CONCERTED ACTION
ENERGY PERFORMANCE OF BUILDINGS

# Implementation of the EPBD Czech Republic

## Status in 2020

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## 1. Introduction

The Czech Republic's building market possesses great potential for energy savings that can largely be achieved through implementing the EPBD, a responsibility of the Ministry of Industry and Trade.

The EPBD has been transposed through the *Energy Management Act* No. 406/2000 Coll[1], with the last amendment coming into force in 2020. The *Energy Management Act* sets the obligation to increase the energy performance of buildings and the obligations related to EPCs; it also sets rules, conditions and educational standards for EPC issuers and heating and AC systems inspectors. The most recent amendments to the Act relate to the obligation of transposing those parts of Directive 2018/844/EU which are amending Directive 2010/31/EU on the energy performance of buildings and Directive 2012/27/EU on energy efficiency. The Act is also amended to include an obligation for the State Energy Inspection to issue a binding opinion regarding the energy performance of a planned construction or renovation if the total energy reference area[2] is greater than 350 $m^2$. A new amendment to the Act is currently being prepared.

Part of Directive 2010/31 EU was transposed via Decree No. 78/2013 Coll. on Energy Performance of Buildings, which was amended as Decree 264/2020 Coll. to fully transpose Directive 2018/844/EU.

Improving the buildings' energy performance and increasing energy savings are high priorities in the Czech Republic. This report presents an overview of the progress and current status of the EPBD implementation in the Czech Republic.

## 2. Current Status of Implementation of the EPBD

### 2.I. Energy performance requirements: NEW BUILDINGS

For new constructions, compliance with energy performance requirements is the responsibility of the builder. In case the design changes during construction in a way which may potentially impact the energy performance, then compliance with the applicable requirements should be demonstrated again through the EPC. In addition, also the technical, economic and environmental feasibility regarding the local RES

supply system, combined heat and power generation, thermal energy supply systems and heat must be demonstrated. Decree 264/2020 sets six relevant energy performance indicators:

1. primary energy from non-renewable energy sources (here onwards, 'primary energy');
2. total delivered energy per year;
3. energy delivered to technical building systems (heating, AC, hot water supply, lighting, forced ventilation and humidity adjustment systems);
4. average U-value;
5. U-value of each construction element on the system boundary;
6. energy efficiency of the technical building systems.

### *2.I.i. Progress and current status of new buildings (regulation overall performance)*

In order for a new building to be constructed, the builder must document that it meets the minimum values for primary energy per year, total delivered energy per year and the average U-value, as well as minimum NZEB requirements. The primary energy indicator must reach EPC level C (in exceptional cases level D), which is set as the minimum requirement for the building to be constructed. This applies to all types of buildings (residential, non-residential, public, etc.). Decree 264/2020 also sets minimum energy performance requirements/values for technical building systems and requirements for nearly energy zero buildings. Figure 1 shows the evolution of the energy performance/class for new family houses constructed in the Czech Republic between 2010 and 2017. Although the NZEB level for family houses entered into force in 2020 (NZEB level for new buildings with total floor energy area less than 250 $m^2$ in the year 2020), the majority of buildings fulfilled stricter criteria years before (since 2016).

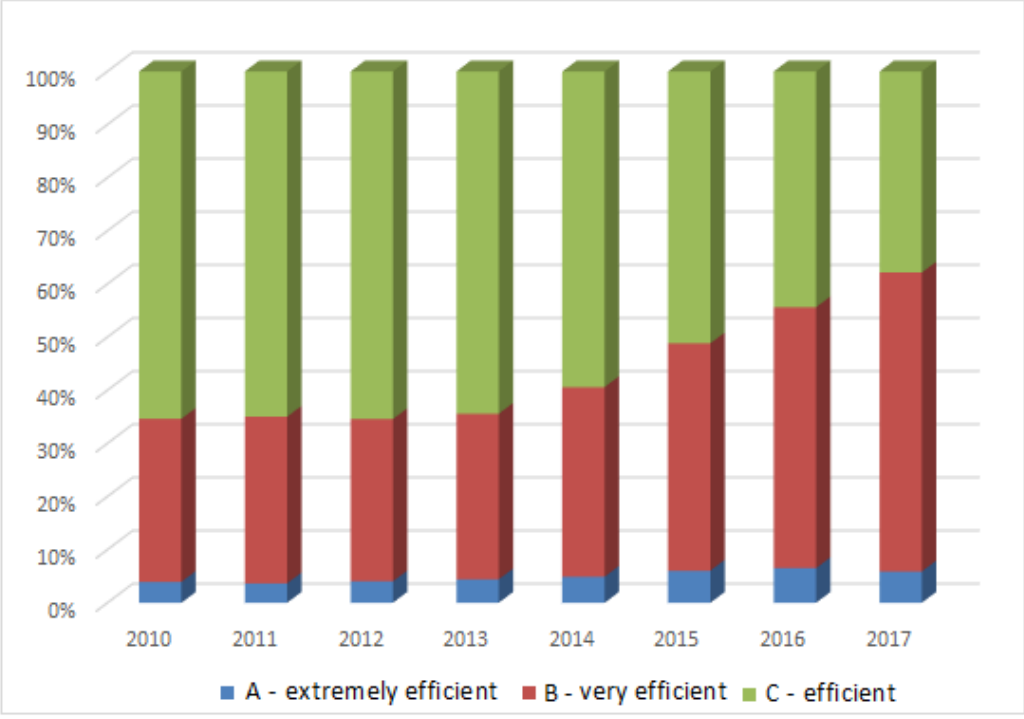


*Figure 1: Evolution of the energy performance/class for new family houses constructed in the Czech Republic between 2010 and 2017.*

## *2.I.ii. Format of national transposition and implementation of existing regulations*

As mentioned earlier, the main act addressing building energy performance is the *Energy Management Act*. The energy performance is further covered by several additional decrees that address more specific technical issues:

- Decree No. 264/2020 Coll.[1] on building energy performance defines the methodology for the calculation of the energy performance of buildings, as well as energy performance indicators, parameters of the reference building, requirements for NZEB, primary energy factors and the obligation to display EPCs;
- Decree No. 193/2013 Coll.[1] on AC systems inspections defines the methodology and frequency of AC systems inspections;
- Decree No. 194/2013 Coll.[1] on heating systems and hot water distribution defines the methodology for heating systems dimensioning and energy efficiency assessment, as well as the methodology and frequency of heating systems inspections.

