Implementation of the EPBD in the Czech Republic

Status in November 2010

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This country status report aims to summarize how the implementation of the EPBD has been applied in the Czech Republic, what has been changed in the national energy performance requirements, how these influenced the building stock, and what is planned for the future.

Two years have passed since the last report, and the Energy Performance Certificate for buildings is used all over the country. The aim of the EPC is mainly to inform building users and residents about the energy performance of the building, and optionally to encourage them to take energy saving measures.


Recently, the revision process of the current EPBD, general (Energy Management Act) and secondary legislation (implementing decree) has been published in order to put the Czech requirements in line with the requirements of the "old" EPBD and to be prepared for the recast of the EPBD in the following years.

This report describes the way the Czech Republic handles the EPBD, and endeavours to present interesting approaches and achievements. It addresses certification and inspection systems, including quality control mechanisms, training of certified experts, information campaigns, incentives and subsidies.

2 > Certification

Certification of buildings

The energy assessment of buildings is not new in the Czech Republic. Since 2001, there is a methodology for energy audits and certificates for the building envelope in place. The energy audit (EA) is mandatory for all types of buildings with total energy consumption higher than 1,500 GJ per year. Part of the energy audit was also the energy certificate with a graphical scale, representing the thermal characteristics of the building envelope (external walls, roof, windows and doors, ground floor).
Due to the energy auditing system, a set of national requirements in terms of energy efficiency and indoor climate was adopted.

In the Czech Republic, the implementation of the EPBD is the overall responsibility of the Ministry of Industry and Trade. The Ministry is the crucial body for amending the general EPBD law and for implementing the regulation. It is also the managing body for examination and accreditation of energy auditors and experts to conduct energy audits, EPCs and inspections. Authorised energy auditors are registered on a List of Energy Auditors kept by the Ministry (see http://www.mpo-enex.cz/experti/ExpertListEng.aspx).

In 2006, the Czech Parliament adopted the amendment of the Act on Energy Management, transposing the requirements of the Directive 2002/91/EC into the legislation of the Czech Republic. In the middle of 2007, the decree about the buildings certification was published.

The Energy Performance Certificate

The Energy Performance Certificate is the document demonstrating compliance with the requirements for the energy performance of the building; it is an integral part of the documentation prerequisite for the planning permission for constructing a new building or for a major renovation of an existing building - an obligation linked to the building permit.

<table>
<thead>
<tr>
<th>BUILDING ENERGY PERFORMANCE CERTIFICATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building address:</td>
</tr>
<tr>
<td>Total floor area:</td>
</tr>
<tr>
<td>Specific calculated energy use (kWh/m²a):</td>
</tr>
<tr>
<td>Total energy delivered (GJ):</td>
</tr>
<tr>
<td>Energy used by:</td>
</tr>
<tr>
<td>Percentage:</td>
</tr>
<tr>
<td>Certificate validity:</td>
</tr>
<tr>
<td>Certificate made by:</td>
</tr>
<tr>
<td>Licence No.:</td>
</tr>
</tbody>
</table>

Figure 1 - Graphical display of the label (EPC)

Calculation procedures

In the Czech Republic, the same methodology is used for all regions and all building types. The recommended calculation procedure is based on published CEN Standards and applicable Czech Technical Standards.

The energy performance is expressed by the total annual delivered energy consumption, including heating, cooling, DHW preparation, mechanical ventilation, lighting, and auxiliary energy needed for standardised building operation.

A simplified multizone calculation is used, based on a typical day for each month, in an one-hour time step. Climate data are specified for 4 climate zones, according to the national standards, which are used as input data for building physics calculation. Building energy systems such as heating, cooling, DHW preparation and ventilation are included as zone assigned systems, while energy sources (e.g. boilers, cogeneration unit, solar collectors etc.) are assigned in the model for the energy delivery systems.
The result of the energy performance calculation for the assessed building is the annual delivered energy consumption, counted over gross floor area (kWh/m² p.a.) and classified according to the levels of the energy classes.

Primary energy and CO₂ emission are not assessed in the energy building certification. The discussion about primary energy co-efficients was stopped at the beginning of the preparation of the EPBD implementation, due to various interests of stakeholders (district heating companies, gas and electricity suppliers).

The energy label classifies buildings on an efficiency scale ranging from A (high energy efficiency) to G (poor efficiency). In the table below, energy classes (in kWh/m² p.a.) for different building types are displayed. Class “C” is a minimum EP requirement level for new buildings and for existing buildings under major renovation.

The aim of the EP certificate is to inform residents and building owners/users, and encourage them to take energy saving measures. These are summarised in the report attached to the certificate.

