registration form.
- http://www.enper-exist.com/pdf/news/Newsletter_ENPER-EXIST_5.pdf

EURIMA
EUROPEAN INSULATION MANUFACTURERS ASSOCIATION



renewable
energy
& energy
efficiency
partnership

EuroACE

FROM WORDS TO ACTION

Accelerating measures to improve energy efficiency in buildings organised by the Renewable Energy and Energy Efficiency. Partnership (REEEP) in collaboration with EuroACE (The European Companies for Energy Efficiency in Buildings) and EURIMA (The European Insulation

Manufacturers Association) to discuss the exciting prospects that are opening up for the building sector in the view of recently adopted European legislation on energy efficiency.

The Implementation of the Energy Performance Directive Throughout Europe

A review of the vocational training need for the EPBD throughout Europe

1. Introduction

The European Union promotes energy savings in buildings by putting into force the Directive 2002/91/EC, whereas all Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive. Proposed measures are summarized to: a methodology for integrated energy performance standards, application of such standards on new and renovated buildings, to establish certification schemes in M.S. for all buildings, inspection of boilers/heating and cooling installations.

In order to assist professionals to comply with the Directive 2002/91/EC, a dynamic vocational training tool is under development through the European project EEED (Electronic European Building Directive).

The professionals concerned by the Directive 2002/91/EC are also potential end users of the projected vocational tool and they were targeted among eight different professionals' domains: building designers and architects, civil engineers, mechanical engineers, electrical and electronic engineers, building experts, building service engineers, building managers and planners, and postgraduate students in the energy efficiency in buildings. A questionnaire was designed and disseminated toward these professionals in order to identify potential end users of the tool and to collect their specific demands for vocational training. Each region has priorities regarding the measures that the Directive 2002/91/EC forces and these priorities formulate also the needs for vocational training needs. The vocational training needs were studied through a survey submitted to more than 1000 concerned professionals: more than 150 engineers per participating countries and to more than 100 engineers from other countries using REHVA's and BSREC's network. Through this review conducted throughout all European regions, 950 responses were collected from June to December in 2005.



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Francis ALLARD

The submitted questionnaire was designed in order to take a census of the professional's profiles, the knowledge level of the Directive, the information level, the specific needs about the Directive and the interest level in this project. In order to obtain a representative amount of responses from the different European's regions as from the different professions, the questionnaire was translated in five languages (English, Finnish, French, German and Greek) and broadcasted through

different media (hardcopy or electronic form) and during conferences or seminars. As EEED is an electronic project and as the Internet users are steadily increasing (35% of the population is using Internet throughout Europe and this percentage is steadily increasing), an online questionnaire was set up, and a specific website for the project is under development (<http://www.eeetd.org>).

2. The Concerned Professionals Profiles

Three criteria were chosen to define the professionals' profiles, and one could give several responses in order to define precisely enough ones professional profile:

- ✓ Eight employer categories (building designers and architects, civil engineers, mechanical engineers, electrical and electronic engineers, building experts, building service engineers, building managers and planners, and postgraduate students in the energy efficiency in buildings).
- ✓ Six expertise areas (architecture or building design, HVAC, building technology, electrical/controls/IT, energy consulting, student).
- ✓ The country.

The repartition of employers' categories shows that a large majority of responses were given by designers (35%), the other categories are represented in an almost equal level (around 10%), except for the associations' category (3%). The targeted professionals appear to fit globally

the proposed employers' categories as 81% of them correspond to at least one of the proposed categories. The repartition of expertise's areas shows that all the targeted areas were represented by the sample, with a majority from the HVAC and energy consulting (32%), which are maybe the most concerned by the Directive, or at least feeling the most concerned.

The repartition of the collected responses' origin is more irregular as it can be seen on Figure 1.

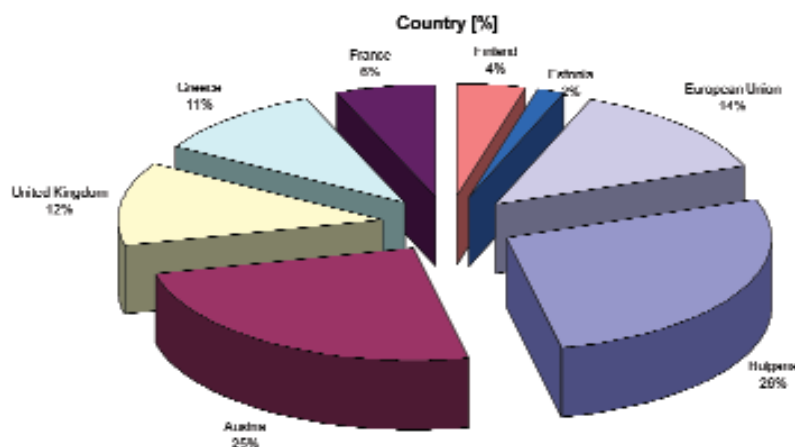


Figure 1. Repartition of the questionnaires' answers by country.

The majority of the responses were from Bulgaria (26%), Austria (25%), United Kingdom (12%), Greece (11%), France (6%), Finland (4%) and Estonia (2%). The regions of the project's partners are obviously well represented in comparison with other countries.

Regarding the responses rates and the observed differences for the countries and professionals profiles, some parameters can partly explain these ones: the questionnaires spreading channels used and their effectiveness, the difference of concern feeling due to cultural differences between countries or professions, the time necessary to answer, etc. However, these distributions of the responses for the 3 criteria can certainly be explained by the motivation to answer the questionnaire which is linked to the professionals' profiles. This motivation is somewhat driven by the specificities of information and the sensitization of the targeted professionals. Then, it depends on its employer's category, expertise area and from the different regions where information on the Directive seems to be different as it appears through further analysis of the questionnaire and detailed in the next parts.

3. Information And Interest In The Project Versus The Vocational Profile

Four questions about professional information and future interest in this European project were asked in the questionnaire. It appears that a low part of interviewees (31% of the total) were informed about any training program or seminar concerning this Directive, at the time these questionnaires were diffused. A lower part (23%) had not already attended any meeting or seminar. However, a large majority (88%) is interested in the future use of the projected vocational training tool (EEBD project aim). There can be a bias from this result on the interest in the tool as the obtained answers often come from interested people who have taken time to answer this survey. However, the crossed analysis on the professional's profile and these responses is valuable for the training tool design and the understanding of the vocational needs. Then, the responses were processed regarding the employers' category, the expertise area and the country.



Figure 2. Information about the Directive by meeting or seminars and interest in the use of the EEBD project, repartition for each employer's category1.

The results are presented here (see Figure 2) regarding the considered category (horizontal axis), and the relative population of each category is highlighted by the diameter of the corresponding mark.

The less informed professionals are designers, manufacturers, contractor and installers: around 80% of them had not already attended a Directive information meeting or workshop, and a slightly lower percentage was informed of future seminar or training program. The information appears to be better among associations, researchers and teachers or in facility management

(more than 30% of informed people). Globally, people from all employers' categories are highly interested in the future use of the electronic project, with a slightly lower level among the manufacturers (81%) and the researchers and associations' category (87%).

The same crossed analysis was conducted versus the expertise area of the interviewees (see Figure 3) and shows similar results.

The information level seems to be the lowest (around 23%) in the fields of architecture or building design, electrical/controls/IT area and among students. The energy consultants look to be the best informed (around 35% of them). Finally all these categories are highly interested in the future use of the project. Whereas the levels of information (between 20 and 30%) and the level of interest (around 85%) vary slightly versus the employer's categories and the expertise areas, the disparities are more noticeable between the countries, see Figure 4.

Through these results it appears that a low percentage of interviewees had already attended a Directive information meeting or workshop in Greece (12%), Bulgaria (16%) and France (21%). Besides, this percentage was higher in Estonia (40%), United Kingdom (36%), Finland (35%) and Austria (30%). The differences appear also in the lower interest's level of the future use of the EEBD training tool in Estonia and Bulgaria, whereas it is above 90% in the others countries.

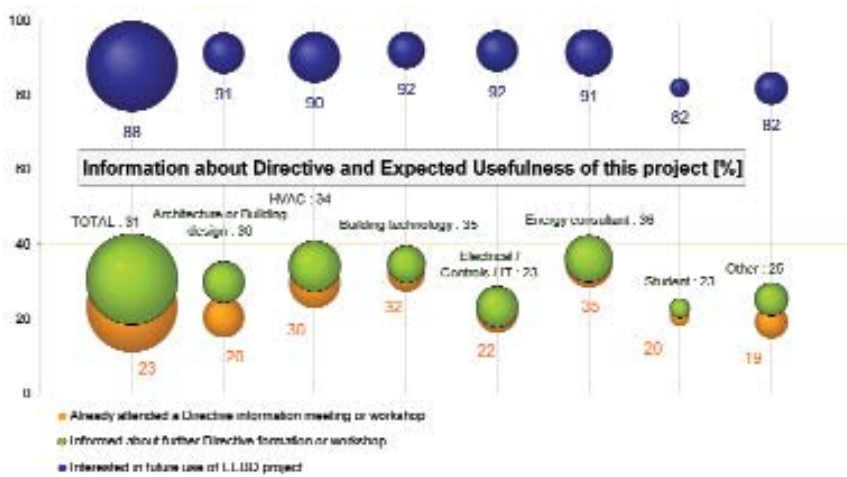


Figure 3. Information about the Directive by meeting or seminars and interest in the use of the EBD project, repartition for area of expertise.

4. An Assessment Of The Professionals' Awareness Of The Directive Main Points

The interviewed professionals were asked some questions of self-assessment about their knowledge of some general points of the Directive. The questions were general from "Have you heard about the Directive?" to more specific ones like "Did you know that the directive will include the specific requirement to inspect and evaluate of the efficiency of boilers?". Globally, the more the questions were precise about the Directive, the less the responses were positive. From these responses, a level of knowledge of the Directive has been defined in order to analyse the results versus the vocational profile: each response was coded as 1 or 0, and the relative level was obtained by the expression of this level on a percentage form. This relative level of Directive's knowledge is valuable to understand more precisely the training needs as to define the different vocational profiles.



Figure 4. Information about the Directive by meeting or seminars and interest in the use of the EEBD project; repartition for the different countries: Bulgaria (BG), Austria (AU), United Kingdom (UK), Greece (GR), France (FR), Finland (FI), Estonia (EE) and others European countries (EU).

A first analysis was conducted according to the employer's category, see Figure 5.

This repartition shows little differences between employer's categories with a relative calculated level around 60%, except for the facility management category (68%) and the associations (77%). This relative level repartition is also interesting to analysis throughout the expertise area, see Figure 6.

This repartition highlights that the less informed targeted category is in the area of expertise of architecture and building design (57%) and electrical/controls/IT (56%), whereas the energy con-

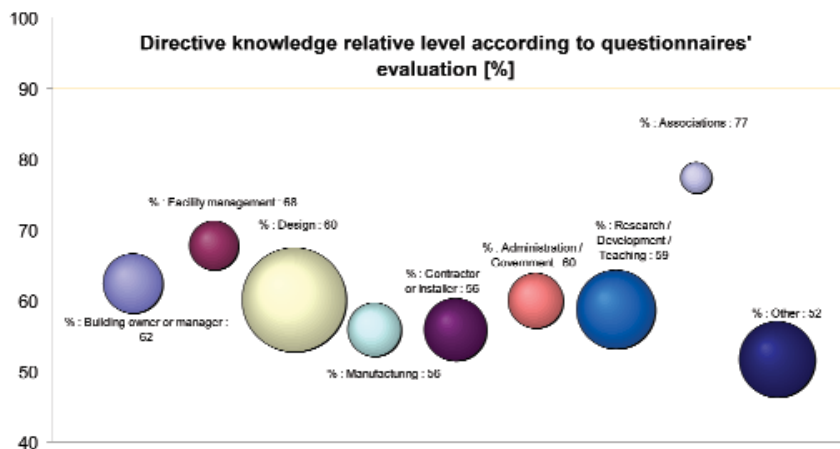


Figure 5. Relative level of Directive's knowledge vs. employer's category.