The energy performance calculation must be based on standards including:

- ČSN EN 73 0540[3] on thermal protection of buildings, which specifies technical requirements for the design and verification of buildings (Table 1), including indoor environmental characteristics during their use.
- Technical standard ČSN 73 0331[3] Energy performance of buildings - Typical values for calculation - Part 1: General and calculation data per month - which contains typical energy efficiency parameter values and intervals of technical building equipment efficiency, typical user profiles (based on, e.g., operational hours, ventilation, lighting and hot water preparation), climate data, etc.

| Description of the building component | Construction type | Required U-values | Recommended U-values |
|---|---|---|---|
| Flat and pitched roof pitch up to 45° included<br>Floor above external space<br>Ceiling below the unheated attic and the roof without thermal insulation<br>Floor and wall with heating | light<br>heavy | 0.24 | 0.16 |
| External wall<br>Steep roof with the roof pitch exceeding 45° | light<br>heavy | 0.3 | 0.2 |
| Floor and wall in contact with the soil*<br>Ceiling and internal wall between a heated and an unheated space | | 0.6 | 0.4 |
| Ceiling and internal wall between a heated and a partially unheated space | | 0.75 | 0.5 |
| Windows and other ‘opening fillers’ in the envelope of the heated space, including the respective frame | | 1.5 | 1.2 |
| Door and other fillers leading from partially heated spaces to unheated spaces of a heated building | | 3.5 | 2.3 |

*Table 1. U-values set in the standard ČSN 73 0540.*

## *2.I.iii. Action plan for progression to NZEB for new buildings*

The *Energy Management Act No. 406/2000* Coll. defines the NZEB as a building with very low energy performance whose energy consumption is to a very significant extent covered by RES. The exact proportion of energy that should come from RES is not defined. Several conditions must be fulfilled by the builder/designer for the building to be categorised as NZEB. Energy indicators to be met for a building to be

considered NZEB are the same for new buildings. However, in the case of NZEB, the Czech legislation demands a gradual decreasing of the primary energy for the reference building. The assessed building must meet this stricter requirement either by increasing the share of RES or by improving the building envelope. The NZEB must then meet the reduced value requirement for primary energy, reduced by 25% for family houses, 20% for apartment buildings, and 10% for other buildings. After 1 January 2022, this NZEB requirement will be even stricter and range from 20% to 60% depending on the energy reference area and the heat demand. The legislation consists of a two-step requirements approach: the cost-optimal level requirements, which came into force on 1 April 2013, and the gradual tightening of requirements towards NZEB depending on the size and type of the building, which gradually came into force between 1 January 2016 and 1 January 2020. The amendment of Decree No. 264/2020 Coll. introduced stricter values for the reference building which indirectly impacts NZEB levels. The amendment also introduces stricter requirements for NZEB (see above) as such for newly constructed buildings (so-called NZEB after 1 January 2022) in order to better reflect the real meaning of NZEB.

**Examples of newly constructed highly efficient buildings in the Czech Republic**

LUKA LIVING RENTAL APARTMENTS & SHOPPING CENTER

Luka Living is an original and revolutionary project of the 21$^{st}$ century, located in Prague, providing modern rental housing with hotel services within fully equipped apartments with a low-energy standard. Luka Living offers 215 apartments ranging from studios to exceptional fully furnished apartments. The entire complex includes 7,000 m$^2$ of retail space within the surrounding area. The complex includes a grocery store, pharmacy, drugstore, bank, restaurant, fitness centre, laundry, hairdresser, tobacconist and children's playground.


*Figure 2: Luka Living rental apartments & shopping center.*

| | |
|---|---|
| Specific heat demand for heating | 11 kWh/(m$^2$.year) |
| Energy Performance Class | A - extremely efficient |
| Primary energy | 43 kWh/(m$^2$.year) |
| Total airtightness $n_{50}$ | 0,6 h-1 |
| Average U-Value | 0,36 kWh/(m$^2$.K) |

*Table 2: Parameters of the Luka Living rental apartments & shopping center.*

ELEMENTARY SCHOOL PSÁRY

A newly constructed passive standard elementary school and gymnasium, located in the Central Bohemia Region. The cover is made of sand-lime brick and reinforced concrete with approx. 240 mm of mineral insulation of U-value 0.14-0.19 W/($m^2$.K). The floor includes 180 mm of EPS insulation with a U-value of 0.17 W/($m^2$.K), while roofs are inclined and flat with different insulation thicknesses and a U-value between 0.13 and 0.18 W/($m^2$.K). Windows include triple glazing and have $U_w$ = 0.75 W/($m^2$.K). External shading with automatic and manual control is connected to the central control.

Heating is provided primarily by a cascade of four heat pumps (4x31 kW) and a set of two condensing boilers of 50 kW each (floor heating, radiators, hot-air heating). Forced ventilation with recuperation, an advanced control and regulation system ($CO_2$ sensors, humidity, time mode) and optimised flow rates are applied throughout the building through a total of 10 air ventilation units. Cooling is provided only for the kitchen space through compressor units. There is a LED lighting system with intelligent control.

*Figure 3: Elementary school Psáry.*

| | |
|---|---|
| Specific heat demand for heating | 13 kWh/($m^2$.year) |
| Specific heat demand for cooling | 1 kWh/($m^2$.year) |
| Energy Performance Class | A - extremely efficient |
| Primary energy | 61 kWh/($m^2$.year) |
| Total airtightness $n_{50}$ | 0,6 $h^{-1}$ |
| Average U-Value | 0,2 kWh/($m^2$.K) |

*Table 3: Parameters of elementary school Psáry.*

## *2.I.iv. Requirements for building components for new buildings*

Any new building must comply with the energy performance requirements of the *Energy Management Act*, which includes minimum energy efficiency requirements of technical building systems and requirements for the building constructions (see Table 1). These minimum values are defined in Annex 1 of Decree 264/2020 applied to the reference building. The amendment of Decree No. 78/2013 to Decree No. 264/2020 Coll. introduced stricter reference values for some technical building systems. In case of heating, the overall efficiency of the heating system in the reference building has increased from a very low level of about 54% to a new level of about 73%. This value better reflects the real heating situation.

| Parameter | Symbol | Unit | Reference value |
|---|---|---|---|
| Heating | | | |
| Heat generation efficiency factor | $\eta_{H,gen,R}$ | % | 92 |
| Heat distribution efficiency factor | $\eta_{H,dis,R}$ | % | 90 |
| Emission efficiency factor | $\eta_{H,em,R}$ | % | 88 |
| Cooling | | | |
| Energy efficiency ratio | $EER_{C,gen,R}$ | W/W | 2.7 |
| Energy efficiency ratio of other cooling sources | $EER_{C,gen,R}$ | W/W | 0.5 |
| Efficiency distribution factor for cooling | $\eta_{C,dis,R}$ | % | 85 |
| Emission efficiency factor for cooling | $\eta_{C,em,R}$ | % | 85 |
| Delivered energy for family and apartment houses (or zones with this operation) | $Q_{fuel,C}$ | kWh | 0 |

*Table 4. Example of requirements for new or changed building systems.*

### *2.I.v. Enforcement systems new buildings*

As already mentioned, Decree No. 264/2020 Coll. sets the minimum reference energy efficiency and other values for technical building systems and an average U-value for the building envelope. Compliance with these requirements is subject to control by the State Energy Inspection that controls the issued EPCs. A penalty can be imposed if the values given in the EPC do not conform with the minimum values set in the decree.