The EPC, in terms of recognised achievable energy savings, contains concrete measures leading to their utilisation. For each measure, the volume of energy savings is stipulated in technical units, along with financial assessment, amount of investment, simple payback period, and the impact on the energy rating if all measures are implemented. Recommendations for energy saving measures should be developed for the specific building by the energy expert; there are no general recommendations selected from a database, on the basis of the building type or the building structure and the typical situation.

The validity of the energy certificates is 10 years.
The structure of residential houses according to the material of outside walls

<table>
<thead>
<tr>
<th>Measures</th>
<th>Energy Savings (GJ)</th>
<th>Investment costs (kCZK)</th>
<th>Simple Payback Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Management</td>
<td>89</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Windows Replacement</td>
<td>1,086</td>
<td>4,900</td>
<td>15.3</td>
</tr>
<tr>
<td>Thermal Insulation of external walls</td>
<td>1,065</td>
<td>4,600</td>
<td>14.3</td>
</tr>
<tr>
<td>Total Saving (incl. synergy effects)</td>
<td>2,240</td>
<td>9,500</td>
<td>14.5</td>
</tr>
</tbody>
</table>

*Figure 4 - Example of recommendations for the improvement of the energy performance in a building*

The EP certification is obligatory since the 1<sup>st</sup> of January 2009 for new buildings (above 50 m<sup>2</sup>) and existing renovated buildings (above 1,000 m<sup>2</sup>). When rented or sold, buildings are provided with the Energy Performance Certificate only if they are newly constructed or renovated, i.e., when renting or selling new buildings (above 50 m<sup>2</sup>), as well as existing renovated buildings (above 1,000 m<sup>2</sup>). Similarly, public buildings (above 1,000 m<sup>2</sup>) must display the EP certificate in a prominent place visible to the public, only in case of a new construction or a major renovation.

In the Czech Republic, these national modifications strongly influence the scope of the EPBD. As mentioned above, it applies only to new buildings and to renovated buildings over 1,000 m<sup>2</sup> of total floor area. The inconsistent implementation of the Directive leaves energy classes "D" to "G" entirely unused. Those are the buildings which are assessed in terms of energy performance as poor, and therefore require the implementation of saving measures. This limitation means that, basically, only EPCs for classes A to C are currently issued in the Czech Republic. There is no record of the number of certificates issued so far.

The owner should present a valid certificate to the buyer or renter when the selling or renting contract is in preparation, but in practice this happens only in the cases described above (only if the property is newly constructed or renovated).


In the Czech Republic, one methodology is used for all regions and all building types. The procedure is based on published CEN Standards and applicable Czech Technical Standards. The EPC regulation has adopted the majority of valid national standards (mostly in the form of EN ISO standards), as well as other requirements (regulations, decree of the government e.g. on thermal insulation of hot water pipes, boiler efficiency, indoor climate), by reference to these standards and regulations. Zone operation profiles include occupation, lighting, indoor environment requirements and auxiliary energy. These profiles are standardised for typical zones such as offices, schools, dwellings, etc.

In the Czech Republic, the definition of a public building follows the EPBD terms, and states that operators of buildings with a floor area larger than 1,000 m<sup>2</sup>, used for education, health services, culture, retail, sport facilities, accommodation and restaurant services, customer centres of water/energy supply, transportation, telecommunication and public administration (i.e. almost all buildings except apartment buildings), are obliged to display the EP certificate in a publicly accessible area of the building.

At the end of 2010, only slightly more than 10 public buildings have been certified, but many more are in the process of being certified.

The responsibility of having a certificate lies with the builder, the owner or the association of the owners of the building in case of a new construction or a major
renovation. Display of the EP certificate on public buildings (according to the definition) is mandatory for building operators.

The cost of the EP certificate is based on a market price and ranges from 200€ for single family buildings, to 1,500€ for multifamily buildings, kindergartens and schools, to 6,000€ for large administrative buildings with A/C system.

Quality assurance (QA)
The Ministry of Industry and Trade (MIT) is responsible for the certification scheme. The MIT authorises energy experts for certification schemes, keeps the list of authorised experts and annually collects experts’ record (number of issued EPCs, energy saving potential and other monitoring indicators). There is no central register of EPCs in the Czech Republic.

The training of experts is the first stage to guarantee a high level of quality for the system. A specific training course with high passing grades in the exam is required. This topic is detailed on Chapter 4. The second stage to guarantee the EPC quality is random sample checks conducted by the State Energy Inspectorate (SEI). SEI has the right to impose penalties (warnings, fines, and removal from the list of energy experts) for failure to comply with the Act.

