

## Applying the EPBD to improve the Energy Performance Requirements to Existing Buildings – ENPER-EXIST

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4<sup>th</sup> European conference on energy performance and indoor climate in buildings (EPIC), 20-22 November 2006, Lyon including 3<sup>rd</sup> ENPER-EXIST workshop

for further information see:

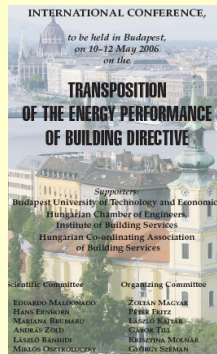
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### ENPER-EXIST informs on calculated and measured rating procedures at EPBD conference in Budapest (part 2)

The 2nd ENPER-EXIST workshop was held on May 10th, 2006 at the International Conference on Energy Performance of Building Directive in Budapest, Hungary. This is the 2<sup>nd</sup> part of the summary on the workshop. For the first part, please have a look at newsletter no. 7.



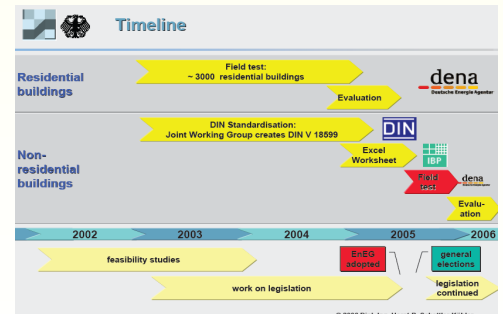
The afternoon session showed examples for Member States experiences with rating procedures. Horst Schettler-Köhler (BBR) started the presentation



on the German experiences with a graphic showing the German milestones towards the EPBD. In Germany since 1995 a calculation procedure for a heat balance existed, in 2002 the new procedure was based on primary energy balance. According to the EPBD there was simply to add 2 new aspects, the cooling and the lighting. It was decided to use the existing procedure for the residential buildings and develop a new procedure for the non-residential buildings. The first proposal by the building ministry was to use only asset (calculated) rating. However the housing companies insisted that operational rating was also possible, furthermore there was already an existing benchmarking system based on consumption data by the cities. Right now it seems as if the operational rating will possible for dwellings with more than 7 flats as this should balance out the user influences and also for other buildings which will then get a malus on top of their consumption data.

The recommendations will in this case be made on the basis of appearance and experience by the expert. For all buildings the calculated rating will be possible. It has to be done for dwellings with less than 7 flats and for new buildings. The recommendations will then be based on calculations. The ministry is still working on a directive on simplified data recording for residential and non-residential buildings for both calculated rating and measured rating. He then explained shortly the new German standard DIN V 18599, which contains a proper balance of the sources and sinks into the rooms (including a feedback from the systems to the room). The presented timeline (see below) showed two different feasibility studies or field tests, one on residential buildings and one on non-residential buildings. The latter one with 45 different buildings has just now been evaluated by the Fraunhofer Institute of Building Physics. The average time needed for the assessment of the buildings with the DIN 18599 was rather long. This was caused by the short time available for producing the standard and then a calculation tool that could be used for the field study. This tool is an excel tool and offers therefore only limited user comfort. Right now the calculation core for professional calculation tools is developed. This will simplify and shorten the necessary calculation time. Mr. Schettler-Köhler finished his presentation by showing the draft of the German certificate.

The afternoon session showed examples for Member States experiences with rating procedures. Horst Schettler-Köhler (BBR) started the presentation on the German experiences with a graphic showing the German milestones towards the EPBD. In Germany since 1995 a calculation procedure for a heat balance existed, in 2002 the new procedure was based on primary energy balance. According to the EPBD there was simply to add 2 new aspects, the cooling and the lighting. It was decided to use the existing procedure for the residential buildings and develop a new procedure for the non-residential buildings. The first proposal by the building ministry was to use only asset (calculated) rating. However the housing companies insisted that operational rating was also possible, furthermore there was already an existing benchmarking system based on consumption data by the cities. Right now it seems as if the operational rating will possible for dwellings with more than 7 flats as this should balance out the user influences and also for other buildings which will then get a malus on top of their consumption data.



