

Benchmarking Regulations on Energy Efficiency of Buildings

**Federation of European Heating, Ventilation
and Air-conditioning Associations**

– REHVA –

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REHVA



This summary and conclusions are based on the information collected from the countries listed below. Due to the limited time and resources the information may not be totally consistent or may include some inaccuracies.

- **Belgium, BE**
- **Denmark, DK**
- **Finland, FI**
- **France, FR**
- **Germany, DE**
- **Hungary, HU**
- **Italy, IT**
- **The Netherlands, NL**
- **Norway, NO**
- **Slovenia, SL**
- **Sweden, SE**
- **UK, UK**

Participating experts

- **REHVA group of experts**

- Francis Allard, France
- Michael Schmidt, Germany
- Derrick Braham, UK
- Livio Mazarella, Italy
- Ioan Dobosi, Romania
- Jean Lebrun, Thierry van Steenberghe, Guillaume Goeders, Belgium
- Vincenc Butala, Slovenia and EPBD CA
- Zoltan Magyar, Hungary and EPBD CA
- Olli Seppänen, REHVA, co-ordinator

- **Invited experts**

- Johnny Andersson, Sweden
- Kirsten Englund Thomsen, Denmark
- Jaap Hogeling, the Netherlands
- Peter Schild, Norway

How CEN standards are used

(41 EPBD related standards)

- **In principle, solutions based on CEN standards are accepted in all counties**
- **But in practice, they are not used due to**
 - National barriers like
 - Language
 - National input values are needed
 - Building inspectors
- **CEN standards are not used as such as part of legislation in any country**
- **Methods described in CEN standards are adopted in national regulations like calculation of energy use EN 13790, but also EN 15251**
- **Some parts are taken from standards to regulations in some countries**
- **CEN standards will be revised – mandate from DG Energy any time during 2010**

Primary energy factors

- **Most of the countries use primary energy in definition of energy efficiency in [kWh/m²,a], in Italy [kWh/m³,a]**
- **Only UK and RO use CO₂ emission per m² as the criteria but even in UK the pressure is towards primary energy**
- **Primary energy factors vary significantly between countries, however, quite common is to have primary energy factor = 1 for all fuels and 2,5 for electricity**

Renewable energies

- **Most countries have a quota for RES to achieve the goals of the RES directive, some examples:**
- **DE (15 - 50% depending on type of RES)**
- **NO (40%) – DH included**
- **UK (10%)**
- **SL (25%) – proposal 2010**
- **IT min 50% of the energy used for DHW**
- **DK In BR10 there will be demand for thermal solar if DHW consumption exceed more than 20 m³/day**
- **NL gives credits for the RES use**
- **At the same time other countries are investigating the issue (BE, HU)**

Calculation procedure

- **Commonly based on simple CEN procedure**
- **Only national methods accepted**
- **Several programmes available – based on same “engine”**
- **Dynamic simulation allowed in some countries DE, IT, NO, NL – verification needed**
- **Methods revised almost annually to include new, innovative systems**

Are the building codes applied to the renovations?

- **All countries apply the new building regulations on renovations but in different ways**
- **Renovation is defined in different ways (25% rule is used but variations in definition)**
- **Most stringent requirements are**
- **Germany**
 - If more than 15 m² floor area or 10 % of wall area renovated -> all requirements for renovation apply;
 - if more than 50 m² floor area renovated -> all requirements for new buildings apply
- **Denmark**
 - DK: if more than 25% thermal envelope renovated-> all cost-effective requirements are to be fulfilled
 - DK: if more than 25% of the value of the building renovated-> all cost-effective requirements are to be fulfilled
- **UK**
 - all regulation for new buildings apply when the cost of renovation is more than 25% of the cost of similar new building construction

Definition of renovation is weak in most countries

Air tightness of building envelope

- **Tight building envelope is necessary in Nearly zero energy buildings**
- **Almost all countries have now numeric values for building air tightness with some exceptions**
- **Both ach and m³/h per m²-envelope area are used**
- **The trend is to tighten the requirements step by step**
- **Most countries specify also the control methods but in practice poorly controlled**

Simple control/measuring methods should be developed

Indoor temperatures

- **Legally binding temperature limits originate from other legislation than energy**
- **Design values are rather homogenous among countries**
- **Winter: 19 C -21 C**
- **Summer: 24 C - 26 C (except 28 C in UK)**
- **CEN standards 15251 is becoming more and more used**
 - Adaptive approach is getting accepted and more used in evaluations of the thermal performance of buildings in summertime
 - Some countries (NO, UK) have adopted the CEN 15251 principles of IAQ classes and number of hours the temperature can be exceeded

