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Raising the efficiency of boiler installations

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DELIVERABLE OBJECTIVES

The general objective of work package 2 is to gather and condense information on existing boiler installations with a focus on the actual quality of these installations resp. on failures and mistakes that are commonly made leading to a decrease of the efficiency of boiler installation.

Each consortium member gathers data and information available in his country and takes care of carrying out and documenting. This deliverable based on individual national reports made by each consortium member.

This subtask will therefore also deliver valuable feedback to the content and form boiler inspections according to the framework of the EPBD are implemented in the different participating countries. So the audits will be implemented using already existing guidelines, e.g. guidelines that have been worked out for the compulsory boiler inspections according to the EPBD.

1 Summary of EPBD

DIRECTIVE 2002/91/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 December 2002 on the energy performance of buildings
THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION, HAVE ADOPTED THIS DIRECTIVE:

1.1 Objective:

The objective of this Directive 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 and assessment of the heating installation in which the boilers are more than 15 years old.

1.2 Definitions

For the purpose of this Directive, the following definitions shall apply:

1. 'building': a roofed construction having walls, for which energy is used to condition the indoor climate; a building may refer to the building as a whole or parts thereof that have been designed or altered to be used separately;
2. 'energy performance of a building': the amount of energy actually consumed or estimated to meet the different needs associated with a standardized use of the building, which may include, heating, hot water heating, cooling, ventilation and lighting. This amount shall be reflected in one or more numeric indicators which have been calculated, taking into account insulation, technical and installation characteristics, design and positioning in relation to climatic aspects, solar exposure and influence of neighboring structures, own energy generation and other factors, including indoor climate, that influence the energy demand;
3. 'energy performance certificate of a building': a certificate recognized by the Member State or a legal person designated by it, which includes the energy performance of a building calculated according to a methodology based on the general framework set out in the Annex;
4. 'CHP' (combined heat and power): the simultaneous conversion of primary fuels into mechanical or electrical and thermal energy, meeting certain quality criteria of energy efficiency;
5. 'air-conditioning system': a combination of all components required to provide a form of air treatment in which temperature is controlled or can be lowered, possibly in combination with the control of ventilation, humidity and air cleanliness;

6. 'boiler': the combined boiler body and burner unit designed to transmit to water the heat released from combustion;
7. 'effective rated output (expressed in kW)': the maximum calorific output specified and guaranteed by the manufacturer as being deliverable during continuous operation while complying with the useful efficiency indicated by the manufacturer;
8. 'heat pump': a device or installation that extracts heat at low temperature from air, water or earth and supplies the heat to the building.

1.3 Adoption of a methodology

Member States shall apply a methodology, at national or regional level, of calculation of the energy performance of buildings on the basis of the general framework set out in the Annex. Parts 1 and 2 of this framework shall be adapted to technical progress in accordance with the procedure referred to in Article 14(2), taking into account standards or norms applied in Member State legislation. This methodology shall be set at national or regional level. The energy performance of a building shall be expressed in a transparent manner and may include a CO₂ emission indicator.

1.4 Setting of energy performance requirements

1. Member States shall take the necessary measures to ensure that minimum energy performance requirements for buildings are set, based on the methodology referred to in Article 3. When setting requirements, Member States may differentiate between new and existing buildings and different categories of buildings. These requirements shall take account of general indoor climate conditions, in order to avoid possible negative effects such as inadequate ventilation, as well as local conditions and the designated function and the age of the building. These requirements shall be reviewed at regular intervals which should not be longer than five years and, if necessary, updated in order to reflect technical progress in the building sector.
2. The energy performance requirements shall be applied in accordance with Articles 5 and 6.
3. Member States may decide not to set or apply the requirements referred to in paragraph 1 for the following categories of buildings:
 - buildings and monuments officially protected as part of a designated environment or because of their special architectural or historic merit, where compliance with the requirements would unacceptably alter their character or appearance,
 - buildings used as places of worship and for religious activities,
 - temporary buildings with a planned time of use of two years or less, industrial sites, workshops and nonresidential agricultural buildings with low energy demand and nonresidential agricultural buildings which are in use by a sector covered by a national sectoral agreement on energy performance,
 - residential buildings which are intended to be used less than four months of the year,
 - standalone buildings with a total useful floor area of less than 50 m².

1.5 New buildings

Member States shall take the necessary measures to ensure that new buildings meet the minimum energy performance requirements referred to in Article 4. For new buildings with a total useful floor area over 1000 m²,

Member States shall ensure that the technical, environmental and economic feasibility of alternative systems such as:

- decentralized energy supply systems based on renewable energy,
- CHP,
- district or block heating or cooling, if available,
- heat pumps, under certain conditions,

is considered and is taken into account before construction starts.

1.6 Existing buildings

Member States shall take the necessary measures to ensure that when buildings with a total useful floor area over 1000 m² undergo major renovation; their energy performance is upgraded in order to meet minimum requirements in so far as this is technically, functionally and economically feasible.

Member States shall derive these minimum energy performance requirements on the basis of the energy performance requirements set for buildings in accordance with Article 4. The requirements may be set either for the renovated building as a whole or for the renovated systems or components when these are part of a renovation to be carried out within a limited time period, with the abovementioned objective of improving the overall energy performance of the building.