The second national example was presented by Kirsten Engelund Thomsen (SBI). In Denmark certification was started in 1997, divided into small buildings and large buildings.

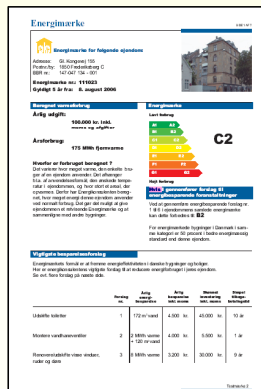
## ENPER-EXIST informs on calculated and measured rating procedures at EPBD conference in Budapest (part 2) (cont.)

The schemes for large buildings were based on yearly operation ratings, which resulted in a labelling (grades A to G) and an energy plan with measures to improve the energy efficiency of the buildings. The scheme for small buildings was done by calculated ratings at the time the buildings were sold. Therefore the Danes have gathered experiences with both, calculated and metered ratings:

- it is difficult to estimate savings if based on metered values
- there is a need for detailed and accurate handbooks for consultants
- very complex methods do not raise the quality
- databases are important

Kirsten Engelund Thomsen explained then the mentioned handbook, which is a guideline for the consultants and includes allowed simplifications based on typical constructions. The handbook contains "musts", "shoulds", "cans" and examples.

In 2006 the Danes have started new schemes. They are based on the use of the buildings, not the size. Single-family houses have to be rated in case of sale, buildings with flats dependent on the size (large: every 5 years, small: in case of renting or sale) and public buildings every 5 years. The labelling is based on calculation as the focus is on the building itself, not the user behaviour. However the measured consumption is also mentioned on the certificate, which is presented below.



Dick van Dijk (TNO) made the final presentation on the Dutch experience with rating. For new buildings overall energy performance regulations exist since 1995. For both residential and non-residential buildings all energy types were included based on a monthly calculation procedure. The long year experiences showed that revisions had to be done every few years. During those revisions also the maximum primary energy consumption was more and more decreased, the method however stayed basically the same. The experiences showed also that in spite of leaving the way of introducing specific requirements for building and system components the regulations paved the way for new technologies penetrating the market.

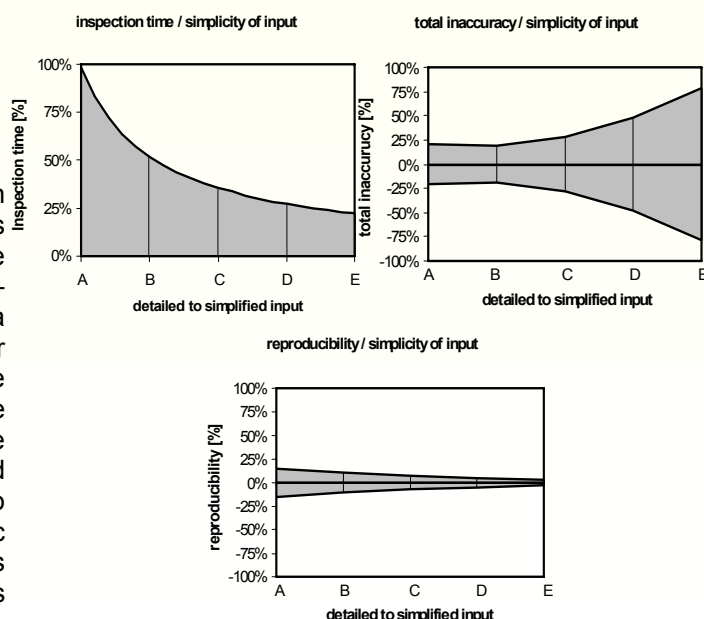
Dick van Dijk mentioned as examples the following technologies: high frequency lighting (now standard in Dutch office buildings), high performance glazings and condensing boilers. He presented the typical timeline for those developments: 1. introduction of an innovative technology, 2. slowly growing market penetration, 3.



