The implementation of the EU Energy Performance Building Directive 2002/91/EC in Austria and in the Czech Republic

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CONTENT

1. **Introduction**

The decrease of the energy demand in the building sector is one of the crucial parts of the efficiency policy as a part of climate change mitigation[1]. On one hand, it delivers great cuts in carbon emissions from reduced use of coal fossil fuels for heating and electricity supply. Additionally, it also brings substantial economic savings on running costs.

In 2002, the European Parliament and the Council adopted the Energy Performance Building Directive[2], which provides framework requirements for Member States. Among the five requirements[3], there is a need to establish a methodology for calculating the energy performance (1), to set performance standards for new buildings (2) and existing buildings undergoing major renovation (3), to provide energy certification of buildings (4), and to run regular inspection of boilers and air-conditioning (5).

Up to January 2006, the EPB Directive should have been implemented into national legislations in respective Member States. However, as a result of many national differences, most of the Member States had to take the additional time of three more years to fully implement the Directive into their legislation following the provisions of Art. 15.

This paper explores the implementation stages in Austria (AT) and the Czech Republic (CZ). It tries to explain the reasons and impacts of regional implementation diversities and their difficulties.

2. **Description of the research question**

The research question aims at finding out what progress has been achieved so far in CZ and AT and how much the EPBD can contribute to the target for the greenhouse gas reduction of 20% until 2020.

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[1] According to IPCC Fourth Assessment Report, the building sector has the largest mitigation potential.

[2] 2002/91/EC

[3] Article 1 of the EPB Directive (Directives in European legislation set only the targets and leave it up to the Member States to find their ways to reach the target.)

2.1. *Methodology*

This paper is divided in two main parts. In the beginning, this paper describes the main content of the EPB Directive and the challenges the Member states are confronted with. The second part is focused on the different implementation progress in Austria and in the Czech Republic, their current situations and especially the main differences of the national implementations. As well illustrated will be the major problems of the period from starting the implementation process and getting into force of the national legislation, followed by some points of critics.

In our research we will analyse both governmental and non-governmental materials and we will try to find out some disparities between the two. We will also make use of materials of European Commission, which is supposed to be a watchdog of the implementation process.

2.2. *Expected results*

We assume there will be some differences in implementation progress between the two countries. We will explain what consequences this implies. We will also try to provide possible explanations for this by comparing starting positions of both countries.

3. The Directive 2002/91/EC of the European Parliament and the Commission on the energy performance of buildings (EPBD)

3.1. *Framework*

The Directive 2002/91/EG of the European Parliament and the Commission on the energy performance of buildings belongs to a broader EU program on energy efficiency as a part of climate change and energy policy. A related Directive is the Directive 2006/32/EC of the European Parliament and of the Council on energy end-use efficiency and energy services and repealing Council Directive 93/76/EEC. Some

other related pieces of legislation are more focused and binding[4], or, on the contrary, they are more general and non-binding[5].

The Directive was adopted in response to the Kyoto protocol, and thus, it should help the European Union and its Member States to fulfill the greenhouse gas reduction target. While energy intensive industries are regulated within the EU Emission Trading Scheme, housing and construction belongs to the non-ETS sectors and has not been regulated yet in terms of contribution to climate change. Buildings and the related services consume about one third of the energy in the EU so there is a big potential for energy savings and thus greenhouse gas mitigation. The energy efficiency question is also related to the problem of energy security of supply, mainly of oil, gas and uranium[6].

The Directive follows the SAVE program provisions on buildings and some other measures (92/42/EEC on boilers, 89/106/EEC on construction products; and also the Directive 93/76/EEC repealed by the Directive 2006/23/32/EC – on the energy certification of buildings, originally adopted before the Kyoto agreement).