1.7 Energy performance certificate

1. Member States shall ensure that, when buildings are constructed, sold or rented out, an energy performance certificate is made available to the owner or by the owner to the prospective buyer or tenant, as the case might be. The validity of the certificate shall not exceed 10 years.

Certification for apartments or units designed for separate use in blocks may be based:

- on a common certification of the whole building for blocks with a common heating system, or
- on the assessment of another representative apartment in the same block.

Member States may exclude the categories referred to in Article 4(3) from the application of this paragraph.

2. The energy performance certificate for buildings shall include reference values such as current legal standards and benchmarks in order to make it possible for consumers to compare and assess the energy performance of the building. The certificate shall be accompanied by recommendations for the cost-effective improvement of the energy performance. The objective of the certificates shall be limited to the provision of information and any effects of these certificates in terms of legal proceedings or otherwise shall be decided in accordance with national rules.

3. Member States shall take measures to ensure that for buildings with a total useful floor area over 1000 m² occupied by public authorities and by institutions providing

public services to a large number of persons and therefore frequently visited by these persons an energy certificate, not older than 10 years, is placed in a prominent place clearly visible to the public.

The range of recommended and current indoor temperatures and, when appropriate, other relevant climatic factors may also be clearly displayed.

1.8 Inspection of boilers

With regard to reducing energy consumption and limiting carbon dioxide emissions, Member States shall either:

(a) lay down the necessary measures to establish a regular inspection of boilers fired by nonrenewable liquid or solid fuel of an effective rated output of 20 kW to 100 kW. Such inspection may also be applied to boilers using other fuels. Boilers of an effective rated output of more than 100 kW shall be inspected at least every two years. For gas boilers, this period may be extended to four years. For heating installations with boilers of an effective rated output of more than 20 kW which are older than 15 years, Member States shall lay down the necessary measures to establish a one-off inspection of the whole heating installation. On the basis of this inspection, which shall include an assessment of the boiler efficiency and the boiler sizing compared to the heating requirements of the building, the experts shall provide advice to the users on the replacement of the boilers, other modifications to the heating system and on alternative solutions; or

(b) take steps to ensure the provision of advice to the users on the replacement of boilers, other modifications to the heating system and on alternative solutions which may include inspections to assess the efficiency and appropriate size of the boiler. The overall impact of this approach should be broadly equivalent to that arising from the provisions set out in (a). Member States that choose this option shall submit a report on the equivalence of their approach to the Commission every two years.

1.9 Inspection of air-conditioning systems

With regard to reducing energy consumption and limiting carbon dioxide emissions, Member States shall lay down the necessary measures to establish a regular inspection of air-conditioning systems of an effective rated output of more than 12 kW. This inspection shall include an assessment of the air-conditioning efficiency and the sizing compared to the cooling requirements of the building. Appropriate advice shall be provided to the users on possible improvement or replacement of the air-conditioning system and on alternative solutions.

1.10 Independent experts

Member States shall ensure that the certification of buildings, the drafting of the accompanying recommendations and the inspection of boilers and air-conditioning systems are carried out in an independent manner by qualified and/or accredited experts, whether operating as sole traders or employed by public or private enterprise bodies.

2 Summary of the standard prEN15378

Title: Heating systems in buildings — Inspection of boilers and heating systems

2.1 Subject and aim

This document (prEN 15378:2005) has been prepared by Technical Committee CEN/TC 228 “Heating systems in buildings”, the secretariat of which is held by DS.

The subjects covered by CEN/TC 228 are the following:

- design of heating systems (water based, electrical etc.);
- installation of heating systems;
- commissioning of heating systems;
- instructions for operation, maintenance and use of heating systems;
- methods for calculation of the design heat loss and heat loads;
- methods for calculation of the energy performance of heating systems.

Heating systems also include the effect of attached systems such as hot water production systems. All these standards are systems standards, i.e. they are based on requirements addressed to the system as a whole and not dealing with requirements to the products within the system. Where possible, reference is made to other European or International Standards, and product standards. However, use of products complying with relevant product standards is no guarantee of compliance with the system requirements.

The requirements are mainly expressed as functional requirements, i.e. requirements dealing with the function of the system and not specifying shape, material, dimensions or the like.

The guidelines describe ways to meet the requirements, but other ways to fulfill the functional requirements might be used if fulfillment can be proved.

Heating systems differ among the member countries due to climate, traditions and national regulations. In some cases requirements are given as classes so national or individual needs may be accommodated. In cases where the standards contradict with national regulations, the latter should be followed.

This document specifies procedures and optional measurement methods to be used for the inspection and assessment of energy performance of boilers and heating systems to provide advice to users on the replacement of boilers, other modifications to the heating system and on alternative solutions as required by article 8 of Council Directive 2002-91-EC.

This standard includes, either in the normative text or in the informative annexes:

- inspection procedures;
- measurement procedures;
- calculation formulas;
- sample reports;
- advice criteria.

Procedures and methodologies defined in this standard are not intended to provide a full energy audit of the heating system. They are intended to:

- support identification of areas of possible improvements;
- define criteria to produce reliable advice on possible improvements of the energy performance of boilers and heating systems through replacement of components or other measures.