rapidly growing market penetration, 4. tightening of energy performance requirements, then again from the start. The Dutch rating methods gave also the possibility for product labelling. There are national labels for condensing boilers, high performance glazing, etc. Additionally there have been efficiency increases in ventilation heat recovery systems and reduced costs due to higher market penetration. He emphasized that EP regulations do cause changes in the energy performance of buildings. As the Dutch rating is a calculated rating method they felt that there is need for optimization of the method. Therefore a sensitivity study on 5 different methods was done (method A-D being monthly calculation methods with A the most detailed and D the roughest, method E is based on a set of reference buildings). The sensitivity study analysed the following values:

- inspection time
- inaccuracy
- reproducibility

The sensitivity study resulted in the best method being between method B and C. By the use of these methods the inspection time can be reduced by 50 % compared to the most detailed method, and suitable levels of accuracy and reproducibility. The method will require a modest level of expertise at the consultants and a simplified quality control. The following figures show the comparison of the methods in the three analysed fields.





## ENPER-EXIST informs on calculated and measured rating procedures at EPBD conference in Budapest (part 2) (cont.)

The workshop ended with a general discussion. Andras Zold summarised the planned Hungarian EPBD implementation. The regulations exist, the minister decree is not yet signed. He raised the following points: The decision on calculated or measured rating should take into account the question "who is interested in rating?". Therefore the public buildings for which the owner stays generally the same can use operational rating, which has to be repeated after some years. The other buildings for which the user and owner can change should have the building in the focus and therefore need calculated rating. He also pointed out that the ventilation assessment (actual air change rate) is one of the most problematic points in both calculated and measured ratings. Robert Cohen said that pressure tests can give first indications on the ventilation rate, in UK also so-called "smoke candles" are used for investigations on the air tightness of a building. Bart Poel agreed with ventilation being a big problem during the assessment and added that no good default values exist. Additionally it is hard to tighten existing buildings in order to improve the energy performance. Jean-Christophe Visier added that a French study showed that in many buildings the mechanical ventilation system was running even during times the building was not occupied. The shut down of the system during that time is of course a no-cost/low-cost measure. Hans Erhorn asked Dick van Dijk which way of promoting a better quality of the building envelope. Dick van Dijk answered that the Dutch system might also include a separate indicator for the building only.

Hans Erhorn and Jean-Christophe Visier closed the workshop by reminding the audience on the planned next ENPER-EXIST workshop in Lyon. This workshop will focus on the roadmap to go beyond the EPBD requirements.

All workshop presentations are available at <http://www.enper-exist.com/wshops.html>.

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## Implementation of EPBD Article 7 in the UK

Pages 3-4 of the May 2006 ENPER-EXIST Newsletter (No. 7) described anticipated plans for the introduction of Building Energy Performance Certificates in the UK. These plans have now been more or less confirmed by a written Ministerial Statement on 14 June 2006. Referring specifically to England and Wales, the statement said:



"We will adopt a system of calculated asset ratings when energy performance certificates are required upon construction, sale or rent and to allow for the use of operational ratings, derived from measured energy consumption, for those obliged to provide certificates for public display. We are engaging with other Government Departments over the implementation and particular display requirements.

Public display will initially be for buildings over 1,000 m<sup>2</sup> occupied by public authorities and by institutions providing publicly funded services to large numbers of persons. This is important as the public sector should be seen to be taking the lead in respect of disseminating energy performance and actively seeking ways of reducing their energy consumption.

We are committed to widening the display requirement to all public and private sector buildings where it can be demonstrated this is cost-effective to do so. We shall be publicly consulting on this to take full account of stakeholders' views."

The full text of the statement is available at: <http://www.publications.parliament.uk/pa/cm200506/cmhansrd/cm060614/wmstext/60614m0075.htm#06061449000001>.

