

**THE CZECH EXPERIENCE IN
IMPLEMENTING THE EU
DIRECTIVE ON THE ENERGY
PERFORMANCE OF BUILDINGS**

FINAL REPORT

JUNE 2010

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LIST OF ABBREVIATIONS

EPBD / Directive	Energy performance of buildings Directive (2002/91/EC)
EPC	Energy performance certificate (CZ)
U	thermal transmittance coefficient (U-value)
AAU	Assigned Amount Unit (Assigned Amount Unit within the Kyoto Protocol; represents the entitlement of a country to release into the air one tonne of a greenhouse gas in the 2008-2012 period)
RB	apartment building
CHS	central heat supplies
EU ETS	European Greenhouse Gas Emission Trading Scheme (trading in CO ₂ emissions at the corporate level within the European Union pursuant to Directive 2003/87/EC)
GIS	Green Investment Scheme, the Czech title of the program is “Green Light to Savings”
IET	International Emission Trading according to Art. 17 of the Kyoto Protocol
RES	renewable energy sources
FH	family house
HW	hot water
NG	natural gas
Zelená úsporám	The Green Savings Programme
EA	Energy audit
CR	Czech Republic
CZ	Czech
EU	European Union
CEN	European Committee for standardization
EPC / certificate	Building Energy Performance Certificate (CZ)
MIT	Ministry of Industry and Trade (CZ)
SEI	State Energy Inspectorate (CZ)
TFB	Technical facilities of buildings
Rulebook	Rulebook for energy efficiency of buildings
CSO	Czech Statistical Office
NKN / NCT	National calculation tool
TSC	Technical Standardization Commission
RIA	Regulatory Impact Assessment
COP	Coefficient of performance (heat pumps)
o.s.	Civic association
o.p.s.	Beneficiary society

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SUMMARY

This study is intended for transfer of experience on implementation and enforcing the requirements of the Energy Performance of Buildings Directive (EPBD) in the Czech Republic and is divided into 3 parts:

1. The introductory part, giving a brief description of the circumstances preceding the implementation of the Directive and the main experience and benefits associated with adoption of the Directive,
2. The second part describes in detail the procedure in implementation of EPBD in the Czech Republic with all the important details,
3. The last part is based on the first two parts and summarizes the basic lessons learned from the Czech experience and describes recommendations based on knowledge of the situation in Macedonian.

Preparation of the Czech Republic for membership in the EU reached a climax with signing of the Treaty of Accession on April 16, 2004. This also completed the first stage in gradual harmonization of the national legislation in the area of energy savings in the sector of buildings, support for renewable energy sources and protection of the air.

A new law was introduced in this first stage – the Energy Management Act, which provides a summary definition of the parameters of energy management from the level of the State and municipalities (State and regional energy policies) to the expert level (energy audits). It was confirmed in practice that it would be reasonable to separate this aspect from legislation governing the entire energy sector – especially the Energy Act – and also from the Construction Code.

Harmonization of the legislation in these areas was not affected by the requirements on climate protection (e.g. the requirements of the Kyoto Protocol), as no real commitment for reducing greenhouse gas emissions followed for the Czech Republic¹.

It can be stated that the Czech Republic entered the process of implementation relatively well equipped in all the legal, institutional and technical areas and in the area of financial instruments. The progress of the implementation was based on experience in the past (especially the 1990's) and followed from practical requirements, where a continuing trend was anticipated in construction. The number of apartments under construction since the beginning of the millennium has increased to 50,000 annually and non-residential construction (administrative buildings, industrial zones, etc.) culminated between 2006 and 2008.

The Energy Management Act of 2000 introduced a logical structure into the approach to energy effectiveness – from creation of the State Energy Policy, through regional energy policies to energy audits of buildings and technical units (industrial energy audits).

However, the Act introduced a rather short deadline for compulsory performance of energy audits for public buildings (i.e. all buildings corresponding to the set criteria).

The implementation process for the requirements of the Directive was represented particularly by the amendment to the Energy Management Act, insertion of new paragraphs and the creation of new decrees basically corresponding to the articles of the Directive.

¹ To the contrary, the Czech Republic was able to sell surplus AAU units, which it did, and the Green for Savings program is financed from this source (see below).

Implementation also required a change in some other laws and existing decrees. The relevant technical standards are regularly updated in the normal procedure and were harmonized with the CEN technical regulations and methods on the basis of the requirements of the Directive.

The process of implementation of the Directive lasted approximately 4 years (2004 – 2008); 2009 can be considered to be a “testing year” and an amendment to the relevant decree is being prepared on the basis of experience in this period.

During the implementation, the National Calculation Tool was created, based on the legal methodology and available free-of-charge to the entire professional public. The National Calculation Tool is administered and regularly improved at the Czech Technical University.

New obligations following from Articles 7, 8 and 9 of the Directive, for example requirements on air-conditioning equipment, were introduced into the legislation during the implementation.

In ordered subchapters (legislative, institutional, technical, awareness, fiscal and other), Chapter three describes practical experience gained during the implementation (and also prior to it) in the Czech Republic and recommendations for the Macedonian context based on the information gathered during a fact-finding mission to the country and study of relevant documents. These recommendations can be generalized in three basic points:

- Emphasis on the transparency of the legislation, activities and responsibilities of the individual groups related to the energy performance of buildings.
- Introduction of a system to minimize the number of changes in the legislative and institutional procedures. Recommendation of a small number of laws in the national legislation.
- Creation of a framework for the competent entity (institution) that will be responsible for the steps in harmonizing the explication of the calculation methodology, tests, energy experts, enlightenment of the individual groups, records of energy experts and their assessments, control of the quality of activities and proposal of the required changes on the basis of trends in the area of the energy performance of buildings.

1. INTRODUCTORY CHAPTER

The purpose of this study is to transfer the positive Czech experience in the implementation of Directive 2002/91/EC on the energy performance of buildings, as well as propose a set of most suitable approaches and recommendations for the Macedonian context based on the “fact-finding mission”. The report includes and is not limited to the following:

- Steps taken to incorporate the Directive into the national legislation;
- Institutional changes to support the implementation of the Directive;
- Measures and actions introduced to support the enforcement of the Directive especially in regards to the financial facilities;
- Stakeholders involvement/participation;
- Lessons learnt (what worked and what didn't work);
- How applicable is the Czech experience to the Macedonian context
- Recommendations on the steps that the country should take to facilitate the implement the Directive.

According to the terms of reference for this study, it is divided into three parts:

1. The introductory chapter summarizes the experience and benefits gained through the implementation of the EPBD in the Czech Republic.
2. The main chapter addresses key approaches, measures and strategies used to facilitate the implementation process of the EPBD.
3. The third chapter summarizes lessons learned and recommendations for the Macedonian context

1. 1. Basic characteristics of the Czech Republic in relation to EPBD

1. 1. 1. Legislative process in the Czech Republic

The legislative process in the Czech Republic progresses in the standard form, where draft laws are submitted by the Government (Ministries) and approved by the Parliament of the Czech Republic (Chamber of Deputies and Senate) and subsequently submitted for signing to the President of the Czech Republic. The individual Ministries submit laws related to harmonization with the European legislation substantively according to the Competence Act and in accordance with the legislative plan of the Government. In some cases, the laws or decrees are discussed in inter-sectoral working groups and are always subjected to the commentary process in the inter-sectoral commentary procedure. The Ministry with the relevant competence issues decrees for the laws, which are always discussed by the Legislative Council of the Government of the Czech Republic.

1. 1. 2. Organization of the public administration and competence

The Government of the Czech Republic consists of the Office of the Government and 16 Ministries. There are 3 sectors that are affected by EPBD: the Ministry of Industry and Trade, Ministry for Regional Development and Ministry of the Environment.

Local government in the Czech Republic consists in:

- 14 higher territorial administrative units, i.e. 13 Regions and the Capital City of Prague,
- 23 statutory cities
- 205 municipalities with extended competence
- 393 municipalities with authorized Municipal Authorities
- 6249 municipalities with the basic scope of delegated competence

The performance of State administration in relation to the Construction Code is the responsibility of 710 Construction Authorities (consideration is being given to reducing this number by 150 – 200 Construction Authorities). In 2009, a total of 112,674 construction permits were issued.

1. 1. 3. Statistics of the building sector

Good statistics are available on the trends in construction and renovation of residential buildings in the Czech Republic and also on the average specific heat consumption for heating. Indicative values for energy consumption in buildings constructed in a particular period can be determined according to the time of construction, standard and legislative requirements on construction and the construction technology employed. Where measures were introduced to improve the thermal technical properties of buildings, consideration must be taken of the means and time of implementation of these measures.

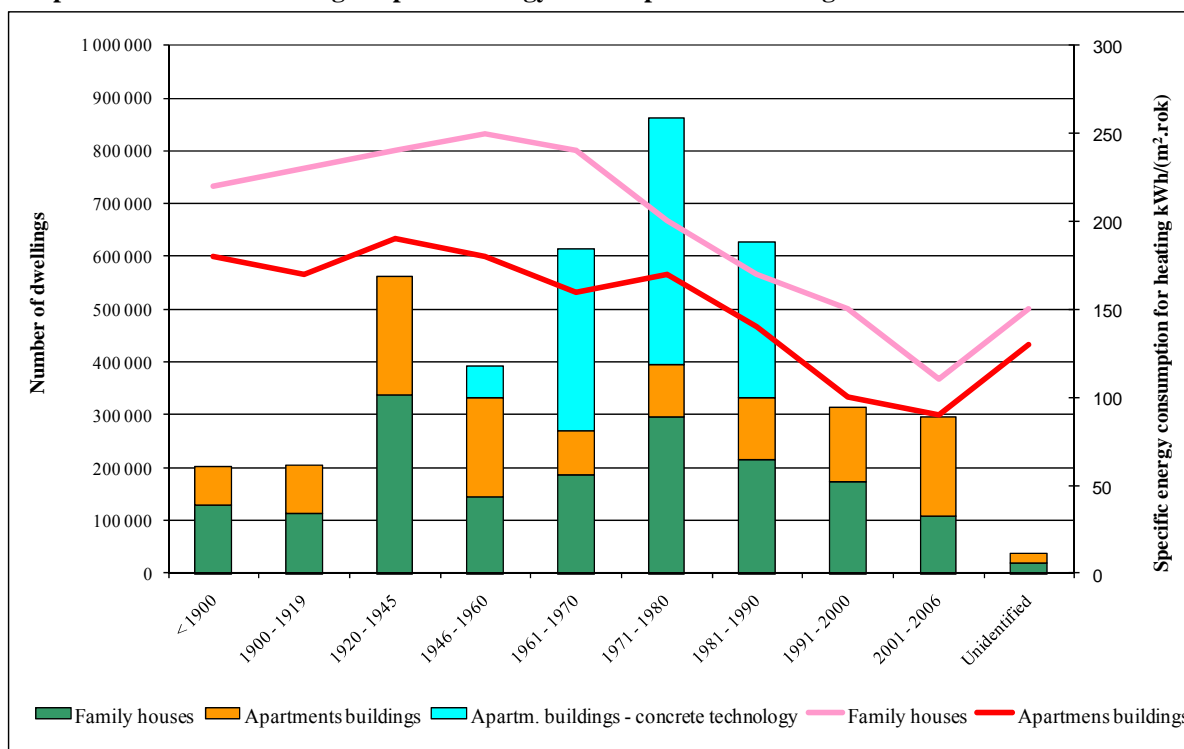
Table 1: Composition of the building fund

Building fund	Total number of buildings	Apartments	Permanently occupied buildings	Apartments
Total family houses	1 732 077	2 005 122	1 406 806	1 673 414
of which, detached FH	1 320 994	1 524 038	1 046 840	1 245 204
of which, semi-detached FH	137 987	166 751	123 274	151 444
of which, row FH	273 096	314 333	236 692	276 766
Total apartment buildings	196 874	2 310 641	195 270	2 301 641
Total housing fund	1 928 951	4 315 763	1 602 076	3 975 055

Source: CSO – Census of people, buildings and apartments, 2001

In 2009, construction of 37, 319 apartments was commenced, of which 18,750 were in family houses.

Graph 1: Number of dwelling vs specific energy consumption for heating



Source: CSO – Census of people, buildings and apartments, 2001

The other sectors (commercial and tertiary) cannot be defined with great accuracy because of the lack of detailed statistics at a national level. It is difficult to determine the specific heat consumption per m² of floor area in these sectors.

Table 2: Classification of the tertiary sector according to the number of facilities, buildings and energy consumption²

2005	Number of buildings	Heat consumption (GJ)	Consumption of electricity (MWh)
Commercial, repair of motor vehicles and products for personal consumption	182 856	3 896 500	1 444 833
Accommodation and catering	19 067	1 245 434	274 615
Transport, storage and communications	41 866	4 061 947	2 710 666
Financial services and mediation	10 420	729 558	190 876
Activities in real estate and leasing, business activities	18 060	6 644 991	652 072
Public administration and defense, compulsory social security	16 105	5 630 200	742 897
Education	25 160	7 041 698	618 464
Health and social care, veterinary work	16 410	6 054 552	718 862
Other public, social and personal services	27 502	3 559 369	605 972
TOTAL		38 864 249	7 958 907

While, for family houses, the commonest material for outer walls is bricks, cement blocks and stone, corresponding to approx. 93% of total material, only 64% of apartment buildings are constructed of these materials and more than 33% of apartment buildings are concrete-panel buildings (however, the number of people living in panel buildings is greater than in non-panel buildings).

Table 3: Composition of the building fund according to the type of structure

Building fund	Total number of buildings
Total family houses	1 732 077
of which, bricks, cement blocks, stone	1 612 564
of which, cement panels	15 589
of which, wood	20 785
of which, other and not determined	83 140
Total apartment buildings	196 874
of which, bricks, cement blocks, stone	126 196
of which, cement panels	65 953
of which, wood	197
of which, other and not determined	4 528

Source: Census of people, buildings and apartments 2001 (CSO)

² Taken from (5)

The following table gives a survey of apartments according to the type of ownership based on information from the Census of people, buildings and apartments (CPBA) of 2001.

Table 4: Number of apartments according to the type of ownership

	owner							total buildings
	natural person	municipality, State	apartment cooperative	privatization cooperative ³	other legal person	combination of owners	other and not determined	
Family house	1 362	12 220	2 823	1 161	12 408	10 268	5 861	1 406
Apt buildings	28 814	55 623	38 985	10 932	14 522	45 117	1 277	195 270
Other	6 498	10 155		311	6 403	498	848	24 713
Total build.	1 397	77 998	41 808	12 404	33 333	55 883	7 986	1 626

In 2001, 1,317,684 apartments were in buildings in private ownership, 1,092,950 in rental buildings and 548,812 in cooperative buildings (according to CPAB 2001).

1. 2. Legislation in relation to implementation of the Directive

Up to 2000, the energy intensity was examined only using technical standards and partly also Act No. 222/1994 Coll., on conditions for operating a business and performance of state administration in energy sectors (the Energy Act). As a consequence of gradual harmonization of the requirements of the national legislation with the EU legislation, the Energy Act was amended and the new Energy Management Act was submitted and approved.

In addition to EPBD, Directive of the European Parliament and Council 2006/32/EC of April 5, 2006 on energy end-use efficiency and energy services and annulment of Directive 93/76/EEC was also incorporated into the Czech legislation.

1. 2. 1. Act No. 458/2000 Coll., the Energy Act

Responsible sector: Ministry of Industry and Trade

The Act of 2000 lays down the rules for operation of a business and for state administration in energy sectors. At that time, the Energy Act was a continuation of the previous legal regulation (Act No. 222/1994 Coll.), which was the first to unify its provisions in a single unit for all the energy sectors, i.e. for the electricity industry, the gas industry and the heat industry. Simultaneously, this regulation also included a provision related to control in the energy sector.

The main reasons for the new regulations consisted in transposition of regulations valid in the EU related particularly to end-use energy efficiency and energy services, and also provision for supplies of energy and investments into the infrastructure, conditions for access to gas-supply systems and providing for the safety of gas supplies. The Energy Act was also newly modified because some of its provisions following from the EU Directives had already been introduced and implemented and thus seemed unnecessary. Reduction of administrative demands on businesses was also one of the motivating factors.

³ According to the current legislation, this status corresponds to an „association of owners of (apartment) units“ as, according to the law, private ownership of apartments (natural persons) must be organized in the form of some type of legal person (commercial company, cooperative, association of owners of units).