## 2.II. Energy performance requirements: EXISTING BUILDINGS

### *2.II.i. Progress and current status of existing buildings (regulation overall performance)*

Existing buildings have to meet strict energy performance requirements in case of major or other renovations. In this case, the builder, owner or association of unit owners must fulfil the requirements given by the applicable legislation, Decree No. 264/2020 Coll., which sets the minimum parameters and energy performance indicators. The EPC must demonstrate that the cost-optimal levels are met for the changed building envelope and/or technical building systems, and that the assessment of the alternative energy delivery system as well as recommendations for improving the energy performance have been provided. The EPC must be part of the building permit application.

| | small municipalities (0 – 1,999 inhabitants) | larger municipalities (2,000 – 49,999 inhabitants) | towns and regions (> 50,000 inhabitants) | state | total amount |
|---|---|---|---|---|---|
| **number of buildings** | **52,975** | **39,069** | **14,376** | **11,332** | **117,753** |

*Table 5:* Number *of non-residential existing buildings of the public sector.*

### *2.II.ii. Regulation on individual parts, distinct from whole building performance*

The *Energy Management Act* sets an obligation in the case of improvements other than major renovations of either an existing building or a completed one, during which the requirement to improve the energy performance must be achieved for the altered structural elements of the building envelope or technical building systems. If improvements to individual parts are performed within ten (10) years from issuing the EPC of the building, the building owner or association of unit owners are obliged to comply with the energy performance requirements for buildings set in Decree No. 264/2020 Coll., and the construction must meet the energy performance requirements for either the altered structural elements of the building envelope or the altered technical building systems, also set in Decree No. 264/2020 Coll. This must be proved in the

building's records relating to an altered structural element of the building envelope or an altered technical system, and the owner must keep these records for five (5) years.

| Parameter | Label | Unit | Reference value |
|---|---|---|---|
| Energy efficiency of a heat source for heating and / or hot water production | $\eta_{H,gen,R}$ | % | 80 |
| Cooling factor of the compressor source of cold | $EER_{C,gen,R}$ | W/W | 2.7 |
| Cooling factor of other sources of cold | $EER_{C,gen,R}$ | W/W | 0.5 |
| Heating factor of a heat pump | $COP_{H,gen,R}$ | W/W | 3.0 |
| Efficiency of heat recovery – equal pressure forced ventilation system | $\eta_{H,hr,sys}$ | (%) | 60 |

*Table 6: Reference parameters and values for altered building technical systems.*

## *2.II.iii. Initiatives/plans to improve the existing building stock*

The Czech Republic prepared the Renovation Strategy of Buildings[4] in line with article 4 of Directive 2012/27/EU. The goals of this strategy were: to create new jobs, especially in small- and medium-sized companies across the territory; to increase living comfort in buildings; to create higher disposable resources for households, institutions & businesses, making non-energy related goods & services more accessible; and to introduce energy savings that would reduce the use of fossil fuels, leading to a reduction in local pollution and greenhouse gas emissions and a rise in energy security. As a part of this strategy, there were additional initiatives and actions for existing building stock improvements. This strategy is also a founding stone for the Long-Term Renovation Strategy that has been prepared in line with the EPBD as amended by Directive 2018/844/EU.

The main focus of the strategy prepared under Article 4 of the EED was on economic measures. The Czech Republic has more than a decade of experience with programmes that help different property owner groups achieve energy savings for their building operations by way of reconstructions, upgrading technical building systems to highly efficient ones, etc. National programmes include the New Green Investment scheme, the Panel Programme and the EFEKT Programme (see sections 2.II.v and vi). The Czech Republic also uses financial tools from EU funds such as the Operational Programme Environment, the Operational Programme Enterprise and Innovation for Competitiveness, and the Integrated Regional Operational Programme. Other introduced measures include the Energy Performance Contracting, legislative measures (e.g., higher credibility of the EPC), consultancy guaranteed by the State, raising of public awareness, training of experts in the field of construction and energy, R&D, etc.

## *2.II.iv. Long Term Renovation Strategies, status*

The Long-Term Renovation Strategy[5] is partially based on the Building Renovation Strategy prepared under Article 4 of Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency. However, it is more complex in terms of policy design requirements which reflect the barriers to building renovation, as well as market failures, etc. It aims to promote a cost-effective transformation of existing buildings through setting up adequate financial mechanisms in order to mobilise private investment.

The outcome of the Long-Term Renovation Strategy is to propose a cost-effective scenario for the renovation of the building stock of the Czech Republic (see scenario 2 below), covering the residential, public and private sectors, with measurable progress indicators and relevant policies as a result.

The Long-Term Renovation Strategy identifies the three following scenarios:

**Scenario 1:** Baseline (Business as Usual, current developments following the implementation of policies and measures based on EED Art. 4). The basic scenario reflects the current market situation. The scenario thus considers all existing policies and measures to support energy efficiency by the State but does not consider their change (nor the introduction of new policies, or their conclusion, for example, when a new programming period begins). By 2050, it reduces consumption by about 72 PJ (19%) compared to the current state. The cumulative investment costs until 2050 for the implementation of this scenario are CZK 722 billion.

**Scenario 2:** Optimal (anticipated development of the renovation of the building stock after the introduction of additional measures aimed, in particular, at changing the approach (complexity) of renovations and increasing their number in the public sector). The optimal scenario goes beyond existing policies. It envisages the introduction of new measures, especially in the area of public and commercial buildings. In the area of residential buildings, it foresees an increased depth of renovations, but not an increase in the actual number. By 2050, it reduces consumption by about 89 PJ (24%) compared to the current state. The cumulative investment costs until 2050 for the implementation of this scenario were calculated at CZK 856 billion. Investment costs will consist of funds from both the State budget and other public budgets, as well as EU and private funds; the volume of funds allocated for national subsidy titles will depend on the possibilities of the State budget for the relevant periods.