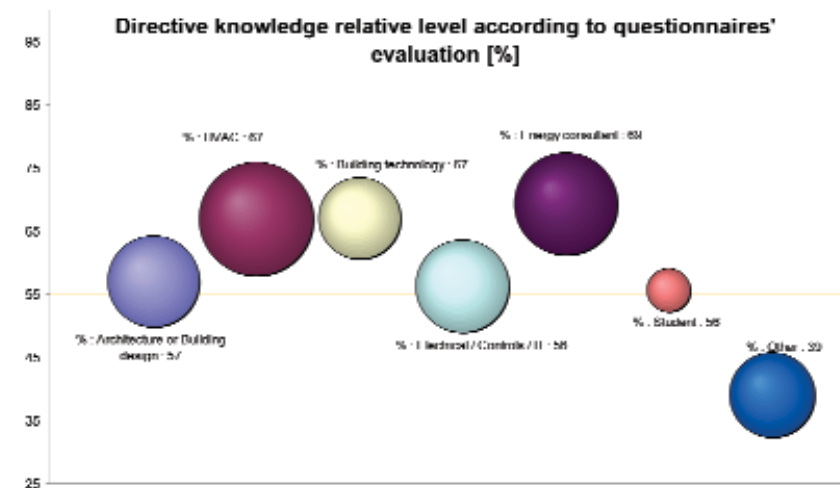


Figure 6 – Relative level of Directive's knowledge vs. area of expertise

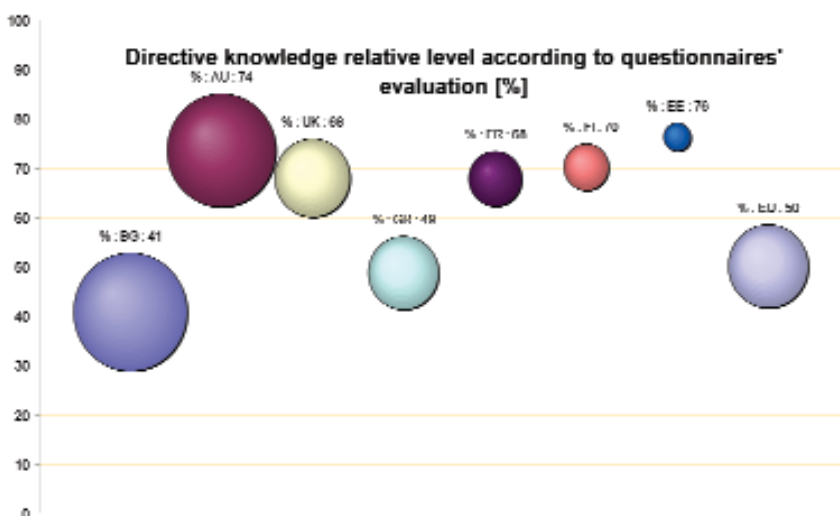


Figure 7. Relative level of Directive's knowledge vs. country.

sultant are the best informed with a level of 69%. This repartition looks to be more regular between the different countries except for some, see Figure 7.

Globally the relative level of knowledge appears to be around 70% for the different considered countries except for Bulgaria and Greece where this level fall to 41 and 49%. This difference may be partly explained by the information's differences between these countries as showed in the precedent parts. Actually, the highest levels are obtained in Austria and Estonia where the information of interviewees was the largest.

5. The Vocational Training Tool: A Possible Response To Specific demands Toward The Directive And Its Effects

Through the questionnaires responses, and more specifically from one opened question about specific training needs, the projected vocational training tool happens to be a possible response to a real demand. Long and largely argued answers were given by a non negligible part of the interviewees (more than 35%) and these responses demonstrate a deep interest and curiosity about the Directive and its consequences. From the process and the aggregation of all responses, 11 points or main questions were highlighted: calculation methods and software, standards, classification, certification procedure, inspection, building regulation and electric installation consequences, HVAC and hot water equipments consequences, energy efficiency of the Directive, Energy sources and renewable energies place, cost consequences, training needs and general information. The repartition between these different needs is represented on Figure 8, the total is superior to 100% as different responses could be given.

This repartition highlights a lot of demands for general information and trainings (around 40%), for which the projected training tool is suitable. Two others specific points appear to be essential from the collected responses:

The calculation methods and the software use (18%): this point mainly concerns designers who are the larger part of the survey, and also an important target of the project.

The certification procedure (20%): this point concerns all professionals' categories, as this will be the actual result of the different studies and/or controls.

A lot of questions are about the practical implementation of EPBD in Europe in general, and more specifically in each country. This global curiosity appears also in the demand for information about the differences between the countries and their application of the EPBD Directive.

6. The Energy Performance Consideration

This study highlights some questions about the Directive on Building Energy Performance with some differences from the different vocational profiles which were identified. These differences can be also explained with the actual practice of energy performance of the professionals. According to the interviewees, more than a half of the professionals (54%) declare that they take already into account energy performance in their project, mainly by computer simulation (25%). However, some variations

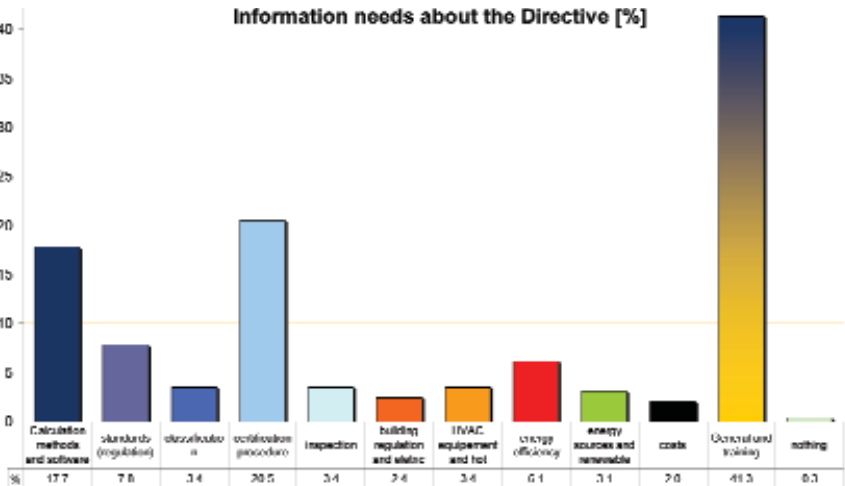


Figure 8. repartition of the different identified information's needs about the Directive from the questionnaires responses to question 14.

appear from the different employer's categories, see Figure 9.

The energy performance appears to be less considered among manufacturers and installers (41%) whereas among facility management category and associations a higher level is attained (around 70%). However there are differences in practice between these categories: building specifications are preferred in facility management's category, in administration and government category and among installers, whereas for almost all others professionals the computer simulation tool is preferred (mainly in the R&D category with a level of 34%). The manual calculation seems to be preferred by the building owners and managers' category. Besides, the crossed analysis with the expertise area shows very low differences between the identified categories, see Figure 10.

For all these categories the computer simulation is preferred to the manual calculation and the building specifications (except for the students). The manual calculation and the building specifications are globally used in a same proportion, around 18%. The highest level of energy performance consideration is found to be among the HVAC, energy consultant's and students categories (64%). Finally, the results are strongly variables between the considered countries, see Figure 11.

The energy performance seems to be considered very differently according to the country. In Bulgaria and Greece only 40% and 36% of interviewees declare to take into account energy performance, whe-

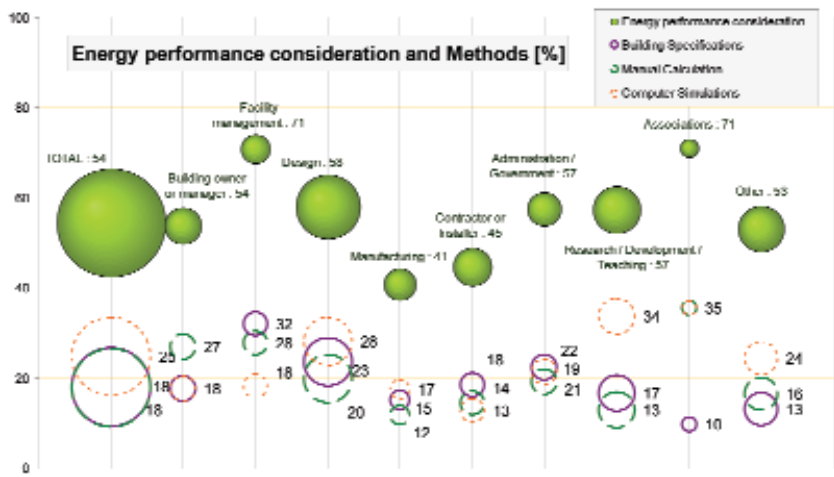


Figure 9. Energy performance consideration vs. employer category.

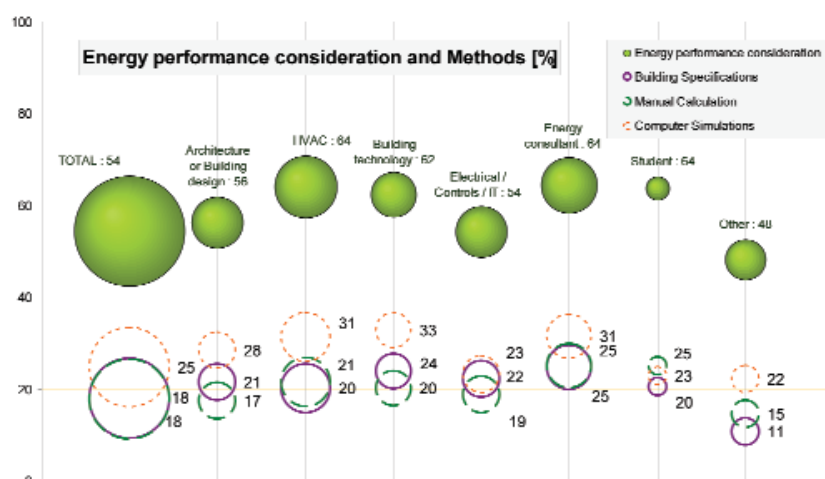


Figure 10 - Energy performance consideration vs. expertise area

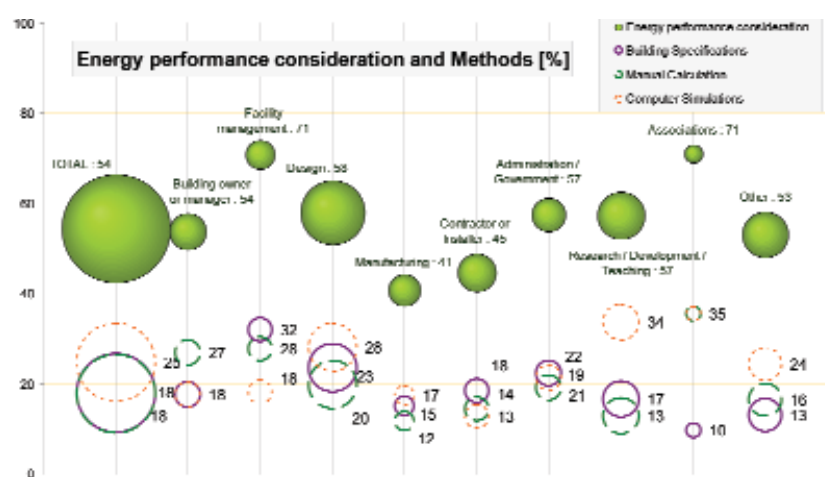


Figure 11. Energy performance consideration vs. country.

reas high levels are obtains in France (91%), Finland (73%) and Estonia (80%). Moreover high differences appear also in the tools: in Greece, as in Estonia, the manual calculation looks to be preferred, in United Kingdom the building specifications are the most used, whereas others mostly use computer simulations.

However, these results have to be carefully used as the question is a self assessment and specificity in some countries can explain the obtained differences. For example, in France (66% of computer simulation's use), the use of the regulation simplified software is often considered as the use of a computer simulation.

7. Conclusion

Regarding the set up of the European Directive on building energy performance, the understanding of professionals' demand and their practice is crucial for its success. For the different countries, significant differences were

observed in the information level and the professionals' practices. However, the presented analysis through the vocational profile gives more details. As the majority of the concerned professionals are strongly interested in the developments of this project (88%), it has been shown that the information level of the different categories is variable, and that the categories of HVAC, building technology and energy consultants seem to be the best informed. The numerous collected comments demonstrate also that there is actually a large demand for further information whatever are the expertise area and the European region. The training tool should answer to this demand by information on the modality of Directive's set up and specificities in the different countries. Yet, there are a many questions about regional differences in regulations as in energy performance in buildings.

Part of this information will be available through the EEBD interactive tool in English, German and French. The translation in these languages appears to be necessary in order to inform a large amount of professionals. General directive's information as regional specific information will be available and translated. The details will be given

for each country in their own language.

The vocational training tool will propose interactive content in relation with the specified professional profile. In this first approach, it appears that the demand is mainly about the calculation methods and software used, and the certification procedure.

Finally, the tool as a web interactive content should evolve according to the end user demand which will certainly evolve too, as the implementation of the Directive will progress throughout Europe.

References:

(1) The graphic represents the employer's category on the horizontal axis, and the percentage of the response "Yes" on the vertical axis in each category. The diameter of each point is proportional to the population of each category; this representation mode is valuable to highlight most representative categories and will be used for the other results.

HVAC and The Energy Performance of Buildings Directive: Challenges and Opportunities

1. Introduction

The Energy Performance of Buildings Directive (EPBD) has been approved in December 2002 and was published in the Official Journal of the European Communities on January 4 2003. As a result, the 25 EU member states have to implement a series of legal measures before January 4 2006.

In this paper, the context of energy performance regulations is first briefly described and the major features of the EPBD are presented. Then, the paper is focused on the challenges to be met for creating an environment that really stimulates the design and construction of energy efficient buildings with good indoor climate conditions. This is followed by a discussion regarding the challenge of keeping the procedures sufficiently simple and at the same time stimulating improved energy performance.