3.2. *The Directive*

The Directive tries to ensure a threshold regarding all common aspects of energy efficiency and performance of the buildings – it does not regard any “movable equipment” of the buildings and its parts, which are subject to other regulations.[7] There are four main elements in the directive. These are the following ones:

- A common methodology, which should be used for executing the calculations of the “integrated energy performance of buildings”.
- Minimum standards regarding the energy efficiency and performance of both existing and new buildings, with the provision that these standards should apply to the existing buildings undergoing “major renovation”. This shall be

[4] e.g. the Directive 2003/54/EC on the common rules for the internal market in electricity

[5] e.g. Communication from the Commission of 19 October 2006 entitled: "Action Plan for Energy Efficiency: Realising the Potential" and Green Paper of 29 November 2000 "Towards a European strategy for the security of energy supply. Downloaded from http://europa.eu/scadplus/leg/en/lvb/l27057.htm, 28.5.2008.

[6] In response to the Green paper on security of supply.

[7] Some of these regulations are already existing, some other ones are foreseen by the Action Plan for Energy Efficiency from the year 2000 (Art. 5 of the Directive).

ensured by Member States for buildings „with a total useful floor area over 1000 m^2“[8]. By major renovations, the Directive understands “cases such as those where the total cost of the renovation related to the building shell and/or energy installations such as heating, hot water supply, air-conditioning, ventilation and lighting is higher than 25 % of the value of the building, excluding the value of the land upon which the building is situated, or those where more than 25 % of the building shell undergoes renovation” (Introducing paragraph 13 of the Directive). For the new buildings „with a total useful floor area over 1000 m^2”, there are other special requests about the “technical, environmental and economic feasibility of alternative systems” in order that the buildings meet the minimum energy requirements[9].

- Energy certification systems for both existing and new buildings, including the displays of the certification and also all other important information in this subject for public buildings. The certificates expire after 10 years, which forces the building owners to make new tests and control the status quo.
- As said before, it includes also regular inspections and controls of central air-conditioning systems and boilers present in the buildings. It also demands “an assessment of heating installations in which the boilers are more than 15 years old”[10]. The Member States should “ensure that the certification and inspection of buildings are carried out by qualified and independent personnel”[11].

The Directive regards the residential buildings and also the tertiary non-resident sector ones. However, some sorts of buildings may be excluded by the Member States from these provisions in order to achieve more practicality[12]. These are:

- 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,

[8] Art. 6 of the Directive
[9] Art. 5 of the Directive

[10] http://europa.eu/scadplus/leg/en/lvb/l27042.htm.

[11] Paragraph 12 of the Directive
[12] Article 4(3) of the Directive.

- 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 non-residential agricultural buildings with low energy demand and non-residential 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, stand-alone buildings with a total useful floor area of less than 50 m2."All of these regulations and subsequent regulations should be regarding the "climatic and local conditions and the occupants"[13]. Thus, the buildings should meet the "minimum energy performance requirements tailored to the local climate"[14].

This certification process should be aided by "programs to facilitate equal access to improved energy performance", and even the energy companies are bound to take respective investments[15].

The energy performance certificates are to be existing and available, "when buildings are constructed, sold or rented out"[16]. That means that the owner of the building should be interested in the equipment of the parts of the buildings, rented or not. He should then take necessary action to ensure keeping the certificate for the whole building. However, the institutions and people occupying the building are supposed to have the possibility of regulating their own energy consumption – including hot water. That should also help the energy and cost efficiency of the buildings.

The Directive draws attention to the increase of the number of air-conditioning systems, mainly in the southern countries. Therefore, "priority should be given to strategies which enhance the thermal performance of buildings during the summer period. To this end, there should be further development of passive cooling techniques, primarily those that improve indoor climatic conditions and the microclimate around buildings"[17] The Directive contains an Annex with the framework regarding the buildings energy efficiency and performance calculations, and also the

[13] Paragraph 8 of the Directive

[14] Paragraph 12 of the Directive

[15] Paragraph 16 of the Directive

[16] Idem.

[17] Paragraph 18 of the Directive

requirements for the boilers and central air-conditioning systems inspections and controls. The Commission is bound to keep this Annex up to date with the technical progress and eventually in accordance with some other regulations and international commitments of the European Union.