1. 2. 2. Act No. 406/2000 Coll., on energy management (as amended)

Responsible sector: Ministry of Industry and Trade

The Act on Energy Management defines:

- Conditions for preparing the State and regional energy policies
- State Program to Promote Energy Savings and the Use of Renewable Energy Sources
- Efficiency of energy use
- Energy intensity of buildings
- Combined production of electricity and heat
- Energy labels (appliances)
- Ecodesign
- Energy audit
- Energy auditor
- Competence of the Ministry
- Procedures on erasure of an entry in the list of energy auditors
- Administrative offences

The last amendment of the Act is awaiting the third reading in the Chamber of Deputies, which is anticipated in the autumn of 2010. The amendment is concerned with the means of creation and approval of the State Energy Policy.

1. 2. 1. Energy Policy

Act No. 406/2000 Coll., on energy management, imposes the obligation to prepare a State Energy Policy (the first was approved in 2004 and preparation for its updating has been underway since 2009) and regional energy policies (means of preparation laid down in separate Government Regulation No. 195/2001 Coll.) for the Regions of the Czech Republic and Statutory Cities of the Czech Republic. The remaining municipalities may voluntarily prepare an energy policy; however, this rarely occurs and most policies are drawn up in relation to requests for subsidies. The Regional Energy Policies should be accompanied by action plans; however, the Regions and cities only rarely update these plans and work with them actively.

Act No. 86/2002 Coll. - on protection of the air, also requires that the Regional Authorities prepare programs to reduce emissions and pollution levels and update them. This law was also amended in connection with EPBD.

1. 2. 2. Energy audit

The legal obligation to prepare an energy audit is laid down for all entities exceeding the legally stipulated energy consumption mentioned in implementing Decree No. 213/2001 Coll., promulgating the details of an energy audit. Simultaneously, this limit varies for the organizational components of the State, Regions, municipalities, contributory organizations and natural and legal persons, with the exception of the following:

- for the organizational components of the State, Regions, municipalities, contributory organizations, total annual energy consumption of 1,500 GJ,

- for natural and legal persons, with the exemption mentioned in Section 10(1), the obligation to subject their buildings or facilities to an energy audit, set at total annual energy consumption of 35,000 GJ,
- the value from which the obligation arises for natural and legal persons to provide for preparation of an energy audit is set for buildings and premises with separate energy supplies at total annual energy consumption of 700 GJ.

The Annex gives a list of all the Decrees to the Energy Management Act.

The original Decree No. 291/2000 Coll., laying down the details of energy use efficiency in heat consumption in buildings was cancelled on July 1, 2007 and replaced by Decree No. 148/2007 Coll., on the energy intensity of buildings, in connection with implementation of EPBD.

Chapter 2 also gives a description of important decrees.

1. 2. 3. Act No. 180/2005 Coll., on promotion of the production of electricity from renewable energy sources;

Responsible sector: Ministry of Industry and Trade

As a Member State of the European Union, the Czech Republic has pledged to increase the production of electricity from renewable energy sources (RES). The Treaty on Accession to the EU stipulated a target of 8% share of renewable sources in gross domestic consumption of electricity. This commitment was one of the reasons for introduction of Act No. 180/2005 Coll., on promotion of production of electricity from renewable energy sources, which was discussed in the Chamber of Deputies of the Parliament of the Czech Republic for more than a year.

The law created stable conditions for business decisions in that the law defined a system of support through fixed purchase prices or premiums on market prices of electricity. The law guarantees the amount of revenues per unit of electricity produced for a period of 15 years.

1. 2. 4. Act No. 86/2002 Coll., on protection of the air, as amended by Act No. 472/2005 Coll.

Responsible sector: Ministry of the Environment

Act No. 86/2002 Coll., as amended by Act No. 472/2005 Coll., specifies the measurement obligation, i.e. which sources and how often the relevant subject is obliged to perform this measurement and who is the person authorized to perform the measurement.

Decree No. 356/2002 Coll. defines a list of pollutants, the means of submitting reports and information gained by measuring, defines the conditions for authorization of persons performing the measurements and simultaneously also defines the conditions for control and calibration of the instruments used to perform the measurements.

Government Regulation No. 146/2007 Coll. stipulates the exact values of the combustion efficiency and permissible concentrations of carbon dioxide in the combustion products, taking into account the type of fuel burned and the year of production of the particular appliance. It also lays down exemptions from measurement, where the controlled quantities are limited for certain types of appliances (for example the CO values for infra-radiators). This Government Regulation is updated quite frequently, where the relevant limits are

reduced because of attempts to improve the air quality, and this trend can be expected to continue in the future.⁴

1. 2. 5. Act No. 183/2006 Coll., on land-use planning and the rules of construction procedure (the Construction Code)

Responsible sector: Ministry of Industry and Trade

This Act defines the conditions for land-use planning and the obligation to assess sustainable development in the territory, but there is no unambiguous methodology.

The Ministry for Regional Development provides (substantive and time-limited) subsidies to promote the creation of land-use planning documents.

1. 2. 6. Energy Efficiency Action Plan

In accordance with the provisions of Directive 2006/32/EC, the first Energy Efficiency Action Plan was prepared in 2007; this plan summarizes ideas on how to meet the national indicative targets for energy savings. This corresponds to reducing the average annual consumption of 2002 to 2006 by 9 percent and the target is expected to be achieved between 2008 and 2016. A second Action Plan is being prepared, along with a National Plan for Use of Renewable Energy Sources.

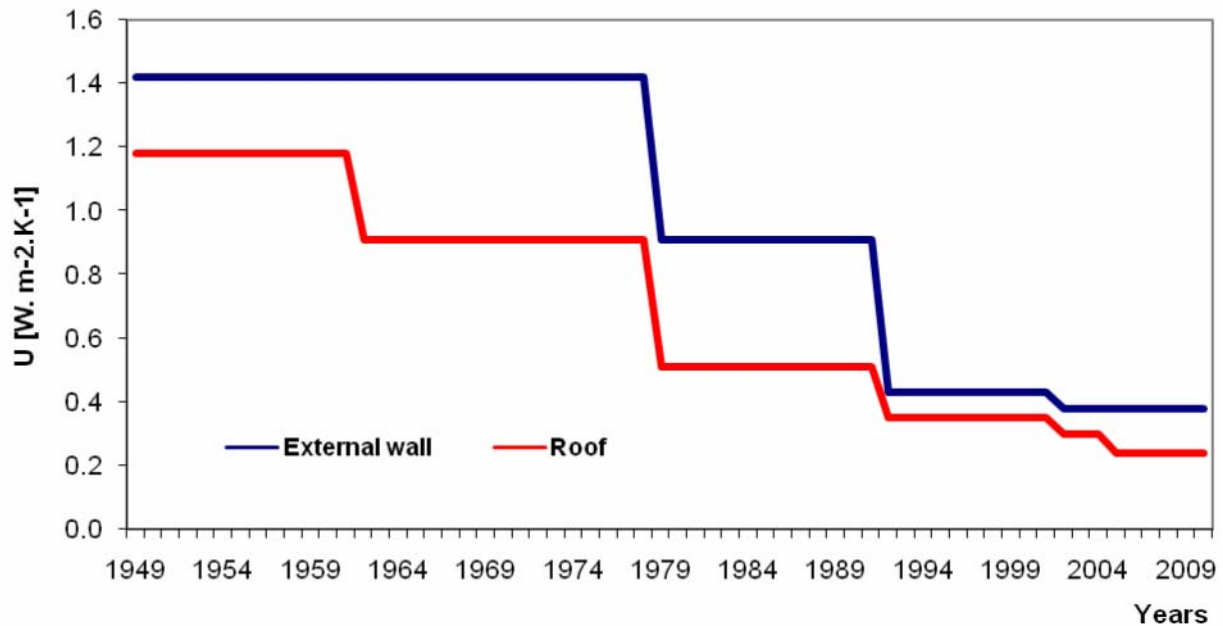
1. 3. Technical standards

Responsible sector: Ministry of Industry and Trade and the Czech Office for Standards, Metrology and Testing

Trends in technical standards in the area of energy intensity can be seen particularly in the standard dealing with the technical requirements on buildings, CSN 730 540 of 1962, with legal force from 1964. Changes in this standard are depicted in the following graph; the values given for the heat transfer coefficient are only indicative for outer walls and roofs; the values for other structures and their trends are given in Chapter 2.

⁴ Implementation of EPBD was not the only reason for amending the Act on Protection of the Air and for new Government Regulations to this Act. The Act on Protection of the Air also implemented the requirements of Directive of the European Parliament and Council 2003/30/EC, on promotion of the use of biofuels or other renewable fuels in transport.

Graph 2: Historical trends in requirements on the heat transfer coefficient in the Czech Republic



The Annex gives a list of selected technical standards relevant to implementation of the Directive.

1. 4. Financial support

No special scheme of financial support has been adopted in connection with implementation of EPBD. All the support schemes described below help promote implementation of EPBD. Preparation for implementation was financed from the PHARE program and the national calculation instrument was taken from the already-existing EFEKT program of the Ministry of Industry and Trade.

1. 4. 1. State Program to Promote Energy Savings and the Use of Renewable Energy Sources

In 1992, the Ministry of Industry and Trade promulgated a State Program whose rules enabled legal persons operating a business to obtain support for investment and noninvestment projects. The support was limited to a maximum amount of CZK 3 million for investment projects and CZK 300 thousand for non-investment projects.

Since 1999, a State Program to Promote Energy Savings and the Use of Renewable Energy Sources has been announced each year in the form of a Government Resolution. This program had 2 parts, one of which was administered by the Czech Energy Agency in the competence of the Ministry of Industry and Trade and the second by the State Environmental Fund in the competence of the Ministry of the Environment.

At the present time, the State Program is represented by the EFEKT program administered by the Ministry of Industry and Trade. Subsidies are provided within the EFEKT program for enlightenment activities, energy planning, minor investment projects and pilot projects. It is a supplementary program to energy programs promoted from European Union structural funds.

Part of the State Program supported by the Ministry of the Environment was transformed into the Green Savings Program during 2009; this program is administered by the State Environmental Fund.

1. 4. 2. Preaccession funds

Energy savings were purposefully supported in connection with preaccession funds in only a few cases. Energy effectiveness was supported within the PHARE program through a special revolving fund.

The Prototype Carbon Fund of the World Bank was also used to support renewable energy sources and potentially also energy savings.

1. 4. 3. Structural funds

The first (incomplete) program period took place in 2004 – 2006 and energy savings as well as renewable energy sources were supported in two operational programs – the Operational Program Industry and Enterprise in the competence of the Ministry of Industry and Trade and the Operational Program Infrastructure in the competence of the Ministry of the Environment.

A total of 26 operational programs were organized for the second program period of 2007 – 2013. These correspond to 8 special-subject programs (the Operational Programs Transport, Environment, Enterprise and Innovation, Research and Development for Innovation, Human Resources and Employment, Education and Competitiveness, Integrated Operational Program, Technical Assistance), 7 regional operational programs (for the areas of the North-East, North-West, South-East, South-West, Central Bohemia, Moravia-Silesia and Central Moravia) and 9 operational programs concentrating on transboundary cooperation (the programs of Czech-Polish, Czech-Saxonian, Czech-Bavarian, Czech-Austrian and Czech-Slovakian transboundary cooperation), supranational cooperation (Interreg IV B) and inter-regional cooperation (Interreg IV C), supplemented by 2 network programs – ESPON 2013 and INTERACT II. In addition, 2 operational programs were intended for Prague.

1. 4. 4. Operational Program Environment

This program is administered in the competence of the Ministry of the Environment by the State Environmental Fund; more detailed information can be found on the website <http://www.opzp.cz>.

Priority Axis 2- Improvement of the air quality and reduction of emissions, Support area 2.1 – Improvement of air quality.

The supported projects included acquisition of low-emission combustion sources with nominal heat capacity of up to 5 MW and possibly simultaneous improvement of the energy properties of building envelopes. The allocation for the 2007 – 2013 period equals € 348 mil.

Priority Axis 3 – Sustainable use of energy sources, Support area 3.1 – Construction of new facilities and reconstruction of existing facilities in order to increase the use of renewable energy sources for production of heat, electricity and combined production of heat and electricity.

Types of projects receiving support included construction and reconstruction of central and block heating plants (or heat sources utilizing RES) and reconstruction of local heat sources utilizing RES for heating, cooling and preparation of hot water, installation of photovoltaic

systems for production of electricity and other measures. The allocation for the 2007 – 2013 period equals € 363 mil.

Priority Axis 3 – Sustainable use of energy sources, Support area 3.2 – Implementation of savings and use of waste heat in the non-business sphere.

Supported types of projects include reduction of energy consumption through improved thermal technical properties of the outer structures of buildings (insulating the outside jackets and roof structures, replacement or reconstruction of the fillings of openings) and application of technologies for use of waste heat. The allocation for the 2007 – 2013 period equals € 310 mil.

1. 4. 5. Operational Program Enterprise and Innovations (OPEI)

This operational program is administered in the competence of the Ministry of Industry and Trade by the Czechinvest agency (Agency for promotion of enterprise and investments - www.czechinvest.cz).

Requests for projects are announced once annually in the Ekoenergie subprogram, implemented within OPEI. So far, approx. CZK 400 mil. (€ 16 mil.) have been allocated to increase the efficiency of energy consumption in OPEI, where measures for the envelopes of buildings (insulation, replacement of windows) correspond to not quite half this amount. The average amount of subsidies corresponds to approx. 30%; the multiplication coefficient for subsidies is thus approx. 3.3.

1. 4. 6. The Panel and New panel Program

This program is intended to improve access to credit through favourable conditions to facilitate financing of repair and modernization of apartment buildings. Projects receiving support can include, for example repairs, modernization and reconstruction of apartment buildings, including improvement of the thermal technical properties. The program is implemented through the State Housing Development Fund in the competence of the Ministry for Regional Development.

Supported new construction is required to comply with the requirements on the energy intensity of buildings valid for class B pursuant to Decree 148/2007 Coll., on the energy intensity of buildings. A resolution was taken for other types of buildings that the “requirement of the above-mentioned energy intensity would be practically impossible to realize, especially for older buildings.”

1. 4. 7. Green investment scheme – Green for Savings

Since 2009, the Green for Savings program has supported energy-saving measures for construction elements and structures, mechanical ventilation with heat recuperation from waste air and installation of biomass boilers, heat pumps and thermal solar collectors in residential buildings based on the GIS scheme. The program also supports the construction of residential buildings constructed in the passive standard. The program is described in the Annex.

1. 5. Institutional Base

1. 5. 1. Energy experts

In the context of implementation of EPBD, the category of “energy auditor” was supplemented by 3 more categories of energy experts:⁵

1. Energy auditor (289)
2. Building energy certificate (700)
3. Control of air-conditioning equipment (104)
4. Control of boilers (149)

The license of an energy expert can be obtained on the basis of compliance with the requirements mentioned in the decrees related to implementation of requirements No. 7, 8 and 9 of EPBD. Authorization is dependent on completed education, experience, references and passing a test. The Ministry of Industry and Trade provides for the test of energy experts and records of their activities.

1. 5. 2. Czech Office for Standards, Metrology and Testing (www.unmz.cz)

The office is an organizational unit of the State in the sector of the Ministry of Industry and Trade of the Czech Republic, whose main purpose is to provide for tasks following from the laws of the Czech Republic dealing with technical standardization, metrology and testing, including harmonization of the technical regulations and standards. Since 2009, it has provided for the creation and publication of Czech technical standards. The preparation of technical standards takes place within technical standardization commissions, which are composed of experts from the particular area of technology.

1. 5. 3. Energy Regulatory Office (www.ero.cz)

Support for economic competition and protection of consumer interests in those areas of energy branches where competition is not possible through support for the use of renewable and secondary energy sources. It issues price decisions for regulating the prices of unregulated electricity, the purchase prices of electricity from renewable energy sources and the prices of heat.

1. 5. 4. State Energy Inspectorate (www.cr-sei.cz)

In accordance with the Energy Act and on the basis of a proposal by the Ministry of Industry and Trade of the Czech Republic, the Energy Regulation Authority or at its own instigation, the State Energy Inspection (SEI) controls compliance with:

- a) the Energy Act,
- b) the Energy Management Act
- c) the Act on prices
- d) Regulation of the European Parliament and Council EC/1228/2003 of 26 June 2003 on conditions for access to the network for cross-border exchanges in electricity,

⁵ The numbers of licensed experts in the given categories in June 2010 are given in brackets. Entry in the list currently provides no information on the activity and references of experts.

- e) the Act on promotion of the use of renewable sources.

However, SEI does not have a special section that would be concerned with buildings. Thus control of energy measures in buildings or at sources with lower output is performed only exceptionally.

1. 5. 5. Czech Chamber of Authorized Engineers (www.ckait.cz)

This is a public law professional organization formed in 1992 on the basis of Act No. 360/1992 Coll., on performance of the profession of authorized architects and on performance of the profession of authorized engineers and technicians active in the construction industry. At the present time, the Chamber has 27,000 members at the levels of authorized engineer, authorized technician and authorized builder. “Energy auditing” is one of the 13 fields of authorized engineers.