Act 458/2000 Coll. - Law on Business Conditions and Public Administration in the Energy Sectors is known colloquially as the Energy Act. Although this Act is largely concerned with regulations in the energy sector, it also defines the responsibilities and powers of the State Energy Inspectorate (SEI). This Act gives SEI the right of initiative to instigate inspection proceedings in order to ensure compliance with the Acts and Decrees related to energy generation, distribution and consumption. The State Energy Inspectorate has specific responsibilities for the Quality Control of EPC, as well as for inspections, according to the requirements of the Energy Management Act. The Quality Control of EPC is additionally co-financed by the state budget, through the State Programme (programme for energy efficiency).

If, during the construction, or after the completion of a building, SEI finds out that the building does not comply with the EP requirements, a fine is imposed on the builder or the owner. The law does not clearly define whether the building will have to be subsequently brought into conformity with the requirements of the Act.

Detailed information about the total number of Q&A checks of EPCs, as well as the results of the checks is not available.

3 > Inspections - Status of implementation

Boiler inspection
The Czech Republic has adopted the option A of the Article 8 of the EPBD, establishing a regular inspection of boilers.

This obligation does not apply to boilers and internal heat distribution systems in residential buildings (family houses, multifamily houses and apartments), which do not use heat for business purposes. These residential owners are provided with consultations and advice, free of charge, by the network of Energy Consultancy and Information Centres (EKIS).

Any other operating boilers (running on natural gas, liquid or solid fuels) with a rated output power from 20 kW up to 200 kW must be subjected to regular efficiency inspections, according to the EPBD (regulation No. 276/2007 Col.). Boilers with a rated heat output over 200 kW are inspected according to the Minimum Efficiency of Energy Use for Heat Energy and Electricity Production Act (Act No. 150/2001 Col.).
## Thermal output of the boiler(s)

<table>
<thead>
<tr>
<th></th>
<th>Coke</th>
<th>Hard Coal</th>
<th>Coal Pressed Fuel</th>
<th>Brown Coal - sorted</th>
<th>Brown Coal - unsorted</th>
<th>LFO</th>
<th>HFO</th>
<th>Natural Gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>up to 0.5 MW</td>
<td>69</td>
<td>68</td>
<td>67</td>
<td>66</td>
<td>62</td>
<td>80</td>
<td>-</td>
<td>85</td>
</tr>
<tr>
<td>0.51 - 3 MW</td>
<td>-</td>
<td>70</td>
<td>69</td>
<td>68</td>
<td>63</td>
<td>83</td>
<td>-</td>
<td>86</td>
</tr>
<tr>
<td>3.1 - 6 MW</td>
<td>-</td>
<td>75</td>
<td>-</td>
<td>72</td>
<td>65</td>
<td>84</td>
<td>81</td>
<td>87</td>
</tr>
<tr>
<td>6.1 - 20 MW</td>
<td>-</td>
<td>77</td>
<td>-</td>
<td>75</td>
<td>70</td>
<td>85</td>
<td>82</td>
<td>90</td>
</tr>
<tr>
<td>20.1 - 50 MW</td>
<td>-</td>
<td>80</td>
<td>-</td>
<td>-</td>
<td>77</td>
<td>87</td>
<td>85</td>
<td>92</td>
</tr>
<tr>
<td>above 50 MW</td>
<td>-</td>
<td>82</td>
<td>-</td>
<td>-</td>
<td>82</td>
<td>89</td>
<td>86</td>
<td>93</td>
</tr>
</tbody>
</table>

Figure 5 - Minimal boiler efficiency of new boilers, sorted by fuel and heat output according to the Act No. 150/2001 Col.

Heating appliances (boilers) with a rated heat output above 20 kW, which are more than 15 years old, must undergo an one-off inspection of the whole heating installation. Mainly, the space heating system dimensioning and function is checked. Such a review has to include an assessment of the boiler efficiency, as well as possible advice on its replacement.

### Inspections of boilers in buildings started in November 2007.

The time interval between periodic boiler inspections depends only on the fuel used:

- Solid and liquid fuel boilers - every 2 years
- Natural gas boilers - every 4 years

### A/C inspection

In the Czech Republic, A/C system inspections use the same methodology based on the use of CEN standard 15 240 for all sizes and types of A/C systems. The procedure includes reviewing the documentation for the air-conditioning system, initially to determine the extent and the location of the system components, as well as reviewing the quality and the likely effectiveness of maintenance. It is considered that some aspects of physical inspection can be omitted from the "standard" inspection procedure when it is clear that the systems have been well maintained. When it is not clear that maintenance has been carried out to a good standard, the system components are inspected, largely to identify and report instances of neglect or damage that could have reduced the efficiency.