4. **Implementation of the EPBD in Austria**

The implementation of the EPBD in Austria is mainly in the responsibility of the 9 federal provinces [Bundesländer] and the Ministry of Economy and Labour. The Austrian Parliament passed the Energy Certification Providing Act in May 2006, in which sellers and landlords providing energy certificates for buildings when they are sold or rented.

Within the EPBD "Concerted Action" - an initiative for promoting dialogue between the EU-Member States and supporting the national implementation process, funded by the "Intelligent Energy-Europe Programme"[18] - 8 meetings took place on which representatives of national decision makers of each Member State participated. For Austria the "OIB" [Österreichisches Institut für Bautechnik] takes this role. Further Partners for the assistance are local agents of each of the federal provinces and the Austrian Energy Agency[19].

The most important consequence of the directive for Austria is the harmonization of the different building regulations of the 9 federal provinces by the OIB. Directive 6 of the "OIB-Guidelines" concerns the implementation of the EPBD.

Until January 2007 a decision-making procedure for the first draft of the OIB-Guidelines took place, where the federal provinces had the possibilities for statements. After the adjustment a notification-process of the European Commission followed and the process for adopting the 9 different building regulations in Austria started.

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[18] Website of the European Building Performance Directive Concerted Action; http://www.epbd-ca.org/, 19.03.2008

[19] Website of the Austrian Energy Agency; http://www.energyagency.at/(de)/projekte/energieausweis_action.htm, 18.03.2008

4.1. *Status of the implementation*

As the expiration of the deadline for coming into force of the EPBD was the 4th of January 2006, Austria needed to take the additional time limit of three more years (until 4th of January 2009). Now since the 1st of January 2008 the energy performance certificate for buildings came into force (at least for the two provinces Tyrol and Vorarlberg) for new buildings and will be binding for existing buildings, in case of renting or selling, from the beginning of the 1st of January 2009.

The current status of the EPBD implementation in form of the OIB Directive 6 is listed in the following subchapters.

4.2. *Calculation procedures*

A calculation system has been developed which conjoins the 9 building codes on more than 200 mathematic algorithms that allow a differentiated description taking care of most of the details used in conventional buildings[20]. The method for the calculation is included in the "OIB-Guideline" and based on standards (Ö-NORM).

The user can either do the calculation by using all available details of the building (dynamic simulation- for new buildings), or consult default values that are based on the experience of more than 100.000 already existing energy certificates (for existing buildings and renovations).

4.3. *Minimum Requirements for buildings*

Also set in the already mentioned "OIB-Guideline" are requirements for new buildings and renovations (residential and not-residential buildings) including mainly:

- The Maximum annual "*heating consumption"* (Heizwärmebedarf) HWB

This maximum value is adjusted by the Volume to Outer Surface ratio. For not-residential buildings the *maximum heating consumption value* is also valid for the *cooling consumption for the building with no internal gains must eb below 1 kWh/m³ K*. This is a very strict rule concerning the architecture of the building-

For new residential buildings (related to floor area):

[20] Jilek W; "Implementation of the EPBD in Austria", EPBD Buildingsplatform, http://www.buildingsplatform.eu/cms/index.php?id=117&no_cache=1, 01.04.2008

Until 31st Dec. 2009 HWB< 78,0 [kWh/m²a]
From 1st Jan. 2010 HWB< 66,5 [kWh/m²a]

For new non-residential buildings (related to volume):
Until 31st Dec. 2009 HWB< 27,0 [kWh/m³a]
From 1st Jan. 2010 HWB< 22,75 [kWh/m³a]

For renovations of residential buildings:
Until 31st Dec. 2009 HWB< 102,0 [kWh/m²a]
From 1st Jan. 2010 HWB< 87,5 [kWh/m²a]

For renovations of not-residential buildings:
Until 31st Dec. 2009 HWB< 33,0 [kWh/m³a]
From 1st Jan. 2010 HWB< 30,0 [kWh/m³a]