**Scenario 3:** Hypothetical (ideal scenario based on rapid and thorough renovation of the building stock, but its implementation is limited by the identified barriers and the possibility of implementing various measures). The hypothetical scenario assumes that the vast majority of buildings (85%) will undergo thorough renovation from 2025 or 2030; only buildings where this is not technically possible will stick with shallow or moderate renovations. This will not be possible without significant State intervention. Furthermore, it foresees an approximately doubled renovation rate, which would result in the renovation of every building within 30 years. This increase in the depth and rate of renovations will lead to a reduction in energy consumption of 166 PJ (44%) by 2050, with a total necessary investment of CZK 1,419 billion.

Some key figures for the 3 scenarios are presented in Tables 7a-c.

| Baseline Scenario | 2020 | 2030 | 2040 | 2050 |
|---|---|---|---|---|
| Final energy consumption in a given year [PJ]* | 374 | 351 | 328 | 306 |
| *Family houses* | 161 | 151 | 140 | 129 |
| *Apartment houses* | 88 | 84 | 79 | 75 |
| *Public and commercial buildings* | 124 | 117 | 109 | 102 |
| Energy savings compared to baseline 378 PJ [PJ] | -4 | -27 | -50 | -72 |
| Investment costs in a given year [billion. CZK] | 23 | 21 | 20 | 21 |
| Cumulative investment costs [billion. CZK] | 91 | 309 | 514 | 722 |
| *Family houses* | 47 | 160 | 266 | 366 |
| *Apartment houses* | 13 | 43 | 71 | 97 |
| *Public and commercial buildings* | 32 | 107 | 177 | 259 |
| **Specific heat demand for heating [GJ/( m².year)]** | **522** | **469** | **420** | **377** |
| **The scenarios are based on the assumption that, together with the renovation of buildings, the operation of the building is optimised and the rebound effect is ignored. Furthermore, the scenarios reflect the current trend of demographic impacts. The scenarios will be updated in the coming years to reflect the current developments in the building segment.* | | | | |

*Table 7a: Parameters and milestones of the Czech Republic's Long-Term Renovation Strategy Baseline Scenario (scenario 1).*

| Optimal Scenario | 2020 | 2030 | 2040 | 2050 |
|---|---|---|---|---|
| Final energy consumption in a given year [PJ] | 373 | 345 | 316 | 289 |
| *Family houses* | 161 | 149 | 136 | 123 |
| *Apartment houses* | 88 | 83 | 78 | 73 |
| *Public and commercial buildings* | 124 | 113 | 102 | 93 |
| Energy savings compared to baseline 378 PJ [PJ] | -5 | -33 | -62 | -89 |
| Investment costs in a given year [billion. CZK] | 24 | 26 | 28 | 23 |
| Cumulative investment costs [billion. CZK] | 93 | 356 | 614 | 856 |
| *Family houses* | 47 | 168 | 282 | 388 |
| *Apartment houses* | 13 | 45 | 76 | 105 |
| *Public and commercial buildings* | 33 | 142 | 256 | 362 |
| **Specific heat demand for heating [GJ/( m².year)]** | **521** | **448** | **376** | **327** |

*Table 7b: Parameters and milestones of the Czech Republic's Long-Term Renovation Strategy Optimal Scenario (scenario 2).*

| Hypothetical Scenario | 2020 | 2030 | 2040 | 2050 |
|---|---|---|---|---|
| Final energy consumption in a given year [PJ] | 372 | 312 | 248 | 212 |
| *Family houses* | 161 | 130 | 94 | 76 |
| *Apartment houses* | 88 | 76 | 60 | 50 |
| *Public and commercial buildings* | 124 | 107 | 94 | 86 |
| Energy savings compared to baseline 378 PJ [PJ] | -6 | -66 | -130 | -166 |
| Investment costs in a given year [billion. CZK] | 32 | 55 | 40 | 28 |
| Cumulative investment costs [billion. CZK] | 104 | 605 | 1 102 | 1 419 |
| *Family houses* | 53 | 311 | 570 | 713 |
| *Apartment houses* | 13 | 94 | 188 | 263 |
| *Public and commercial buildings* | 37 | 199 | 344 | 443 |
| **Specific heat demand for heating [GJ/( m².year)]** | **520** | **409** | **306** | **261** |

*Table 7c: Parameters and milestones of the Czech Republic's Long-Term Renovation Strategy Hypothetical Scenario (scenario 3).*

## *2.II.v. Financial instruments and incentives for existing buildings*

The main financial incentives for building renovations in the Czech Republic are direct subsidies from operational and national programmes. There are three main operational programmes that provide financing for building renovations, targeting a wide range of potential applicants from the public and private sectors. A list of some operational and national programmes are:

**Operational Programme Environment (2014-2020)**

Regions, municipalities, state organisational units, state organisations, public research institutions and research organisations, universities, non-governmental non-profit organisations, contributory organisations, churches and religious societies, etc. can apply. The programme aims at public buildings with the main focus on insulation of the building envelope, replacement and refurbishment (repair) of hole fillings; implementation of measures demonstrably affecting the energy performance of the building or improving the quality of the indoor environment; implementation of forced ventilation systems with waste heat recovery, implementation of systems using waste heat, replacement of the source for heating, cooling or hot water production in case of renovations and construction of new public buildings.

**Integrated Regional Operational Programme (2014-2020)**

This programme aims at apartment buildings only. Apartment block owners and unit owners' associations (excluding natural persons not doing business) can apply for this programme. The main focus is on reducing energy consumption by improving the thermal properties of buildings (insulation, cladding, roof, and ceiling and floor constructions); heating or hot water installations (replacing fossil fuel sources with environmentally friendly sources); transition to environmentally friendly sources (biomass or natural gas boilers, heat pumps or combined heat power); water and heat distribution systems.

**Operational Programme Enterprise and Innovation for Competitiveness (2014-2020).**

Entrepreneurs can apply for buildings owned by businesses within this programme. The main focus is on: insulation and replacement and refurbishment of opening fillers; other construction measures having a demonstrable impact on the energy performance of the building; installation of ventilation systems with waste heat recovery; modernisation of lighting systems; and installation of renewable energy sources.

**New Green Savings (2015 – ongoing)**

The programme is funded by the profits made from the sale of emissions allowances and is focused on improving the energy efficiency of residential buildings, on the construction of new energy-efficient buildings, the replacement of heating systems and the use of RES.

**Programme ENERG**

The programme is a soft-loan programme for financing energy efficiency measures for small- and medium-sized enterprises. The programme aims to facilitate SMEs in the capital city of Prague in securing financing for their projects through soft loans aimed at reducing energy intensity in their activities, in order to achieve savings in their final energy consumption. The purpose of the programme is to fill the gap as regards financing enterprises, which cannot apply in the operational programmes in the capital city due to high GDP per capita The programme is funded by the profits made from the sale of emissions allowances.