2. Why An Energy Performance Approach And Why Now?

There are clearly some remarkable trends in the expression of requirements:

In the seventies, eighties and the beginning of the nineties, many countries have set up standards and regulations concerning minimum requirements regarding the thermal insulation of buildings. Often, this was combined with requirements regarding the minimum efficiency of heating systems. This approach was quite logical since many buildings were poorly insulated (due to which transmission losses represented the bulk of the heating losses) and equipped with heating systems with poor performances;

In the eighties, several regulations included the so-called passive solar performances of buildings (use of free solar gains in winter time) whereby minimum requirements concerning the net heating demand were imposed;

Due to the increased importance of summer comfort and cooling, the potential contribution of renewable energy sources, the relative and sometimes absolute increase in the energy use due to ventilation, the widening of the scope of regulations to non-domestic buildings in which e.g. the pri-



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mary energy use for lighting is often very important, there is since the beginning of the nineties a strong tendency for setting up requirements whereby attention is paid to the total energy use of buildings.

3. Main Features Of The Energy Performance Of Buildings Directive

3.1. Objective Of EPBD

As stated in Article 1 of the EPBD, the objective is to promote the improvement of the energy performance of buildings within the Community, taking into account outdoor climatic and local conditions, as well as indoor climate requirements and cost-effectiveness.

This Directive lays down requirements as regards:

- a) the general framework for a methodology of calculation of the integrated energy performance of buildings;
- b) the application of minimum requirements on the energy performance of new buildings;
- c) the application of minimum requirements on the energy performance of large existing buildings that are subject to major renovation;
- d) energy certification of buildings; and
- e) regular inspection of boilers and of air-conditioning systems in buildings and in addition an assessment of the heating installation in which the boilers are more than 15 years old.

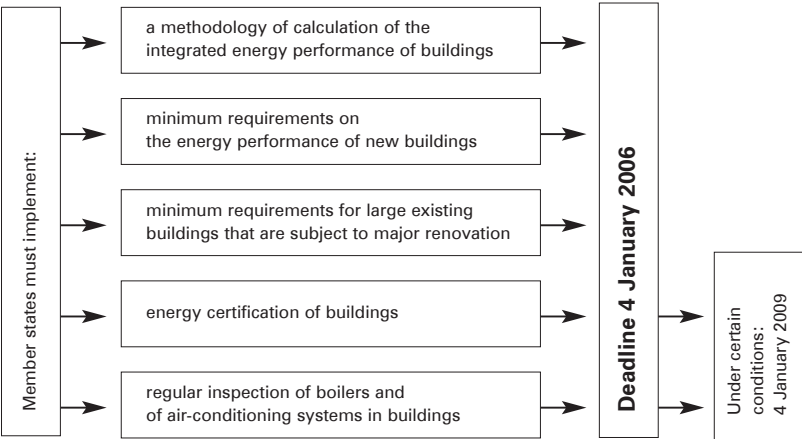


Figure 1. Requirements in EPBD and timing.

1. The methodology of calculation of energy performances of buildings shall include at least the following aspects:
 - a. thermal characteristics of the building (shell and internal partitions, etc.).
 - These characteristics may also include air-tightness;
 - b. heating installation and hot water supply, including their insulation characteristics;
 - c. air-conditioning installation;
 - d. ventilation;
 - e. built-in lighting installation (mainly the non-residential sector);
 - f. position and orientation of buildings, including outdoor climate;
 - g. passive solar systems and solar protection;
 - h. natural ventilation;
 - i. indoor climatic conditions, including the designed indoor climate.
2. The positive influence of the following aspects shall, where relevant in this calculation, be taken into account:
 - a. active solar systems and other heating and electricity systems based on renewable energy sources;
 - b. electricity produced by CHP;
 - c. district or block heating and cooling systems;
 - d. natural lighting.

3.2. Timetable For EPBD

In Article 15, the following is stated:

1. Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive at the latest on January 4 2006. They shall forthwith inform the Commission thereof.

When Member States adopt these measures, they shall contain a reference to this Directive or shall be accompanied by such reference on the occasion of their official publication. Member States shall determine how such reference is to be made.

2. Member States may, because of lack of qualified and/or accredited experts, have an additional period of three years (corresponding with January 4 2009) to apply fully the provisions of Articles 7, 8 and 9. When making use of this option, Member States shall notify the Commission, providing the appropriate justification together with a time schedule with respect to the further implementation of this Directive.

4. General Framework Of The Requested Calculation Method

The annex of the EPBD specifies the required characteristics of the calculation method.

5. Challenges For An Energy Performance Calculation

It is probably possible for member states to implement regulations which formally meet the EPBD requirements but whose impact in reality is limited and/or resulting in adverse effects.

In order to implement an Energy Performance Regulation that really achieves environmental and societal quality, a whole range of challenges have to be dealt with (Figure 2).

1. An EP approach must focus on the overall energy consumption

The total energy consumption of the building and its installed appliances has to be considered, whereby certain assumptions have to be made with respect to various boundary conditions.

2. Special attention to indoor climate

An EP approach must pay explicit attention to the indoor climate conditions. Of particular interest is the thermal comfort in summer and the indoor air quality.

3. Performance oriented procedures

As much as possible, the whole EP approach must be based on a performance-oriented approach. This does not necessarily mean that the whole calculation procedure must be expressed in performance terms, but that the method is founded on a performance based philosophy. This is especially crucial for allowing the principle of equivalence.

4. Procedures in line with CEN standards

It is clear that EP procedures should be based as much as pos-

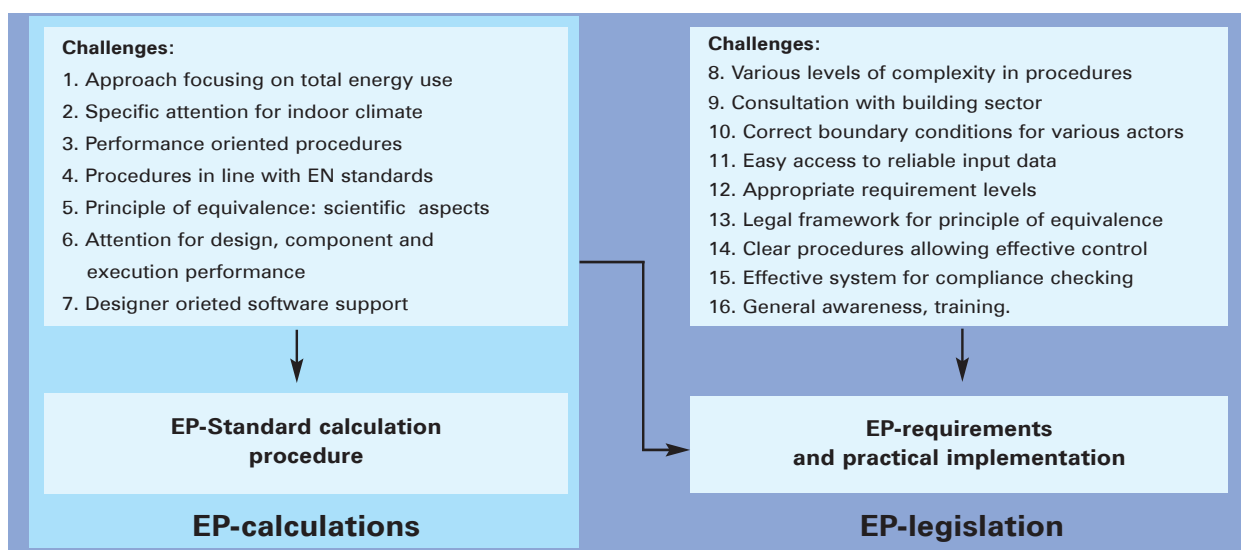


Figure 2. Challenges for and interaction between EP calculation and legislation aspects.

sible on the CEN standards. A practical problem is the fact that certain procedures are not yet approved as EN-standard.

In order to facilitate the implementation of the EPBD, the European Commission has given a mandate to CEN for developing a whole range of standards.

5. Open platform for innovation: coherent scientific philosophy with respect to the principle of equivalence

It is crucial that the whole EP philosophy takes from the beginning the principle of equivalence into consideration. It means in practice that one should have a correct philosophy for allowing in a later phase a correct assessment of the principle of equivalence.

6. Attention for design, component and execution performances

It is important to have not only good component performances but also a good design and a correct execution. Therefore, an EP approach should pay attention to these 3 aspects. As far as legislation is concerned, the execution aspects can only be included in the assessment if proof of compliance is required after construction ('dossier as built').

7. Support by means of designer oriented software

6. Challenges For An Energy Performance Legislation

An Energy Performance legislation specifies the minimum performance level, whereby the agreed Energy Performance calculation method has to be used as determination method or, if not fully covered by the method, use can (partly) be made of the principle of equivalence. In order to have an effective approach, a whole range of requirements has to be met, e.g.:

8. Various possibilities for proving compliance with required performance level, with specific attention for simplified procedures for simple projects.

Especially for small projects and/or projects with very classical techniques and/or in a market which makes little use of specific consultancy on building physics, there may be a need for a simple procedure aside the fully elaborated EP calculation method. Such approach is in principle almost purely descriptive. The other extreme is the approach that is required for applying the principle of equivalence. It may require detailed calculations going far beyond the fully elaborated EP calculation and it is mainly performance based.

9. The preparation of the procedure should include consultation with all stakeholders

Implementing an EP legislation should be preceded by consultation with the various partners: designers, industry, building contractors, consumer organisations.... This is important for various reasons: to inform, to obtain feedback on the applicability in practice.

10. Correct boundary conditions for various stakeholders

In order to achieve a successful implementation of an EP approach, it is important that the various stakeholders

(architects, building contractors, investors, building owners, administration) have appropriate boundary conditions that motivate them to correctly apply the regulations and/or to take actions that increase the probability for a correct application.

11. Easy access to reliable product data

Reliable and well-defined product data are essential inputs for applying an EP procedure. This means that, first of all, there must be appropriate determination procedures. Moreover, industry must make these data available whereby easy access by the users is important. As far as possible, there should be default data for most products and systems, which should be an underestimation of the real performances.

12. Requirement levels which are performance oriented and achievable by the market

An EP regulation can contribute to a better environmental and societal quality if the levels of requirement are on the one hand sufficiently severe for stimulating better building design, technology and execution and if on the other hand these levels are achievable by the market.

- In a first phase, the building sector must become familiar with the new approach. Therefore, sufficient time should be allowed between the adoption of the new legislation and its effective application on new buildings. One year seems to be appropriate;
- Later on, the requirements can/should be gradually increased. This has e.g. been done in the Netherlands where the required EP level (based on NEN 5128) was in the beginning 1.40 (1996), then it became 1.2 (1998) and since January 2000, it has become 1.0.

13. Legal framework for the application of the principle of equivalence

Given the importance of the principle of equivalence as a measure for correctly assessing innovative approaches, a legal framework for proof of compliance is needed. The authors believe that it is not realistic to expect from a communal civil servant to correctly assess such approaches and, therefore, an assessment procedure at a higher level is required.

14. Clear procedures allowing effective control

Given the building practice in certain countries, it is not evident to assume that regulations are well respected. A way for increasing compliance with regulations is to require proof of compliance with the regulation after construction (and not only when requesting a building permit) and this for the following reasons:

- It allows to pay attention to the execution aspects;
- The motivated architects are in a stronger position to impose the desired performance;
- The motivated builders know quite well the composition of their building. They will have the possibility of checking the conformity between the dossier 'as built' and the reality;

- The material producers and building contractors are in a stronger position;
- As a result, the governmental officials will no longer be the only controllers, since motivated building owners, architects, material producers, building contractors and possible buyers of the building are becoming able to carry out control;
- The risk of non-compliance with the regulations strongly reduces and it will lead to more energy efficient buildings and a better environmental performance of the building stock;
- Finally, a dossier 'as built' is at the same time an ideal basis for the energy certification as foreseen in article 7 of the EPBD.

15. An effective system for checking compliance with the regulation

A legislation without an effective control system will in many cases not be very well respected. A legislation that is based on a proof of compliance after construction strongly enlarges the number and type of persons who can check the works. Nevertheless, there is still a major role for the administration to set up a framework for carrying out random controls and for taking appropriate measures in case of non-compliance.

16. Actions in relation to creating general awareness, training...

It is probably in many cases important to pay sufficient attention to informing the market about the philosophy and advantages of an EP approach. Moreover, appropriate training programmes are crucial.

7. Implementation Of CPD And EPBD: Similarities And Differences

The CPD (Construction Product Directive) and EPBD (Energy Performance of Buildings Directive) have become very common terms in the European building language. In this paragraph, attention is given to some major similarities and differences.