1. 5. 6. Czech Chamber of Architects (www.cka.cz)

CCA is a self-administering professional association that was established as a public law entity under Act No. 360/1992 Coll., on performance of the profession of authorized architects and on performance of the profession of authorized engineers and technicians active in the construction industry

1. 5. 7. Czech Energy Agency (abolished)

The Czech Energy Agency was active in the Czech Republic in 1991 – 2008. Its main task consisted in administration of support projects. Support was provided for non-investment (enlightenment) projects in an amount of up to CZK 300,000 and also for minor investment projects to an amount of support of CZK 3 million.

The Czech Energy Agency was abolished in 2008 and its agenda was divided amongst the Ministry of Industry and Trade, the Czechinvest agency and the State Energy Inspection.

1. 5. 8. Other public institutions

- Czech Statistical Office – CSO (www.czso.cz)
- Czech Hydrometeorological Institute (www.chmi.cz)
- Internet information portals, for example:
 - the information portal www.tzb-info.cz (technical equipment of buildings) has, over the past 10 years, become the largest information and especially discussion base for the professional public in all fields related to the construction and equipment of buildings, incl. the use of renewable resources,
 - www.e-stav.cz – information portal for the construction industry
 - www.archiweb.cz – information portal for architecture and the construction industry
 - www.i-ekis.cz (updating of information stopped with termination of the activities of the Czech Energy Agency)
- The Czech Environmental and Information Agency (www.cenia.cz) – this agency also encompasses the agency for "environmentally friendly products", which also include environmentally friendly home boilers.

1. 6. Nongovernmental organizations

Nongovernmental organizations active in the area of energy saving and thus also in the process of implementation of EPBD consist particularly in professional organizations, consulting companies and nongovernmental (environmental) organizations. Most of these organizations already performed activities in the area of energy effectiveness prior to implementation of the Directive and only some were formed or extended their activities on the basis of greater pressure on enlightenment and changes in the commercial environment. The following table gives a brief survey of these organizations.

Organisation	Brief description
EPS CR Association www.sdruzeni-zps.cz	Since 1998, the Association of the Manufacturers of Polystyrene Foam has associated particularly the polystyrene manufacturers and EPS applications, amongst other things with the purpose of: promoting and coordinating common development, participating in the creation of standards, controlling the quality of EPS products and thus contributing to energy savings.
Association of manufacturers of mineral insulation (EVMI) www.avmi.cz	The Association of the manufacturers of mineral insulation in the Czech Republic has the goal of assisting individuals and companies to understand the subject of reducing the energy intensity of buildings and improving the comfort and environmental friendliness of housing. It is currently assisting in creating conditions for implementing EPBD recast. The Association was re-established in 2009 following termination of the activities of the original MIM association in 2008.
Guild for insulation of buildings www.czb.cz	The guild for insulation of buildings is an association of entrepreneurs – legal and natural persons active in the area of insulation of buildings. It was founded in 1993 and has its seat in Prague. At the present time, the guild associates more than forty professional companies and specialists active in the production and distribution of insulation systems, performance and installation of these systems, designing and assessing and also expert activities.
Czech Green Building Council www.czgbc.org	This is a civic association of companies in the area of real estate, construction and technical equipment of buildings with a program of introducing certification of environmentally friendly buildings in the Czech Republic. The Council was founded in 2009.
Association of Energy Auditors www.aea.cz	The Association of Energy Auditors is a civic association voluntarily associating all persons professionally active in performing energy audits. It is the goal of the association to maintain a high level of performed energy audits and to actively participate in the creation of legislative conditions.
Association of Energy	This association was established in 1992 as an independent

Organisation	Brief description
Managers www.aem.cz	nonprofit organization of managers whose work is concerned with the thrifty obtaining and use of energy, its conversion and distribution. Its main activities consist in holding workshops and lobbying.
Passive house centre www.pasivnidomy.cz	The passive building centre is a nonprofit association of legal and natural persons established to support and promote the passive building standard and to ensure the quality of passive buildings. The members of the association include architects, project planners, construction companies, manufacturers of construction materials and elements and other professionals.
SEVEn o.p.s. (Centre for Effective Use of Energy) www.svn.cz	The Centre for the Effective Use of Energy was established in 1990 as a foundation and was the first consulting company after 1989 in the area of energy effectiveness. The organization was formed in the context of the same project as, e.g., the Bulgarian ENEFFEKT association.
ENVIROS www.enviros.cz	This is a private (international) consulting company active in the area of energy policies, energy audits, energy management and preparing documents for government decisions. In addition, it substantially contributed to the preparation and coordination of the process of implementation of EPBD.
Consulting companies and nongovernmental organizations	<p>In addition to the above, a number of other consulting companies and civic associations are active in the Czech Republic in the area of energy effectiveness, not only at the level of buildings, but also for the use of energy sources at both the national and regional levels, for example:</p> <ul style="list-style-type: none"> • EKOWATT o.s.⁶ • CityPlan spol.s r.o. • Energy Consulting o.s. • Veronica o.s. • PORSENNA o.p.s. • Hnutí Duha o.s. – Friends of the Earth CR

1.7. Current conditions and preparation for transposition of EPBD recast

The basic characteristics of EPBD recast are:

- From 2019 buildings of the public administration and, from 2021, all new buildings will be constructed in the standard of nearly zero-energy buildings and the Member

⁶ o.s = Civic Association

States will prepare national plans to promote this standard with a preliminary target for 2015.

- The European Commission will publish a cost-effective methodology for determining national requirements on energy effectiveness in the middle of 2011. New buildings and those undergoing fundamental reconstruction will have to correspond to these energy requirements 3 years after the Directive comes into effect.
- By June 30, 2011, the Member States must publish a list of existing and, as appropriate, also proposed measures to promote implementation of this Directive.
- Two and a half years after the Directive comes into effect, a measure will come into effect according to which a certificate (the building energy performance certificate – EPBC) will be issued for the construction or sale of a building/apartment or new lease, so that the purchaser/lessee is informed about the properties of the building/apartment, and also for buildings occupied by the state administration with an floor area of over 500 m²; five years after the Directive comes into effect, this limit will be reduced to 250 m²; the state administration will further be obliged to display this certificate in a visible place; amongst other things, the certificates of buildings must contain recommendations for improving the energy performance.

Preparation for EPBD recast is taking place in two steps in the Czech Republic. The first step consists in amendment of the Decree on the energy performance of buildings, which deals with some provisions that were found to be problematic in practice.

The second step consists in the incorporation of the requirements of EPBD recast into the national legislation. The unofficial position at the government level (ministries) is that the recast will not entail any change in the set parameters for the Czech Republic in the area of requirements. Particularly the change in requirements on issuing the certificate (EPBC) within the deadlines required by the Directive will be important.

In mid 2008 the National Advisory Team (NAT) was established by the initiative led by Enviro and the Ministry of Environment and associated main stakeholders (Ministries, Universities, Consultancy companies, Normalization and Standardization Institutes, Associations of Energy auditors) to direct the process of the EPBD preparation and implementation at the beginning of 2009 in the Czech Republic.

It can be assumed that this team, which could be extended to include further entities, will continue to participate in any modifications in the legislation in connection with the implementation of the recast of the Directive.

1. 8. Summarizing experience and benefits of implementation of the Directive (EPBD) in the Czech Republic

From the beginning of the 1990's, conditions were created in the Czech Republic for improvement of the energy effectiveness of buildings and energy sources. In connection with harmonization of the legislation prior to accession to the European Union⁷, a separate Energy Management Act was approved in 2000. Together with its secondary legislation, this law

⁷ The Treat on Accession came into effect on May 1, 2004.

created a good framework for implementation (not only) of the Energy Performance of Buildings Directive.

The main benefits provided by the new Energy Management Act can be considered to consist particularly in the systematic approach to energy management, both from above – state and regional energy policies, as well as from below – definition of an energy audit and, in the next phase, the building energy performance certificate. Simultaneously, the institutional base and the responsibilities of the individual entities were defined.

The law originally defined a relatively short deadline for performance of energy audits of public buildings (or all buildings corresponding to the set criteria), which was manifested in a reduction of their practical usefulness. It was not possible to implement measures proposed and recommended in energy audits in such a short time. Energy audits were updated or new ones were gradually created for implementation of projects financed from subsidy programs.

The main benefits of implementation of the Directive can be considered to be particularly:

- the form of the system of administration of the database of energy experts, their authorization (awarding of licenses and allocation of registration numbers) and records of their work,
- the creation and introduction of a systematic approach to evaluation of new structures⁸,
- instigation of professional discussions on the principles of evaluation of the energy performance of buildings,
- creation of the National Calculation Tool for evaluation of the energy performance of buildings based on MS Excel,
- modification of 2 existing commercial SW products that, when the Decree came into effect, already included a calculation methodology according to the requirements of Article 7 EPBD.

In addition, the general fact that, especially for the secondary legislation in the Czech Republic, it is necessary to introduce amendments during one to two years from the date of legal force, can be considered to be, in a certain sense, an advantage. Thus, new legal regulations are created on the basis of experience and needs in practice that could not be completely revealed during the preparation of RIA.

This is also true of the Decree on the energy intensity of buildings, which is the basic regulation implementing the Energy Performance of Buildings Directive into the Czech legislation. It is anticipated that this Decree will be amended during 2010 to eliminate the basic inadequacies of the first version.⁹ Simultaneously, the Decree will be supplemented by evaluation of the primary energy, evaluation of the energy supplied for the individual sphere and evaluation of CO₂ emissions.

Amendment of the Decree should also eliminate one of the unfilled purposes or preconditions of the Directive, the possibility of lay identification of energy performance according to assignment to a particular energy class. For example, at the present time it is not easy to identify whether a low-energy building is involved or not because of the lack of an expression for the heat consumption for heating. The resultant energy obtained is also

⁸ The operative energy audit methodology was created for the purpose of evaluation of existing buildings.

⁹ For example, the ambiguity caused by combination of elements of balance and operative evaluations and evaluation of renewable energy sources produced and consumed in the building.

distorted in the relevant cases by the use of alternative energy sources, especially heat pumps and their COP factor. Amongst other things, this is abused by development and construction companies and also architect ateliers, which use the term “low-energy” and sometimes even “passive building” as a marketing term even when the parameters corresponding to the set standards are not met.

The number of requests for preparing and actually prepared energy performance certificates is increasing, especially in connection with subsidy programs – New Panel and Green for Savings. The greatest volume of requests for subsidies comes from apartment buildings where the construction authority requires construction on the basis of a construction permit. In this case, compliance is ensured with the requirement for preparing a certificate for apartment buildings that comply with both legal conditions, i.e. have more than 1000 m² floor area and reconstruction (insulation) will affect more than 25% of the surface of the shell of the building.

The positive effect of introducing new assessment of buildings was substantially reduced by further effects, in particular:

- Inadequate enlightenment and training of responsible workers, leading, for example, to the employees of the individual construction authorities not acting uniformly after the Decree came into effect¹⁰.
- In addition, a great many builders, not only individual, but especially smaller development companies and engineering offices (project planners and architects) only became aware of the need to prepare an energy performance certificate during construction procedures when the Decree was already in effect.
- The initial interest in the subject of preparing a certificate gradually decreased during the first year of legal force of the Decree and thus the preparation of an energy performance certificate remained a “necessary evil”.
- The anticipated costs of the evaluation were gradually reduced and, after builders discovered that the authorities considered the certificate to be “only a formality”, they began to employ cheaper authors.
- At the present time, a difference is emerging in the preparation of energy audits and energy performance certificates.

Even real estate offices and individual purchasers and sellers in the sale of real estate have not shown any interest in the tool for evaluating energy performance.

The described methodology for evaluation is difficult to understand for the lay public, which has a tendency to compare the results of the calculation for evaluating the energy performance with reality, i.e. with the values measured in the particular building. These users are frequently disappointed that these results do not correspond, as buildings are frequently not used in the standard way anticipated by the boundary conditions of the calculation.¹¹

¹⁰ This was particularly true of the varying approach of the individual construction authorities, i.e. some authorities did not require an energy performance certificate or accepted a certificate with unsuitable evaluation of the building, etc. These ambiguities are gradually being eliminated; nonetheless those that are not of a methodical character but rather of an institutional nature will require a systematic approach, probably in the next stage of implementation of EPBD.

¹¹ For example, cases exist where the building is overheated (frequently to a temperature above 23 °C), while the calculation temperature is 21 °C and differences occur in the determination of the consumption of energy for lighting, cooling or preparation of hot water.

Implementation of the Directive did not have practically any qualitative impact on the approach of development companies that used the visual form of the label for the energy performance certificate for marketing purposes, but did not change their practical construction procedures. This situation is also gradually improving; nonetheless enlightenment and education of purchasers are progressing slowly and consumers are frequently satisfied with a statement that the purchased real estate has a “low-energy standard”.

At the present time, no statistics of preparation of certificates are available, i.e. information on the total number of certificates prepared, how many of these were for new construction, classified as apartment buildings, administrative buildings and other buildings, etc. Although energy experts are obliged to send surveys of prepared certificates (and also energy audits) to the Ministry, it is estimated that this happens in only 60% of cases.

There was no official state campaign supporting EPBD implementation in the Czech Republic at this time (and up to the present day). Some energy consultancy companies, technical equipment manufacturers (pumps, space heating and cooling control systems) and professional associations are running their own information campaigns, sometimes in collaboration with local municipalities.

A national information campaign within the framework of financing energy efficiency projects of the public sector from EU Structural Funds was in the process of preparation by Ministry of Environment but has not been launched.

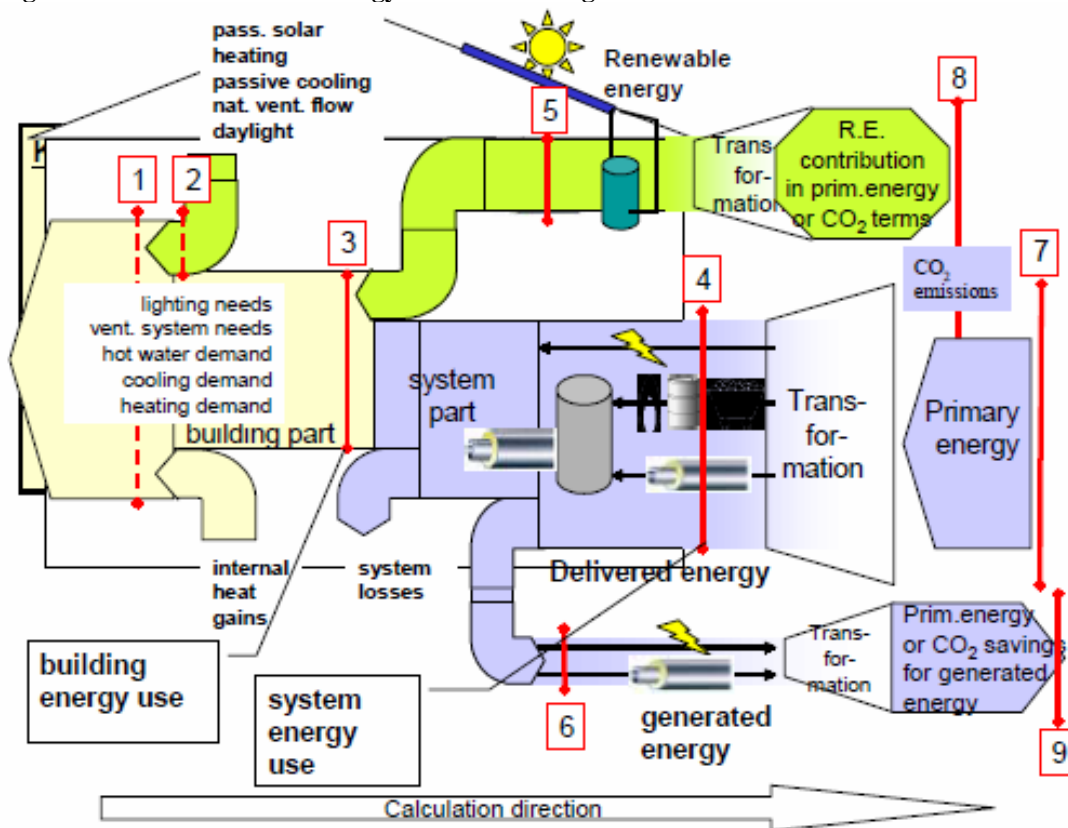
2. IMPLEMENTATION PROCESS OF THE EPBD IN THE CZECH REPUBLIC

This chapter gives a detailed description of the process of implementation of the Directive with references to the conditions prior to implementation and mentioning introduced changes and the reasons for them.

2.1. Purpose and targets of the Directive at the level of the EU

The objective of the Directive is to improve of the energy performance of buildings within the EU, taking into account outdoor climatic and local conditions, as well as indoor climate requirements and the cost-effectiveness of energy consumption.