Part of the inspection is the review of the suitability and settings of the system controls, as these may be improved or simply reset at low cost.

### Inspections of A/C systems in buildings started in November 2007. The default inspection period is 4 years.

The A/C inspection report includes:

- refrigeration equipment
- outdoor heat rejection
- cooled air and independent ventilation air, delivery systems
- heat exchange to the refrigeration system
- building system controls and control parameters

### Inspection reports

There is a standardised report template with a common set of required minimum information defined. Inspection reports are not collected at a central database. Boiler or A/C system owners keep these inspection reports to present them on demand.

Inspections of boilers and air-conditioning systems are based on the assessment of efficiency under normal working conditions. Currently, inspections must simply follow the reference methodologies defined in the relevant CEN standards.

Boiler and A/C inspections are paid by the end user or by the owner of the building.
4 > Qualified Experts

In the Czech Republic, experts in building certification, as well as inspectors of boilers and A/C systems, have to pass different examinations, but the same expert can be simultaneously authorised to perform more than one of these activities. Experts for building certification and inspections need to be registered with an Energy Auditor Registration Number, and authorised by the Ministry of Industry and Trade.

The application may be submitted only by a person who:
› has an Energy Auditor Registration Number, or
› is registered as an authorised architect or authorised engineer and technician by the Czech Chamber of Certified Engineers and Technicians.

Energy auditors (the qualification required is a university degree and 3 years of technical experience, or a “highschool” degree + 5 years of experience). Authorised engineers or architects undertaking a specific training course and passing an examination are authorised by the Ministry.

Experts should have a liability insurance because clients usually so demand (but not required by the law) and must play an independent role in the certification process.

The EP certificate/inspection may NOT be performed by a person who:
› holds a share in the company or the co-operative that ordered the EPC;
› is a stakeholder in or a member of the co-operative that ordered the EPC, or is a statutory body of or a member of the statutory body of the entity that ordered the EPC, or is employed by or has a similar relationship to the corporation that ordered the EPC;
› is someone close to those people, who might be, due to their position, a natural or legal person to influence the energy auditor.

If there are complaints on an expert’s work or if an expert does not issue any audit or EPC for 5 years, than he/she is deleted from the list of experts.

At the end of 2010, there are about 788 authorised experts for EP certification, and 275 authorised experts for inspections in the Czech Republic.

5 > National Information and Communication Campaigns

In the Czech Republic, there has been no official state campaign supporting the EPBD implementation. Some energy consultancy companies, technical equipment manufacturers (pumps, space heating and cooling control systems) and professional associations are running information campaigns, mostly in collaboration with local municipalities.

Local campaign in the frame of IMPLEMENT projects

The IMPLEMENT project started in January 2007 in the framework of the Intelligent Energy for Europe Programme (www.epbdinaction.eu). The aim of the campaign carried out was to set up, lead and evaluate an awareness campaign which should communicate direct information to building owners (private, municipal and government), building users, installing companies, designers and developers in the Czech Republic.

The focus of the campaign was to raise interest among all target groups regarding the EPBD, energy savings and using urban renewable energy sources with respect to the minimal energy performance requirements set in the EPBD for new buildings and major renovations.
The Czech IMPLEMENT campaign should not be simply a remedy for problems associated with energy efficiency and the use of renewable energy sources in the building sector, but it is an important contribution to the increase of energy efficiency and the improvement of the quality of the existing building stock.

The campaign was not intended as a “universal cure” healing all energy related problems in buildings. The success rate lies in making people understand how they consume energy and the offer of technical and financial solutions.

However, the high-quality preparation of the campaign, its attraction and its aiming to the right target groups are the core of the campaign’s success. However, the obstacles have shown that, although a lot of work has been done, much more has still to be done in order to convince building owners to implement energy saving measures.

6 > National incentives and subsidies

The Green Savings programme focuses on support for heating installations utilising renewable energy sources, but also for investment in energy savings in reconstructions and new buildings. The programme will support quality insulation of family houses and non-panel multiple-dwelling houses, replacement of environment-unfriendly heating equipment by low-emission biomass-fired boilers and efficient heat pumps, installation of these sources in new low-energy buildings, as well as construction of new houses complying with the passive energy standard.
The Czech Republic has raised funds for this programme from the sale of emission credits under the Kyoto Protocol on greenhouse gas emissions. The overall anticipated programme allocation is up to 25 billion Czech crowns (about 1,000 M€).