- A major similarity is that it are both European Directives. They contain instructions to the Governments of all Member States which must comply with them. A series of measures must be adopted in line with the requirements of the Directive and this before the specified deadline.
- Another similarity is that both directives apply to the European building sector.
- A major difference concerns the requested type of measures: the CPD is focusing on free movement of construction products (with specific attention to standards and technical approvals) whereas the EPBD is obliging the member states to impose minimum requirements in terms of the energy performance of buildings.
- Another major difference has to do with the time scale to be respected by the member states:
 - o For the CPD, member states have, among others, to implement the relevant CEN standards and to withdraw conflicting national standards within a given time scale. However, member states can only take action once the CEN standards are available. In 1988 (adoption of CPD), it was expected that CEN would be able to prepare the required actions within a time scale of only a few years. In practice, this work is only now coming for most of the working items in a final stage. As a result, the pressure for meeting the CPD requirements has for a long time been mostly on CEN related work and less on the member states.
 - o For the EPBD, the situation is completely different. The timescale is very clear and the member states cannot justify a delay by referring to CEN or other organisations since the EPBD does not impose to use CEN procedures nor allows a delay if certain procedures are not available at CEN level. The mandate given to CEN in the context of the EPBD doesn't change this.
- Another major difference between CPD and EPBD concerns the degree of uniformisation of procedures. The CPD is clearly leading to a rather high level of similarity of national standards since the CEN standards have to be fully implemented. In case of the EPBD, there is a real risk that the non-availability of certain crucial calculation methods will lead to a rather wide range of national procedures. As far as HVAC systems are concerned, there may be substantial differences in assessing the energy performances of such systems.

8. How to Combine Sufficiently Simple Procedures With Pushing Increased Energy Efficiency?

The EPBD imposes all member states to implement an energy performance calculation procedure and to require minimum energy performance levels for all new buildings. In practice, this means that at a European level more than a million of persons (architects, consultants, material suppliers, building contractors, building owners, administration, ...) will be directly or indirectly confronted with the national implementation(s) of the EPBD. Since for most of these people, the energy performance of buildings is just one of the many aspects they have to deal with, it is evident to require that such regulations should be kept 'as simple as possible'.

Keep it simple

There probably is a wide consensus that EP regulations should be kept as simple as possible. In practice, what does it mean? Should the target be to have a simple list of necessary measures? Should a method be more than 5...10 pages?

An example may illustrate some issues of concern. Assume that you are a decision maker and that you have the choice between 2 'similar' buildings but with 'some' differences:

- One building has a condensing boiler, the other building has an ordinary boiler;
- One building has a heat exchanger with an efficiency of 60%, the other of 80%;
- One building has efficient luminaries with daylight compensation and presence detection, the other not;
- One building has a lot of thermal bridges, the other not;
- One building has a solar collector, the other not;
- One building is very airtight, the other not;
- One building has a high thermal inertia, the other not;
- One building has a well designed control of solar gains, the other not;
- One building uses passive cooling, the other not.

Many more potential differences can be listed. Probably, for most of these differences, a lot of people will agree that it is important that such differences should be handled (and rewarded) in an energy performance regulation.

9. A Correct Driver For Decisions Regarding Energy Efficiency

In case a calculation method predicts a certain performance (e.g. the normalised primary energy consumption), a user of the regulation probably expects that the predicted performance (or change in performance due to a modification) has a reasonable degree of correlation with the performance to be found in practice.

In order to have a good correlation, it is important that:

1. the performances at building level as predicted by the regulation is a reasonable indication of the typical performances (for an average user) in practice;
2. the prediction by the regulation concerning the impact of certain technological measures is globally in line with the tendency in the reality.

The first aspect is receiving by many people a high priority whereas the second aspect is often receiving a lower priority. However, the second aspect is at least as important as the first one. As an illustration, 3 alternative prediction models for a calculation method are evaluated in Figure 3, Figure 4 and Figure 5.

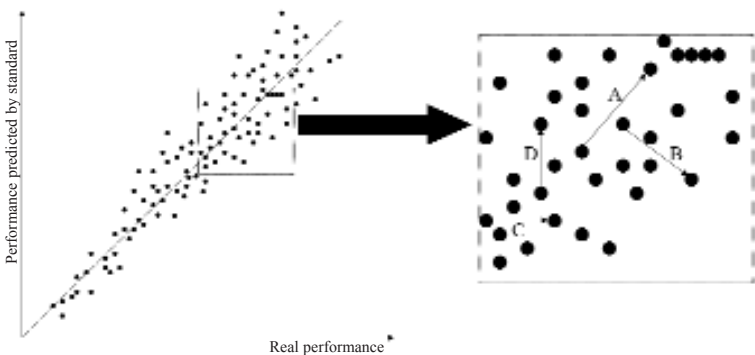


Figure 3. Predicted energy performance versus real performance: example of good global correlation but poor prediction of change of performance (explanations in text).

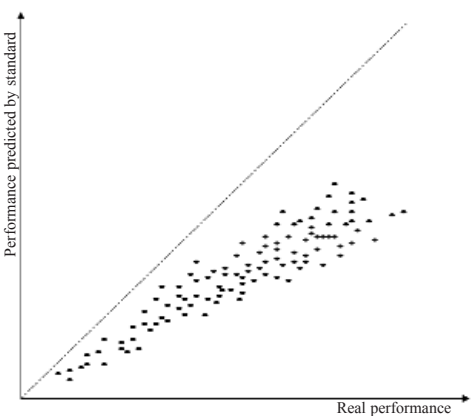


Figure 4. Systematic underestimation of the performance by the calculation method.

The example of Figure 3 shows a model for which, on average, the building performance as predicted by the calculation method is of the same level as the real performance. As such, one can consider that the absolute level of the predicted performance is rather reliable.

The example of Figure 4 clearly performs less good: the calculation method underestimates systematically the energy performance and such a calculation method should be improved.

In the example of Figure 5, there is a slight underestimation of the calculation method and some correction might be useful.

Whereas the example of Figure 3 predicts on average the absolute performance globally better than the example of Figure 5, this is not at all the case if the predicted impact of certain modifications is evaluated. In the example of Figure 5, there is a very good level of agreement between the predicted and real variation in the energy performance. In Figure 3, all possible relations are observed.

For the 4 considered cases in Figure 3, the following remarks can be made:

Variation A:

→ Predicted variation of a certain technological modification is of the same order of magnitude as the real change in performance.

Variation B:

↘ The calculation method predicts that the technological modification gives a performance reduction whereas in reality there is an improvement.

In case of a poorly designed air-to-air heat exchanger, it is possible that the gain (in primary energy units) due to an improvement in thermal efficiency of the heat exchanger will be completely lost by increased fan energy use (due to higher pressure losses). If a calculation method only focuses on the thermal performances of the heat exchanger without

considering the fan energy, the predicted performances will be the opposite of the real performances.

Variation C:

→ The technological modification gives a significant improvement in real performance whereas the calculation method does not at all consider this as a performance improvement

A procedure which automatically considers a fixed energy reduction for daylight compensated luminaires without giving attention to the building and window design is not able to give a benefit for a good daylight design. Also if a fixed benefit is given to presence controlled lighting without considering the technology used, there is no motivation for industry for making use of very energy efficient presence detection systems.

A procedure which doesn't take into account thermal mass will not give a benefit to the increase of the thermal mass and as such not award the improved thermal comfort.

Variation D:

↘ The technological modification gives no improvement in real performance whereas the calculation method predicts a substantial performance improvement.

Application of daylight compensated luminaires in offices without windows will in practice give no energy reduction at all. If the calculation method gives a fixed benefit for daylight compensated lighting, also this benefit will be given to luminaires in rooms without daylight or for luminaires installed at a distance of 6...15 meters from windows.

If a preference has to be made among the 3 models, the authors clearly prefer the model presented in Figure 5. Although in absolute terms not very precise, it gives the correct tendency as far as technological modifications are concerned. Such approach will effectively stimulate the use of more energy efficient technology.

Complexity in balance with importance Many decision makers (architects, ...) are not specialists with respect to the calculation of the energy performance of buildings. Moreover and especially for many small dwellings, the applied technology doesn't require very complex calculations for showing compliance with the regulations. Therefore, it is important that EP procedures are adapted for various degrees of complexity. In practice, the use of default values for certain products or type of performances can substantially shorten the learning curve for become familiar with EP calculations and also for carrying out such calculations.

Examples:

- The standard EN ISO 6946 deals with the calculation of the U-value of cavity walls. The method needs as input data the number of mechanical fasteners per m² of wall, the thickness and thermal conductivity of the mechanical fasteners, the percentage of mortar joints and the conductivity of the mortar. A precise col-

lection of such data is completely unrealistic for (most) architects. By using default values (values which don't have to be proved), one can substantially reduce the calculation effort.

- For the estimation of the energy consumption due to lighting, one needs in principle information on the nominal power of the luminaries. By using a default value for ordinary luminaries (e.g. 20 W/m²), the work is substantially simplified and it is up to the user to decide whether or not to use this default value.
- Thermal mass is an important element in a strategy of passive cooling. It is essential that this parameter is taken into consideration but it should also be avoided that for ordinary

small projects the determination of the thermal mass requires a lot of building data.

10. No Barrier For Innovation

An EP regulation can be a major stimulus for the market uptake of innovative energy efficient technologies. However, it also can be a barrier if the procedures don't have a consistent framework for handling innovative systems.

Example:

During recent years, demand controlled ventilation, hybrid ventilation, night cooling strategies, ... are technologies which have received a lot of interest in research activities as well as in a whole range of demonstration projects and in more commercial projects. At present, many regulations don't have clear procedures for handling such systems. If the result of such lack of procedures would be that these systems don't receive a benefit, it is clear that an EP regulation will be a (major) barrier for such systems.

This issue has been studied in the framework of the EC RESHYVENT Project. It seems quite realistic to expect that, especially during the first coming years, certain types of advanced HVAC concepts will not be well covered in the energy performance regulations as used in the various EU countries. As such, an energy performance regulation can be a barrier for the implementation and market uptake for such strategies.

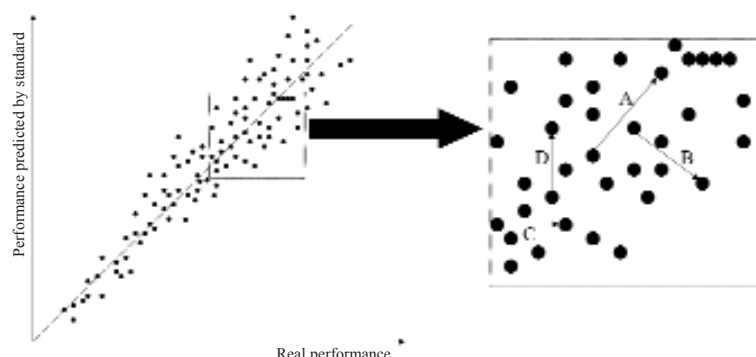


Figure 5. Predicted energy performance versus real performance: example of moderate global correlation but good prediction of change of performance.

11. Limiting Unnecessary Differences Between Member States And Regions

The EPBD allows each member state to develop its own procedure and differences are even allowed between regions in a member states. However, many industries, architects and consultants are active in several regions or states and uniformity in qualitative procedures is highly appreciated by them. Moreover, different procedures will substantially increase the development cost of such procedures and the updating. Therefore, the European Commission has set up different support measures for stimulating uniformisation in the national approaches and to facilitate the implementation of the EPBD.

Of particular importance are the following measures:

- The mandate given by the European Commission to CEN for developing standards for 31 mandates;
- The EPBD Concerted Action, which acts as a central meeting point for the policy makers in the different member states (www.epbd-ca.org);
- A series of SAVE projects focusing on different aspects of the EPBD and with the aim to support the member states in the implementation.

12. Energy Performance Regulation: An Open Platform For Innovation And Creativity

The availability of cost-effective innovation technologies with respect to indoor climate and energy efficiency is not a guarantee for its large-scale application by the building sector. Many users are not able to correctly assess the benefits of certain innovations. Moreover, creative solutions for improving the indoor climate and/or energy efficiency are not always understood by the decision makers. An EP approach has the potential to stimulate innovation and to promote creative solutions.

In Figure 6, various possible actions (all aiming to improve the energy efficiency of a building) are compared with respect to their investment and the energy savings (in EP terms). In principle, an EP approach must allow to assess all relevant technological improvements. As far as the various measures have no other advantages, an EP approach will

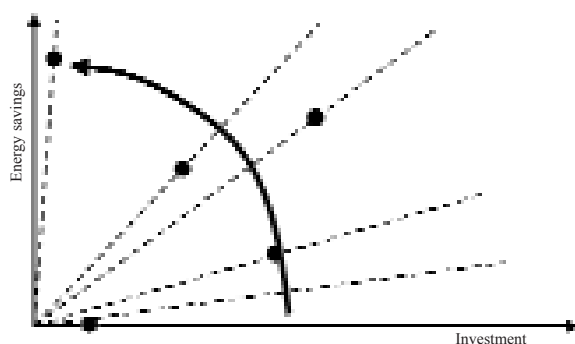


Figure 6. An EP approach stimulates the use of cost-effective measures.

orient the market to those measures with the best 'investment-energy savings'-ratio, which corresponds in Figure 6 to those measures with the steepest slope. A major advantage for governments is that one can focus on a single global requirement; the market forces can determine the most attractive options.