Any replacement of appliances or modification of the heating system following advice should be designed according to appropriate methodologies. This may require additional input and investigation for detailed design and final check of economical effectiveness.

Clause 5 and 6 describe separately basic inspection procedures related to:

- regular inspection of boilers;
- one-off inspection of the entire heating system.

This standard introduces inspection classes by which different levels of inspection accuracy and detailed inspection requirements can be determined, because:

- the same inspection procedure and level of details cannot reasonably be required for any kind and/or any size of boilers/heating systems;
- there are currently significant differences among member states with respect to:
 - heating systems typologies;
 - legal and/or standard requirements;
 - maintenance and inspection practices.

Alternative and/or optional partial inspection procedures and measurement methods for boilers and heating system parts are described in the relevant annexes.

Inclusion/omission/alternatives of individual inspection items as well as border lines between classes are specified through tables given in national annexes. If no specific national annex is available, default tables and inspection classes are given in annex Tables in the national annexes may refer either to methodologies given in the annexes to this standard or to suitable existing national standards.

This standard has been drafted to support inspection required by Council Directive 02/91/CE, that is “regular inspection of boilers fired by nonrenewable gaseous, liquid or solid fuel” and “one-off inspection of heating systems with boilers that are more than 15 years old”. This does not exclude the possibility to use this standard for other types of generation devices (e.g. warm air heaters, heat pumps, thermal solar, CHP ...) and to domestic hot water systems if appropriate additional classes are defined in the national annexes.

2.2 Scope

This document specifies inspection procedures and optional measurement methods for the assessment of energy performance of existing boilers and heating systems.

Boiler types covered by this standard are:

- boilers for heating, domestic hot water or both;
- gas, liquid or solid fuel fired boilers.

Parts of heating systems covered by this standard are:

- boilers, including generation control;
- other generation devices;
- domestic hot water production facilities;
- heating distribution network, including associated components and controls;
- heating emitters, including components and controls;
- space heating control system
- storage and associated components
- domestic hot water control system.

2.3 Related documents

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 13600:1997

EN 50379-1-2-3, Measuring instruments for flue gas analysis

EN 12828, Heating Systems in buildings - Design of water based heating systems

EN 15315, Energy performance of buildings – Overall energy use and definition of energy ratings

EN 15316-4-1, Heating systems in buildings - Method for calculation of system energy requirements and

system efficiencies - Part 4-1 Space heating generation systems, combustion systems

EN 15316-2-1, Energy performance of buildings — Heating systems in buildings - Method for calculation of

system energy requirements and system efficiencies – Part 2-1: Space heating emission systems

EN 15316-2-3, Energy performance of buildings — Heating systems in buildings - Method for calculation of

system energy requirements and system efficiencies - Part 2-3: Space heating distribution systems

2.4 Procedures regulated by this standard

Boiler inspection procedure

Boiler inspection class identification

Boiler identification

Document collection

Boiler visual inspection

Boiler maintenance status

Boiler functionality check

Boiler controls, sensors and indicators

Meter readings

Boiler performance evaluation

Boiler inspection report and advice

Heating system inspection procedure

- Heating system inspection class identification
- Heating system inspection preparation
- Heating system identification
- Heating system functionality check
- Heating system maintenance status
- Heating system controls, sensors and indicators
- Energy ware consumption

Measurement

- Reference values
- Advice criteria on energy ware consumption
- Space heating emission subsystem
- Space heating emission control subsystem
- Space heating distribution subsystem
- Generation subsystem
 - Generation subsystem identification
 - Boiler(s) inspection
 - Storage subsystem for heating systems
 - Heat exchangers for heating system
 - Other generation subsystems
 - Generation subsystem control inspection
- Generation subsystem sizing
 - General
 - Advice
- Heating system subsystems efficiencies
- Domestic hot water systems
- Space heating system and domestic hot water system inspection report and advice
- Heating system inspection report
 - Heating system advice

3 Implementation of the EPBD in Austria

3.1 Introduction

In Austria the implementation of the EPBD is mainly in the responsibility of the provinces (building codes and inspection of heating, ventilation, air conditioning).

On May 24th 2006 the Austrian Parliament passed the Energy Certification Providing Act which sellers and landlords providing energy certificates for buildings when they are sold or rented. The obligation for providing energy certificates for new buildings will come into force on January 1st 2008 and for existing buildings on January 1st 2009. Energy certificates have to be issued according to the technical rules which to be set by the Austrian federal provinces by December 2007. ¹

3.2 Status of EPBD implementation in Austria

A comprehensive calculation system has been developed to compromise the nine building codes (of the nine Austrian provinces) based on more than 200 mathematic algorithms allowing a differentiated description taking care of most of the details used in conventional and special purpose buildings. The methodology is included in the “OIB-Guideline” and is based on the following Austrian standards (finished in May 2007):

ÖNORM B 8110-6 heating and cooling demand

ÖNORM B 8110-5 user profiles and climate data

ÖNORM H 5056 end energy demand of heating system

ÖNORM H 5057 end energy demand of aeration/ventilation system

ÖNORM H 5058 end energy demand of cooling system

ÖNORM H 5059 lightning

ÖNORM B 8110-1 heating and cooling requirements

ÖNORM H 5055 energy certificate

ÖNORM B 8110-2 protection from moisture

ÖNORM B 8110-3 protection from summer heat

ÖNORM B 8110-4 economic protection from heat losses

¹ BGBl. I Nr. 137/2006: Energieausweis -Vorlage-Gesetz – EAVG

As far as they have been already available all CEN standards were implemented and will represent a high compatibility of the Austrian calculation methodology to the future harmonised European methodology. A general description of the calculation method is given in <http://www.oib.or.at> where further information can be found.