- The maximum annual "*final energy consumption*" per m² of floor area *[$EEB_{BGF,WG}$]*

It contains following indices:

- ***HWB*** $_{BGF,WG,max,Standort}$; (Heizwärmebedarf) the maximum annual specific heating consumption in [kWh/m²a] for residential buildings and [kWh/m³K for non residential buildings. .
- ***WWWB*** $_{BGF}$; (Warmwasserwärmebedarf) Warmwater heating demand related to floor area [kWh/m²a][kWh].
- ***HTEB*** $_{BGF,WG,REF}$; (Heiztechnikenergiebedarf) specific energy demand of the heating system itself (losses due to efficiency, auxiliary energy demand for pumps, fans etc.) of an reference object related to floor area [kWh/m²a].
- f_{HT} ; coefficient for raising the specific energy demand of the heating system of an reference object. Until 31st Dez. 2009 f_{HT} =1,15. From the 1th Jan. 2010 f_{HT} =1,05.

The maximum annual final energy consumption is therefore determined as the sum of the maximum allowed heating consumption and the losses of the heating- and warm water systems of an reference object.

- The maximum *"U-values"* of different elements of the building

Following thermal transfer-coefficients (U-values) of the named building elements are not allowed to exceed for new buildings form the beginning of 2008 (in the right

column of the table are listed the values before the harmonisation that where valid for the province of Styria):

Element	**U-value [W/m²K]** **NEW**[21]	**U-value [W/m²K]** **OLD**[22]
Wall to external air	0,35	0,5
Wall to unheated or not completed garret	0,35	0,9
Floor to external air or not completed garret	0,20	0,3
Inside floor to unheated building elements	0,40	0,45
Windows to external air	1,40	2,5
Walls and floors with ground contact	0,40	0,7
Doors to external air	1,70	1,7
Party floor	0,90	0,9
Party wall	0,90	1,6

Table 1: Comparison of the U-values of building elements

As clearly can be recognised, most of the new values undercut the reference-values of the old building regulation (Steirische Wärmedämmschutzverordnung).

- The *"building air-tightness"*

This point is just valid for the building shell of new buildings and especially required for "passive houses" and for buildings with heat recovery systems.

- The prevention of "thermal bridges"

Thermal bridges should be requested as set in the standard ÖNORM B 8110-2.

[21] Website of the OIB; http://www.oib.or.at, 01.04.2008

[22] Steirische Wärmedämmschutzverordnung von 1996, „Bauvorschriften für das Land Steiermark", 8.Auflage, Steiermärkische Landesdruckerei, Graz 1996

- Requirements on the quality of boilers, ventilation systems and chillers as well as on systems for storage and distribution.

The proof of compliance for all those points must be made before (after the planning period) and after the completion of the building. Control of the regulation is the responsibility of the municipal authorities.

4.4. *Energy Performance Certificate*

As already mentioned, the energy performance certificate for new buildings came into force on 1st of January 2008 and is therefore binding. In the case of selling a new realty that is build after this date, the seller has to deliver the buyer an energy performance certificate (which should be not be older than 10 years) of the adequate building.

The layout for the certificate (see image 1) is also set in the “OIB-Guideline 6”. The calculation method has been set in Austrian standards (ÖNORM).

The certificate exists of a front page (as illustrated on the left part of the figure) with an efficiency scale, a second page with detailed data of the building (right part of the figure) and an annex with more detailed information about input and output data.

Image 1: Layout of the Energy Performance Certificate in Austria for residential buildings
Source: www.energie-tirol.at, 02.04.2008

The ranks of the efficiency scale for the graphic display of the HWB (Heizwärmebedarf - the maximum annual heating consumption in [kWh/m²a])

are set as followed:

- Class A++: $HWB_{BGF, Ref} \leq 10 kWh/m^2a$
- Class A+: $HWB_{BGF, Ref} \leq 15 kWh/m^2a$
- Class A: $HWB_{BGF, Ref} \leq 25 kWh/m^2a$
- Class B: $HWB_{BGF, Ref} \leq 50 kWh/m^2a$
- Class C: $HWB_{BGF, Ref} \leq 100 kWh/m^2a$
- Class D: $HWB_{BGF, Ref} \leq 150 kWh/m^2a$
- Class E: $HWB_{BGF, Ref} \leq 200 kWh/m^2a$
- Class F: $HWB_{BGF, Ref} \leq 250 kWh/m^2a$
- Class G: $HWB_{BGF, Ref} \leq 250 kWh/m^2a$

4.5. *Inspection of boilers and air conditioning*[23]

The frequency of inspection of heating systems in Austria depends on the energy source and the power-size of the heating systems and has been in use for many years. Therefore the EPBD implementation in this area can be seen as completed except for the 15 year one-off-inspection which will be introduced together with the building certificate.

Air conditioning and cooling devices have so far not been inspected regularly in Austria, so requirements and calculation methods had to be adopted, which also came into force on the first of January 2008.

5. Implementation of the EPBD in the Czech Republic

The EPB Directive was implemented in March 2006 into national legislation amending the Act on Energy Management (No. 406/2000 Coll.) by adding Articles §6

[23] Jilek W; “Implementation of the EPBD in Austria”, EPBD Buildingsplatform, www.buildingsplatform.eu, 01.04.2008

(boiler and air-conditioning inspection), §6a (requirements for new and renovated buildings, building certification) of the act No 177/2006 Coll., which was adopted in March 2006 and came to force in July 2006 with exceptions to the EPBD provisions. As obvious, the implementation into Czech legislation was delayed by half a year behind the schedule suggested by the EPBD. The new consolidated version of the Act on Energy Management (No. 61/2008 Coll.) was adopted in 2008. The Act implements not only the EPBD from the European legislation, but also the Directive on eco-design.

The new §6a incorporated to the amendment of Energy Management Act will enter into force from 1st of January 2009 when minimal requirements for new and renovated buildings and buildings certification becomes mandatory. The further articles implemented from the EPBD are §7-10. The amendments of the Act are implemented by regulations No 277/2007, 276/2007, and 148/2007 Coll., related is also a regulation on energy audit No 213/2001 Coll. The authority responsible for implementation and monitoring is the Ministry of Industry and Trade (MPO). The original deadline for implementation was not fulfilled; therefore the EPBD enters force in the Czech Republic three years later after 1st January 2009.

5.1. *Calculation*

The special regulation No 148/2007 Coll. sets the process of calculation energy performance, the process and provisions of certification and minimum requirements for buildings.

According to §5 of the regulation, energy efficiency of buildings is calculated as an annual energy consumption in GJ used for heating, cooling, ventilation, air-conditioning, hot water supply and lightening using a balanced assessment method in various time intervals. The overall annual energy supply is stated as a sum of those balanced assessments of particular energy consumption in various time periods. Balanced assessment method is defined by the Czech technical norm ČSN EN ISO 13790.

The formula to calculated Energy performance of a building according to the attachment 1 to the regulation No. 148/2000 Coll. states:

$$\mathbf{EP_A = 277,8 \times EP/A_c,}$$

whereas the units are kWh/m^2 for a year, the EP is calculated overall annual energy supply in GJ/year, and A_c is the total floor area in m^2. The processes to measure the energy supply for various needs is set up by respective technical norms. The first attachment also states energy consumption classes according to the purpose and use of buildings[24] and describes of the energy classes of A-G in words.

It also states the energy consumption classes according to the purpose and use of the building. The strictest standards are stated for educational and block flat buildings, the mildest standards are allowed for hotels and restaurants and for hospitals.