Figure 1: Overall scheme of energy flows in buildings



Source: Umbrella document / Description of energy flows:

[1] – is the gross energy needs – user’s requirement for heating, cooling, lighting etc., which are specified for the purposes of the calculation

[2] – is the “natural” energy gains – passive solar, ventilation cooling, daylighting etc.

[3] – the building’s net energy use is obtained from [1] and [2] along with the characteristics of the building itself.

[4] – is the delivered energy, represented separately for each energy carrier, inclusive of auxiliary energy, used by heating, cooling, hot water, ventilation and lighting systems, taking into account RES and co-generation. This may be expressed in energy units or in units of the energyware (kg, m³, kWh, etc.)

[5] – is renewable energy produced on the building premises

[6] – is generated energy – produced on the premises and exported to the market` this can include part of [5].

[7] - represents primary energy usage or the CO2 emissions associated with the building

The local calculation methodology according to the Directive should have been harmonized with the EU legislation. An explanation of the general relationship between various CEN

(European Committee for Standardization) standards and the Energy Performance of Buildings Directive (EPBD) was provided by the Umbrella document (1).

The Umbrella document outlines the calculation procedure for assessing the energy performance of buildings. It includes a list of the European standards, both existing and those that are being written, which together form the calculation methodology. Drafts of the new standards were being prepared in 2004 – 2006 by a special working group.

2. 2. Basic strategic approach to implementation in the Czech Republic

Incorporation of Directive 91/2002/EC into the Czech legislation is a continuous process and this is still not complete. In 2002, following the issuing of the Directive, the Ministry of Industry and Trade began to prepare the individual phases of its implementation in the Czech Republic, where it was planned that the process would be commenced in 2004. A call for tenders was announced in 2004 for preparation of documents leading to changes in the legislation. Both commercial entities and the representatives of technical universities participated in the selection process.

One of the requirements on document authors was setting up of an international team, whose main task would consist in transfer of the available information on implementation of the requirements of the Directive from the EU countries that had already had experience in transformation of the EPBD requirements and their transformation into the national legislation.

A summary table is given of the time demands associated with the process of implementation of the requirements of the Directive in the Czech Republic, showing the important points in the process in time.

Figure 2: Implementation of the Directive in the Czech Republic over time

	Period vs. implementation work	2004			2005			2006			2007			2008			2009		
1	Call for tenders and selection of the implementation team																		
2	Inception of the implement. process – PHARE project																		
3	Implementing EPBD in the Czech Republic																		
4	Analysis of EU experience																		
5	Market segment analysis																		
6	Preparation and delivery of training seminars																		
7	Procedure guidelines																		
8	Presentation of project results																		
9	Preparation of documents for a change in the law																		
10	Documents for a change in the secondary legislation																		
11	Unification process – EU and CR																		
12	Amendment of Act No. 406/2000 Coll.																		
13	Preparation of a (national) calculation tool																		
14	Preparation of an amendment to the law																		
15	Preparation of implementing decrees																		
16	Approval process																		
17	Training the professional public and authorization																		
18	Issuing Decree No. 148/2007 Coll.																		
19	Issuing Decrees No. 193/2007 Coll. and 194/2009 Coll.																		
20	Issuing Decrees No. 276/2007 Coll. and 277/2007 Coll.																		
21	Issuing testing version of calculation tool																		
22	Testing period for the calculation tool																		
23	Working version of the calculation tool																		
24	Amendment of Act No. 406/2000 Coll.																		
25	Imposing of the obligation of compliance with the requirements of EPBD																		

The first stage of preparation of the implementation was opened by the ministry for a closed group of experts; the discussion was opened for the general public in the phase of presentation of the results of the project and in preparation of the amendments to the Act and the relevant decrees.

2.3. National legislation (CZ)

The Ministry of Industry and Trade is responsible for implementing the EPBD requirements (all the articles of EPBD).

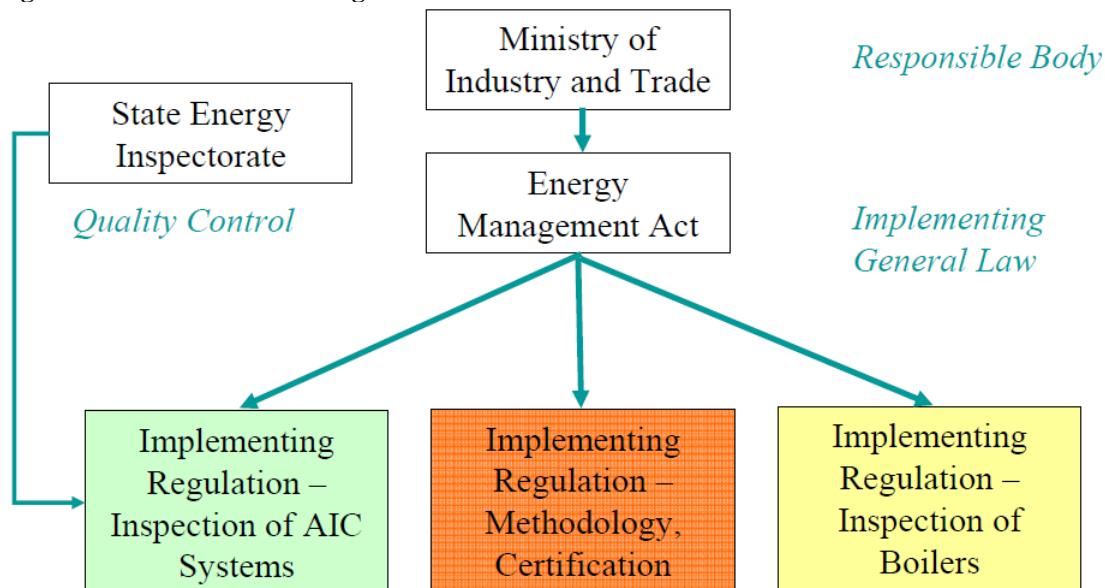
A key amendment of the Energy Management Act was adopted on 29th March 2006 and transposed EPBD Articles 6 and 6a into the Czech legislative framework. The Act came into force on 1st of July 2006.¹²

The Energy Management Act stipulates in Article 10 that experts must be qualified for both building certification and inspections i.e. authorised energy auditor or authorised engineer or architect.

Implementing the regulations of the Act specifying the methods of building certification and inspections are as follows:

- Energy Performance in buildings in 148/2007 Coll.
- Inspection of Boilers in 276/2007 Coll.
- Inspection of AIC Systems 277/2007 Coll.¹³

Figure 3 : Scheme of EPBD Legislation and Control mechanism



Source: Jan Pejter, ENVIROS, s.r.o.- EPBD Platform

2.3.1. Institutional changes

The newly accepted requirements on preparation of energy audits of the energy performance of buildings (Article 7), control of the efficiency of boilers (Article 8) and inspection of air-conditioning systems led to the necessity of extending the network of energy experts. On the basis of an examination by Ministry of Industry and Trade, these experts have been assigned registration numbers, under which they are authorized to perform their professional activities.

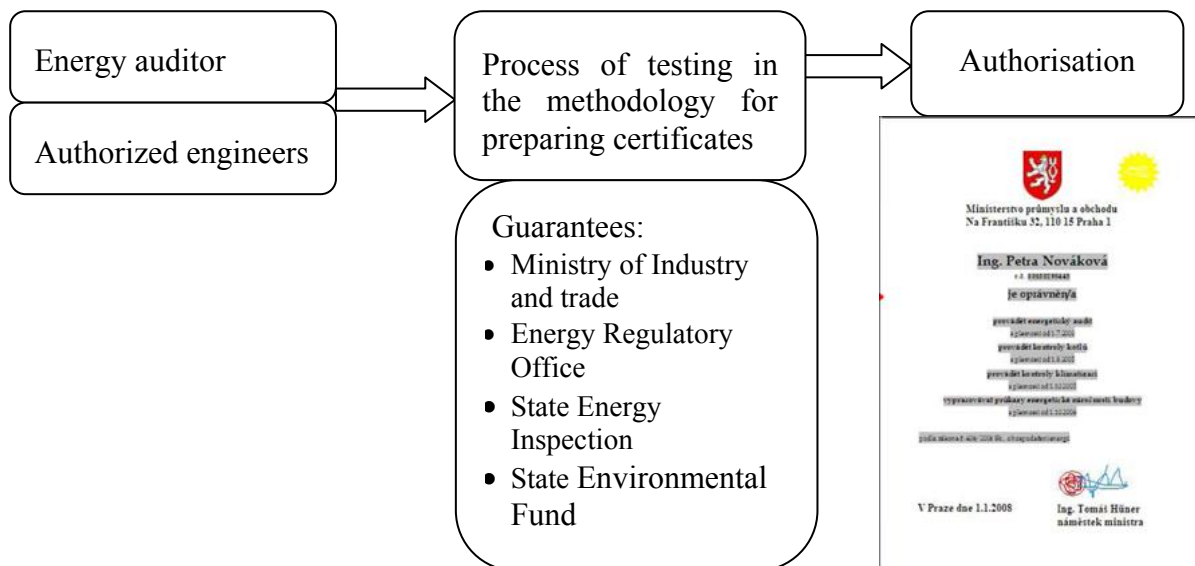
The Ministry of Industry and Trade has created a freely accessible database for easy records of energy experts and their completed expert reports. An energy expert can be found in this

¹² The latest wording of the Act is not available in English.

¹³ The Collection of Lws is available only in the Czech language at the website of the state administration http://portal.gov.cz/wps/portal/_s.155/6966/_s.155/699/place.

database according to his/her name, location and field of activity for which (s)he has received authorization. <http://www.mpo-enex.cz/experti/ExpertListEng.aspx>

Figure 4: Process of obtaining authorization by energy experts¹⁴.



Source: Jan Pejter, ENVIROS, s.r.o.- EPBD Platform

¹⁴ Within authorised engineers engaged in construction with specialisation for building construction, building services, technology of the structure (according to the branches of the Czech Chamber of Authorised Engineers and Technicians).

Figure 5: Excerpt from the online database of energy experts

Ministry of Industry and Trade of the Czech Republic

Minister and ministry | Czech

Search | Advanced search

Home | Business support | Foreign trade | Consumer Protection | EU and Internal market | Energy and raw materials | Industry and construction | e-Comm. and post

Home » Energy and raw materials » Energy efficiency » List of energy experts

List of energy experts

Published: 17.6.2010
Author: Energy department

List of energy experts (see details)

Last name:

Region: --All regions--

Field: --All fields--
--All fields--
Energy audit
Air-conditioning inspection
Boiler inspection
Energy Performance Certificate

Ordering:

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Contact details	
Certificate number	0000
Name	ENERGY EFFICIENCY
Energy audit, inscription date	2002
Number of Expert statements	34
Number of Client references	19 see references
Air-conditioning inspection, inscription date	2008
Number of Expert statements	0
Number of Client references	0
Boiler inspection, inscription date	2008
Number of Expert statements	0
Number of Client references	0
Energy Performance Certificate, inscription date	2008
Number of Expert statements	35
Number of Client references	31 see references
Street	Průmyslová ul. 1000/100
ZIP code	10000
Locality	Prague
Telephone	+420 224 123 456 789
Fax	+420 224 123 456 789
E-mail	energy@mpo.cz
Company	ENERGY EFFICIENCY
Street	Průmyslová ul. 1000/100
ZIP code	10000
Location	Prague
Telephone	+420 224 123 456 789
Fax	+420 224 123 456 789
E-mail	energy@mpo.cz

Source: www.mpo.cz

Professional groups were also expanded in the Czech Chamber of Authorized Engineers and Technicians Active in Construction. A special section was established for evaluation of the requirements of Article 7 of the Directive. Engineers that have authorization by law to prepare project plans for construction and the technical facilities of structures may request the Ministry for extension of their authorization and inclusion in the database of energy experts.

2.3.2. Qualified Independent Experts

Experts for building certification and inspections are authorised by the Ministry of Industry and Trade. According to Section §6a of Article (7) of the Energy Management Act (406/2000 Coll.), the application may be submitted only by a person who:

- has an energy auditor registration number or
- is registered as a authorised architect or authorised engineer or technician by the Czech Chamber of Certified Engineers and Technicians.

Energy auditors¹⁵ and authorised engineers or architects undertaking a specific training course and passing an examination are authorised by the Ministry.

Training for energy experts is not mandatory and each applicant decides which training course to undertake. Generally the training contains following areas of education:

- legislation (laws, decrees);
- technical (national technical standards, machinery and civil)
- engineering, energy generation, distribution and consumption, control systems);
- economic (IRR, NPV, amortisation, discount & interest)

Experts in building certification, inspectors of boilers and AC systems have to pass different examinations, but the same expert can be simultaneously authorized to perform more than one of these activities.

The EP certification or inspection may not be performed by a person who:

- holds a share in the company or co-operative that ordered EPC;
- is a stakeholder in or a member of the co-operative that ordered EPC,
- or is a statutory body of or a member of the statutory body of the entity that ordered EPC, or is employed by or has a similar relationship to the corporation that ordered EPC;
- is someone close to those people who might be, due to their position, a natural or legal person influencing the energy auditor.

There were about 190 authorised experts for EP certification in the middle of 2008 and this number was expected to increase to about 220 by the end of 2008. At the end of 2009 there were 700 authorised experts according to a ministry decision.¹⁶

¹⁵ The qualification required for energy auditors are: a university degree and 3 years technical experience, or a school-leaving certificate + 5 years experience.

¹⁶ It is probable that this later decision of the Ministry to issue additional license to up to 700 increased the competition on the market and substantially reduced the cost of energy certificates.

2.4. Procedure for new buildings

On the basis of Article 5

For new buildings, requirements have been established on the building structure and elements in a national technical standard, which is included in the laws (the Act on energy management, the Construction Code) and secondary legislation. Here, standard CSN ČSN 73 05040 becomes binding for project planners, builders and executive and control authorities.

Further technical requirements on construction are stipulated in implementing Decree No. 268/2009 Coll., on technical requirements on construction, which replaced implementing Decree No. 137/1998 Coll., on general requirements on construction.

Similar to the requirements on the technical equipment of buildings, harmonized technical standards have been introduced and are referred to in the implementing secondary legislation.

2.5. Approach in existing buildings

On the basis of Article 6

The implementing regulation of the Act sets the minimum requirements for the energy performance of existing buildings under major renovation that must be complied with.

Major renovation means alteration to a completed building that involves more than 25% of the overall surface area of the building shell, or a change in the technical equipment of the building that causes energy effects whose overall impact on the initial energy consumption is greater than 25% of the overall energy consumption of the building.

The requirements for existing renovated buildings are the same as for new buildings. Comparative parameters for comparing assessed building and notional building are such as the thermal/technical properties of building structures (maximum U-values, air tightness of the building envelope, etc.).

However, attaining of the required values must correspond to the economic cost. In contrast to the requirements of the Directive, the requirement was introduced that an energy performance certificate be provided for buildings that are rented or sold only when a certificate was prepared in the past as a legislative obligation. If this obligation did not arise in the past, the owner need not provide a certificate.

2.6. Requirements for new buildings and existing buildings

Trends in technical standards in the area of the energy intensity of buildings can be seen particularly in standard CSN 73 0540, dealing with the technical requirements on construction elements and structures, of 1962 with effect from 1964.

Table 5: Development of required U-values in the Czech Republic

U – value [W/(m ² .K)]	Since Jul 1964	Since Jan 1979	Since May 1994	Since Nov 2002	Since Apr 2007
Windows	-	3.70	2.90	1.80	1.70
Wall	1.48	0.89	0.46	0.38	0.38 (0.25)
Floor	1.39	1.09	1.03	0.60	0.45
Roof	0.90	0.51	0.32	0.30	0.24

In addition to the requirement on structural elements and structures, stricter requirements are imposed on the technical facilities of buildings (source and distribution of energy). The requirements on the energy efficiency of storage accumulators are given as an example. The table is an annex to the implementing Decree on the energy intensity of buildings (No. 148/2007 Coll.).

Table 6: Required minimal energy efficiency of the boilers in %.

Thermal out of the boiler	Coke	Hard Coal	Coal Pressed Fuel	Brown Coal – sorted	Brown Coal – unsorted	LFO	HFO	Natural Gas
Up to 0.5 MW	69	68	67	66	62	80	-	85
0.51 – 3 MW	-	70	69	68	63	83	-	86
3.1 – 6 MW	-	75	-	72	65	84	81	87
6.1 – 20 MW	-	77	-	75	70	85	82	90
20.1 – 50 MW	-	80	-	-	77	87	85	92
Above 50 MW	-	82	-	-	82	89	86	93

2.7. Energy Calculation Methods

An assessment analysis of the possible use of European procedures based on CEN standards was prepared for the calculation method (according to Article 3 of the Directive). The evaluation was prepared in the context of the PHARE implementation project by the ENVIROS – ČR, BRE – UK, CSTB – France team.