3.2.1 Requirements for new buildings²

Requirements for new buildings are set in the mentioned “OIB-Guideline”, including mainly

- maximum annual final energy consumption per m² of floor area,
- maximum U-values of different elements of the building,
- building air tightness,
- prevention of thermal bridges,
- requirements on the quality of boilers, aeration systems and chillers as well as on systems for storage and distribution.

The proof of compliance must be made before (planning finished) and after completion of the building. Control of the regulation is the responsibility of the municipal authorities. Residential buildings have to fulfil special requirements. Additional requirements may be set by the Austrian provinces.

3.2.2 Requirements for existing buildings²

Requirements for existing buildings are also set in the mentioned “OIB-Guideline”, including mainly

- maximum annual final energy consumption per m² of floor area,
- maximum U-values of different elements of the building,
- prevention of thermal bridges
- requirements on quality of boilers, aeration systems and chillers

Control of the regulation is in the responsibility of the municipal authorities.

Residential buildings have to fulfil special requirements. The simplified methodology for existing buildings basically does not differ from the above mentioned one but uses mainly default values. Additional requirements may be set by the Austrian provinces (“Bundesländer”).

² See also: [http://www.energyagency.at/\(de\)/projekte/energieausweis2008.htm](http://www.energyagency.at/(de)/projekte/energieausweis2008.htm)

3.2.3 Certification of buildings

The requirements regarding the certification of buildings have been agreed on by the Austrian provinces; this agreement has been fixed in the above mentioned “OIB-Guideline” which has been adopted in April 2007.³

Certification is obligatory for new buildings with a building permit after the OIB-Guideline come into force in a province, on 1st January 2008 at the latest. The certificate of public buildings has to be publicly displayed from 1st January 2009, unless a province introduces it earlier by (regional) law (building code). Other buildings when rented or sold must have an energy performance certificate from 1st January 2009.

3.3 Inspection of boilers and air conditioning⁴

In Austria, the periodic, regular inspection of heating systems has been in use for many years, the frequency of inspection depends on the energy source and the size (power) of the heating system (from up to four times a year for solid fuels, once a year for gaseous fuels). So the relevant article of the EPBD can be seen as completed, except for the 15 year one-off inspection which will be introduced together with the building certificate; a new methodology has been developed for that. Section 3 summarizes details concerning the future implementation of the one-off inspection.

As far as the future CEN-regulations are at least as strict as the Austrian ones, the relevant existing Austrian regulations will be adapted. EN 15378 – Heating systems in buildings: Inspections of heating systems and boilers – has already been mirrored to a draft ÖNORM standard in December 2005. At this stage no significant differences could be analysed by comparing draft prEN 15378 and draft ÖNORM 15378.

Cooling devices have so far not been regularly inspected, so it was necessary to develop requirements as well as calculation methods (see relevant standards) which will come into force by 1st January 2008.

³ OIB-Richtlinie 6: “Energieeinsparung und Wärmeschutz“, [http://www.energyagency.at/\(de\)/publ/eausw/oib/RL6_0407.pdf](http://www.energyagency.at/(de)/publ/eausw/oib/RL6_0407.pdf)

⁴ Vorschlag der Länderexpertenkonferenz, „Vereinbarung gemäß Art. 15a B-VG über das Inverkehrbringen und die Überprüfung von Feuerungsanlagen“, September 2007

3.4 Future planning

It is intended to strengthen the requirements for residential and non-residential buildings and to introduce the use of renewable energies by certain frame conditions, step by step (some provinces have already introduced a mandatory “passive house” standard or mandatory use of solar energy for some residential buildings in case of granting subsidies).

As for independent experts, Austria has many consultants and institutions having done “conventional” energy consulting for new and existing buildings, but usually many of them have not been concerned with heating, aeration and cooling. Therefore a common system of information and formation has been put in place starting to enlarge the number of independent experts in order to guarantee a high level of expertise when the issuing EPBD certificates is mandatory.

Further information concerning the present status of EBPD implementation is available on the Website of the Austrian Energy Agency:
[http://www.energyagency.at/\(de\)/projekte/energieausweis2008.htm](http://www.energyagency.at/(de)/projekte/energieausweis2008.htm)

4 Implementation of the EPBD in Germany

4.1 Legal context

The implementation of the EPBD in Germany in general is the responsibility of the Bundesministerium für Verkehr, Bau und Stadtentwicklung (Federal Ministry of Transport, Building and Urban Development) and the Bundesministerium für Wirtschaft und Technologie (Ministry of Economics and Technology) and Article 8 is the responsibility of the Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit (Ministry for the Environment, Natural Conservation and Nuclear Safety).