Druh budovy	A	B	C	D	E	F	G
Rodinný dům	< 51	51 - 97	98 - 142	143 - 191	192 - 240	241 - 286	> 286
Bytový dům	< 43	43 - 82	83 - 120	121 - 162	163 - 205	206 - 245	> 245
Hotel a restaurace	< 102	102 - 200	201 - 294	295 - 389	390 - 488	489 - 590	> 590
Administrativní	< 62	62 - 123	124 - 179	180 - 236	237 - 293	294 - 345	> 345
Nemocnice	< 109	109 - 210	211 - 310	311 - 415	416 - 520	521 - 625	> 625
Vzdělávací zařízení	< 47	47 - 89	90 - 130	131 - 174	175 - 220	221 - 265	> 265
Sportovní zařízení	< 53	53 - 102	103 - 145	146 - 194	195 - 245	246 - 297	> 297
Obchodní	< 67	67 - 121	122-183	184 - 241	242 - 300	301 - 362	> 362

Image 2: A chart of different energy classes according to the type of the building.

(Translation: druh budovy=type of building, rodinný dům=a family house, bytový dům=a block of flats, hotel a restaurace=a hotel and a restaurant, administrativní=administrative, nemocnice=a hospital, vzdělávací zařízení=an educational facility, sportovní zařízení=a sport facility, obchodní=a shopping facility.)

The attachment 2 of the regulation No 148/2007 Coll. states details of calculations and input data for assessing energy performance of buildings. It states the inputs for calculation of energy consumption in a year, inputs for calculation of energy supply, and calculation of energy supply and consumption from CHPG. The methodology, however, does not include a non-obligatory CO_2 emission indicator as suggested by the EPBD. Instead, the Czech Republic chose as an indicator of energy efficiency the overall energy input to the building.

[24] Various types of buildings according to the purpose are family houses, block flat houses, hotels and restaurants, administrative buildings, hospitals, educational facilities, sport facilities, commercial buildings.

5.2. *Certification of buildings*

The compliance with the minimum energy requirements is documented in the energy efficiency certificate. It should not be older than 10 years. It is a part of the technical documentation (a) by construction of new buildings, (b) by major renovation of buildings with floor area larger than 1000 m2, (c) by sale or rent of buildings or its parts if there was no duty to do so under Art. (a) and (b)[25].

The detailed structure of the certificate is provided by attachment 4 of the regulation No 148/2007 Coll. The certificate must include information on technical, ecological and economic feasibility of alternative heating systems[26], which are (a) decentralized energy supply based on renewable sources, (b) combined heat and power generation, (c) district of block heating, or cooling if needed, (d) heat pumps. This part is sorted under energy certification in the transposed legislations, while in the EPB Directive is stated as a condition for new buildings in Art 5.

Operators of public buildings are obliged above 1000 m2 to display the certificate at a publicly accessible place in the building.

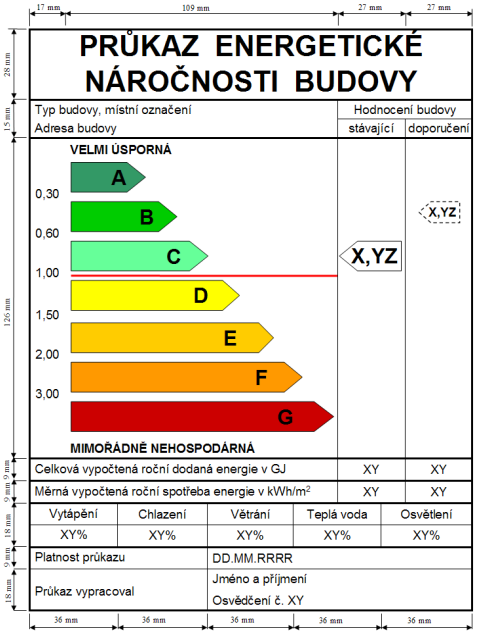

Image 3: **Template of the Energy Certificate (graphical picturing)**

[25] These provision have been directly adopted from the EPBD.

[26] The process of assessment of feasibility of alternative heating systems is described in attachment 3 to the regulation No 148/2007 Coll.

The written Certificate includes a number of detailed information on important indicators (description of the building, incl. climatic conditions, energy consumption on heating, ventilation, hot water supply and lightening and their energy efficiency assessment). It also provides data on energy inputs into the building and energy production (if any) in the building and discusses economic and environmental feasibility of alternative energy supplies. Lastly it includes recommendations for increase of energy efficiency, incl. their assessment. The Certificate is signed by the authorized energy auditor.