**Programme PANEL 2013+ (2013 – ongoing)**

Owners of apartment buildings, housing cooperatives, community of apartment owners, natural and legal persons, cities and municipalities who own an apartment building may apply. The main focus is on reducing the energy performance of dwellings; repairing construction failures; repairing and modernising common areas; and modernising sanitary units.

**EFEKT Programme**

The Ministry of Industry and Trade also runs the EFEKT Programme which supports minor investments and non-investment projects. For a detailed description, see 2.II.vi.

## *2.II.vi. Information campaigns / complementary policies*

The EFEKT Programme, which is ongoing *since the 90s,* is one of the tools of the Ministry of Industry and Trade to achieve the current goal set by the European Directive No. 2012/27/EU on energy efficiency. The EFEKT Programme is a programme complementary to operational and national energy programmes aimed at increasing energy savings. Minor investment and non-investment projects are promoted throughout a five-year period. Non-investment projects assist with energy consulting, implementing energy management, preparing energy efficiency projects, hosting events and providing books and pamphlets, all of which are free to the public. The EFEKT Programme[6] also supports the EPC system, for example, by providing essential books as learning materials for applicants who wish to obtain a licence to issue EPCs and inspect heating and AC systems. The programme also supports energy auditors.

Under this programme, the ministry runs energy consulting and information centres. Energy consulting is provided as a free service to the public, which serves to achieve energy savings and increased deployment of RES. It is designed for citizens, public administrations, businesses and entrepreneurs. The information centres are represented in all regions of the country and provide advice from qualified energy consultants.

**Energy Savings short-term campaign**

The Ministry of Industry and Trade has prepared a short-term campaign aimed at the following target groups:

| |
|---|
| **Households** |
| *Youth (18-35 years)* |
| *Families (35-60)* |
| *Elderly and seniors (60+)* |
| **Business Management** |
| *With production* |
| *Without production* |
| **Public administration** |
| *Mayors of municipalities and directors of relevant departments* |
| *Directors of the Investment and Property Management* |

The objective is to run a campaign focused on rapidly raising awareness about energy savings among the Czech public. The campaign is planned to last two years.

Given that the campaign is short-term and focused on the rapid achievement of the goals set, it should appeal more to the so-called quick thinking and decision-making in the near future. Quick thinking is a fast, emotional, mostly unconscious and intuitive decision-making system. Therefore, the short-term campaign should support this rapid decision-making process, which also leads to rapid change.

Examples of strategic learning are described in Table 8.

| |
|---|
| **Households** |
| *Youth (18-35 years)* |
| • Online content prevails over printed content - especially among younger people within this target group. Communication should take place via social networks and digital campaigns.<br>• Long-term sustainability is important for target group representatives who live in large cities, and more emphasis is also placed on green issues. |
| *Families (35-60)* |
| • The most comprehensive target group for which the largest number of activities can be generated.<br>• Greatest potential for improvement, not only for soft measures but, above all, more costly measures.<br>• Good practice examples. This theme is ideal for residential media, where it is easy to show attractive buildings and renovations of low-cost houses or proper, modern solutions for energy management.<br>• All communication should follow the campaign slogan, '**Opportunities are all around us**'. Communication can thus focus on two main areas – showing good practice and telling people what opportunities exist around them or pointing out mistakes and potential for improvement. |
| *Elderly and seniors (60+)* |
| • Print media should be the main communication channel in this case. The main types of media that seniors follow are tabloids, crossword magazines and TV magazines. From the news media, they prefer regional newsletters.<br>• Communication focuses primarily on soft measures that do not require major investment. What matters to them is the presence of a campaign ambassador or a celebrity who is generally popular and that adds credibility and weight to the campaign.<br>The main motivation is a healthy environment that seniors want to enjoy. But for many of them, financing and their savings are also very important. |
| **Company Management** |
| *Companies with/without productions* |
| Business-focused communication should generally be concentrated in economic media, where more comprehensive financial savings data can be utilised by using specific business stories and examples of good practice, targeting either business owners/management or employees. |
| **Public administration** |
| *Mayors of municipalities and directors of relevant departments* |
| • Specialised media is the most important media. Communication towards municipalities should be based on good practice examples from surrounding municipalities and regions and generally from the Czech Republic. Such demonstrations might convince municipalities that choosing Smart Choices and applying measures to help save energy is not difficult.<br>• Examples of bad practice can also be presented - when municipalities did not make use of the energy consultant's advice and made mistakes that later forced them to change the original project.<br>• Competition for the best (re)construction carried out by the municipality or region or by the public administration in general. The award for the competition should provide motivation for a number of municipalities and be a tool for impressing constituents. |

*Table 8: Strategic insights per target group for the Energy Savings short-term campaign.*

Additional information can be found in the LTRS (see https://ec.europa.eu/energy/topics/energy-efficiency/energy-efficient-buildings/long-term-renovation-strategies_en

## 2.III. Energy performance certificate requirements

The obligation to obtain an EPC is set in the Energy Management Act for all buildings that are covered by this Act. An EPC is requested before construction (in the process of getting the building permit), for major renovations, for sale and rental, as well as when a builder submits a request for building changes before building completion. The Energy Management Act covers all residential, commercial and public buildings and defines the following exemptions as regards the issuance of the EPC:

- buildings with a total floor area of less than 50 $m^2$;
- buildings that are considered to be historic buildings or are located in a conservation area;
- buildings used as places of worship and for religious activities;
- residential buildings which are used or intended to be used for a limited time annually and with an expected energy consumption of less than 25% of what would be the result of all-year use;
- industrial sites, workshops and non-residential agricultural buildings with energy consumption of less than 700 GJ;
- intelligence service buildings;
- buildings important for state defence;
- buildings built before 1947 to be sold or rented and which have not undergone major renovations since, and the seller/lessor and the buyer/tenant agree on not issuing the EPC.

The EPCs can only be issued by energy specialists having a licence from the Ministry of Industry and Trade. The Ministry of Industry and Trade maintains a database of all approved energy specialists on its website. Further to the energy specialists, the database also includes heating and AC systems inspectors. The energy specialist is obliged to register all issued EPCs in ENEX, the electronic database maintained by the Ministry. It is the obligation of the building owner to obtain the EPC. In case the EPC is processed by an expert from a different Member State, the building owner is obliged to inform and present the licence of the expert to the Ministry.

## *2.III.i. Progress and current status on EPCs at sale or rental of buildings*

The building owner covered by the Energy Management Act must show and hand over the EPC or its verified copy when selling or renting the building, either as a whole or in part. The handover must happen at the latest when signing the contract; this applies for all building types. An EPC issued for an apartment building serves as an EPC for each apartment unit within the building. In case of sale or rental of an apartment unit, the Apartment Owners Association must provide the EPC to the apartment unit owner.