The EPBD is implemented in the legal context of the Energy Saving Act, which originally came into force in 1976 and has since then been used to set up the requirements for:

- the thermal insulation of buildings,
- › the energy performance and maintenance of heating appliances and
- › the billing of heating cost according to individual consumption of the tenants.

On this basis the current Energy Saving Ordinance (EnEV 2002 – amended 2004) sets up requirements for new buildings and the refurbishment of building stock. These are mainly based on an energy balance of the whole building taking into account most of the aspects given in the annex of the EPBD. For normally heated new buildings the overall requirement is based on primary energy, an energy certificate (Energiebedarfsausweis) has to be issued for these new buildings as well as for buildings in the course of major refurbishments.

In future, this approach will apply to residential buildings only - except those equipped with air conditioners (very few because of strict limits for solar shading).

To implement the aspects “lighting” and “cooling”, the Energy Saving Act had to be amended. This was also necessary for the implementation of energy certificates for existing buildings, which are not subject to renovation.

4.2 Status of implementation

The German Federal Parliament adopted the amendment; it came into force on 1st September 2005. In June 2007 the Second Chamber of Parliament (Bundesrat) also adopted the amendment of the Energy Saving Ordinance.

The calculation procedures for residential buildings will stay in force. They are based on two German prestandards, which are mainly transpositions of EN 832. The current versions are DIN V 4108-6: 2003-06 and DIN V 4701-10: 2003-08.

In 2005, the German Standardization Institute (DIN) published under the Title “DIN V 18599 (Part 1 – 10)” the results of an interdisciplinary standardization work as the calculation method for overall energy performance of buildings including all aspects of the EPBD. The standardization works were initiated by the federal government in order to have a universal method covering all aspects primarily for non residential buildings.

4.2.1 Requirements for new buildings

The requirements for residential buildings will be kept at the present level as will the requirements for refurbishment of parts of the building’s fabric. For nonresidential buildings the requirements will be transposed without significant changes to the new model taking into account the different uses of these buildings and the new aspects. In general, there will be no changes in the level of requirements after the current amendment comes into force. The level of requirements will be revised later, not before people have got familiar with the new methods for nonresidential buildings and the energy certificates for existing buildings.

The level of requirements for new buildings is governed by the function and the type of building (residential / nonresidential with detailed conditions of use) and also the Surface/Volume Ratio.

They consist of:

- a maximum primary energy demand,
- a maximum average U-value
- maximal U-values of each element of the building’s fabric
- several requirements on quality of boilers, controls and pipe insulation
- building air tightness and
- the prevention of thermal bridges.

4.2.2 Requirements for existing buildings

The requirements in cases of refurbishment consist of either

- a maximum primary energy demand (140% new buildings) and
- a maximum average U-value (140% new buildings) or
- maximum U-values (=state of the art) for each element of the refurbishment.

The requirements have to be met, if more then 20% of the element in question (walls, windows, roof/upper ceiling, cellar ceiling/walls) is subject to refurbishment.

4.3 Inspection of boilers and air conditioning

Inspection of boilers is covered by the Small and Medium Combustion Pla Ordinance last amended 1997. The Inspection of air conditioners is subject to the amendment of the Energy Saving Ordinance and will come into force in several steps according to the date of installation of the appliance and in relation to the date of the final issue of the ordinance.

4.4 Field tests

After political negotiations concerning some details of energy certification the amendment of the Energy Saving Ordinance has been published in November 2007. In parallel inspection measures according this amendment have been developed by the Association of German Central Heating Industry (Vereinigung der deutschen Zentralheizungswirtschaft e.V.). These measures called “VdZ-Heizungs-Check” were successfully tested in practice in April 2007 and will tested in State Hesse in an extensive field test in winter 2007.

4.5 Future planning

The amended Energy Saving Ordinance will be accompanied by several directives about simplification of procedures to keep the cost of certification low.

A revision of the level of requirements is envisaged in a few years.

References for national part

Horst-P. Schettler Köhler, Implementation of the EPBD in Germany: Status October 2006, published at www.buildingsplatform.eu/cms .

5 Implementation of the EPBD in Greece

5.1 Legal context

The implementation of the EPBD in Greece is the responsibility of the Ministry of Development and the Ministry of Environment. By early 2007, the Parliament is planning to adopt the Decree (www.ypan.gr) regarding the transposition of the EPBD in national law. The execution orders are the responsibility of the Ministries of Development and Environment.

5.2 Status of the implementation

5.2.1 Calculation procedures

Greece is in the process of setting the regulations for the EPBD (general design/inspection principles and minimum requirements for the building cell, lighting, boiler/heating system, air conditioning etc). The country is planning to form the calculation procedures (art. 3) in parallel to the regulations. It is foreseen that they will be adopted by the Government within 2007. There will be specific procedures for dwellings and for other buildings. Software tools are expected to be developed by the market and verified by appropriate government bodies thereafter.

5.2.2 Requirements for new buildings

The Government of Greece is completing a study on minimum requirements for all new buildings. The task is being undertaken by the Ministry of Development with the help of the Regulatory Authority for Energy. The requirements will come into force for building permits requested after 1 January 2009. The type and level of requirements are function of the type of building (dwellings, office buildings, schools ...) and may cover:

- › Maximum U-value;
- › Requirement on average insulation level;
- › Maximum primary energy consumption per m² of floor area;
- › Boiler and air conditioner efficiencies.