At the time when the analysis was prepared, a great many of the current CEN standards were in the stage of preparatory documents being harmonized by the individual working groups. This fact was not a substantial obstacle to performance of the analysis.

2.7.1. Evaluation of the available calculation methods

The international team analyzed the possibility of using calculation methods from several viewpoints, especially taking into consideration:

- national practices,
- introduced technical standards,
- valid legislation,
- the experience of foreign partners transferred from the applied approach in the EU countries in which the requirements of the Directive had mostly been incorporated into the legislation and into the calculation tools.

Table 7: Summary of the results of the multi-criteria analysis of calculation methods

Method	Simplified methods				Simulation methods	
	Simple degree-day	Developed degree-day	Monthly heat balance	Simplified dynamic	Prescribed simulation tool	Competing simulation tools
Availability as certification tool	****	***	*****	****	***	**
Repeatability	*****	*****	*****	*****	*****	**
Affordability	*****	****	****	****	**	**
Technical scope and applicability	*	***	***	****	*****	*****
Technical soundness	*	***	***	****	*****	*****
Adaptability and stability	*	**	***	****	*****	*****
Transparency	*****	****	****	****	***	*
Consistency with other countries	**	***	*****	*	*	*
Weather data availability	*****	***	***	*	*	*
Match to Czech legal and technical context	*****	****	***	***	*	*

Source: Working paper 2005 – ENVIROS, CSTB, BRE

2.8. Energy requirements

During the implementation process, workshops and discussions were organized amongst the professional public, involving discussions of the proposals of the international team and the possibility of using existing national methods and procedures. On this basis, it was possible to establish the requirements of the energy calculation at a national level. The main conclusions of these discussions are summarized below:

- The calculation procedure must be capable of being described explicitly (either in legislation or in standards). This does not preclude implementation in the form of software, but effectively rules out the use of complex computer simulation methods.
- Existing practice for heating energy calculation is the use of a (fixed base temperature) degree-day method using local weather data. There is a strong preference to maintain continuity with this.
- However, current Czech standards do not address energy use for lighting, or HVAC or DHW system efficiency. A two-stage process, first establishing whether there is an overheating risk, followed by different calculation procedures for cooled and uncooled buildings would be acceptable in principle.
- It was considered important to be able to compare the Operational and Asset Ratings of each building.

- Therefore ratings systems based on “reference” or “notional” buildings are unlikely to be acceptable.
- In order to make the comparison, any procedure should be capable of adjustment for observed weather and building operation.
- Both ratings should be expressed in the same terms, such as primary energy per unit of floor area, rather than as indices.
- The chosen procedure should be able to use the available local weather data. Little monthly climate data is currently available, although this is expected to be provided shortly. No suitable hourly weather data is available.

2. 8. 1. Assessment of the energy demand in buildings due to heating

Prior to implementation of the Directive

From 1964, the calculation of the energy intensity of buildings as a legislative requirement was subject to CSN 73 0540. The national standard sets boundary conditions (indoor and outdoor calculation temperatures, solar gains, indoor gains) and thermal technical requirements on the structure, quality of the microclimate, etc. The standard defines a procedure based on the day-degree method.

Definitions for project planning and installation of thermal systems in buildings were defined by national standard CSN 06 0310 and calculation of the thermal power was defined by national standard CSN 06 0206. The calculation method for determination of energy requirements and the efficiency of the system – Production of heat for heating, boilers was established by CSN 06 0401.

Decree No. 213/2001 Coll. (as amended by Decree No. 425/2004 Coll.) outlines the means of evaluation of heat consumption for heating in the energy audit. The Decree stipulates the means of evaluation by an operative method taking into account the average climatic year from the average temperatures for the previous three years. The further calculation procedure was based to a major degree on CSN 73 0540.

The energy audit method was supplemented to include:

- Decree No. 291/2001 Coll., laying down the details of the efficiency of energy use in heat consumption in buildings¹⁷.
- Decree No. 150/2001 Coll., stipulating the minimum efficiency of energy use in the production of electricity and thermal energy.
- Decree No. 151/2001 Coll., laying down the details for the efficiency of the use of energy in the distribution of thermal energy and indoor distribution of thermal energy.
- Decree No. 152/2001 Coll., laying down the rules for heating and supply of hot water, specific indicators of heat consumption for heating and preparation of hot water and requirements on the fitting of the indoor thermal facilities of buildings with instruments regulating the supply of thermal energy.

¹⁷ The Decree was cancelled without replacement because of the use of a different calculation method for calculation of indoor and outdoor heat gains and annual evaluation of heat consumption for heating.

- Decree No. 153/2001 Coll., laying down the details of determining the efficiency of energy use in transmission, distribution and internal distribution.

After implementation of the Directive

The methodology of calculation of the heat requirements for heating is based on the monthly methodology given in harmonized technical standard CSN EN 13 790, which forms the basis for the calculation methodology. National standard 73 0540 continues to be used for identification of local conditions and compliance with the set standard of thermal technical parameters of constructions and conditions taking into consideration the impacts on the local micro-climate.

At the present time, calculation of the thermal power is adjusted according to harmonized European standard CSN EN 12 831 and thus replaces original national standard CSN 06 0206. The calculation method for determination of energy requirements and the efficiency of the system – Production of heat for heating, boilers is established by harmonized European standard CSN EN 15 316 and thus replaces the original national standard CSN 06 0401.

The original implementing decree supplementing the energy audit method was reduced and replaced by a new one corresponding to the EPBD requirements.

- Decree No. 148/2007 Coll. - on the energy intensity of buildings which stipulates the requirements on the energy intensity of buildings and comparison indicators. Similarly, references are made here to the calculation method. This Decree further stipulates the extent of preparation and the prescribed uniform form for the energy performance certificate, including the use of already prepared energy audits. This Decree replaced Decree No. 291/2001 Coll.
- Decree No. 193/2007 Coll., laying down the details for the use of energy in the distribution of thermal energy and indoor distribution of thermal energy and cold. This decree replaced Decrees No. 151/2001 Coll. and 153/2001 Coll.
- Decree No. 194/2007 Coll. – laying down the rules for heating and supply of hot water, specific indicators of consumption of thermal energy for heating and for preparation of hot water and requirements on the fitting of indoor thermal equipment of buildings with instruments regulating the supply of thermal energy to end consumers. This Decree replaced Decree No. 152/2001 Coll.

2. 8. 2. Assessment of the energy demand in buildings due to hot domestic water

Prior to implementation of the Directive

The calculation of the heat consumption to prepare hot water was assessed according to CSN 06 0320:1986; minor changes were made in this standard in 1998.

The calculation method was mentioned in Decree No. 291/2001 Coll., laying down the details of the efficiency of energy use in heat consumption in buildings.

After implementation of the Directive

The methodology of calculation of the energy performance of a building for energy supplied to the boundary of the building was based on harmonized European standard CSN EN 15 316 – 3 – 3, which stipulates the calculation for the system and preparation of hot water. National standard CSN 06 0320 is still in effect and is used for project design and planning.

Reference to the technical regulations is given in the secondary legislation.

- Decree No. 148/2007 Coll. - on the energy intensity of buildings, which stipulates the requirements on the energy intensity of buildings and comparison indicators, as well as stipulation of the method of calculation.
- Decree No. 194/2007 Coll. – laying down the rules for heating and supply of hot water, specific indicators of consumption of thermal energy for heating and for preparation of hot water and requirements on the fitting of indoor thermal equipment of buildings with instruments regulating the supply of thermal energy to end consumers. This Decree replaced Decree No. 152/2001 Coll.

2. 8. 3. Assessment of the energy demand in buildings due to cooling

Prior to implementation of the Directive

Calculation of the energy consumption was not required. This was because of historical developments where air-conditioning systems were installed to a minimum degree in buildings, i.e. their consumption was negligible in the sector. A substantial increase in installation of air-conditioning units occurred in the 1990's.

After implementation of the Directive

The methodology of calculation of the need for energy for cooling is based on the monthly methodology in harmonized technical standard CSN EN 13 790, i.e. the same calculation method as for expression of the heat for heating..

- The requirements on cooling are mentioned in implementing Decree No. 148/2007 Coll. - on the energy performance of buildings and Decree No. 193/2007 Coll., laying down the details for the use of energy in the distribution of thermal energy and indoor distribution of thermal energy and cold.

2. 8. 4. Assessment of the energy demand in buildings due to ventilation

Prior to implementation of the Directive

Because of the absence of HVAC in most buildings, a methodology has not been stipulated for calculation of energy consumption and the energy requirements for ventilation.

After implementation of the Directive

European standards EN 15 241:2007, EN 15 242:2007 and EN 15 243:2007 have been adopted. The method mentioned in these standards was included in the calculation tool at the national level.

The requirements on ventilation are mentioned in implementing Decree No. 148/2007 Coll. – on the energy performance of buildings.

2. 8. 5. Assessment of the energy demand in buildings due to lighting

Prior to implementation of the Directive

Until the middle of 2003, basic standard CSN 36 0450 was in effect; in the context of harmonization with EU regulations, this was replaced by standard CSN EN 12464-1. This standard gives an exhaustive list of requirements on lighting for areas for which this requirement is stipulated for hygienic reasons. The expected energy savings could be calculated on the basis of the dimensions of the individual lighting systems and their

anticipated use. Exact calculation procedures and the impacts of artificial lighting on calculation of indoor gains were not stipulated.

After implementation of the Directive

The Czech regulations were harmonized with European standard EN 15 193, which stipulates the energy requirements on lighting. This standard was incorporated into a calculation procedure together with other harmonized standards and procedures.

During the EPBD implementation process, the working teams agreed on stipulation of their own algorithms because of the difficulty in implementing the proposed CEN standards.

2.9. Calculation procedures

General level

The methodology is used for all regions and all building types in the Czech Republic. The procedure is based on published CEN Standards and applicable Czech Technical Standards. Energy performance is expressed by the total annual delivered energy consumption, including heating, cooling, hot water, mechanical ventilation, lighting and auxiliary energy needed for the building operation.

A simplified multi-zone calculation, loaded as a typical day for each month in one hour stages is used. Climate data are specified for 4 climate zones according to the national standards and are used as input data for building physics calculation.

Building level

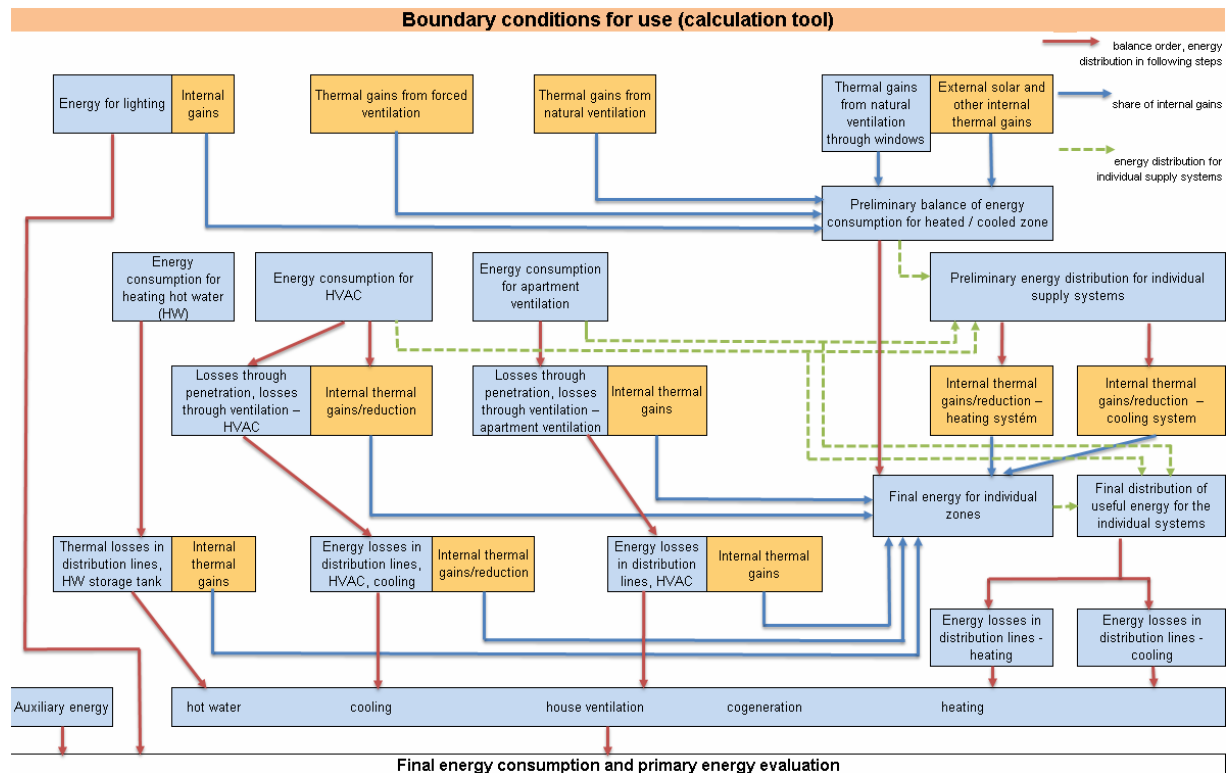
Zone operation profiles include occupation, lighting, indoor environment requirements and auxiliary energy. Zone operation profiles are standardized for typical zones such as offices, schools, dwellings, etc.

Building energy systems such as heating, cooling, hot water and ventilation are included as zone-assigned systems, while energy sources (e.g. boilers, co-generation unit, solar collectors etc.) are assigned in the model to the energy delivery systems.

2.9.1. Tool for the energy assessment

On the basis of recommendations of the boundary conditions for the calculation, the first version of a freely available calculation tool in the MS Excel program was prepared. The draft tool was prepared at the Department of Construction Technology of the Faculty of Civil Engineering of the Czech Technical University in Prague. This calculation tool was programmed here on the basis of the stipulated methodology and the consulted calculation scheme.

Figure 6: Boundary conditions for use of the tool and the calculation procedure



Source: Prof. Ing. Karel Kabele, CSc., Ing. Miroslav Urban, Ph.D – Czech Technical University

The National Calculation Tool (NCT) was published in October 2007. The calculation method is based on the delivered energy required under standard indoor and outdoor conditions.

The basic process of the calculation is divided into two stages:

- calculation of the energy demand is calculated on the standard use of the building, or its parts – zones; this means calculation of heat losses and heat gains required in each space in order to maintain the specified internal conditions;
- calculation of energy consumption (building, or parts – zones, according to the energy demands); this means calculation of the energy required by the energy systems (boilers, AHU units, hot water systems, lighting, etc.) needed to provide the necessary heating or cooling, or humidity control, etc.

Development of NCT was supported by Ministry of Industry and Trade in terms of the EFEKT programme. NCT is available free-of-charge <http://tzb.fsv.cvut.cz/projects/nkn/>.

The basic principle of the national EP requirement assessment is a comparison of the assessed building with a notional building. The notional building is theoretical with the same geometry, purposes and regime of usage as the assessed building.

The thermal characteristics of the components (building envelope, energy source, distribution system, etc.) are set to a reference value defined by the national standards and regulations.

The energy delivered to the assessed building must be lower or equal to the energy delivered to the notional building.

The principle of comparison of the energy performance of the evaluated building with a reference building was altered during the testing period. It was established as classification into individual energy performance classes on the basis of the total energy consumption.

Primary energy and CO₂ emissions are not yet assessed in the building certification. The table below shows energy classes (in kWh/m²a) for different building types. Class “C” is a minimum EP requirement level for new and renovated existing buildings (reference values).

Table 8: Energy classes for different building types

Building type	A	B	C	D	E	F	G
Single family houses	< 51	51 - 97	98 - 142	143 - 191	192 - 240	241 - 286	> 286
Apartment blocks	< 43	43 - 82	83 - 120	121 - 162	163 - 205	206 - 245	> 245
Hotels and restaurants	< 102	102 - 200	201 - 294	295 - 389	390 - 488	489 - 590	> 590
Offices	< 62	62 - 123	124 - 179	180 - 236	237 - 293	294 - 345	> 345
Hospitals	< 109	109 - 210	211 - 310	311 - 415	416 - 520	521 - 625	> 625
Educational buildings	< 47	47 - 89	90 - 130	131 - 174	175 - 220	221 - 265	> 265
Sports facilities	< 53	53 - 102	103 - 145	146 - 194	195 - 245	246 - 297	> 297
Wholesale and retail trade services buildings	< 67	67 - 121	122 - 183	184 - 241	242 - 300	301 - 362	> 362

Source: Decree 148/2007 Coll. – energy efficiency into buildings

2. 9. 2. Building certificates

The Energy Management Act lays down the requirements for the certification of buildings. The certification became obligatory after 1st January 2009 for new buildings (larger than 50 m²) and existing renovated buildings (larger than 1,000 m²).