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## Next ENPER-EXIST Workshop will take place in Lyon at the EPIC conference in November 2006

A specific session of the next EPIC conference (20-22 November 2006) will focus on the results of the ENPER EXIST project. The main results of the WP4 – Roadmap will be presented. This WP aims to present possibilities to extend the purpose of the EPBD. The most relevant measures to improve the energy performance of the building sector (mainly existing buildings) are identified. More information about this conference is available on <http://epic.entpe.org/>.



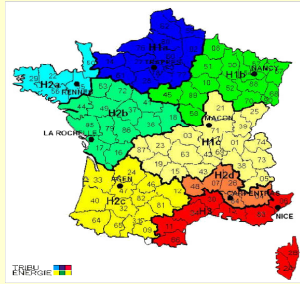
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## The state of progress in the transposition of the EPBD in France Articles 5, 6 and 7

### Article 5: New buildings RT2005 the new thermal regulation

Any building permit submitted as from the 1st of September 2006, implies that the building will have to fulfil the requirements of new thermal regulation 'RT2005'. A decree n° 2006-592 and an act published on the official journal of the French Republic on the 24th of May 2006 determine the requirements and methods of the new regulation.



In comparison to RT2000 (the actual thermal regulation for new buildings), the requirements of thermal insulation and heating systems are strengthened. New topics have been introduced such as:

- The calculated conventional consumption is limited by an absolute value for the residential sector, and not only verified with respect to a notional building.
- Architectural design (Implantation and orientation) have become parameters of the French calculation methodology in order to have an improved, so that the influence of outdoor climate is now better taken into account.
- Renewables have been given greater importance in the calculation method (thermal solar, PV, biomass, solar gains, natural lighting...), and the notional building requires the use of thermal solar system for domestic hot water.

More generally, distinct summer and winter requirements are imposed in order to encourage an improved bioclimatic architectural approach. The calculation method includes cooling but its use in France is seriously discouraged, in particular, for residential buildings. The enforcement for 2010 as announced to professionals may include: condensing boilers mandatory in the North of France, heat pumps replacing direct electric heating, no allowance for thermal bridges, etc.

### Article 6: existing buildings Requirements in case of retrofit



The whole legal structure for existing buildings was approved by official text (law n°2005-781 Law of July 13th 2005 of program fixing the orientations of the energy policy – article 27). Decrees and application acts that will determine the energy performance requirements for existing buildings when retrofitted, the requirements of new equipments when installed and other accompanying issues are not yet published.

Requirements for existing buildings when retrofitted, the requirements of new equipments when installed and other accompanying issues are not yet published.

These decrees are currently being prepared by the Ministry of Housing together with professional bodies. It is expected that for:

- Buildings less than 1000m<sup>2</sup> and having a cost of retrofit less than 25% of the construction cost:
  - Minimal requirements will be determined for component/equipment that are changed.
  - Expected date of application: January 2007
- Buildings more than 1000 m<sup>2</sup> with a cost of retrofit more than 25% of the construction cost:
  - Energy performance requirement
  - Study of technical and economic feasibility of alternative systems of energy supply based on renewable energy
  - Expected date of application: July 2007

It is important to note that in the determination of requirements for existing buildings, particular attention is paid to the following:

- The dissemination in the market
- The end user : comprehensible expression of requirements
- The balance between cost and energy performance
- Coherence with tax reductions incentive

And also to avoid negative effects such us:

- Degradation of summer comfort
- Creation of condensing points
- Degradation of the building

### Article 7: Energy performance certificate DPE: Energy performance diagnosis

Logement économe	Logement
< 51 A	< 6 A
51 à 90 B	6 à 10 B
91 à 150 C	11 à 20 C
151 à 230 D	21 à 35 D
231 à 330 E	36 à 55 E
331 à 450 F	56 à 80 F
451 ou supérieur G	81 ou supérieur G
Logement énergivore	XX
Primary energy (kWh/m <sup>2</sup> .an)	CO2 emission (kgéqCO2/m <sup>2</sup> .an)

The whole disposition for implementation of energy certification of buildings was approved by official texts (law n° 2004-1343 of December 9<sup>th</sup> 2004, Ordonnance n°2005-655 of June 8<sup>th</sup> 2005). The main elements were described in Newsletter N° 3.