New buildings should produce an energy study for the building permit to be issued. The proof of compliance must be made after completion of the building. It is foreseen that control of the regulation is the responsibility of the Regional Authorities (the existing Building Permit Offices) where the building is located.

5.2.3 Requirements for existing buildings

The procedure followed for new buildings covers also existing buildings. The ongoing studies examine minimum requirements for new building components when building renovation is done and for extensions to existing buildings. The requirements will be formally adopted on 1 January 2009.

5.2.4 Certification of buildings

The requirements regarding the certification of buildings will be adopted by the Government by mid 2007. The general certificate model to be used will be the A-G label. There are considerations, however, to allow for more categories above the B level (e.g. A+, A, A- etc.), to stimulate competition towards very efficient building design in the future. Certification will be obligatory for new buildings with a building permit after 1 January 2009. This date will also hold for public buildings, and other buildings when rented or sold.

5.3 Inspection of boilers and air conditioning

The plan for Inspection of boilers has been prepared and is under review by the Ministries of Development and Environment (www.minenv.gr/4/41/g4100.html). It will replace existing boiler inspection procedures undertaken by the Ministry of Environment. The examination of air conditioners will start during the first part of 2007.

5.4 Future planning

A study on minimum requirements for Air conditioners will start in spring 2007 was handed to the relevant Ministries for review by autumn 2007. The Technical Chamber of Greece has also initiated a study for inspection requirements and (economic) rates for inspectors. The Ministry of Development is reinstating a Committee to finalize requirements for new and existing buildings, and organize in general the implementation of the Directive. A revision of the requirements is foreseen.

References for national part:

<http://training.eebd.org/Page.aspx?id=68&ui=en&lang=en>

<http://www.mure2.com/downloads/NationalPresentations/greece.pdf>

http://www.buildingsplatform.org/cms/index.php?id=118&publication_id=2698

6 Implementation of the EPBD in Spain

6.1 Legal context

The EPBD was transposed in Spain by means of three royal decrees:

- Royal Decree approving the “Technical Code of Buildings (CTE)”. It was approved by the Council of Ministers on 17th of March 2006 and published in the Official Gazette on 28th of March 2006.
- Royal Decree approving the review of the current “Regulations for thermal installations on Buildings (RITE)”, approved by the Council of Ministers on 20th of July 2007 and published in the Official Gazette on 29th August 2007.
- Royal Decree on the Basic Procedure for Energy Performance Certification of new buildings approved by the Council of Ministers on 17th January 2007, and published in the Official Gazette on 31st January 2007.

All of these are responsibilities of the Ministry of Housing, and the revised RITE and Energy Certification is the responsibility of the Ministry of Industry, Tourism and Trade also.

6.2 Status of the implementation

6.2.1.1 Calculation procedures

The calculation procedure for the buildings energy efficiency (named “Energy Efficiency qualification”) is expressed by the estimated energy consumption necessary to satisfy the building energy demand in occupational and standard running conditions.

More information about the technical specification of the calculation procedure for the energy efficiency qualification is found in the Annex I of the Royal Decree 47/2007, dated 19th January, by which the Basic Procedure for the new buildings Energy Efficiency Certification is approved.

6.2.1.2 Requirements for new buildings

The Building Code (CTE) has set minimum energy requirements for new buildings. The requirements come into force for building permits requested after 17th September of 2006.

The type and level of performance requirements depend on the climatic zone (in total, there are 12 in all the Spanish territory) where there is building work, and they cover:

- Maximum U-values for different building elements;
- Solar factor for windows, roof lights, etc;
- Minimum Efficiency performance for thermal installations;
- Minimum Efficiency performance for lighting installations;
- Minimum natural lightning contribution;
- Minimum solar contribution to Domestic Hot Water;
- Minimum photovoltaic contribution to electric power.

The compliance with requirements on ‘Energy demand limitation’ (HE1) could be checked using a simplified procedure or by using a complex procedure, that requires the use of

software tools. LIDER is the official one; it has been developed by the Government and is available for free.

6.2.1.3 Requirements for existing buildings

Existing buildings must comply with the same minimum requirement as new ones when building rehabilitation, enlargement or renovation is carried out: also large buildings (floor area over 1.000 m²) where more than 25 % of the building envelope undergoes renovation.

6.2.1.4 Certification of buildings

Provisions regarding the energy performance certification of new buildings have been adopted at national level by the Government as the 'National Basic Procedure for energy certification' by means of the Royal Decree 47/2007, of 17th January, published on 31st of January 2007. The fact that it is a 'Basic procedure' means that other authorities having jurisdiction, such as the Autonomous Communities, can regulate and complete the National system giving more detail provisions of the control and inspections.

Certification will be obligatory for new buildings for which a building permit is requested by Local Authorities after 31st October 2007. This applies to every type of building (dwellings, public, commercial...).

As for the calculation of energy demand, the 'National Basic Procedure' for energy certification foresees two possible ways: a simplified one and another complex one, which requires the use of a software tool, 'CALENER' being the official one.