5.3. *Energy auditors*[27]

Only examined and authorized persons can issue energy certificates. Energy auditors need to be included in a list operated by the Ministry. To be enlisted, the auditors needs to pass a professional exam and to have a legally and professional capability. The process of examination is stated by a special regulation. If conflict of interests might occur, the energy auditors should not perform the audit. The auditor needs to be insured for potential damage caused in relation to auditing. Each auditor holds a unique ID in the list of energy auditors and can use this ID only in appropriate cases. The auditor has to run a timeline register of audits and other activities performed and must submit an annual report on this register to the Ministry.

5.4. *Minimum requirements for buildings*

The constructor, owner or the community of owners must ensure fulfilment of requirements of energy efficiency and of indicative standards in compliance with respective Czech technical norms. Minimum requirements for energy performance of buildings are fulfilled if the energy performance calculated according to the procedure mentioned above is **lower than energy performance of a reference building**, which complies with technical standards[28]. Energy classes are set differently according to the purpose of the building (see the part on certification). By using new or reconstructed buildings, the owner of the building must not exceed the reference values of energy consumption for heating, cooling and water warming.

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[27] Requirements for energy auditors are set in the Energy Management Act No 406/2000 Coll.

[28] Par. 3 of the regulation No 148/2007 Coll.

The requirements need not be fulfilled for finished buildings provided the owner can prove by energy audit that it is not technically, functionally or economically feasible in regard with life span of building or the purpose of it. Temporary buildings used for maximum of 2 years, experimental buildings, randomly used buildings, especially for religious purposes, and residence buildings used for shorter than 4 months are excluded from fulfilling the requirements. The requirements need not be fulfilled by production buildings in industry areas, by agricultural buildings with low energy consumption for heating.

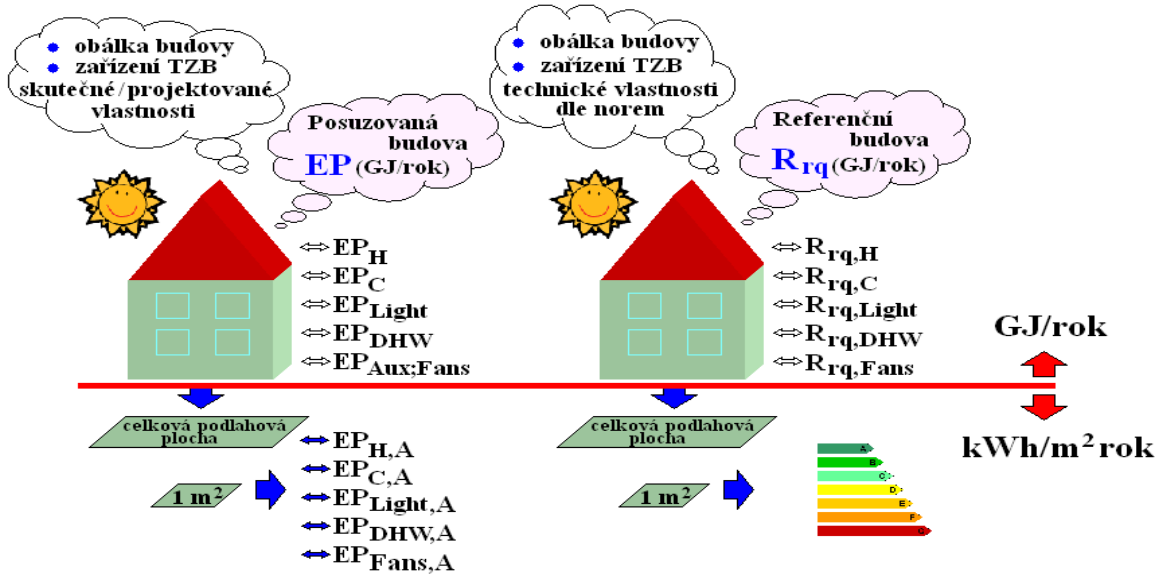

Image 4: Graphic illustration of process of setting min. energy requirements for buildings[29].