The Green Savings support has been set up so that the funds can be used throughout the period from the programme's launch in 2009 until the 31st of December 2012. Applications for subsidies will be admitted until the 30th of June 2012, or until the programme's funds are exhausted. A subsidy may be granted before or after the implementation of the measure, but support for measures completed before the programme's launch cannot be granted. The support is granted for equipment installed in residential houses, not for buildings intended for individual recreation or for industrial buildings, even if the applicant has their permanent residence there.

7 > Impact of the EPBD at national level

Evolution of minimum quality requirements in building regulations

The EPC implementing regulation (published in 2007) sets the minimum requirements for the energy performance of new buildings and existing buildings under major renovation. The EP requirements for new and existing buildings are the same. This means that there is no difference in energy performance aspects between newly constructed and refurbished buildings.

The main regulations are:

› Regulation No. 148/2007 Coll. of the Ministry of Industry and Trade, specifying the details of the energy performance of buildings.
› Level of heat energy demand, according to the Czech standard ČSN 73 05 040-2/Z1: 2005

Both specify details of energy efficiency in buildings. The required values are obligatory for almost all new buildings. In case of existing buildings, they are obligatory for larger refurbishments (e.g. if more than 25% of the surface of a building is insulated, then the insulation must comply with the standard).

The standard sets two levels of insulation: required and recommended. The required level is obligatory. The recommended level reflects the expected development in the future.

Following the development of the required U-values in the Czech Republic, no impact of the EPBD is evident regarding the strengthening of the thermal characteristics of the building envelope (the more recent update of U-values was prepared and published in 2005).

<table>
<thead>
<tr>
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<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>-</td>
<td>3.700</td>
<td>2.900</td>
<td>1.800</td>
<td>1.700</td>
</tr>
<tr>
<td>Wall</td>
<td>1.467</td>
<td>0.894</td>
<td>0.461</td>
<td>0.380</td>
<td>0.380</td>
</tr>
<tr>
<td>Floor</td>
<td>1.369</td>
<td>1.091</td>
<td>1.034</td>
<td>0.600</td>
<td>0.450</td>
</tr>
<tr>
<td>Roof</td>
<td>0.900</td>
<td>0.508</td>
<td>0.316</td>
<td>0.300</td>
<td>0.240</td>
</tr>
</tbody>
</table>

*Figure 8 – Development of the U-value of the key structure elements of the buildings (included in Czech Technical Standard ČSN 73 0540)*

Other impacts

In the Czech Republic, the average age of the housing stock is relatively high. In 2001, the average age of the housing stock increased to 46.9 years. A serious problem is the neglect of maintenance of the housing stock, meaning a lack of maintenance over a protracted period of time, which has resulted in a decrease of
the financial and utility value of residential structures. Specific problems exist in respect of prefabricated-panel buildings. Due to construction and design flaws, as well as to insufficient maintenance, these problems are exacerbated by the fact that buildings of this type account for close to the one third of the housing stock.

Since the beginning of the 1950s, new technologies for a new type of residential building construction were used: the panel houses, which were being built till the end of the 20th century. Heat transmission resistance of the outside walls was 1.2-1.5 m²K/W (it represents an U-value of 0.83-0.67 W/m²K).

Despite the fact that most of the blocks of flats built in the period 1970-1990 used concrete panels as the material for outside walls, the majority of the currently used housing was built using bricks.

There are some new requirements directly connected with the EPBD implementation. The following requirements are considered as new features:

› Global minimum requirements on consumption for all types of buildings, expressed in kWh/m² per year of delivered energy;
› RES and D-H feasibility studies for new buildings over 1,000 m²;
› Energy Performance Certificate (incorporating heating, cooling, DHW preparation, mechanical ventilation, lighting, and auxiliary energy).

8 > Conclusions and future planning

Fundamental change in Czech legislation on energy efficiency in buildings will be completed in 2011 by implementing aspects of the EPBD recast. With these changes, new demands will come up regarding the reconstructed or newly constructed buildings in many areas, e.g.:

› Extension of the building stock under the EPBD.
› Tightening of thermal-insulation characteristics of the building envelope.
› Calculation of CO₂ emission produced by the building’s use.
› Introduction of primary energy calculation.
› Addition of features missing in the previous transposition of the Directive (namely, certificates in cases of sale and renting of existing buildings, display of certificates in buildings for public services frequently visited by the public).

The incorporation of the key steps and the timetable for the implementation of obligations under the EPBD recast into the Czech legislation is expected to take place as follows:

› In 2011 - The new legislation will be prepared and publicised. The amendment of the Energy Management Act will be submitted to the Parliament for approval.
› In 2012 - The new legislation will become mandatory.