For existing buildings, another Royal Decree is under preparation. A 'Basic procedure' for the certification of existing buildings is expected to be ready and mandatory from 2009.

6.2.1.5 Inspection of boilers and air conditioning

Inspection of boilers is already covered by the Regulation on thermal installations on Buildings (RITE) since its first version was approved in 1982, revised in 1986 and currently applicable since 1998. This current RITE version has been recently revised and approved by the Council of Ministers on 20th of July 2007.

The technical procedures for HVAC systems are included in this revised version of RITE.

6.3 Future planning

It is expected that the Royal Decree approving the Certification for new buildings will be approved by the Government soon.

6.4 Relevant information

Official texts and software tools are available on the national websites.

LIDER tool is available at:

http://www.codigotecnico.org/fileadmin/Ficheros_CTE/Programas/iLIDER_070611.EXE

National basic procedure for energy certification is available at:

<http://www.mityc.es/DesarrolloSeccion/EficienciaEnergetica/CertificacionEnergetica/>

The CALENER software tool is available at:

http://193.146.123.247/aplicaciones/calener/iCalener_VYP_070611.EXE (for dwellings and small tertiary sector buildings) and

http://193.146.123.247/aplicaciones/CALENER/instalar_CALENER-GT_30rc2b.EXE (for big tertiary sector buildings).

Official National websites:

<http://www.mityc.es/Desarrollo/Seccion/EficienciaEnergetica>

<http://www.boe.es/g/es/>

[bases_datos/doc.php?coleccion=iberlex&id=2007/02007&txtlen=1000](http://www.boe.es/g/es/bases_datos/doc.php?coleccion=iberlex&id=2007/02007&txtlen=1000)

http://www.boe.es/g/es/bases_datos/doc.php?coleccion=iberlex&id=2007/15820&txtlen=1000

<http://www.codigotecnico.org>

7 Implementation of the EPBD in Hungary

7.1 Legal context

The implementation of the EPBD in Hungary was the responsibility of the State Office of Housing and Building (Articles 3, 4, 5, 6, 7) and the Ministry of Economy and Transport (articles 8 and 9).

To date, the national regulation, relating to Articles 3, 4, 5 and 6 was issued in May 2006 (Ministerial Order TNM 7/2006). The rules are in force from 1 September 2006, from this date a building permit is mandatory for new buildings and also for buildings over 1000 m² floor area undergoing major renovation.

The text of the national regulation relating to Article 8 - which refers to „Inspection of boilers“ - was published in 2005. After discussion by different professional bodies it has been approved, nevertheless it is not yet issued as a ministerial order. The reason is due to an ongoing discussion, as to whether the issue of certification should be the precondition of the registration of the real estate ownership.

Meanwhile after the general election the administration has been reorganized and the State Office of Housing and Building no longer exists. The ongoing tasks should be dealt with by the new Ministry of Interior.

Regarding Articles 8 and 9 the Ministry of Economy and Transport is still collecting proposals from professional bodies.

All related documents have been published on different forums. Due to the above mentioned reorganization the only recent reliable link is the homepage of the Department of Building Energetic, Budapest University of Technology and Economics (which developed the national regulation) www.egt.bme.hu

7.2 Status of the implementation

7.2.1 Calculation procedures

The calculation procedures (Article 3) have been adopted and the related national regulation is in force. A general description of the calculation method is given in www.egt.bme.hu Information on the software tool can be found in www.bausoft.hu.

7.2.2 Requirements for new buildings

Also the national regulation on minimum requirements for all new buildings is in force (www.egt.bme.hu).

The requirements for building permits came into force after 1 September 2006.

The type and level of requirements are governed by the function, the type of building (dwellings, office buildings schools, ...) and the surface to volume ratio and including:

Maximum U-value of each building element;

Requirement on specific heat demand coefficient of the building (W/m³ K), which includes transmission heat losses (incl. thermal bridge effect) and passive solar gains);

Maximum primary energy consumption per m² of floor area.

The first level (maximum U value of elements) is generally in force. On the second level the specific heat demand coefficient depends on the surface to volume ratio. The calculation method facilitates the application of a simple estimation and a more detailed calculation (including solar access) of passive solar gains. The simplified estimation is intended to be on the safe side.

Maximum primary energy consumption per floor area depends on the surface to volume ratio and the use of the building. Nevertheless, in case of multipurpose buildings (e.g. an hotel) when no figure is prescribed in advance, the requirement should be defined according to the state of the art, so that the requirements on the first and second level must be met and the primary energy consumption is to be calculated on the base of standardized (“notional”) mechanical systems.

Requirements relating to summer overheating are formulated as the maximum mean daily indoor-outdoor temperature, which depends on the provisions of natural ventilation and thermal mass.

Requirements on each level must be fulfilled. The fulfillment of the requirements of a lower level (e.g. U value of building elements) does not automatically guarantee the fulfillment of the requirements on a higher level. Thus, unfavorable surface to volume ratio must be compensated by better U values in order to meet the overall heat demand coefficient requirement, or unfavorable HVAC systems must be compensated by better building.

The compliance is a precondition of the building permit and will be checked again when the building is commissioned. Control of the regulation is the responsibility of the Commune where the building is located.