13. Conclusions

In general, there is a tendency for increasing the number and severity of the requirements regarding building performances: environmental impact, acoustical performances, building security, durability, energy, In principle, there is a wide consensus that energy performance regulations should be as simple as possible. However, and as illustrated in this paper, there are a whole range of challenges for an energy performance regulation. As a result, it seems impossible or at least not suitable to develop very simple methods since such methods may have adverse effects. On the other hand, it has for many, especially small, projects little sense to confront designers and other building partners with all the details of a very refined approach. One of the major challenges is to find an intelligent mixture between simplicity and detail.

In parallel with the calculation procedures, it is crucial to pay sufficient attention to the implementation aspects of such regulations. Success can only be achieved by meeting a whole range of challenges.

There is no doubt that the European work on energy performance legislation will not reach its final stage in 2006 and even not in 2009. It probably will be an iterative process whereby there will be as function of time an improvement in the quality of the calculation procedures and in the practical implementation aspects. Moreover, one should logically expect on the longer term an increased level of uniformity of the procedures with a major role for the European standardisation activities.

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Energy Performance of Buildings Directive (EPBD) Influences On European Standardization And On Ventilation And Air-conditioning Industry

1. Introduction

EU Member States should have transposed into their national legislation the new Energy Performance of Buildings Directive (EPBD), by the beginning of 2006. This transposition process is not yet completed in most countries, but full implementation of the key elements is on its way. To put the main elements of the EPBD not only in legislation but also into real practice will still need many efforts on European level and each Member State, but the elements are still the same: New buildings (residential, commercial, etc.) and a substantial number of existing buildings shall have an energy performance certificate based on the calculated energy performance of the building, and heating and air-conditioning systems above a certain capacity shall be inspected regularly.

Under a Mandate issued by the Commission, CEN has prepared draft standards to support the implementation of the EPBD within a harmonised framework, to cover the requirements for the energy performance calculations for buildings and building services systems, ways of expressing energy performance, criteria for the indoor environment, inspection of heating and air-conditioning systems and conversion to primary energy.

This article presents information of the ongoing CEN work, including selected highlights from numerous discussions around the subject. Some thoughts about the whole progress are pointed out, not only looking at standardisation but at EPBD implementation as a whole. The importance to see the three main elements as a whole and linked together is also discussed: energy performance requirements and calculations, energy performance certificates, and inspections, are not independent of each other. One big challenge to our industry and to the whole profession is to promote good indoor environment in parallel with good energy performance, and thus find more convincing arguments for more sophisticated technologies and services based on certified high-quality products. Good indoor environment and good energy performance can be achieved together only if systematically considered in parallel from the early design stage - for example according to the chart in Figure 1.

My first article on this subject was published in EUROVENT/CECOMAF Review 68, October 2004 - and the first follow-up in Review 74, April 2005. This article is otherwise technically identical with the second follow-up article published in Review 82, January 2006, with one addi-



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tion the chart (Figure 1) was originally presented in Review 74. (See www.eurovent-cecomaf.org, page "Review")

2. The Directive - Some Key Issues

In 2003 the European Commission issued a new directive on Energy Performance of Buildings, often abbreviated as the EPBD, 2002/91/EC [1]. This directive requires all member countries by January 2006 have to implement the directive in national building legislation. To support the implementation, a standardisation mandate to CEN from the Commission has been issued.

A fact is that, in any case, each Member State will prepare its own laws and regulations for EPBD implementation. - Even though in the beginning there are lots of differences, Europe is already on the way towards harmonised methods and practices. Energy performance is in fact a complicated issue. If we go to details, there are several questions still open. In my previous article I wrote about the discussions around cooling load calculations. The recent CEN Enquiry stages have brought up lots of other comments and questions, and even some main definitions would need further clarification. For example: what is the exact definition of "BUILD-

ing permit stage (I)

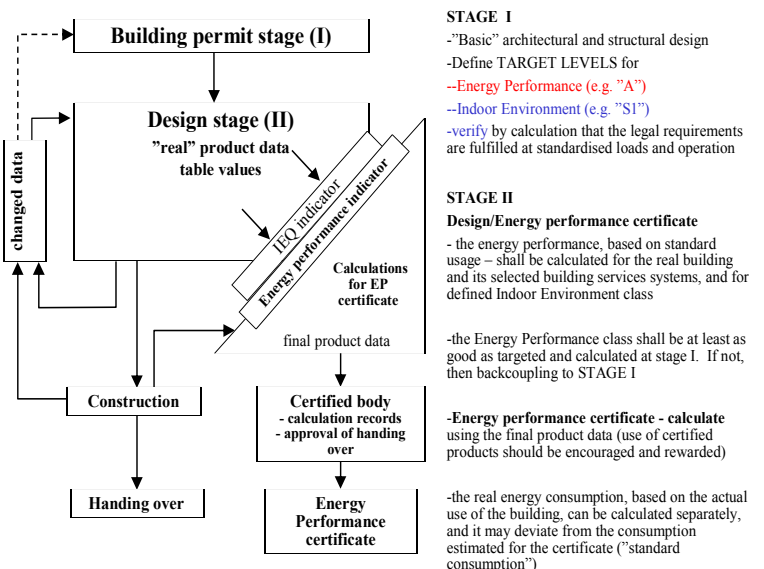


Figure 1. Principles of design methodology for good energy performance and good indoor environment. The same system and product data should be the basis of inspections, too.

ING", "part of building", or "zone in a building"? In the CEN work for inspection standards, one difficulty is that in some countries "ventilation" and "air conditioning" are almost the same, but in some other countries these are two totally different things.

3. CEN Standardization Related To The EPBD

The standardisation mandate to CEN from the Commission lists the Work Items (WIs) for five CEN Technical Committees (TC's). Some 2000 pages of text had been developed in an exceptionally tight time schedule - mostly technically completed before the end of 2004, but final technical adjustments and editorial work took their own time and the CEN Enquiry for the first drafts started in March 2005. By the end of November 2005, all drafts have received their prEN numbers - and the number for each document will stay from now on, for the lifetime of the final European Standard and its future revisions.

The target date of Formal Vote for the final drafts is August 2006, and the scheduled date of availability of the Standards is February 2007. The next months will show how these target dates can be met.

The extent of the drafts has brought up a lot of discussion - "too much too soon - and is the text reliable?". The Enquiry has at least questioned the quality of certain parts in the written material; several comments claim that the writers have not taken into account the most recent scientific findings, or that some information in the texts is valid only in a limited part of Europe and/or only in certain types of buildings and systems.

Another question of concern is the fact that the directive leaves a lot of freedom for interpretations on national level, and it has been very difficult to try to harmonise different national interpretations, which may rely on different existing national building regulations, especially if these have been based on different philosophies - one example of this is the minimum ventilation rates. This concern is really justified from the manufacturer's point of view. Companies are working more and more international - different requirements, methods and practices can make serious barriers for trade!

4. Ventilation, Air Conditioning, Indoor Environment

The Work Items (WIs) allocated to CEN/TC 156 were technically finalized before the end of 2004, the only exception being adjustments in WI 31 (prEN 15251). The titles of the drafts have changed several times during the writing process. The present titles, still subject to change if needed, can be seen from the list of all WIs in the end of this article.

-prEN 15240 "Inspection of air-conditioning systems": WG 10 (Convenor: Jorma Railio, Finland)

-prEN 15243 "Dynamic calculation" WG7 (Convenor: Gerhard Zweifel, Switzerland)

-prEN 15242 "Calculation of air flows..." WG7 (task leader: Jean-Robert Millet, France)

-prEN 15241 "Calculation of ventilation energy" WG7 (task leader: Jean-Robert Millet, France)

-revision of EN 13779 WG 7 (task leader: Jorma Railio, Finland)

-prEN 15239 "Inspection of ventilation systems" WG11 (Convenor: Pierre-Jean Vialle, France)

-prEN 15251 "Criteria for indoor environment" WG 12 (Convenor: Bjarne Olesen, Denmark)

Some words about the progress including the CEN Enquiry:

prEN 15240 Ventilation for buildings - Energy performance of buildings - Guidelines for inspection of air-conditioning systems : As this is clearly related to Article 9 of the EPBD, the objectives are rather clear. However, the definition of "air conditioning system" is a bit complicated if we think about a common question: "is ventilation (or air distribution) included in the air conditioning system":

"air conditioning system" - a combination of all components required to provide a form of air treatment in which temperature is controlled, possibly in combination with the control of ventilation, humidity and air cleanliness"

The definition has been interpreted in many ways, and the EPBD Mandate includes separate work items for inspections of air conditioning (prEN 15240) and ventilation systems (prEN 15239 Ventilation for buildings - Energy performance of buildings - Guidelines for inspection of ventilation systems). Much is discussed about the extent of prEN 15240 - should it only describe the minimum requirements and procedures of mandatory inspection, and would it be possible to satisfy the different needs in different Member States as well as the needs for different types of new and existing buildings, by means of classification. And: should the 12 kW limit defined in Article 9 be defined per unit or per building. Commission's interpretation is still unchanged: buildings where the total installed power is over 12 kW are subject to regular inspection. However, Member States have also different interpretations - some adopt the Commission's interpretation, some others define the limit 12 kW per zone". Furthermore, should the inspection be limited to the generation side and exclude distribution? Article 9 is, however, applicable to systems using air handling units equipped with cooling coils.

Even though several CEN members have wished to merge prEN 15240 and prEN 15239, this merger is not possible due to contractual reasons. The Mandate specified two different Work Items. If we look the "merge or not to merge" question from the technical point of view, there is not a single correct answer to it. Especially in Nordic countries, "ventilation" and "air conditioning" are typically provided by more or less centralised systems and the difference is typically only in the number of air treatment functions in the air handling units. In warmer climates the difference is clear as ventilation and air-conditioning are typically separated from each other. So, there will be two different standards, but attention will be paid in further editing to make the two standards comple-

mentary, referring to each other, with minimum duplication of text.

prEN 15243 "Ventilation for buildings - Calculation of room temperatures and of load and energy for buildings with room conditioning systems" presents a method for hour by hour calculation for all cases which cannot be covered by simplified methods. The draft aims to describe the procedure for the use of calculation methods for different room related purposes such as room temperature calculation, room cooling and heating load calculation, and room energy calculation for buildings with room conditioning systems, as an alternative or complement to simplified calculation methods described in other standards already existing. prEN 15243 includes several informative Annexes which describe, among other issues, some existing national models and methods applied in different energy calculations, plus some validation tools. Some parts of these Annexes are subject to revision after the CEN Enquiry, which closed in November 2005.

prEN 15242 "Calculation methods for the determination of air flow rates in buildings including infiltration" describes a method to calculate the ventilation air flow rates for buildings for applications such as energy calculations, heat and cooling load calculation, summer comfort and indoor air quality evaluation. In the calculation, much attention will be paid on naturally ventilated buildings and infiltration, but also the performance and air-flows in mechanical ventilation systems are discussed, including also estimates for unintentional leakages in the system (AHU's, ductwork). Even if the leakage calculation is just one of the many issues in the standard, it would be important to point out the benefits of low leakages in the system from energy point of view, and thus promote the use of high-quality products in the ventilation systems. prEN 15241 "Ventilation for buildings - Calculation methods for energy requirements due to ventilation-systems in buildings" - describes the method to calculate the energy impact of ventilation systems in buildings to be used for energy calculations, heat and cooling load calculation. Its purpose is to define how to calculate the characteristics (temperature, humidity) of the air entering the building, and the corresponding energies required for its treatment as the auxiliaries electrical energy required. For example, prEN 15241 gives possibilities to make calculations based on real product data. This is indeed a very challenging issue for the AHU groups CEN/TC 156/WG5 and EUROVENT WG6C. The newly completed EUROVENT AHU Energy Guideline takes a more product-oriented approach, but this work is a valuable complementary contribution there and may give a good input in the future revision of the 15241.

prEN 15251 "Criteria for the Indoor Environment including thermal, indoor air quality (ventilation) and light" is an important item to support the efforts for proper indoor environment in parallel with energy performance. It is possible to specify different classes for ventilation rate and acceptable space temperature range, and also for indoor air quality in a measurable way. Also the "system performance" standard under revision within the EPBD work, EN 13779 "Ventilation for non-resi-

dential buildings - performance requirements for ventilation and room-conditioning systems", specifies several classes for comfort and indoor air quality. One of the key issue is how to express the requirement for maximum summertime indoor temperature. Another new issue introduced in prEN 15251 is the "overall index for indoor environment" - this should be defined in parallel with the energy performance class which is the key issue of the energy performance certificate. At the CEN Enquiry for prEN 15251, some critical comments were presented on the idea of overall index, but improved approaches to this index are in preparation.