An energy performance certificate issued for a multifamily apartment building is mandatory for each apartment.

Public buildings (larger than 1,000 m², in the case of a new construction or a major renovation of a public building) must display the certificate in a prominent place clearly visible to the public before the 1th January 2008 (Law No. 61/2008 Coll.).

Other buildings when rented or sold will be provided with an energy performance certificate only if they were new or renovated after 1st January 2008 (Law No. 61/2008 Coll.).

The building energy performance certificate comprises energy certificate illustration and written documentation with administrative and technical data (building type, energy use in the building taken into EP calculation, results of the calculation and proposal of energy-saving measures). The EP certificate also shows the building class after the implementation of cost-effective saving measures.

The energy auditing scheme for industry and buildings has been in place in the Czech Republic since 2000. Long experience has been gained in recommendations for cost-effective improvement of the energy performance divided between modernisation measures (building envelope, technical systems) and measures of property management. The energy audit methodology is given by Decree No. 425/2004 Coll. stipulating mandatory requirements on energy auditing.

A list of EP certificates (as well as the energy audits) by authorised energy auditors kept in the register is compiled annually by the Ministry of Industry and Trade.

The State Energy Inspection (www.cr-sei.cz) ensures quality control of the EP certificates. It also has the power to penalize failure to observe EPBD legislation by building owners.

The annex gives an example of a building energy performance certificate label¹⁸.

2. 9. 3. Commercial tools for the calculation

Prior to implementation of the Directive, two of the most frequently used commercial tools for evaluation of the energy performance of buildings were available in the Czech Republic. During the testing period and period of validity of the Decree on Energy Performance (before it came into effect), both these tools were extended to include its methodology. Thus, both these tools are employed for evaluation according to the Directive in the creation of energy performance certificates.

Both software products enable complete energy calculations and calculations in the area of construction physics. The price of basic modules permitting calculation according to the requirements of the Directive vary in the range € 500 – 1000 €.

2. 10. Boilers, HVAC technology

Articles 8 and 9

Prior to implementation of Directive 91/2002/EC, the legislation and technical standards for boilers were at a good level (the national legislation basically corresponded to the requirements of the Directive). However, there was no obligation to control air-conditioning equipment. The following chapters analyze this aspect in more detail.

2. 10. 1. Evaluation of the legal state prior to implementation of EPBD

Act No. 406/2000 Coll., as amended, was valid prior to implementation of Directive 91/2002/EC. The Act reflected the requirements mentioned in Council Directive 93/76/EEC to limit carbon dioxide emissions by improving energy efficiency.

In addition, Act No. 86/2002 Coll., on protection of the air, and the related Government Regulation No. 352/2002 Coll., laying down emission limits and other conditions for operating stationary combustion air pollution sources, are also in effect. The Government Regulation regulates not only the permissible limits, but also the periodicity of control and measurement. The requirements and the means of authorization of persons authorized to implement them were also laid down. The rights and obligations of boiler operators, including small boilers (to 0.2 MW), were also stipulated.

Both basic laws and the related implementing legal regulations have been amended and the requirements of the national legislation have been unified with the EU requirements, expressed in EPBD.

2. 10. 2. Inspection of boilers

Prior to implementation of the Directive

Under the term boiler, EPBD refers to a hot-water boiler (Article 2 (6)), while the Czech energy legislation (MIT Decree No. 150/2001 Coll.) regulates obligations jointly for steam, hot-water and warm-water boilers. From the viewpoint of economy of energy consumption in boiler operation, from 2000 Act No. 406/2000 Coll. has stipulated the obligation for the

¹⁸ Only public buildings or buildings open to the public are required to place a sign visibly on the building. At the present time, a new design of this sign is being prepared, which will also give the primary energy consumption and/or CO₂ emissions.

producers of thermal energy to ensure at least minimum efficiency of the production of thermal energy in boilers as stipulated by a Decree. The relevant Decree No. 150/2001 Coll., prescribes the means of calculating the efficiency and stipulates minimum permissible values of the efficiency of steam and hot-water boilers for various performance categories and kinds of fuel burned.

The Act further requires that natural and legal persons and the organizations of the State, Regions and municipalities with an annual consumption greater than the value stipulated in Decree No. 213/2001 Coll. subject their energy management to an energy audit. The energy audit must evaluate the efficiency of boilers and compare the results with the requirements of Decree No. 150/2001 Coll. These legislative requirements do not apply to the operators of boilers installed in family houses, apartments and structures for individual recreation.

Independent of the energy legislation, the environmental protection legislation also imposes further obligations on the operators of boilers – especially Act No. 86/2002 Coll., on protection of the air. For the category of small boilers, the Act on Protection of the Air and Government Regulation No. 352/2002 Coll. (Annex 7) impose the requirement of controlling the efficiency of combustion from a nominal output of 15 kW (and 11 kW for gas boilers) and stipulates limits for the combustion efficiency.

In addition, the Czech Labour Safety Office issued a Decree on the safety of work with low-pressure boilers, requiring that operators provide for an expert inspection of the boiler rooms 1x annually.

After implementation of the Directive (Article 8)

Amendment to Act No. 406/2000 Coll. brought Decree 276/2007 Coll. into effect – control of the efficiency of boilers, which was promulgated in 2007. The Decree lays down procedures for regular and one-time controls of boilers, methodologies, scope of preparation of reports (described in greater detail in the annex to the Decree) and the requirements on examining persons.

The frequency, scope and means of control are further stipulated for regular controls by the special legal regulations, in particular Act No 86/2002 Coll., on protection of the air, Government Regulation No. 146/2007 Coll. laying down emission limits, and Decree No. 356/2002 Coll., as amended.

2. 10. 3. Inspection of air-conditioning systems

Prior to implementation of the Directive

Energy management in ventilation of buildings and cooling is regulated by only one legal regulation (Decree No. 231/2001 Coll., laying down the details of an energy audit based on Act No. 406/2000 Coll., on energy management). The Decree marginally mentions ventilation and cooling in Section 8 (8i), relating to “other energy appliances”.

The requirements on the ventilation of buildings (intensity of replacement of air and micro-climatic conditions) are stipulated in Government Regulations 178/2001 Coll. (523/2002 Coll. and 441/2004 Coll.). The dimensions of HVAC and the technical design were regulated only by the Construction Code No. 83/1998 Coll. and its implementing Decree No. 137/1998 Coll., on general technical requirements on construction.

After implementation of the Directive (Article 9)

Amendment to Act No. 406/2000 Coll. brought Decree No. 277/2007 Coll. into effect - Decree on the efficiency of air-conditioning systems, promulgated in 2007. The Decree

defines the obligations, scope of controls, scope of reports of controls (the annex gives a form) and obligation to re-examine persons performing controls.

2. 10. 4. Amendment of the legislation pursuant to Articles 8 and 9

The requirements on implementation of Directive 91/2002/EC and its Articles 8 and 9 led to recommendations on amendment or issuing of new primary and secondary legislation at a national level.

- Act No. 406/2000 Coll.¹⁹ - proposal for supplementing Section 6a to include the obligation to introduce inspection of operators of boilers with a nominal output of greater than 20 kW and also recommendation of supplementing of Section 9, imposing the obligation on operators of buildings to subject the building and energy management to an energy audit to include inspection of air-conditioning equipment.
- It is recommended that Decree No. 213/2001 Coll. (Decree No. 425/2004 Coll.)²⁰ be extended to include air-conditioning equipment.
- Supplementation of Decree No. 150/2001 Coll. and unification with Government Regulation No. 352/2002 Coll.²¹
- Act No. 86/2002 Coll., where no changes were recommended
- Government Regulation No. 352/2002 Coll. - supplementing to include a paragraph on combustion efficiency (for small pollution sources) and harmonization with other legislation
- Decree of the Czech Labour Safety Office No. 91/1993 Sb. for safeguarding of work with low-pressure boilers.

¹⁹ Energy Management Act

²⁰ Energy audit definition

²¹ Minimum efficiency and emission limits definition

3. LESSON TO LEARN AND RECOMMENDATION

This chapter is concerned with the main experience gained in the implementation of the Directive in the Czech Republic. Its first part describes experience in the Czech Republic, while the second part contains specific recommendations. These recommendations take into account information gained in discussions during the fact-finding mission to Macedonia, from available documents and from practical experience in the Czech Republic.

The chapter is conceived in that the individual subchapters contain brief considerations of experience gained in the Republic of Macedonia in the light of experience in dealing with these facts in the Czech Republic. The relations mentioned in Chapter 2 of this study form an essential basis for complete understanding of the brief descriptions.

Where “Articles” are mentioned in the following text, they refer to Articles of the Directive (EPBD).

3.1. LESSONS LEARNED AND RECOMMENDATIONS

This chapter elaborates on lessons learned and recommendations based on the experience of the Czech Republic in implementing the Directive. The recommendations take into account information gained during the fact finding mission, discussions with the Macedonian experts, available documents and practical experience from the Czech Republic itself.

Where “Articles” are mentioned in the following text, they refer to Articles of the Directive (EPBD).

3.1. Lessons learned from the Czech Republic

This chapter describes facts that can be transferred or utilized in implementation of the Directive in the Macedonian context. The chapter is divided into parts dealing with legal, institutional, technical, awareness, fiscal and other issues.

3.1.1. Legal issues

1. All legislation that has the adjective “energy” in its title is the responsibility of the Ministry of Industry and Trade, while the impacts of the Directive fall within the competences of:

a) the Ministry for Regional Development, which is concerned with the area of housing policy, territorial development and methodical guidance of the construction authorities,

b) the Ministry of the Environment, which has competence over protection of the climate and makes a substantial contribution to energy effectiveness and renewable energy sources,

c) the Regional Authorities which, by law, perform methodical guidance and supervision of the construction authorities (especially in matters of land-use decisions).

2. The individual ministries are responsible for issuing new or updating existing laws, decrees and Government regulations. Changes in the requirements of the Directive lead to amendments to these laws, decrees and Government regulations. These are gradually updated on the basis of the priorities of the individual ministries. Consequently, it can and does happen that, at a certain time, reference may be made to legislation that is not in effect. Harmonization of the national legislation, similar to addressing of the professional and

general public in a uniform manner, is more complicated and more expensive and, in some cases, ambiguous interpretation of concepts can occur²².

1. The amended Act on energy savings (No. 406/2000 Coll., as amended by Act No. 177/2006 Coll.) led to extending of the obligation of preparing energy audits, affecting the energy intensity of buildings, records of completed energy audits and energy experts to include Directive Articles 7, 8 and 9.
2. The framework for implementation of the requirements of the Directive was established by newly issuing 5 Decrees (No. 148/2007 Coll., No. 193/2007 Coll., No. 194/2007 Coll., No. 276/2007 Coll. and No. 277/2007 Coll.) and harmonized European technical standards, to which reference is made in the primary and secondary legislation. The secondary legislation also mentions the scope of tests required for a particular audit.
3. However, the existing legislation does not stipulate punishments for poor preparation of audits following from Articles 7, 8 and 9 (audit of buildings, furnaces and air-conditioning units). This leads to unrealistic evaluation of some projects²³.

3. 1. 1. Institutional issues

1. The public database of energy experts was extended to include persons authorized for compliance with Articles 7, 8 and 9 of the Directive. These experts were examined at the Ministry of Industry and Trade, which administers their database and keeps a record of their activities. The database is freely accessible through the web interface.
2. ČKAIT (Czech Chamber of Authorized Engineers and Technicians), AEA (Association of Energy Auditors) and other professional organizations have included the required aspects of the Directive into their educational courses.
3. An insufficient number of officials responsible for evaluation of the energy performance of buildings were aware of the stipulation of obligations and compliance with the requirements of the Directive. In particular, the officials of the construction authorities were inadequately and differently informed. Thus, in practice, these officials control only demonstration of the EPCB items in construction documents, but not their contents and material accuracy.
4. The State Energy Inspection, as the only potential control institution, does not have sufficient capacity or methodology for control of buildings and their energy intensity (energy performance certificate). Implementation of the

²² For example, in the amendment to the Act on energy savings, reference is made to no-longer valid Decree No. 291/2001 Sb., stipulating the details of the efficiency of the use of energy in the consumption of heat in buildings, and Decree No. 152/2001 Coll., stipulating the rules for heating and supplying hot utility water, specific indicators of consumption of heat for heating and for preparation of hot utility water and requirements on selected indoor thermal equipment in buildings with instruments regulating the supply of thermal energy to end consumers. Lack of uniformity of the term “floor area” also causes substantial problems.

²³ This thus leads to inclusion of buildings that report important elements of energy ineffectiveness in better classes than they should be. This takes place at the level of Government buildings, for which a certificate (voluntarily, as the law imposes this obligation only in case of fundamental reconstruction) or for apartment buildings heated by heat pumps, where this energy is not included in the total supplied energy, etc.

Directive was not accompanied by the creation of a section for buildings, furnaces and air-conditioning units within the organizational structure of SEI (State Energy Inspection).

5. Construction authorities, which issue construction approval decisions, on the basis of which permits are issued for use of a structure, are only marginally informed of the aspects of the energy performance of buildings.

3. 1. 2. Technical issues

1. A test version of a freely available calculation instrument, taking into account the method of balance calculations according to the prepared European standards was placed on the market in advance (in 2006 some of the now-approved standards were only undergoing the approval process. Expert groups from a number of European States were working on their completion.) A web site created by the authors of this instrument has been introduced to increase the availability and awareness of the new evaluation methodology. As a result of the low awareness of these standards amongst the general population, the law was adequately tested only after it had come into effect, leading to further changes in the calculation algorithms.
2. The first version of the calculation instrument included a reference building (the same geometry and manner of equipping with technology ensuring coverage of the requirements of the individual processes) that complied with the standard, where this was performed for each kind of building (see Annex 1 to the Directive). This reference building was gradually replaced by only final limits for classes of energy performance for overall calculation of the specific energy consumption. The final limits for the classes of the energy performance of buildings take into account the total supplied energy consumption in the building where, assuming that the standard values are met, the building is classified in class C. Reference limits are not set here for the individual forms of utilization of energy (heating, preparation of hot water, etc.). The fraction of supplied energy is divided in detail according to the forms of use on a graphic form of the “certificate”, i.e. EPCB (Energy Performance Certificate of a Building).
3. Balance values are given for determination of the specific energy consumption of the individual forms of energy use (heating, hot water, ventilation, cooling and lighting). Energy performance class C was stipulated for the individual forms of energy consumption on the basis of the valid standard requirements in the Czech Republic. This simultaneously means that it is not possible to permit construction or approval of a building that is classified in class D or worse²⁴.
4. The limits of the values for the classes of energy performance of buildings were determined with high precision for residential and administrative buildings. These values were adjusted in relation to the size of the evaluation database following from the performed energy audits. The limits of the energy performance classes were set by expert estimate for other types of buildings,

²⁴ However, simultaneously, it is possible to comply with the requirements for inclusion of buildings in energy performance classification class C by compensation, for example, of unsuitable (higher) values for heating by attaining better than standard values for hot water consumption or by some other technical measures.

defined in the Annex as mentioned in Article 3 of Directive 91/2002/EC. The limits of the energy performance classes were set under the assumption that they would be refined in later amendments in relation to a greater sample of evaluated buildings.

5. The manner of including energy produced by renewable energy sources (RES) was originally taken into account only in the final value of energy produced, in the annex after the energy audit of the individual energy consumptions. Thus, the impact of renewable and alternative energy supply on the individual values is not clear at first glance.
6. The detailed uniform methodology for evaluation of RES and alternative energy supply is still in the process of creation and will be included in an amendment to Decree No. 148/2007 Coll.
7. Because of the different methodologies, the energy supplied at the edges of the building was calculated and reported in the first wave of adoption of the requirements of the Directive. Recalculation of the energy supplied at the edges of the building to primary energy or the amount of production of CO₂ emissions is not elaborated in EPCB.
8. Technical effects also include errors in the calculation. A uniform method still doesn't ensure a uniform result. It is necessary to take into account different approaches by experts:
 - a) different calculation of cooled areas, calculation of the coefficient of heat passage and corrections for heat bonds and bridges. Small differences in setting these parameters, similar to the parameters mentioned below, have major consequences for the final result, especially in energy-saving buildings.
 - b) different entering of the initial values of the efficiency of sources and distribution systems – in the framework of the requirement for a low price for preparation of EPCB, the author is not able to perform a more detailed audit. The project requirements for new buildings are frequently not sufficiently precise.