If the building owner does not fulfil these obligations, a penalty can be imposed by the State Energy Inspection.

The price of the EPC can typically range between 120 € and 150 € for an apartment or for a single-family house, and may go up to between 2,000 € and 3,000 € for hospitals or large apartment buildings.

## *2.III.ii. Quality Assurance of EPCs*

In 2019, the State Energy Inspection performed 215 controls of energy specialists from a total of 1,331 energy specialists (16% of energy specialists controlled). These controls covered 998 EPCs to verify whether they were processed objectively, truthfully and completely, as the Energy Management Act requires. The controls identified several law violations, and penalties of up to 76,300 € have so far been imposed. This amount does not include penalties from ongoing court proceedings.

State Energy Inspection also performs a quality check of all EPCs intended for construction of a new building or major renovation of an existing building with a total energy reference floor area greater than 350 $m^2$.

### *2.III.iii. Progress and current status of EPCs on public and large buildings visited by the public*

The Czech Republic runs a database called the Central Register of Administrative Buildings[1]. This register keeps records of 5,000 buildings that are properties of the state. The Energy Management Act §7a sets the obligation for public authorities and owners of buildings occupied by public authorities to have the EPC issued by 1 July 2013 for buildings with a total floor area of over 500 $m^2$, and by 1 July 2015 for buildings with a total floor area of over 250 $m^2$. The same paragraph requires that the EPC be displayed in the building in accordance with Decree no. 264/2020 Coll., which obliges owners to obtain it for a new building construction or a major renovation of a building in which the energy reference floor area is equal to or greater than 500 $m^2$. It also requires that the EPC be displayed in the building in accordance with the Decree No. 264/2020 Coll., for buildings having an energy reference floor area equal to or greater than 250 $m^2$ and being intended for public use. The EPC has the same format as the one for non-public buildings and must be displayed in a prominent place where it is clearly visible to the public. The EPC must be issued again as soon as it expires (within 10 years), in case of major building renovations, or if a change is made to the heating, cooling or hot water preparation system in the building.

### *2.III.iv. Implementation of mandatory advertising requirement – status*

When a building or an apartment is offered for sale or rent in commercial media, the relevant advertisement should include the classification of the relevant energy performance indicators. The obligation to present the energy performance indicator classification in advertisements started on 1 January 2013. When the sale or rental is advertised by a third party (e.g., an estate agency), the owner must provide the visual part of the EPC (Figure 4) to that party, who then features the energy performance indicator classification in the advertisement. If the building owner does not provide the EPC, the third party displays class G to fulfil the obligation; the building owner can nevertheless be fined for not providing the graphical part of the EPC to the third party.

## 2.IV. Smart buildings and building systems

### *2.IV.i. Status and plans on smart buildings*

Requirements for building intelligence differ depending on the building's purpose and the way it is used, although it is always necessary to meet the criteria for safety, reliability, economic operation, reasonable investment and operating costs. The 'smart buildings' concept is one element of a broader concept, that of the 'smart city'. In the Czech Republic, many projects have been launched in recent years to gain practical knowledge and to unify methodologies of approaches regarding these concepts.

In this respect, the National Research and Innovation Strategy for Smart Specialisation, which the EU Member States were required to prepare for identifying the most promising areas of the economy, should be mentioned. This should subsequently be supported by the European Structural and Investment Funds (ESIF). The Czech Republic has prepared its National RIS3 Strategy based on these elements, and it reflects the priorities of the economy which should be addressed by ESIF programmes and selected national R&D support programmes. A complex area is the preparation and demonstration of integrated solutions for cities and their agglomerations (smart cities and regions) concerning European initiatives, but also taking into account the specific characteristics of the Czech Republic. The essence is to establish synergies between the generation and transmission of energy, the use of energy in buildings and the energy intensity of transport, while applying ICT (Information and Communication Technologies). In the residential sector, the concept of smart homes and housing is to be developed, which is the intersection between

construction, local energy production and smart appliances, but also other elements contributing to a safe and happy building and living environment. Energy savings must focus not only on technical solutions but also on business and financing models. Also important is to reduce the energy consumption of buildings, including improving their insulation. Passive houses can lead to an increase in quality for the indoor and outdoor environment, as lower levels of harmful substances are inside the building and lower pollution emissions seep into the surroundings.

## *2.IV.ii. Regulation of system performance*

As mentioned above, in accordance with the Energy Management Act No. 406/2000 Coll. the building's technical systems must meet applicable energy performance requirements. But there are also other laws that set additional requirements on the performance of systems. The Air Protection Act No. 201/2012 Coll[1]. sets minimum emission requirements for stationary combustion sources with a nominal heat input of 300 kW and lower for the purpose of placing relevant products on the market. The Act also sets minimum emission requirements for stationary combustion sources for solid fuels with a nominal thermal input of up to 300 kW inclusive, which serves as a heat source for the central heating system in the existing buildings (see Table 9).

| Fuel delivery | Fuel | Rated thermal input (kW) | Emission limit values | | |
|---|---|---|---|---|---|
| | | | CO | VOC | TSP[1)] |
| | | | mg.m$^{-3}$ | | |
| Manual stocking | Biological | ≤ 65 | 5,000 | 150 | 150 |
| | | > 65 - 187 | 2,500 | 100 | 150 |
| | | > 187 - 300 | 1,200 | 100 | 150 |
| | Fossil | ≤ 65 | 5,000 | 150 | 125 |
| | | > 65 - 187 | 2,500 | 100 | 125 |
| | | > 187 - 300 | 1,200 | 100 | 125 |
| Automatic | Biological | ≤ 65 | 3,000 | 100 | 150 |
| | | > 65 - 187 | 2,500 | 80 | 150 |
| | | > 187 - 300 | 1,200 | 80 | 150 |
| | Fossil | ≤ 65 | 3,000 | 100 | 125 |
| | | > 65 - 187 | 2,500 | 80 | 125 |
| | | > 187 - 300 | 1,200 | 80 | 125 |

1)Total suspended particles

*Table 9: Emissions limit for the heat source for the central heating system in households.*

Other requirements are laid down in Decree No. 268/2009 Coll.[1] on Technical Requirements for Constructions. These are the requirements for the protection of health, healthy living conditions and the environment for all kinds of constructions. For buildings, it deals in particular with requirements for the amount of daylight and artificial lighting, ventilation and heating.