The relationships between the standards in preparation have been discussed in nearly all Working Groups in concern, with a lot of confusion. The outcome of the CEN Enquiry has expressed several needs to improve the texts and to clarify the scopes and borderlines. In the final stages of the preparatory work after the CEN Enquiry, much attention has to be paid to efforts to minimise overlapping and duplication of texts, and to work for consistency between the drafts. One table was drawn up at the latest CEN/TC 156 plenary meeting to explain the borderlines between the different standards applied at the design of indoor environment. This table should also give advise how to clarify the borderlines between different drafts and to avoid unnecessary duplication of texts:

The table is only to clarify the different focuses of the documents presented there. Actually, prEN 15243 will link these all more closely together and provide a link between the ventilation and/or air conditioning system and the whole building, further to prEN ISO 13790 (WI 14), prEN 15203 (WI 4), prEN 15217 (WI 2) etc. The relationships between all EPBD standards will be explained in the so-called "Umbrella Document", which is still in preparation and will be published as a Technical Report possibly by the end of year 2006.

5. Conclusions And Discussion

It is clear that the CEN work in 2004 was just the first step towards harmonisation of European practices, and it will also reveal needs on product level for new standards and revisions of many existing ones. Calculations, and further the certificates and inspections, should actually be based on reliable product data - this is also an opportunity to give priority to certified high-quality products and advanced indoor environment technologies. However, many countries tend to prefer simplified approaches based on "typical product data", or default values.

The work from now on, for the Formal Vote stage, must be seen as "the end of the beginning". It is unrealistic to expect 100% consistency between all drafts, a full description of their relationships and a fully harmonised framework within the existing schedule. A statement was drawn up recently at the CEN/TC 156 plenary to emphasise the needs for early revisions, in fact a need for continuous review was also pointed out in the statement.

Another challenge - and this is a big challenge to European HVAC profession as a whole - is related to the extent of infor-

mation. The concern on the extent of the present drafts is well justified. On the other hand, there is a huge need of more specific information about how to apply the EPBD and the Standards, for example how to perform the required inspections in residential buildings, schools, offices, hospitals etc.

The introduction to prEN 15251 says "An energy declaration makes no sense... without a declaration related to the indoor environment ". It is now a real challenge to our industry. If we

just look at the energy performance, the EPBD may become a threat to our industry - but if we promote good indoor environment hand in hand with good energy performance, the EPBD will provide lots of opportunities and challenges.

References

[1] Directive 2002/91/EC of the European Parliament and of the council of 16 December 2002 on the energy performance of buildings. European Commission

TABLE: References List of EPBD STANDARDS

List of Mandated Work Items and standards related to the EPBD. After the end of Enquiry, the CEN Working Group responsible for the preparatory work will start the analysis of comments and to prepare the final draft for Formal Vote, within one year of the closing date. During this revision process comments given to related standards have to be taken into account as well.

WI -nr	Title	Number	TC in charge	End of Enquiry
32	Umbrella document, Overview of relations between EPBD standards	CR abcd		
1.	Energy performance of buildings - Methods of expressing energy performance and for energy certification of buildings I (merged with WI-3)	prEN15217	89	2005-08-31
2.	Energy performance of buildings - Overall energy use, primary energy and CO2 emissions	prEN15315	228	2005-12-28
3.	Energy performance of buildings - Ways of expressing energy performance of buildings (merged with WI-1)	- (see 1)	-	
4.	Energy performance of buildings -Assessment of energy use and definition of ratings	prEN15203	89	2005-08-24
5.	Energy performance of buildings - Inspection of boilers and heating systems.	prEN15378	228	2006-04-06
6.	Ventilation for Buildings - Energy performance of buildings - Guidelines for the inspection of air-conditioning systems.	prEN15240	156	2005-09-28
7.	Heating systems in buildings - Method for calculation of system energy requirements and system efficiencies - Part 1: General	prEN15316-1	228	2005-12-28
8.	Heating systems in buildings - Method for calculation of system energy requirements and system efficiencies - Part 2.1: Space heating emission systems	prEN15316-2-1	228	2006-03-20
9.	Heating systems in buildings - Method for calculation of system energy requirements and system efficiencies - Part 2.2: Space heating generation systems: Part 2.2.1. Combustion systems (Boilers) Part 2.2.2. Heat pump systems Part 2.2.3. Thermal Solar systems (including DHW) Part 2.2.4 The performance and quality of CHP electricity and heat (incl. on-site and micro-CHP) Part 2.2.5. The performance of quality district heating and large volume systems. Part 2.2.6. The performance of other renewable heat and electricity. Part 2.2.7. Biomass combustion systems	prEN15316- 4-1 4-2 4-3 4-4 4-5 4-6 4-7	228	2006-03-20 2006-03-20 2006-03-20 2006-03-20 2006-03-20 2006-03-20 2006-06-26
10.	Heating systems in buildings - Method for calculation of system energy requirements and system efficiencies - Part 2.3: Space heating distribution systems	prEN15316-2-3	228	2006-03-20
11.	Heating systems in buildings - Method for calculation of system energy requirements and system efficiencies - Part 3. Domestic hot water systems: 3.1 characterisation of needs (tapping requirements) 3.2 distribution 3.3 generation	prEN15316- 3-1 3-2 3-3	228	2005-12-28 2005-12-28 2005-12-28
12.	Ventilation for Buildings - Calculation of room temperatures and of load and energy for buildings with room conditioning systems	prEN15243	156	2005-11-19

13.	Energy performance of buildings - Energy requirements for lighting - Part1 : Lighting energy estimation (a part 2 with additional data is proposed)	prEN15193-1	169	2005-08-17
14.	Energy performance of buildings - Calculation of energy use for space heating and cooling - (with extension of scope of EN ISO 13790)	prEN-ISO 13790	89	2005-10-05
15.	Thermal performance of buildings - Calculation of energy use for space heating - Simplified method (superseded by WI14)	- (see 14)	-	
16.	Thermal performance of buildings - Sensible room cooling load calculation - General criteria and validation procedures	prEN15255	89	2005-11-19
17.	Thermal performance of buildings - Calculation of energy use for space heating and cooling - General criteria and validation procedures	prEN15265	89	2005-12-15
18.	Ventilation for buildings - Calculation methods for the determination of air flow rates in dwellings including infiltration (To be replaced by w.i. 19)	- (see 19)	-	
19.	Ventilation for buildings - Calculation methods for the determination of air flow rates in buildings including infiltration. (The items 18 and 19 are merged)	prEN15242	156	2005-10-28
20.	Ventilation for buildings - Calculation methods for energy requirements due to ventilation systems in buildings (merged with 21)	prEN15241	156	2005-10-28
21.	Ventilation for buildings - Calculation methods for energy requirements due to ventilation systems in dwellings. (merged with 20)	- (see 20)	-	
22.	Calculation methods for energy efficiency improvements by the application of integrated building automation systems.	prEN15232	247	2005-09-21
23.	Review of standards dealing with calculation of heat transmission in buildings. - 1st set	prEN-ISO	89	2005-07-10 2005-09-07
	- Thermal performance of building components - Dynamic thermal characteristics - Calculation methods	13786	.	
	- Thermal performance of buildings - Transmission and ventilation heat transfer coefficients - Calculation method	13789		
	- Thermal performance of windows, doors and shutters - calculation of transmittance Part 1 : General	10077-1		
24.	Review of standards dealing with calculation of heat transmission in buildings. - 2nd set	prEN-ISO	89	2005-09-07
	- Building material and products - Hygrothermal properties - Tabulated design thermal values and procedures for determining declared and design values	10456		
	- Heat transfer via the ground - calculation methods	13370		
	- Thermal bridges - Heat flows and surface temperatures - detailed calculations	10211		
	- Thermal bridges - Linear transmittance - simplified methods and default values	14683		
	- Thermal resistance and thermal transmittance - calculation method	6946		
25.	Ventilation for non residential buildings - Performance requirements for ventilation and room conditioning systems. (revision of EN 13779)	prEN13779	156	2005-09-28
26.	Design of Embedded water based surface heating and cooling systems:	prEN15377	228	2006-03-06 2006-03-06 2006-03-06
	Part 1: Determination of the design heating and cooling capacity	-1		
	Part 2: Design, Dimensioning and Installation	-2		
	Part 3: Optimizing for use of renewable energy sources	-3		
27.	Performance requirements for temperature calculation procedure without mechanical cooling. prEN 13791	EN13791	final	Published
28.	Thermal performance of buildings - Calculation of internal temperatures of a room in summer without mechanical cooling - Simplified method. prEN 13792	EN13792	final	Published
29.	Data requirements for standard economic evaluation procedures related to energy systems in buildings, including renewable energy sources.	prEN 15459	228	2006-06-26
30.	Guidelines for inspection of ventilation systems	prEN15239	156	2005-09-28
31.	Criteria for the indoor environment, including thermal, indoor air quality, light and noise.	prEN15251	156	2005-10-05

Chilled beams - A Versalite Solution

1. Introduction

Today, in the Nordic countries, the use of chilled beams is the system of choice for creating good indoor climate. They provide correct temperatures and high air quality without causing any noise or draughts.

The system is based on the use of both water and air: the water maintains the correct temperature in the room and the air supplies the correct air quality. Water is also an excellent carrier of energy and that is why energy costs for a system based on chilled beams is lower than for many other systems. Another advantage of chilled beams is that they do not have any moving parts, which means that service and maintenance is simpler.

Today, there are a great number of alternative systems to choose from if you want to create a good indoor climate. Your choice, of course, will depend on the type of building and what it is used for. A clear trend, however, is that more and more property owners are choosing to install chilled beams.

2. Type Of Chilled Beams

Chilled beams can be divided into two different categories – passive and active.

2.1. Passive Chiled Beams

A passive chilled beam often comprises a finned cooling coil enclosed in a casing. Cold water circulates through the cooling coil and the air flowing between the fins becomes colder than



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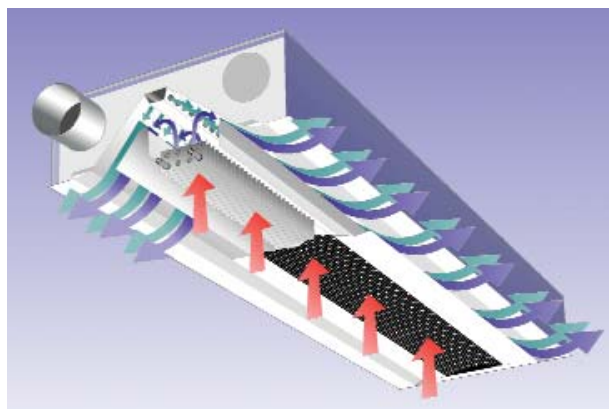
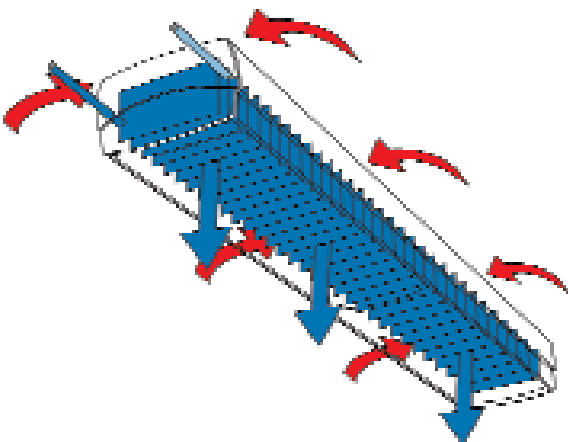
the surrounding air and descends into the space below. This causes the room air to circulate through the plates. The cooling capacity is dependent on the temperature difference between the cooling coil and the room air. As only small amounts of energy create their cooling capacity, the passive chilled beams are sensitive to the location of the heating sources and to the design of the supply air system. It is therefore important to position these beams so that they work in unison with the heat loads (heat sources) in the room in the best way possible. This means that the manufacturer of passive chilled beams must be able to supply adequate recommendations regarding their positioning in a room so that the specified cooling capacities can be attained. The best

way to address such issues is build a model room in a climate laboratory and measure the actual room temperatures and air speeds.

2.2. Active Chilled Beams

An active chilled beam also comprises a casing with a finned cooling coil. This is then combined with a supply air unit so that it can also function as a supply air terminal. In an active chilled beam, pressurised air is discharged through a number of nozzles causing induction of the air in the room, which balances the pressure. The induction of air is the result of an under-pressure being built up around the nozzles when air is ejected from them, causing a deficit of air. This deficit is replaced by air from the room; the air from the room is said to have been induced.

As an active chilled beam includes a supply air unit the driving force in the system is constant and significantly higher than in



a passive chilled beam. This makes it much less sensitive to where it is placed; it produces its desired cooling effect independent of its position in the room.