3. 1. 3. Lack of awareness

1. At the time of introduction of the obligation to incorporate the requirements of Articles 7, 8 and 9, a large percentage of the professional public was insufficiently aware of the approach and requirements necessary for evaluation of the energy performance of buildings. This led to and frequently still leads to different opinions on the introduced audit methodology and the extent, preparation and complexity of the calculation.
2. The general public frequently learned of the obligation to prepare an EPCB only when they were directly affected by this obligation.
3. State institutions that award state contracts do not have sufficient information on the energy performance of buildings for public contracts in relation to the future energy performance of the building. It is also possible that they do not

pay great attention to this aspect because of low awareness of the impacts of energy consumption in buildings.

4. Financial institutions do not take into account the effect of energy performance when providing loans or mortgages.

3. 1. 4. Fiscal and financial issues

1. Implementation of EPBD was primarily performed so that the financial consequences would be minimized.
2. No economic instruments or direct or tax incentives, for example advantages for buildings attaining a better standard of energy performance, were adopted in connection with implementation of EPBD. This is also true of the banking sector, which was not stimulated to introduce positive incentives for loans for construction of buildings with higher standards.
3. The market price of preparation of a Certificate (EPCB) was estimated at the time of implementation by the responsible authorities at approx. 100 € for a certificate for a new family home. Some experts in the field predicted that this price would be at the level of 400 – 800 €. In relation to the prescribed extent of preparation of the Certificate, both these estimates were shown to be erroneous. The commercial price gradually decreased as certificates were prepared by ever more experts and as the work required was reduced because of the routine nature of the preparation. At the present time, the price is about 200 €. The price is very individual for other types of buildings. The prices of various authors in various regions can be compared on the internet.

3. 1. 5. Other issues

1. At the beginning of imposing obligations, only a few experts were available who had suitable experience in evaluating individual energy consumption in buildings and especially experts with experience in overall evaluation and the impacts of the energy intensity of buildings.
2. After introduction of the obligation, the low awareness amongst the general public led to longer deadlines for submission of applications for construction permits and increased aversion to the newly introduced regulation.
3. Initially, the new obligation led mainly to:
 - a) evading the legislative regulation in an attempt to reduce the costs of project planning documents. No enforceable punishment can be imposed on auditors. EPCB became simply a compulsory part of the project planning documents for new buildings and major changes to existing buildings. Initially, the requirement that an EPCB be prepared was seen as a necessary evil and superfluous increase in investments into the project plans.
 - b) devaluation of the goals of EPBD and the impact of EPCB on the end user. After several years, the value of the audit is gradually entering into the consciousness especially of small private investors.

- c) development companies have less difficulty in including a building in energy intensity classification class B without any real increase in investment costs for energy-saving measures.

3.2. Conclusions and recommendations

This chapter describes the conclusions and recommendations deriving from Czech experience, but that could be applicable to the Macedonian context as well. These recommendations are mutually complementary or can be combined but should not be mutually contradictory. The conclusions and recommendations are based on the fact that the requirements following from the Directive have already been introduced to a substantial degree in two of the country's laws, the Construction Code and the Energy Act, and also in the "rulebook" about the energy intensity of buildings. Where "Articles" are mentioned in the following text, they refer to Articles of the Directive (EPBD).

3.2.1. Legal issues

1. Both existing laws (construction and energy), similar to a number of other legislative regulations, will have to be amended in relation to implementation of the requirements of the Directive so that they can be interpreted unambiguously, i.e. so that their provisions are mutually complementary and duplicate definitions do not occur.
2. We recommend that the national legislation be modified in direct connection with the Directive and that frequent amendments to the legislation and especially to the evaluation methodology (according to Articles 7, 8 and 9) be avoided. This can lead to confusion and loss of motivation of the professional and general public and can complicate the enlightenment process.
3. It is recommended that a process scheme be prepared for implementation of the Directive, describing the individual steps, i.e. denoting the roles of the participating institutions and giving a timetable. It is necessary to establish a single coordinating institution for the implementation process, which will prepare changes in the legislative regulations in a uniform manner with coordinated deadlines. Here it is assumed that the Ministry of the Economy will be the coordinator of the process of implementation.
4. Prior to incorporation into the legislation, we recommend that the evaluation methodology (Article 3) be prepared and tested and that it be tried out in a testing period, which can also be stipulated in the law if it were modified in advance. Only on the basis of the extent of the tested methodology and comments from the testing period will it be advantageous to stipulate a date for the validity of the new requirements at a national level. Simultaneously, it will be useful to prepare clear instructions for the "rulebook" for the participating ministries and other State institutions to ensure uniform interpretation of use of the evaluation methodology and performance of the related administrative tasks.
5. A similar testing period can also be set for implementation of the requirements following from Articles 8 and 9 of the Directive.
6. On the basis of testing the evaluation methodology, we recommend that tests be prepared for granting authorization to persons pursuant to Article 10 of the Directive, i.e. establishment of the difficulty of tests, their scope, the extent and means of demonstrating the experience of the expert and stipulation of qualification to implement the requirements mentioned in Articles 7, 8 and 9. Introduction of the obligation of authorization and also the extent of the tests and

sanctions into the legislation should be performed sufficiently far in advance prior to stipulation of the obligation of evaluation of the EPBD requirements.

7. A sufficient number of persons authorized to perform the audit must be available at the moment of legislative validity of the energy audit. The number of authorized persons may vary at the various stages of implementation and should be based on local experience, and especially on trends in the construction industry, expert capacity, etc.²⁵
8. The process of testing independent energy experts according to Article 10 should be simultaneously supplemented by a system of records of these authorized persons and the evaluations that they have performed and this system should be defined in the (secondary) legislation with reference to the manner of dealing with punishment of experts for any offences.
9. We recommend that Article 57 of the Construction Code (categories of buildings) be extended to include buildings for which their energy performance is evaluated on the basis of the requirements of the Directive (mentioned in the Annex to the Directive in relation to Article 3). Buildings should be divided into categories according to the Annex to the Directive in relation to Article 3, so that it is possible to define the manner of use of the individual zones, similar to the specific demands for or consumption of energy. It is recommended that this be unified with the definition of buildings in the “rulebook”, Articles 4 and 5.
10. We recommend that national coefficients be established expressing recalculation of the supplied energy to primary energy (according to the methodology described in EN 15316-4-5) and the related expression of the production of CO₂ emissions and that this methodology be included in the “rulebook”.
11. It is recommended that the date of effect of compliance with the obligation according to Article 7 be introduced in the law sufficiently far in advance. In the Czech Republic, the validity of enforcement of the requirements of Article 7 of the Directive was stipulated in a Decree of July 1, 2007, but with legal force from January 1, 2009.
12. Similarly, for compliance with Articles 8 and 9 of the Directive, we recommend that sufficient periods of time be set bindingly for the validity and effect in the relevant national law (Energy Act) or in the secondary legislation (decree, “rulebook”).
13. When amendments are introduced, it is also recommended that provisions following from revision of the Directive (EPBD recast) be introduced, where various dates of effect will be set for the individual proposed measures or the degree of their implementation²⁶.

²⁵ For comparison – in the Czech Republic, there are a total of 700 experts with licenses for issuing an energy performance certificate for a building and the number of construction permits (all structures incl. industrial and transport) is about 120,000 p.a., of which new construction of family homes and apartment buildings corresponds to about 30,000.

²⁶ On May 18, 2010, the European Commission approved revision of EPBD No. 91/2002 EC, requiring that the individual States stipulate minimum requirements on energy intensity in relation to optimization of costs over the life cycle of the building. The newly modified provisions of the Directive will come into effect for the Member States in 2012.

3. 2. 2. Institutional issues

It is recommended that the following elements of institutional provision for implementation of the Directive be introduced:

1. Unambiguous stipulation of the competence of institutions participating in the implementation process and subsequent implementation of individual activities. For the sake of transparency, it is advisable to publish the structure of the institutional base, e.g. as a scheme in the “rulebook”.
2. Estimation of the anticipated number of energy experts required to cover the market – for drawing up a certificate of the energy intensity and control of furnaces and air-conditioning units on the basis of anticipated numbers.
3. Designation of an institution (entity) that will be responsible for introduction of the requirements of EPBD into the market environment according to the proposed timetable.
 - a) Professional training and enlightenment of the professional public (holding workshops, learning about the methodology, changes in the laws, harmonizing standards, computer program and means of demonstrating obligations).
 - b) Timely issuing of a methodical base (rulebook) for the professional public.
 - c) Guarantee of enlightenment of the general public – campaign and other enlightenment activities that can be implemented by commercial entities or universities on the basis of the stipulated methodology.
 - d) Preparation of tests, on the basis of which authorization will be granted for performance of calculation of the energy intensity of buildings (Article 7), inspection of furnaces (Article 8) and inspection of air-conditioning equipment (Article 9).
 - e) Preparation of a system of control of the number (and, as appropriate, the quality) of performed evaluations (Articles 7, 8 and 9) and records of experts active in the field.
 - f) Creation of a database of energy experts that will be available to the general and professional public and also for the responsible institutions.
 - g) Establishment of rules and criteria for adding new experts or, as appropriate, striking them off this list.
 - h) Establishment of rules of evaluation and administration of prepared certificates, control of furnaces and air-conditioning equipment.
 - i) Collection and evaluation of comments and recommendations of the professional public leading to potential further harmonization of the legislation at a national and European level.
4. Preparation of changes in the teaching programs of technically oriented universities concerned with the proposal and evaluation of the energy intensity of buildings. Introduction of an educational structure into secondary school and university teaching programs.

5. Creation of a control authority to document the number of prepared audits and registration of their results. On the basis of initial discussions, it seems probable that the Ministry of the economy will control the results of documentation. Initial discussions suggest that the energy intensity of buildings will also be incorporated into the Construction Code, which is the responsibility of the Ministry of Transport and Communication.
6. The energy agency will employ an expert for the area of the energy intensity of buildings, who would be capable of independently evaluating the recommendations of commercial or academic groups.

3. 2. 3. Technical issues

The following recommendations are made in connection with providing for the technical conditions for implementation:

1. Creation of a sufficiently large sample of buildings evaluated according EPBD, on the basis of which limits could be set for energy intensity classes at a national level. In the absence of detailed analysis, it will be very difficult to define the consumption of the individual processes for a standard building and the limits of energy intensity classes. Based on the estimates of Macedonian experts, the limits should be set for energy intensity classes and the time period defined after which the limits of the energy intensity classes will be re-evaluated on the basis of a sufficient number of performed audits.
2. Acceptance of definitions of terms for stipulation of the time of use of the building and its occupation in time.
3. In the individual articles of the “rulebook”, state the methodology and technical standards used in the calculation²⁷. It is also useful to add tables containing recalculation coefficients taking into account the efficiencies for technical equipment, shielding factors, recalculation to primary energy, etc.
4. Following completion of testing of the proposed methodology taking into account the requirements of the Directive, stipulate the binding nature of this methodology in the “rulebook” or directly in the law²⁸.
5. Prepare or adopt a calculation instrument that takes into account the method adopted by the evaluator according to Article 7 of the Directive at a national level.
6. Introduce a monthly methodology of calculation for the individual processes, unification of the methodologies of calculation of individual consumptions to calculation over a time interval.
7. We recommend that demand for and consumption of the individual processes in the building be mentioned. This should also mention the fraction of energy from RES and other energy sources.

²⁷ At the present time, these details are mentioned in only some articles.

²⁸ The existing methods differ in evaluating the energy intensity of buildings (as energy audits) and procedures leading to expression of the requirements for and energy consumption of the individual kinds of energy according to the means of use.

8. We recommend statement of specific values of the supplied energy at the edges of the building in the certificate²⁹ and expression of the total energy consumption in physical units (in GJ or kWh). The general and professional public will thus gain a better idea of the parameters of the building. Thus, the end user can estimate the annual costs of energy on the basis of the current unit price of energy (€/kWh, €/GJ) or can compare real consumption with the value calculated according to the certificate³⁰.
9. We recommend that the existing data be employed or that new studies be prepared to determine the prices of energy from the individual sources and that a study be prepared evaluating the cost effectiveness of the individual requirements on the energy intensity of buildings. These documents can assist in better and socially responsible stipulation of the minimum requirements on energy intensity.
10. It is recommended that compliance with Articles 5 and 6 be monitored consistently and independently in relation to inclusion of renewable and alternative energy supplies in the energy management of a building and that a calculation methodology be established for this purpose.
11. It is recommended that a catalogue be created of thermal bridges and technical approaches to reduce them and to ensure control that they are (individually) the subject of calculation in the project planning documents for the construction project (in relation to the provisions of Article 9 of the rulebook).

3. 2. 4. Awareness issues

For the purposes of “marketing” support and to provide general information, we recommend provision for:

1. Systematic educational courses for the professional public to explain the approach to calculations according to EPBD. Explanation and acquaintance of experts with the implemented methodology.
2. Educational course for the representatives of industry – construction companies, technology suppliers and manufacturers of construction materials.
3. Systematic education of the control authorities and institutions awarding construction permits. Placing energy intensity in the position of a safety element for construction (as for assessment of the statics of a building in relation to the effect of the risk of a seismic area).
4. Introduction of enlightenment for the general public – newspaper articles, magazines concerned with housing.
5. Enlightenment of the financial sector of the effect on prices of real estate with better energy parameters (possibility of introduction of a new product of more advantageous mortgages for energy-saving buildings), long-term lower monthly

²⁹ Certification

³⁰ The existing energy intensity certificate, given as an annex to the “rulebook” of 2008, is based on a point evaluation. This evaluation need not be informative for the general public or foreign experts who are not sufficiently aware of the stipulated methodology.

expenditures increasing the clients' ability of make payments. Creation of a positive campaign exerting sufficient pressure on the professional public.

6. Setting of time intervals for enlightenment, where 2010 would witness recommendation of the method of the future methodology for energy evaluation and harmonization of the national legislation.
7. After completion of harmonization of the national legislation and issuing of laws stating the dates, validity, stipulation of national calculation methodology and national calculation instruments, we recommend introduction of training responding to the main aspects of compliance with the requirements of the individual Articles of the Directive. In order to be able to pass information on, the trained individuals must receive comprehensive training with a clearly defined methodology, evaluation instrument, dates for compliance and the approximate price of a particular evaluation.
8. It is recommended that public enlightenment be commenced at an early stage to create a demand on the professional public and industry, which must provide suitable products in response to legislative requirements.

3. 2. 5. Fiscal and financial issues

In the economic sphere, it is recommended that the following aspects be provided for or taken into consideration:

1. Consideration of financial demands and price policy in preparing an energy performance certificate for a building. The price is fundamentally affected by the cost of the calculation instrument and complexity of the calculation. A well-trying approach consists in creation of the first test version of the calculation instrument in MS Excel so that it is available to the professional public at minimum cost. Stipulation of the range of indicative prices, e.g. for a family home, on the basis of which it will be possible to derive the price for more complicated calculations. Commercial calculation instruments can then be created on the basis of the tested version of the calculation instrument (according to the methodology in the "rulebook").
2. Within the preparation of the process, estimate the anticipated demands imposed by implementation of the Directive without and with inclusion of its amendment (recast). This corresponds particularly to financial impacts on investors in both the private and public sectors through an increase both in the costs of project planning documents and also in the investment costs for the construction work. Simultaneously, it is recommended that an estimate be prepared of demands on administration of the new approach.
3. Promote the implementation process and accompanying campaign by economic instruments, including, for example, tax benefits, creation of a scheme of support and an institution providing support (fund), for example for the following activities:
 - a. educational courses and conferences for officials at the level of the State and municipalities and other professional public,

- b. introduction of records of energy experts and completed evaluations (Articles 7, 8 and 9),
 - c. individual support for implementation of energy-saving measures (at a higher level than required), incl. tax benefits through advantageous loans, mortgages, etc.
4. Prepare a study evaluating the economic impacts on the construction sector connected with the investment costs for energy-saving measures and taking into account future savings in operating costs.

3. 2. 6. Other issues

It is recommended that attention also be paid to the following requirements:

1. The limits of the individual classes of the energy intensity of buildings should be adjusted so that they correspond to technical and economic capabilities under the national conditions. Energy intensity classes A and B should be set so that they provide motivation.
2. A positive campaign should be oriented towards:
 - a) Public institutions active in the construction industry
 - b) Developers
 - c) People constructing buildings (citizens)
3. Utilize the document “Energy efficiency strategy of the Republic of Macedonia”, i.e. the conclusions mentioned in it, to form a basis for future implementation of the Directive on energy end-use efficiency and energy services (2006/32/EC).

3. 3. Conclusion

All the harmonized European technical standards CEN are available and they can play an important role in the introduction and implementation of the Directive in the national context. The basic provisions required for implementing energy efficiency in practice are already defined in the national laws (Energy Act and Construction Code). The “Rulebook for energy efficiency of buildings” is available, providing a basis for implementation (intense work was underway on amendment of this regulation at the time of preparation of these recommendations). During amendment, this methodology will have to be supplemented by a detailed calculation procedure to facilitate orientation of the professional public in introduction into practice of the new legislation requirements and evaluation of Articles 7, 8 and 9. In subsequent amendments and issuing of new legislative regulations relating to the requirements of EPBD, it is advantageous to minimize the number of documents directly affected by the change.