Decree No. 193/2007 Coll.[1] lays down the details of energy use efficiency in the distribution of thermal energy and internal distribution of thermal energy and cold. It also lays down requirements for the efficiency of energy use in newly established facilities for distribution of thermal energy and for internal distribution of thermal energy and cold, as well as requirements for equipping such systems with thermal insulation, regulation and control for:

a) steam, hot-water and hot-water/cold-water supply networks, including connections, with the exception of cooling water from energy and technological processes that release thermal energy into the environment;

b) heat exchange or heat exchange stations;

c) equipment for the internal distribution of heat, cold and hot water in buildings.

Furthermore, this Decree lays down a method for determining the heat losses of thermal energy distribution systems and internal distribution of thermal energy, cold and hot water systems. This Decree applies to distribution heat systems and internal distribution systems for thermal energy and cooling which serve the supply of thermal energy to residential buildings for technological purposes and for non-residential premises.

## *2.IV.iii. Building Automation and Controls (BACs)*

The Czech Republic has set regular inspection schemes for heating and AC systems. In accordance with Directive 844/2018/EU, exemptions have been introduced for such systems in buildings equipped with an automation and control system which meet the requirements specified in the national legislation transposing the EPBD. In this case, the building automation and control system is a system comprising all products, including software and engineering services that support the safe, economic, energy-efficient operation of the technical building systems through automatic controls which still allow for manual intervention in order to set some input parameters. Installation of BACs in the Czech Republic must follow the technical standard ČSN EN 15232-1 Energy Performance of Buildings - Part 1: Impact of Building Automation, Controls and Building Management - Modules M10-4, 5, 6, 7, 8, 9 and 10.

The installation of BACs is promoted by the State with financial instruments supporting the implementation of energy management as described in section 2.II.v and vi. For example, the EFEKT programme provided a total funding of 316,000 € in 2017-2019, and 308,000 € in 2020. The support is aimed to regions, municipalities and city districts of over 5,000 inhabitants, voluntary associations of municipalities, and business entities.

## *2.IV.iv. Status and encouragement of intelligent metering*

Smart metering in the field of heat and electricity in the Czech Republic is on a voluntary basis. Currently, 61% of electric meters in the Czech Republic are smart meters with continuous metering. There are currently no incentives supporting the installation of smart meters.

## *2.IV.v. Progress and current status on heating systems (Inspection / Equivalence)*

The Czech Republic implemented an obligation for mandatory inspections of heating systems over 70 kW and hot water distribution systems in line with Articles 14-15 of the EPBD. The relevant provision was implemented through Article 6a of the Energy Management Act. This article defines inspections of heating systems in buildings with business purposes. Inspections relating to family houses are defined by the 201/2012 Coll. Air Protection Act[1] or 458/2000 Coll.[1], the Energy Act and Decree No. 85/1978 Coll.[1] on inspections, revisions and tests of gaseous heat sources.

The Czech Republic also coordinates energy consultancy and information centres which give advice regarding heat sources that are not covered by the EPBD, as well as for AC systems, energy efficiency and RES, as mentioned in Section II.vi.

According to the Energy Management Act, all heating systems (with rated output power above 70 kW) are subject to regular efficiency inspections in compliance with Decree 194/2013 on the inspections of boilers and hot water supply. This decree sets the scope, methodology and frequency of the inspections of heating systems as well as the form and content of the inspection reports, including:

1. assessment documentation;
2. visual inspection and a check of the accessible heating system operability;
3. evaluation of the heating system maintenance;
4. evaluation of the heating system dimensioning when compared to the building's heating requirements;
5. evaluation of the heating system efficiency;
6. recommendations for financially feasible improvements of the heating system and thermal energy distribution.

The inspection report must be uploaded to the national database ENEX and can be subject to control.

## *2.IV.vi. Progress and current status on AC systems (Inspection / Equivalence)*

Similar to heating systems, the Energy Management Act requires AC systems with a rated cooling output above 70 kW to undergo regular efficiency inspections in compliance with Decree 193/2013 on the inspection of AC systems (formerly Decree 277/2007), resulting in a written report on the AC systems inspections. The decree also sets out the inspection methodology. The inspection of the AC systems consists mainly of:

1. assessment documentation;
2. visual inspection and a check of the operability of the accessible AC units;
3. evaluation of the AC system maintenance;
4. evaluation of the AC system dimensioning when compared to the building's cooling requirements;
5. evaluation of the AC system efficiency;
6. recommendations for financially feasible improvements of the AC system.

The inspection report must be uploaded to the national database ENEX and can be subject to control.

## *2.IV.vii. Enforcement and impact assessment of inspections*

### Enforcement and penalties

Both the inspection and the inspection report can be issued only by energy specialists licensed to perform heating systems and thermal energy distribution or AC systems inspections. The report must be objective, complete and correct. If the inspection report is improperly processed, a penalty of up to 185,000 € can be imposed by the State Energy Inspection.

### Quality control of inspection reports

The State Energy Inspection checked 74 heating and AC systems inspection reports. The control revealed 32 erroneously processed reports. Also, 28 energy specialists were subject to control. The total amount of penalties imposed was 3,200 €. This figure does not include penalties from ongoing court proceedings.

## 3. A success story in EPBD implementation

**Making the EPCs user-friendly**

The EPC in the Czech Republic is used for many purposes. In the case of constructions and major renovations, it is a document that demonstrates compliance with the minimum requirements for energy performance. It also serves as a tool to assess energy savings applicable to the scope of energy efficiency financial support schemes in the Czech Republic. For an ordinary user it can be used as a cost estimation tool when considering buying or renting a property. It can also give an indication about the quality of the technical equipment systems used in the building and the quality of the building envelope. At the same time, thanks to the recommended measures, it can show to interested persons, e.g. the current building owner or potential buyer/renter, what measures can be taken in the future and what impacts these measures will have on the building energy performance. However, experience in the Czech Republic shows that unlike energy labels on energy-using products, the EPC does not fully fulfil its purpose. Although people consider energy costs when renting or buying a property, the EPC is not so widely used for this purpose. Moreover, the EPC is often considered a necessary administrative burden by the public. Even though it contains all the necessary data, it is considered to be a complex and not user-friendly tool. The Ministry, therefore, decided to amend the EPC to make it more credible, more usable and friendlier to the public.

Until 2020, the EPC consisted of two parts: the visual part and the protocol.

The visual part originally consisted of two A4 pages. It contained two main energy performance indicators – primary energy and total energy delivered to the building. It was, however, considered that including two indicators on one page could be confusing for users, as different indicators could allocate a building to different classes at the same time. With the updated layout, the visual part consists of only one A4 page and contains only the evaluation of the building expressed by the primary energy indicator and its classification into the primary energy class A-G (Figure 4).