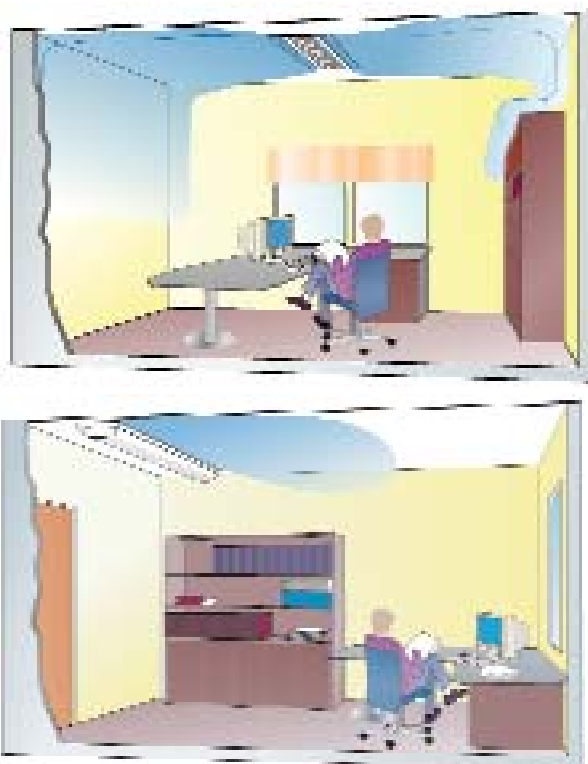
3. Principles of Chilled Beams

The principle behind chilled beams is the creation of mixed flow ventilation, with air being supplied to the treated room at a relatively high speed. There are a number of different ways in which chilled beams can be installed. All of them have advantages, but also limitations. Depending on what the rooms look like, where the heating sources are and how the beams are placed, different air flow patterns can be created.

The solution chosen will depend on a number of factors. Some of the most important are the design of the building, how it is used and the demands made regarding flexibility. Some of the more common solutions are described below.

At right angles to the facade

This is an installation alternative for modular offices or open plan offices. The chilled beam is placed in the middle of the room or next to one of the partition walls. The most common position is in the middle of the room, this suits all types of products, both active and passive. Positioning next to a partition wall is possible with products with or without a supply air unit. If a supply air unit is used, it is best to design for asymmetrical discharge of the supply air.



Parallel to the facade

In this variant, the chilled beams are positioned alongside an outer wall. This solution can be used in both modular rooms

and large rooms, that is, open areas such as open plan offices and large shops. This alternative is, as yet, more common on the continent than in the Nordic countries. Positioning along the facade has a number of advantages. Air is discharged towards the centre of the room where it then combines with the so-called convective air sources that then rise, as they are warmer than the surrounding air. Opposing streams of discharged air, from beams otherwise placed in the room, and that could cause draughts, are also avoided. In office environments, placing a beam in every module also offers greater opportunities for future flexibility. With the correct air distribution from the chilled beams a comfortable and stable system is achieved.

Parallel to the rear wall

A solution where the beams are placed along the corridor wall can be used for both cellular offices, i.e. ordinary offices, and for large rooms, i.e. open-plan solutions.

A chilled beam supplies air through a long slit on each side of the cooling coil, ejecting either an equal amount of air on both sides, symmetrically, or more air to one side than the other, asymmetrically.

Some manufacturers recommend discharging the whole of the volume of air along the top of the corridor wall and letting it drop down to the floor. This causes high air speeds at floor level and easily leads to draughts in the occupied area. In a similar way, the system will become unstable if all the air is ejected at ceiling level towards the facade. This is because the heat loads in the room create air streams that rise to the ceiling and these can cause the air discharged from the beam to be pressed down into the room.

The most suitable solution, therefore, is to dimension the beam so that the air flow descends close to the beam and does not reach far into the room.

Modular offices

If the system is to function well, it is important that the cooled supply air discharged from the beam can be treated in a long mixing zone before it reaches the occupied space. After leaving the beam, the air can cling to the ceiling, wall and parts of the floor and, while flowing along these surfaces, mix with the room air and raise the temperature in the circulation air. In this way a comfortable indoor climate is reached without the risk of draughts, and large cooling loads can often be dealt with without any problems.

Open plan solutions

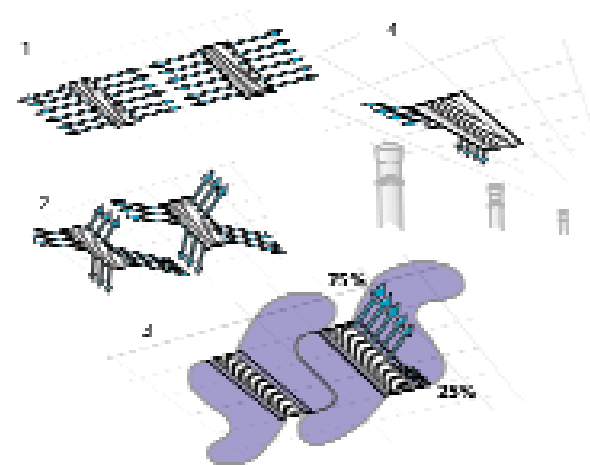
In large spaces, such as shops or open-plan offices, the situation regarding chilled beams is different to those in ordinary offices. Usually there are no wall surfaces that the cooled supply air can flow along. The most common type of installation in large rooms therefore uses long parallel units placed at right angles to the facade and reaching into the room.

In mixed flow ventilation systems, heat exchange takes place vertically between the room air and the tempered air. Here, it is important to eliminate the risk of draughts right from the start. And this risk increases in large rooms, as there are greater demands on flexibility, especially regarding the relocation of walls and different furnishing solutions.

A relatively common problem occurs when chilled beams are placed too close together. If they are placed close together, the system will be more flexible but there is also a greater risk of the opposing jets of air mixing together, creating air movements will be easily perceived as draughts.

One way of removing this risk is by directing the air flow from every individual beam. By fitting every beam with an air control device, a so-called ADC (Air Diffusion Control), the air discharge can be individually adjusted and, as a result, the ADC will significantly increase the degree to which room air is mixed with the tempered air stream. Another advantage of ADC is that it allows the direction of the ejected air to be changed when refurbishing a room.

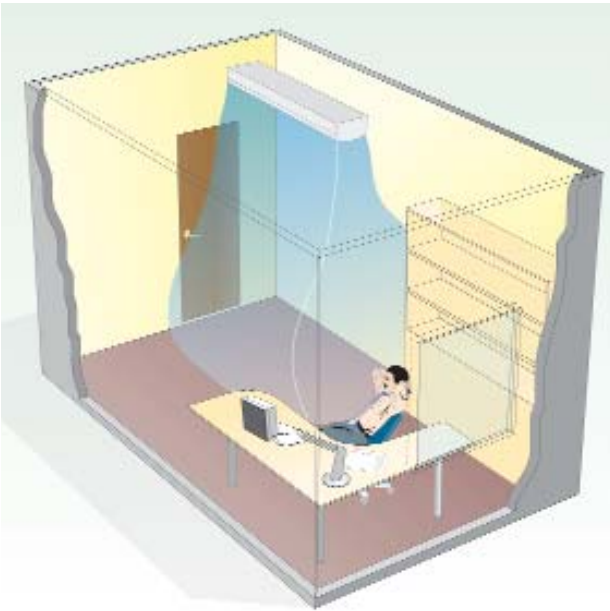
The solution offered by placing short beams, i.e. beams 1200 to 1300 mm long, in every module parallel to the facade is an alternative that is gaining ground in Europe. The risks involved when air jets are directed towards each other are avoided and, at the same time, a stable system is created.



4. Preventing Condensation

On warm summer days the air humidity can be high and sometimes this will cause condensation problems. To avoid these, you have to ensure that the system prevents condensation occurring on the chilled beams. The easiest way to do this is by cooling the supply air.

A centrally placed sensor is also required to measure the relative humidity in the extracted air and make sure that the supply air temperature is kept above the dew point.



This sensor causes the water temperature in the whole building to be raised at the same time, and the chilled beams retain their cooling capacity. If there are sensors in every single room that can close down their respective units, then there will be a risk of condensation in another part of the building and that cooling capacity will be lost when the valve is closed.



5. Design

When dimensioning a system it is important to carry out calculations using operational values, not, as is usual, peak values. If only peak values are used, these, of course, include the values for people, lighting, computers and sun in a room. But the values resulting from the building itself are also important and these are included in the operational values.

Today, there are a number of computer-based calculation programs in which it is possible to optimize a building's cooling loads and to calculate throw and beam positions.

No matter which design method is used, it is a good idea to carry out tests and the best results are, of course, obtained in a full-scale testing situation. The best way to do this is to choose a reference room and carrying out the tests inside it.



Here, it is possible to measure temperatures, air speeds and degrees of turbulence. A subjective assessment of the results can also be obtained by calculating the DR index according to ISO 7730.

The DR index indicates how people will experience the indoor climate from a draught point of view. The calculation method used is based on extensive measurements obtained from reference groups.

6. Computer Simulation

Computer simulations, often known as CFDs, can also be carried out to test the function of a system. Primarily, these are applicable to rooms that are too big or too complicated to build full size, for example, sports halls or large conference halls. For the CFD simulation to be as accurate as possible, the input data must represent the actual room as closely as possible, and obtaining this data is a demanding, precision assignment.

7. Chilled Beams In The Past And In The Future

The successful installation of a chilled beam system is no more difficult to achieve than the successful installation of any

other type of system. Neither is it, as regarded by many, a new system.

As far back as 1958, the Norwegian engineer Gunnar Frenger patented a technical solution that entailed fixing a pipe to an aluminium profile, the so-called Frenger system. The system comprised a ceiling arrangement for heating and cooling by radiation, and was the first step towards the chilled beams of today.

At the end of the 1960s, the first radiating chilled beams were installed at the Volvo plant in Gothenburg. In 1972, the first chilled beams with supply air features were installed at the head office of Götabanken in Gothenburg.

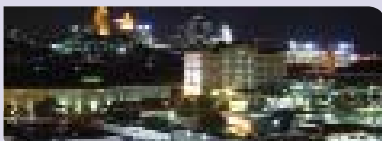
In 1986 came the breakthrough for convection beams, when SAS chose this solution for their headquarters at Frösundavik in Stockholm. More than 5,000 passive chilled beams were installed in this block of offices.

What the future will hold in store for chilled beams is naturally hard to say. However, the combination of energy efficiency, simplicity in installation and maintenance, and their ability to create a comfortable indoor climate, does make the trend clear; chilled beams are becoming increasingly popular.

hvac events

CHINA REFRIGERATION 2006, April 11-13, 2006, Shanghai, CHINA

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WINDOW CONFERENCE 2006, COMFORT AND ENERGY USE IN BUILDINGS, April 26-30, 2006, Larn, UK

Organisation
Fergus Nicol



LIGHT & BUILDING 2006 (fair & conference), April 23 - 27, 2006 Frankfurt, GERMANY

<http://light-building.messefrankfurt.com>

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

23rd April, Sunday; 15:00 - 17:00

Organisation

Mech.Eng. Numan SAHIN,
REHVA Vice-President, Chairman
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It continues the tradition of being the third biggest exhibition of HVAC sector in the world, with 41.600 m²

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INTERNATIONAL CONFERENCE

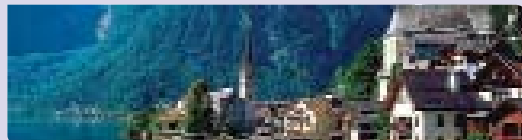
May 10-12, 2006, Budapest, HUNGARY

Transportation of the Energy Performance of Building Directive

Organisation: Hungarian Scientific Society of Buildings

Contact : Zoltan Magyar

zmagyar@witch.pm.mf.hu www.trivent.hu



17th AIR-CONDITIONING and VENTILATION CONFERENCE, May 17-19, 2006, Prague, CZECH REPUBLIC

Contact : acv2006.cz



5th INTERNATIONAL CONFERENCE ON 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 existing buildings.