7.2.3 Requirements for existing buildings

According to the published Ministerial Order, the same rules for new buildings apply to major renovation of existing buildings over 1000² floor area. The limitation of the U value of building elements automatically limits the selection of elements which can be used for renovation. The regulation is in force from 1 September 2006. Further details are available on www.egt.bme.hu.

7.2.4 Certification of buildings

The certification of buildings has been adopted by the professional bodies and informally by the State Office of Housing and Building, but the related national regulation is not yet issued due to the afore mentioned discussions (precondition of real estate ownership). It is expected that the ministerial order will be issued by the end of 2006. It is to be mentioned that asset method has been selected, thus the calculation method for design and certification overlap.

7.3 Inspection of boilers and air conditioning

In Hungary there has been long time regulation for safety rules for different boilers and heating systems. These rules are connected on one hand with fire protection and on the other hand against toxicities. Boiler installation needs to be planned by an engineer having appropriate license. This plan is investigated and judged by adequate gas supplier and chimney sweeper and they give permission for operation for the boiler. This plan shall include gas and combustion air supply and chimney or other flue gas removal system, but shall not include heating system itself. Commissioning of the boiler by a licensed person is one of the terms of guarantee. But up to now there has not been any rule for field tests for boilers after commissioning. So there is not any all comprehensive study regarding annual efficiency and electricity consumption of heating systems in Hungary.

Discussions regarding implementation of EPBD are in progress between the Ministry of Economy and Transport and invited professionals.

The standard prEN 15378 is going to specify procedures and optional measurement methods to be used for the inspection and assessment of energy performance of boilers and heating systems to provide advice to users on the replacement of boilers, other modifications to the heating system and on alternative solutions as required by article 8 of Council Directive 2002-91-EC.

7.4 Future planning

It is expected that the certification will be implemented by the end of 2007, while the execution order for the inspection of air conditioning systems is unlikely to be started before the end of 2008. A revision of the requirements is foreseen every five years.

References for national part:

<http://www.magyarokzlonny.hu/nkonline/MKPDF/hiteles/MK06062.pdf>

<http://www egt.bme.hu>

http://www.buildingsplatform.eu/cms/index.php?id=118&publication_id=2579

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

8 References:

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- OIB, OIB Richtlinie 6: Energieeinsparung und Wärmeschutz, OIB-300.6-038/07, April 2007, http://www.energyagency.at/publ/pdf/energieausweis_rl6.pdf
- OIB, OIB-Richtlinie 6 – Erläuterungen, Erläuternde Bemerkungen zu OIB-Richtlinie 6 „Energieeinsparung und Wärmeschutz“ und zum OIB-Leitfaden „Energietechnisches Verhalten von Gebäuden“, OIB-300.6-038/07-001, April 2007, http://www.energyagency.at/publ/pdf/energieausweis_rl6erl.pdf
- OIB, Leitfaden energietechnisches Verhalten von Gebäuden, OIB-300.6-039/07, April 2007, http://www.energyagency.at/publ/pdf/energieausweis_lf6.pdf
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- Federal law, „Energieausweis-Vorlage-Gesetz – EAV“, Vienna, August 2006, http://www.energyagency.at/publ/pdf/energieausweis_regvorlage.pdf
- Vorschlag der Länderexpertenkonferenz, „Vereinbarung gemäß Art. 15a B-VG über das Inverkehrbringen und die Überprüfung von Feuerungsanlagen“, April 2007
- www.enev-normen.de
- DIN 4792 (2007-10/Entwurf): Heizungsanlagen in Gebäuden-Inspektion von Wärmeerzeugern und Heizungsanlagen- Nationaler Anhang zu E DIN EN 15378: 2006-02. Hg.: Beuth-Verlag, Berlin, 2007
- E DIN EN 15378 (2006-02/Entwurf): Heizsysteme von Gebäuden-Inspektion von Wärmeerzeugern und Heizungssystemen; Deutsche Fassung der prEN 15378: 2005. Hg.: Beuth-Verlag, Berlin, 2006
- VdZ 2007-1: Tagung „Systemeffizienz und Modernisierung von Heizungsanlagen durch energetische Inspektion“ (Tagungsunterlagen Printversion u. CD-ROM-inkl. Software „Heizungsanlagen optimieren“ (überarbeitetes Optimus-Programm/kostenlos vom VdZ/Hottgenroth-Software). Veranstalter: VdZ-Vereinigung der deutschen Zentralheizungswirtschaft e.V. 53123 Bonn.-s.a. www.vdzev.de
- VdZ 2007-2: Der VdZ Heizungs-Check-Ein Verfahren zur energetischen Bewertung von Heizungsanlagen – Umsetzung der EU-Richtlinie „Gesamtenergieeffizienz von Gebäuden“ (Arbeitsblätter: A4-Format; Ausgabe: Sept. 2007). Hg.: VdZ-Vereinigung der deutschen Zentralheizungswirtschaft e.V. 53123 Bonn.-s.a. www.vdzev.de
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- http://193.146.123.247/aplicaciones/calener/iCalener_VYP_070611.EXE (for dwellings and small tertiary sector buildings) and
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- http://www.boe.es/g/es/bases_datos/doc.php?coleccion=iberlex&id=2007/02007&txtlen=1000
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