The ministry of housing is preparing, together with professional bodies, the decrees that specify the conditions of application of energy performance diagnosis. The decree will distinguish:

- Sales of Existing building: the methods used for energy performance estimation will depend on the building category. Category 1 includes residential buildings and category 2 includes non-residential buildings and some residential buildings with specific central heating systems.
  - For category 1: energy performance of building is based on calculation. Each calculation method that fulfils the specific requirements of the decree could be used; however

## The state of progress in the transposition of the EPBD in France Articles 5, 6 and 7 (cont.)

some simplified calculation methods are clearly defined.

- For category 2: energy performance of building is based on real energy consumption (measurement or bills)

Date of application of energy performance diagnosis: September 2006

- New buildings: The method used for energy performance estimation will be very similar to calculation method of new buildings 'RT2005'. It is expected that energy performance certificate will be enforced in summer 2007
- Public buildings: The energy performance certificate will be mandatory for Buildings 'ERP category 1 to 4' that receive people for which the area is more than 1000 m<sup>2</sup>. The expected date of application is not yet announced

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## The EPIC 2006 AIVC conference

### Scope of the conference

Given the oil crisis and the huge increase of the energy consumption (and its environmental impact), the theme of the conference focuses on the sustainability principles to be applied in the built environment.

In order to achieve a sustainable development with respect to the energy use and indoor climate in buildings, significant actions are required in the short and long term. The conference will pay attention to both aspects. Practical HVAC aspects are covered during the conference.

The 3-day conference is organised in the framework of the 4th European Conference on Energy Performance and Indoor Climate in buildings (EPIC), the 27th Conference of the Air Infiltration and Ventilation Centre (AIVC – <http://www.aivc.org>) and the 1st conference of the International Energy Agency - Programme on Energy Conservation in Building and Community Systems) <http://www.ecbcs.org>.

### Target audience

- Industrial manufacturers and developers of building components
- Consultant engineers
- Designers and architects
- Researchers
- Building and housing estate managers

- Policy makers and officials involved in housing, construction and energy
- People involved in standardization sector should be seen to be taking the lead in respect of disseminating energy performance and actively seeking ways of reducing their energy consumption.

### Topics

1. Extreme Low Energy Buildings and Buildings with Positive Energy
2. Energy Performance Regulations and Certification: where are we and where to go?
3. The Existing Building Stock: Technical, Economical and Social Aspects for a Wide Scale Upgrading
4. Performance Assessment of Building Components and Installations
5. Sustainable Urban Planning
6. Advanced Glazing, Façade and HVAC Technologies
7. Natural Ventilation in Urban Settlements
8. Design of Buildings of High Architectural and Environmental Quality
9. Contributions & Challenges of the Information Society in relation to achieving Environmental Quality
10. Indoor Climate Criteria in relation to Sustainable Building
11. Indoor Climate, Energy & Economy, i.e. the Economic Value of Indoor Climate, the Overall Cost of Low Energy Concepts
12. Opportunities & Barriers for the integration of Renewables in the Built Environment
13. International and National Policies for medium and long term Energy Management – Post-Kyoto
14. Innovative Concepts for Education and Training

### Conference Programme

There will be 4 parallel sessions during the whole duration of the conference (with the exception of the opening and closing session). Each of the parallel sessions covers a specific topic:

1. *AIVC track organised by the Air Infiltration and Ventilation Centre*: A total of 8 sessions will cover a wide range of topics dealing with ventilation, e.g. development of new ventilation systems, ventilation and thermal comfort, indoor air quality, energy performance of ventilation systems, air tightness of buildings
2. *EPBD and SAVE track organised by the EPBD Buildings Platform*: Also this track contains 8 sessions during which the focus is primarily on the implementation of the European Energy Performance of Buildings Directive. Information will be provided about the relevant projects of the SAVE programme, the activities in the EPBD concerted Action and the EPBD Buildings Platform, the mandate given by the EC to CEN for developing a whole range of standards facilitating the implementation of the EPBD. Moreover, a wider view on the EC policy regarding energy in buildings as well as the long-term challenges will be presented.
3. *IEA track organised by the International Energy Agency*: For more than 30 years, the International





## Disclaimer:

ENPER-EXIST has received funding from the Community's Intelligent Energy Europe programme under the contract EIE/04/096/S07.38645

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[www.enper-exist.com](http://www.enper-exist.com)

## The EPIC 2006 AIVC conference (cont.)

Energy Agency (IEA) has been running a whole range of projects focusing on the energy performance of buildings. Many of these projects are managed by the IEA Programme on Energy conservation in buildings and community systems (ECBCS). In total, 8 of these so-called annexes will lead a session covering topics as low energy systems, high performance thermal insulation, commissioning of buildings and HVAC, testing and validation of energy simulation tools, integrating environmentally responsive elements in buildings, energy efficient lighting, energy efficient retrofit buildings for governmental buildings, energy efficient retrofits of schools.

4. *EPIC track:* During these sessions, there will be a wide range of presentations in relation to the conference topics.

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## High-rise: Changing the view Energy efficiency in the refurbishment of high-rise residential buildings

Some 36 million European households are in high-rise residences, one in six of all households, and yet many of the buildings are in urgent need of refurbishment. However this building type suffers from special retrofit barriers, one of them being the structure of the ownership, that often requires collective agreement on a capital investment. This study, based on a research project funded by the International Energy Agency and EuroACE (the European Alliance of Companies for Energy Efficiency in Buildings) identifies a Europe-wide cost-effective energy saving potential of 28% from energy-efficient refurbishment of the high-rise residential building stock. Attainment of this potential would imply a 1.5% reduction of Europe's total final energy demand and CO<sub>2</sub> emissions savings of 35 Mt. In practice only the less efficient buildings need to be refurbished to realise these stock-average savings and for these buildings typical savings in heating energy from refurbishment of between 70% and 80% are identified.

The 28 countries covered by the project

were organised into 8 groups, according to socio-economic category ('old' EU members (EU15), 'new' (EU10) and accession (AS3) states) and climate.

The quantitative modelling assessment incorporated wall, roof and floor insulation, window replacement, and improvements to the heating system – all in terms of their effect on reducing heating demand. Using data from a variety of European surveys and based on expert knowledge, it was possible to create eight representative (of those in need of refurbishment) high-rise buildings with construction and energy features typical for buildings in each group of countries.

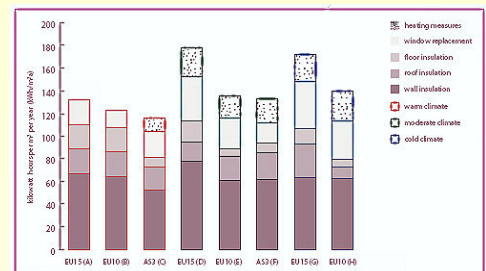


Figure 2: Reduction of heating demand – contribution of all modelled measures

Six case studies, covering the various climatic and socio-economic regions and carried out as part of this project, highlight many practical approaches for appropriating the benefits outlined above, and carry a number of their own findings. Short summaries and the full case studies can be downloaded on the project website.

**Finding a way forward:** The report identifies that there are substantial benefits associated with improving the energy efficiency of high-rise residential buildings, in practice the realisation of the significant energy and emissions saving potential is faced with a number of institutional, economic, legal and social barriers, but also opportunities. A comprehensive assessment identified significant barriers, needing to be addressed or exploited.

- Politically and institutionally,
- Financially and economically,
- Legally,
- Socially

For energy efficiency in the refurbishment of high-rise buildings overall, the report concludes on main recommendations for policy

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