Contact: brodatch@abok.ru www.abok.ru



ICCI 2006, 12th INTERNATIONAL COGENERATION, COMBINED CYCLE AND ENVIRONMENT CONFERENCE & EXHIBITION, May 25-26, 2006 Hilton Convention & Exhibition Center, Istanbul

Contact Information:

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HEALTHY BUILDINGS CONFERENCE, June 4 - 8, 2006 Lisboa, PORTUGAL

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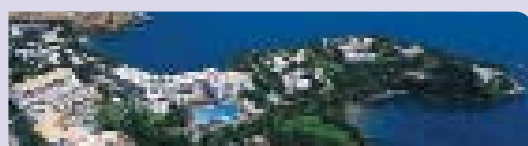
**ASHRAE SUMMER MEETING,
June 24-28, 2006, Quebec City, CANADA**

Contact: www.ashrae.org



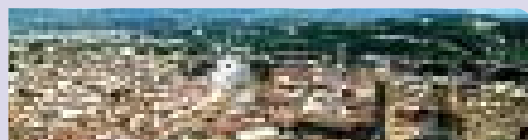
**19th INTERNATIONAL CONFERENCE ON EFFICIENCY,
COST, OPTIMIZATION, SIMULATION AND ENVIRON-
MENTAL IMPACT OF ENERGY SYSTEMS,
July 12-14, 2006**

Contact: capis-crete@capis.gr www.capis.gr



**WORLD RENEWABLE ENERGY CONGRESS IX AND EXHI-
BITION, August 19-25, 2006, Florence, ITALY**

Contact: Marco Sala marco.sala@taed.unifi.it
www.web.taed.unifi.it/abitaweb/wrec.htm



**HEAT TRANSFER CONFERENCE,
August 13-18, 2006, Sydney, AUSTRALIA**

Contact: <http://ihc-13.mech.unsw.edu.au/>



**INTERNATIONAL BUILDING PHYSICS/SCIENCES
CONFERENCE (IBPC3),**

August 27-31, 2006, Montreal, CANADA

Concordia Univ, & Int'l association of Building Physics

Contact: www.bcee.concordia.ca/ibpc3



KLIMA FORUM

Sept 28-29, 2006, Ljubljana, SLOVENIA

Co-sponsored by REHVA

Contact: www.klima-forum.org, info@klima-forum.org



INTERCOOL 2006

October 3-6, 2006, Düsseldorf, GERMANY

Contact organizers at 312-781-5180 or
www.mdna.com/shows/intercool.html



**SCANDINAVIAN HVAC EXHIBITION VVS-DAGENE 2006,
October 18-20, 2006, Lillestrom, NORWAY**

Contact: www.vvs-dagene.no



IKK 2006, October 18-20, 2006, Nürnberg, GERMANY

Contact organizers at 49 0 9 11 86 06 0, fax 49 0 9 11 86 06
82 28, or www.ikk-online.com



SAIE 2006, October 25-29, 2006, Bologna, ITALY

Contact organizers at www.saie.bolognafiere.it



**CLIMAMED 2006,
November 30 - December 1, 2006 Lyon, FRANCE**

Deadlines; Paper due 30 June 2006

Contact: www.climamed2006.org info@climamed2006.org



EPIC 2006 AIVC

Nov. 29 - Dec. 1, 2006, Lyon, FRANCE

Endorsed by ASHRAE.

Contact organizers at 33 0 4 72 04 70 27

fax: 33 0 4 72 04 70 41,

epic2006aivc@entpe.fr, or

<http://epic.entpe.fr>



**IWEERB 2007, January 15-16th,
2007, Harbin, CHINA**

Contact: IWEERB2007@hit-edu.cn
<http://indoorair.hit.edu.cn>





TTMD Turkey

Turkish Society Of HVAC & Sanitary Engineers (TTMD) is a non governmental organization which implements its activity independently and for the purpose advancing sciences of heating, ventilation, air-conditioning and sanitary. In Turkey, HVAC & Sanitary services have been accomplished by the engineers who were graduated from the Mechanical Engineering departments of 35 university faculties. The experts in this field, who have experiences in building technology, management and energy economics, who have knowledge in architectural design and applications, are concentrated in their particular fields in heating, ventilating, air-conditioning, sanitary, installations of medical applications, etc. These experts have been continuing their professional activities in one or combination of production, sales, assembling, purchasing, design, applications, testing, control, commissioning, services, maintenance and repair. In recent years, with the contribution of our Society, important improvements have been achieved in the expertise and trainings of HVAC & sanitary sector.

The Foundation of Turkish Society of HVAC & Sanitary Engineers: Turkish Society of HVAC & Sanitary Engineers, in order to contribute the developments in this field, was founded in 1992. Presently, it has got around 1500 members. It has also got close links with foreign professional organizations, and became associate members of both ASHRAE and REHVA.

Objectives of Turkish Society of HVAC & Sanitary Engineers:



- To mediate in the transfer of Know-How and Technology, to contribute in the improvement of efficiency in energy usage of Turkey, to transfer the knowledge within the sector which will lead to better establishments; to represent Turkey in related foreign platforms; to follow up all the latest improvements within the sector,
- To contribute the training, research, know-how and technology transfer of professional colleagues, newly graduates and the ones who would like to be within this sector; to mediate their communications and discussions related to the sector,
- To contribute studies of universities and other research institutions; to mediate university-industry cooperation,
- To publish magazines, books and handbooks that contain correct and contemporary information about the sector; to state 'Application Rules' of the sector,
- To contribute the development of our country when applying our professions; to help in achieving health-





hier, safer, more hygienic, more comfortable, in other words more inhabitable environments at indoor where people spend 80-90 % of their time; to produce more economical, more energy active and more environmentally friendly solutions and in order to achieve that to act with solidarity within the society and in corporation and coordination with other professional and expertise groups.

Activities of Turkish Society of HVAC & Sanitary Engineers:

TTMD, in order to contribute the sector and engineers, and to achieve the above stated objectives, has been executing the following activities:

a) Training Activities:

Magazines: TTMD, has been editing "TTMD Journal" periodical for every two months and distributing them to over 4000 people within the sector in Turkey, free of charge, and helping the growth and development of knowledge.

Books: TTMD, in order to enrich the technical publishing and documentations in the sector, editing various publishing, some of them are listed as below:

- HVAC Dictionary between Turkish/English/German
- The Turkish Translation of ASHRAE Fundamentals Handbook
- The Turkish Translation of ASHRAE Application Handbook
- The Turkish Translation of ASHRAE Systems and Equipment Handbook



- The Turkish Translation of ASHRAE Algorithms for HVAC Acoustics
- The Turkish Translation of REHVA Displacement Ventilation Guidebook
- Central Heating Book
- Data of Climate of Turkey Book (Research funded Project)
- The Turkish Translation of ASHRAE Noise and Vibration Control Guide
- Installation Engineering Application Book
- Fire Extinguishing and Smoke Control Book
- Recknagel Heating, Cooling and Ventilation Handbook
- Sanitary Engineering Technology
- Symposium Transaction Books.



Meetings: Through our Regional Committees, various training and education activities have been accomplished.

b) Symposium:

TTMD has been organizing the Biannual International HVAC&R Symposium in Istanbul. In May 8-10, 2005, the 7th Symposium will take place in İstanbul Hilton. Through the papers that had been presented and the discussions that had taken place during the Symposiums, TTMD has been contributing the healthier development in the sector. During the Symposiums, designer, contractors, researchers, university members and managers working in heating, ventilating, acclimatizing and installation, have always found an open platform where they may discuss their wide range of experiences. All the papers that has presented has also been collected in Symposium Book and CDs, for the future references of the sector. The Fair that will take place on 4-7 May 2006 before the Symposium is "SODEX 2006 International Sanitary and HVAC Exhibition" and it is the third largest fair of its kind in Europe. We would like all the participants of the Symposium to attend this distinguished event also.

TTMD Honors and motivates the successful and Distinguished Senior and Young Engineers and also organizes Students Competition with a sponsor. TTMD's founder and the first President Mr. Celal Okutan has been elected as Honorary President and second President Mr. Numan Sahin is serving REHVA as Vice-President since 2001 and also elected by TTMD as President of Clima2010 - Turkey Committee for being candidate and realization after the election. Our Presidents are elected only for 2 years and currently Mr. Huseyin Erdem is serving as President until the end of 2006.

Contact:

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A.G.F.R. Romanian

The most prominent Romanian professional associations in the building services engineering sector are the Romanian General Association for Refrigeration (A.G.F.R.) and the Romanian Association of Building Services Engineers (A.I.R.). These two professional societies join together a number of 1953 specialists.

The activity of these associations is complementary, the Romanian General Association for Refrigeration dealing with the refrigeration and air-conditioning related problems, and the Romanian Association of Building Services Engineers dealing with the problems related to heating, ventilating, sanitary, electrical and lighting.

These professional associations organize regularly regional conferences, and also an annual national conference.

The main topics of the A.I.R. activity are:

- the adoption of the European legislation regarding the energy performance of buildings;
- the energy auditing of buildings;
- the organization of training courses for specialists in the field of heating, ventilating, sanitary, electrical and lighting installations;
- the award of legally recognized certificates for technical expert and energy auditor (in co-operation with the Ministry of Transport, Buildings and Tourism);
- the organization of technical exhibitions – on the occasion of the regional and national conferences;
- the editing of two technical journals (“The Plumber” and “The Electrician”)

The Romanian General Association for Refrigeration (A.G.F.R.), working in close contact with the Romanian Business Owners Association in Refrigeration and



Air Conditioning, is very active in the following domains:

- the adoption of the European legislation specific for the field of refrigeration and air conditioning;
- the certification of specialists and the accreditation of companies involved in refrigeration and air conditioning;





- the organization (in co-operation with the Ministry of Education and Research and the economic ministries) of training courses for medium- and high level specialists in refrigeration and air conditioning;

- the elaboration of the Code of Good Practices for the refrigeration specialists;

- the recovery and recycling of refrigerants and of household electric and electronic appliances;

- the co-operation with the specialized Romanian exhibitor RomExpo for the organization of specialized exhibitions RomTherm (thermal equipment) and IndAgra (equipment for agriculture and the food industry);

- the editing of the technical journal "FrigoClima"

The Romanian Association of Building Services Engineers and the Romanian General Association for Refrigeration support the participation of the Romanian specialists at the world technical and scientific events organized by REHVA, ASHRAE and IIF/IIR.





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

REHVA is a 40 year old association of European societies in the field of HVAC and other building services. REHVA represents more than 100.000 experts from 30 European countries. REHVA's main activity is to develop and disseminate economical, energy efficient and healthy technology for building services.

The topic of the guidebook on ventilation and environmental tobacco smoke (ETS) is extremely important in respect of indoor air quality, health and energy consumption. REHVA realises that the best protection against the environmental tobacco smoke is to restrict the smoking indoors. But if the smoking is allowed indoors, like it is in many countries, ventilation can be effectively used to reduce the exposure to ETS. The purpose of this guidebook is present the state-of-the-art technology of controlling ETS indoors. The guidebook presents latest ventilation technology and illustrates the use of the technology with several practical examples for application. The book is intended for the designers, installers, architects and building owner.

The REHVA Guidebook "Ventilation and Smoking" was presented at the international CLIMA 2005 conference in Lausanne, September 2005. As a part of this conference REHVA organised 15 workshops, one of which was dedicated to "Ventilation for reducing exposure to ETS". A summary of this workshop was recently published. (Seppanen and Skistad 2005).

Translation of the book in other languages is appreciated. Refer to REHVA for conditions. (www.rehva.com)

• 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.

Active chilled beams are connected to the ventilation ductwork, high temperature cold water and when desired low temperature hot water system. The main air-handling unit supplies primary air into the various rooms through the chilled beam. Primary air supply induces room air to be recirculated through the heat exchanger of the chilled beam. In order to cool or heat the room either cold (14-17 °C) or warm (30-50 °C) water is cycled through the heat exchanger. Recirculated room air and primary air mix prior to diffusion in the space. Room temperature is controlled by regulating the water flow rate of the heat exchanger.



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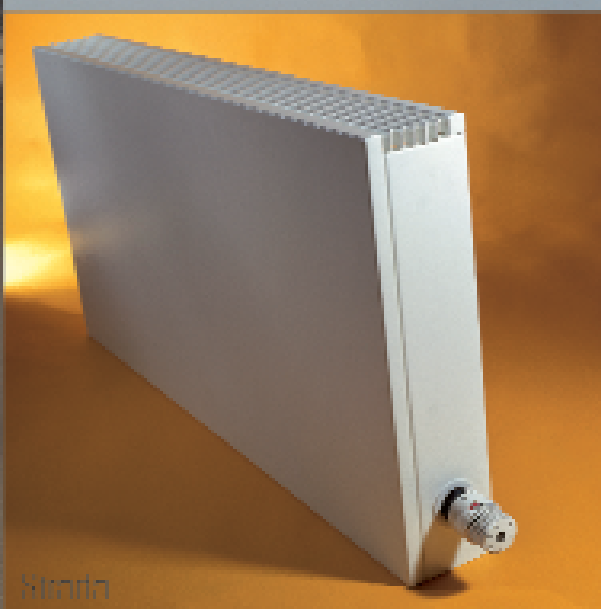
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Design Radiators



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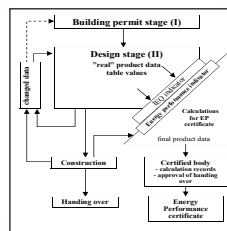
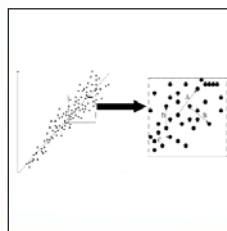
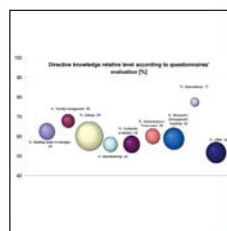
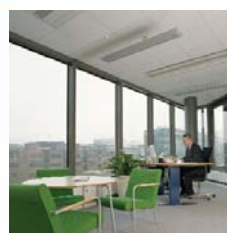


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Energy Performance of Buildings Directive (EPBD)



The Implementation of the Energy
Performance Directive Throughout Europe

IIVAC and The Energy Performance of Buildings Directive: Challenges and
Opportunities

Energy Performance of Buildings Directive (EPBD):
Influences on European standardization and on ventilation and
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