When introducing the obligations into practice, it is recommended that systematic enlightenment be introduced amongst the professional and general public and also amongst State and municipal officials. A sufficiently large group of experts and officials should be created who will have adequate experience with the new subject matter.

ANNEX 1 – LIST OF DECREES TO LAWS ON ENERGY MANAGEMENT

- Decree No. 291/2000 Coll., laying down the details of energy use efficiency in heat consumption in buildings was cancelled on July 1, 2007 and replaced by Decree No. 148/2007 Coll.
- Decree No. 213/2001 Coll., stipulating the details of an energy audit.
- Decree No. 148/2007 Coll., on the energy intensity of buildings.
- Decree No. 193/2007 Coll., laying down the details for the use of energy in the distribution of thermal energy and indoor distribution of thermal energy and cold.
- Decree No. 194/2007 Coll., laying down the rules for heating and supply of hot water, specific indicators of consumption of thermal energy for heating and for preparation of hot water and requirements on the fitting of indoor thermal equipment of buildings with instruments regulating the supply of thermal energy to end consumers.
- Decree No. 195/2007 Coll., laying down the scope of opinions on the territorial development policy and land-use planning documents, binding opinions in protecting interests protected by Act No. 406/2000 coll., on energy management, as amended, and conditions for specifying energy-production facilities
- Decree No. 276/2007 Coll., on control of the efficiency of boilers
- Decree No. 277/2007 Coll., on control of air-conditioning systems
- Decree No. 150/2001 Coll., stipulating the minimum efficiency of energy use in the production of electricity and thermal energy
- Decree No. 151/2001 Coll., laying down the details for the use of energy in the distribution of thermal energy and indoor distribution of thermal energy and cold.
 - defines, amongst other things, the obligation of installation and setting of thermostatic valves in heat supply
- Decree No. 152/2001 Coll., laying down the rules for heating and supply of hot utility water, specific indicators of consumption of heat for heating and for preparation of hot utility water and requirements on the fitting of indoor thermal equipment of buildings with instruments regulating the supply of thermal energy to end consumers.
- Decree No. 153/2001 Coll., laying down the details of determining the efficiency of energy use in transmission, distribution and internal distribution of electrical energy.
- Government Regulation No. 195/2001 Coll., stipulating the details of the contents of territorial energy policies
- Decree No. 212/2001 Coll., stipulating the details of preparation and implementation of combined production of electricity and heat.

ANNEX 2 – SAMPLE ENERGY LABEL FOR THE SHELL OF A BUILDING (THE METHODOLOGY IS STIPULATED BY NATIONAL STANDARD CSN 730540:2)

ENERGY LABEL FOR THE SHELL OF A BUILDING								
Type of building, local designation Address						E		
Total floor area $A_c =$ m^2						as built	recomended	
<p><i>Cl</i> High savings</p> <p>0.3 A</p> <p>0.6 B</p> <p>1.0 C</p> <p>1.5 D</p> <p>2.0 E</p> <p>2.5 F</p> <p>G</p> <p>Extremely wasteful</p>						Cl_x		Cl_y
Average coefficient of heat transmission of the building shell U_{em} ve $W/(m^2K)$ $U_{em} = H_T / A$						X	Y	
Classification of indicator <i>Cl</i> and the corresponding values of U_{em} for $A/V =$ m^3/m^2								
<i>Cl</i>	0.30	0.60	(0.75)	1.00	1.50	2.00	2.50	
U_{em}								
Label validity				DD.MM.YYYY				
Label prepared by				Name and surname Certificate No. XY				

ANNEX 3 – SAMPLE BUILDING ENERGY PERFORMANCE CERTIFICATE LABEL (THE METHODOLOGY IS STIPULATED IN DECREE NO. 148/2007 COLL.)

BUILDING ENERGY PERFORMANCE CERTIFICATE				
Type of building, local designation Address Total floor area:			Evaluation of the building	
			as built	after implementation of recommendations
			C	B
Specific calculated annual energy consumption in kWh/m ² rok			XY	XY
Total calculated energy supplied annually in GJ			XY	XY
Fraction of supplied energy for:				
Heating	Cooling	Ventilation	Hot water	Lighting
%	%	%	%	%
Certificate validity		DD.MM.YYYY		
Certificate issued by		Name and surname Certificate No. XY		

ANNEX 4 – DESCRIPTION OF THE GREEN FOR SAVINGS PROGRAM

The Czech Republic has an expected emission surplus equalling 150 million tons of CO₂eq. (or AAU) within the Kyoto Protocol regime for the 2008 – 2012 period, of which approximately 100 million AAUs can be traded in the framework of the international emission trading scheme mechanism (IET) pursuant to Art. 17 of the Protocol. The revenues from this amount of AAUs are estimated to correspond to approx. CZK 25 billion (if the price equals EUR 10 per AAU).

By virtue of amendment to Act No. 695/2004 Coll., on the conditions for trading in allowances for emissions of greenhouse gases, of July 18, 2008, revenues from sale of emission credits constitute an income for the State Environmental Fund and may be used solely for supporting activities and events aimed at reduction of greenhouse gas emissions.

The use of these funds is mediated through the Green Investment Scheme (GIS) in a program entitled “Green for Savings” and is directed exclusively to the area of housing, i.e. for family houses and panel and non-panel apartment buildings.

The external conditions that limit the usefulness of funds from sale of AAU include the requirements of the individual purchasers, which are particularly Japan, Spain and Austria.

The objective of the program is to support selected measures implemented in residential buildings by natural persons and entities that own residential buildings that will lead both to immediate reduction in emission of carbon dioxide and to initiation of a long-term trend of sustainable construction.

The support is conceived as semi-mandatory, i.e. it is prepared so that the funds from the program can be withdrawn throughout the entire program period from April 1, 2009 to December 31, 2012. Eligible applicants for support include the owners of family houses and apartment buildings, i.e. natural persons, associations of owners of apartment units, housing cooperatives, cities, towns and municipalities (including city wards) and business entities. The maximum amount of support from the program for one entity is proposed at CZK 30 mil. for the entire term of the program. The support is subject to the European Union rules for provision of public support.

Measures supported within the Green for Savings program

A. Energy savings for heating

A.1 Complete insulation of building shells (insulation and replacement of windows)

A.2 Good insulation of selected parts of residential buildings (partial insulation).

B. Support for construction of passive buildings

B.1 Support for new construction of passive buildings

C. Use of renewable energy sources for heating and for hot water

C.1 Replacement of environmentally unsound heating by low-emission sources using biomass and effective heat pumps

C.2 Installation of low-emission sources using biomass and effective heat pumps in new structures

C.3 Installation of solar thermal collectors.

Amount of support

Support will be allocated in a fixed amount per m² of floor area of the completely insulated building or completely insulated parts of the building and will take the form of a subsidy. The amount of the subsidy varies from CZK 450/m² to CZK 1350/m² (€ 18 – 45/m²) for apartment buildings and from CZK 650 to 1950/m² (€ 26 – 78/m²) for family houses, depending on the level of implemented measures.

In support for new construction of passive buildings, support will be allocated in a fixed amount per family house or apartment unit in an apartment building. The subsidies correspond to CZK 220 thous. (€ 8,800) per family house and CZK 140 thous. (€ 5,600) per apartment unit in an apartment building.

Support for systems of heating and preparation of hot water are allocated as percentage amounts of investment costs for purchase of new sources and their accessories and the costs of connection to the heating system. Support for this equipment varies from CZK 25 to 80 thousand (€ 1,000 – 3,200) according to the kind and level of equipment and type of building.

Simultaneously, a subsidy bonus is provided in cases where several measures are combined (insulation and installation of a renewable source).

ANNEX 5 - REPORT ON FACT FINDING MISSION

Participating experts

Miroslav Šafařík, PORSENNA o.p.s.

Tomáš Vanický, e-concept, s.r.o. (on behalf of PORSENNA o.p.s.)

Date of the mission

May 10th – May 13th

Macedonian institutions and experts interviewed

	Institution	Person	Web sites
1	Ministry of Economy	Mr. Andon Kirov	www.economy.gov.mk
2	Energy Agency of the Republic of Macedonia	Mr. Jordan Angelovski	
3	Macedonian Academy for Arts and Sciences	Ms. Natasha Markovska	www.manu.edu.mk
4	Austrian Development Cooperation	Mr. Robert Sharlamanov	www.ada.gv.at
5	UNDP Country Office	Mr. Georg Schoen	www.undp.org.mk
6	Macedonian Center for Energy Efficiency	Prof. Konstantin Dimitrov	www.macef.org.mk
7	Association of the units of Local self-government of Republic of Macedonia ZELS	Aleksandar Arsovski	www.zels.org.mk
8	NGO Proaktiva network of NGOs against climate change	Vladimir Karcicki	http://www.proaktiva.org.mk
9	Topteh	Petar Nikolovski	
10	Chamber of authorized architects and engineers	Dr. Strahinja Trpevski	
11	Macedonian Bank for Development Promotion	Aleksandar Stanojkovski, Sabina Fakič	www.mbdp.com.mk
12	Ministry for Environment and Physical Planning	Ms. Teodora Obradovic Grncarovska	www.moepp.gov.mk

Main findings

In May of 2006, a law for ratifying the Contract for establishing the Energy Community was adopted by the Macedonian Parliament. Based on media reports, the EU accession negotiations are expected to commence in the middle of 2011. All the legislative steps that have been introduced since 2006 are directed towards harmonization with the EU rules, which has also been favourably reflected in documents in the area of energy production, energy-production structures and energy effectiveness.

As a member of the Energy Charter, the country has also prepared a document “In depth review of energy efficiency policies and programmes” (2007), which summarizes the basic indicators in the production and consumption of energy across the sectors of the national economy and existing policies and programs in the relevant areas.

In addition, further documents are also being prepared, formulating strategy in the area of energy production and energy effectiveness

Strategies and coherent documents

The goals of the national energy policy (increased use of cheap domestic sources of energy and reduced dependence of the country on fuel imports) are based on the fact that, even if the current energy consumption were to remain constant, current stocks would suffice to provide for energy supplies for 20 – 30 years.

In 1999, the Government document Program for Effective Energy Use to 2020 was prepared. In addition to increasing energy effectiveness, the program emphasizes the use of renewable energy sources. The main goals of contemporary Macedonia include implementation of the European energy policy. The establishment of the Energy Agency was one of the steps leading to meeting these targets.

On the basis of Article 10 of the Energy Act, a Strategy for Energy Development in the Republic of Macedonia to 2020 with an Outlook to 2030 was drawn up and the Macedonian Academy of Science and Arts was established. In addition, the Macedonian Centre for Energy Efficiency, MACEF, performs one of its main tasks in this process.

The National Strategy for Clean Development Mechanism defines the targets and priorities and the need for creation of capacities for implementation of this financial mechanism (CDM). According to this strategy, the carbon intensity in 2006 was at a level of 706 t CO₂eq/mioUSD GDP, i.e. about 3 % less than the carbon intensity in the Czech Republic at that time. However, total CO₂ production is almost an order of magnitude lower, and has long been at a level of 15 Mt CO₂ p.a. (146 mil. tonnes in the Czech Republic).

In addition, the following relevant documents were prepared:

- National Strategy for Sustainable Development (NSSD) www.nssd.com.mk
- Energy efficiency strategy of the Republic of Macedonia (March 2010, USAID)
- Macedonian energy efficiency and renewable energy assessment (June 2009, USAID)

Basic information and statistics

The census performed in 2002 indicated that the number of inhabitants amounted to 2,022,547 persons living in 564,296 households. The total number of apartments equaled 698 thousand with a living area of 50 mil.m². A total of 5,691 apartments with a total area of 284 thousands m² remained in the ownership of the State (in 2008). More than half of the buildings in the country have inadequate thermal insulation and most of the buildings have unremedied heat bridges. There are about 5 domestic manufacturers of thermal insulation – polystyrene in the country.

In 2006, the consumption of primary energy equalled 2810 ktoe and the final consumption equalled 1818 ktoe. By 2020, it was anticipated that the consumption of primary or final energy would equal approx. 4000 or 2500 ktoe. The “baseline” and “energy efficient” scenarios differ by approx. 5%.

Energy prices are controlled by the Energy Regulatory Commission www.erc.org.mk. A contribution to the cost of energy exists for households with low incomes.

The price of electricity remains very low compared to the EU average and prices in the surrounding countries. The final price of energy is approximately 5c€/kWh.

New housing is poorly accessible without regard to the energy standard because of the high interest rates of banks on housing loans.

Legislative

The Ministry of Transport and Communications (www.mtc.gov.mk) is responsible for the construction sector, while the Ministry of the Economy (www.economy.gov.mk) is responsible for the sector of energy production and savings.

The energy intensity of buildings is regulated in the existing Energy Act (Article 130), sources and equipment (Article 131) and in the Construction Act (Article 57).

Article 130 of the Energy Act is methodically elaborated as a Rulebook dealing with the rules for energy efficiency for new and existing buildings which came into effect on January 1, 2010³¹. Amongst other things, the Rulebook defines the coefficient of heat transmission for individual kinds of structures and also the graphic form of the certificate.

The technical standards and technical standardization are at a good level and all the technical standards required for successful implementation of EPBD are available.

Structure of new-built and refurbished buildings

Based on the documents provided by the Statistical Office and the surveys prepared by Petar Nikolovski³², construction in the country can be classified into three periods:

1. Prior to 1963
2. In 1963-1980
3. From 1980 with a turning point in 1991

The current thermal transmission coefficient (U value) for external vertical structures is equal to 0.4 W/m²K (given in the Rulebook) and a reduction to 0.3 W/m²K is being prepared. Current construction practice employs 5 cm-thick thermal insulation; protests are raised against an increase to 10 cm, stating that this would increase the cost of construction.³³

The current specific consumption of energy in residential buildings varies around 150 – 200 kWh/m², corresponding to measurements of central heat supply in Skopje, indicating a value of 160 – 200 kWh/m².

³¹ Article 9: The building and its rating, cooling and ventilation appliances must be designed and performed in a way so that, depending on the climate conditions of the location, they shall secure energy consumption during use equal to or lower than a specific level, providing appropriate heating conditions to the people present in the building.

³² Overview of the current situation in the Republic of Macedonia, relevant for implementation of Project 8129-00/2008.

³³ Analogical to the Czech experience; insulation thickness quarreled about grows slowly in the course of time.

The means of defining buildings, which are divided into 5 groups in the Construction Act, does not take into consideration their energy standard.

Institutions and organisations in energy efficiency

The Energy Agency was established with the main aim to implement the Energy Act and its key role focuses on the implementation of the European energy policy. The agency currently has three employees and can perform only organizational tasks in the area of preparation of documents, methodologies, methodical instructions and Directives for the Ministry of the Economy.

The state institution Macedonian Academy for Arts and Sciences and the NGO Macedonian Centre for Energy Efficiency play an important role in the preparation of strategic and technical documents.

Currently a project is underway to create national structures and capacities in the area of energy effectiveness in buildings and in the use of sources with support from the Austrian development program.

Architects and engineers are mandatory members of the Chamber of Authorized Architects and Engineers. Consideration is being given in 2010 for its extension to professional groups that would also include “energy experts”. The Chamber currently has approximately 5000 members. Based on the estimates of the President of the Chamber, the national requirements would correspond to approx. 5% of this number of energy experts, i.e. about 250 authorized persons, i.e. experts with a license to provide energy services in connection with the requirements of EPBD or to perform the activities of energy auditors.

The PROAKTIVA association is an NGO with experience in preparing projects on energy effectiveness and renewable energy sources. This association is experienced, e.g. in preparing projects with the participation of Czech NGOs. It has important experience in cooperation with several municipalities in the “Energy Efficient Municipality” project, which is a continuation of the earlier “Energy Brigade” project.

The Economic Chamber is another institution that could play a positive role in implementation of EPBD.

In 2006, the “Energy Audits of Buildings” training program was implemented in cooperation amongst the Norwegian ENSI company (Energy Saving International AS), the Macedonian Centre for Energy Effectiveness and the University of Ss. Cyril and Method in Skopje – Faculty of Mechanical Engineering.

Renewables

The fraction of renewable energy sources in final energy consumption is estimated at 13.8% (2005), with a target for 2020 tentatively calculated as 21%, but an official target according to the Directive has not been established.

The anticipated target for solar heating of water is 25,000 systems to 2020 compared to 4200 systems in 2006. Use of solar heating for extra heating is not anticipated. In some regions, wood is employed for heating; in general, biomass is a potentially useful renewable energy source.