Summer comfort and air-conditioning

- **Due to energy use and power demand of A/C this is an issue in all MS**
- **All countries limit the load qualitatively or quantitative i.g. 30 W/m² (UK)**
- **In all countries the summer temperatures have to be calculated, consequences may differ if limits are exceeded:**
 - Fictive use of energy for A/C added to EP
 - Re-design of building until criteria are met
- **A/C is not as much used in Central European new buildings than in Finland :**
 - Natural ventilation and window ventilation are more used
- **New VDI guidelines in 2010 will lead to an increase of A/C due to more stringent IAQ requirements**

Windows

- **All countries limit the U-value of windows, some have different values for glass and window with frame**
- **Window area is typically not limited (NO considering)**
- **Solar protection is required but only some countries give max g-values for windows**
- **Some countries require openable windows or possibility to window ventilation**

Heat generation

- **Minimum requirements for the efficiency of boilers and other heat generators are given in most countries (but not all) and in different ways like: nominal, part load, annual, CE standards**
- **Requirements also given on the boiler type (like condensing) and heat pump COP**
- **Boiler replacement required but again the criteria varies**
 - **Chimney sweepers has taken this market in many counties with minimum expertise**

Heating system

- **Design temperatures are given in general**
- **Balancing of central system required in most countries**
- **Central automatic control required**
- **Room level control required in most countries (DE, DK, UK, FR, SL, SE advised)**
- **Low pressure loss requirements of hydraulic system: Not at the moment in any country, but under consideration in DE, SL, UK**
- **Pumps; no requirements in general excepted for DK and DE**
- **Pump electricity included in the reference building calculations in most countries**
- **Heat generator and heating load to be balanced and load factor included –requirement only in DE**

Heat metering

- **Metering of heating energy use is getting more common in apartment buildings**
- **Compulsory in Germany: allocation of cost 30-50% fixed, rest by measured use**
- **Generally 15% reduction in energy use just by metering system**
- **Electronic remote readable systems more and more used**
- **DK: heat metering is required by law**
- **SL: all radiators has to be metered from 2012**
- **IT: system available but not used –meters destroyed in social housing**
- **NO, NL: not required, but is used in some apartments**
- **UK: not used**

DHW water use

- **DHW is getting more important in the total energy use of residential building**
- **For energy use estimation the table values are used either in kWh/m² or kWh/per tenant**
 - UK: decentralised 5 and in central system 15 kWh/m² s
- **None of the countries calculates/estimates the water or energy use based on type of faucets or equipment**

Energy flows included in the calculation process and calculated separately

- **Ventilation, Heating, DHW are included in all countries**
- **Cooling/air conditioning – typically but break down may differ from country to country**
- **HVAC Electricity (can be part of those above)**
- **Lighting: FR, DE, DK, NL, NO, UK 2010 (but not in residential)**
- **Facility/building electricity most of the countries but not in FR, HU, SL**
- **Household electricity not usually but estimated in UK, NO**
- **Humidity control – not in any of the countries but should**

Situation in member countries

- **Very lively activities in all countries on regulatory and professional levels**
- **Regulations revised in 2-3 year intervals according to a published plan**
- **No time for feedback from previous to next step – this is considered to be a problem**
- **Published revision will also explain what can be expected in the next revision (UK, DE, NO)**
- **Extremely wide variety in the contents of regulations**
 - What is regulated?
 - How is regulated?
 - How is controlled?

Status of energy efficiency regulations in some MS (1)



- **DK:** - very advanced
- generally acknowledged as a model country



- **NO:** - not EU country but very advanced
- realistic regulations



- **DE:** - very active and advanced
- ahead in RES and renovations
- a model for central European countries
- protective with DIN pre-standards



- **FR:** - very active
- innovative solutions

Status of energy efficiency regulations in some MS (2)



- **SL:** - an example for small countries
- active and innovative



- **IT:** - active
- very complicated due to regional administration and policy



- **NL:** - cost conscious
- leading in CEN calculation procedures and in many other areas of standardization



- **FI:** - advanced in thermal insulation, indoor climate and ventilation
- very conservative and slow, do not follow the front line

REHVA EPBD actions – decisions of REHVA board

- **Follow up the final reading in the Council and in the Parliament**
- **Develop further the contacts with the Commission**
- **Inform the national associations**
- **Organise a number of seminars**
- **Follow up CEN activities**
- **Establish a subgroup/subgroups**

Several potential tasks for REHVA

- **Definition of energy flows that are regulated, including how RES % is calculated**
- **Definition of nearly zero energy building and development of roadmaps towards NZEB**
- **New methodology for A/C inspections including the load reduction**
- **Develop inspection methodology for heating system inspections**

Several potential tasks for REHVA

- **Development of requirements at technical system level (new requirement)**
- **Assist in developing uniform calculation method**
- **Definition of cost-optimal**
- **Develop a cost effective method for controlling EP certificates**
- **Make a summary of innovative incentives and punishments**