(Translation: obálka budovy=envelope of the building, zařízení TZB=technical facilities in the building, skutečné/projektované vlastnosti=real/projected features, technické vlastnosti dle norem=technical features according to technical norms, posuzovaná budova=evaluated building, referenční budova=reference building, rok=year, celková podlahová plocha=overall floor area).Inspection of boilers and air-conditioning)

5.5. *Inspection of boilers and air-conditioning*

The boilers with power of more than 200 kW should be regularly inspected in terms the efficiency. The owner or operator of the boiled is in charge of it. Heating facilities with power of more than 20 kW and older than 15 years should be once inspected in terms of efficiency within the whole heating system until 2010. The control can be

[29] Metodická příručka, 2007.

only performed by persons authorized according to the special regulation and checked by the Ministry. Regular inspections concern only the houses and buildings which are used for business purposes (private dwellings are thus excluded). The air-conditioning systems with power of more than 12 kW should be inspected every 4 years by authorized persons. The explicit specification of inspection procedure, outcomes and reporting is provided by regulations No. 276/2007 and 277/2007 Coll., for boilers and AC, respectively. The inspection provisions have been directly implemented from the EPBD into the Czech legislation without major differences.

6. **Conclusions and recommendations**

As this paper figured out, both of the considered countries finally managed the implementation process of the EPBD with a maximum delay allowed by Directive schedule because of various special circumstances. The EPBD will enter into force as well in Austria as in the Czech Republic on the 1st of January 2009.

However, in this analysis we found some major differences between the implementation of the EPBD. First, whereas in Austria, the energy certificates provide with much more information, in the Czech Republic their content is rather limited to basic figures on energy input in buildings. Furthermore, the Czech certificates do not include information on CO2 emissions, which is not the case by Austrian certificates. The calculation method in Austria enables to use case examples of other buildings, which we did not find in the Czech technical norms (though we did not study them in detail). Also the differentiation between the energy classes shows that the analyzed Member States have implemented the EPBD differently. Whereas in Austria, the classes are valid universally for all types of buildings, in the Czech Republic, the type of building determinates the requirements of each energy class, which creates more lenient conditions for most inefficient buildings.

There are some reasons to explain the implementation differences. The first difference comes from the fact that the climatic and other conditions vary between the two states and also within the states, which requires careful approach to any regulation adopted. The second and main reason of differences in implementing the EPBD comes from the fact that Austria has longer tradition in energy efficiency and sustainable approach to environment. However, when implementing the EPBD, it had

to integrate it in nine federal states. The Czech Republic, on the other hand, could implement this Directive centrally from a national level.

The main aim of the EPBD is the reduction of the energy amount in buildings by setting five requirements for new buildings and renovations. These five instruments can be seen as a positive incentive to finally cut the greenhouse gas emissions in the building sector, which by largest contributes to most of the greenhouse effect. However, in order to maximize the mitigation potential, the Directive would need to have a broader range including also building under $1000m_2$. Also, many exceptions are to be revisited whether they should be included in the EPBD update in 2009 as well. Further suggestion would be to reconsider market conditions in housing sector, which should not be dominated by investment costs only. As a last point, the certification could be broadened up to the life cycle analysis of houses, which would enable comparison of input materials used from the environmental point of view.

Because of rising costs of energy, which makes running costs of buildings more expensive, the certification of buildings can contribute to better transparency and provide a useful tool to undergo renovations, apply alternatives or adopt saving measures. Should all buildings regardless their area have the energy certificate, it would be much easier to compare their energy consumption, which could also change their market value. However, consumer patters and habits change slowly. In terms of emission reductions, housing sector is a crucial one in the most of the EU Member States, especially in the new ones, and important tool to achieve GHG cuts in the non-ETS sector.

7. Literature

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