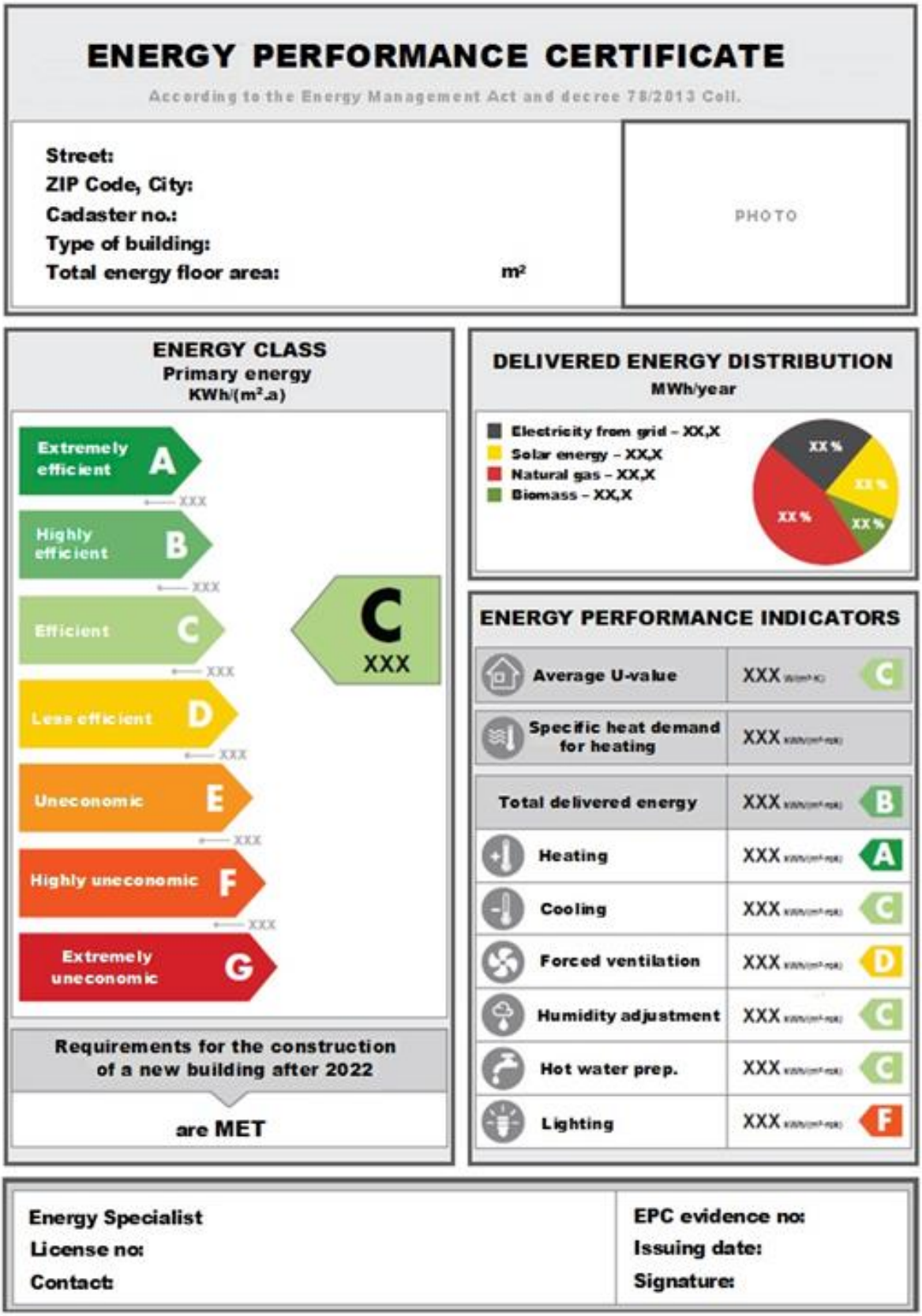


*Figure 4: The new EPC layout (visual part).*

As in the past, it includes an assessment of the energy delivered to each individual technical building system and the distribution of energy carriers per energy use in the building.

The protocol, on the other hand, contained all the data used for the EPC calculation. The protocol has also undergone significant changes. Complex tables in the protocol have been replaced by easily readable elements and supplemented with clear graphical representations. An example is the graphical display of the monthly consumption of delivered energy in a building according to end use.

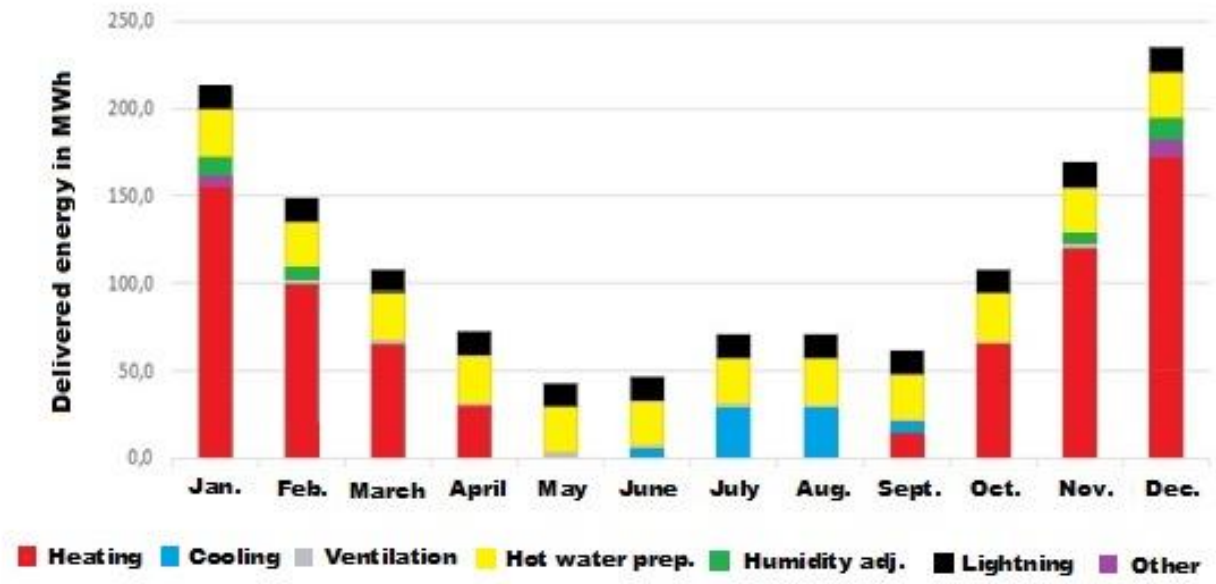


*Figure 5: Example of the display in the new version of the EPC of the monthly consumption of delivered energy in a building by end-use.*

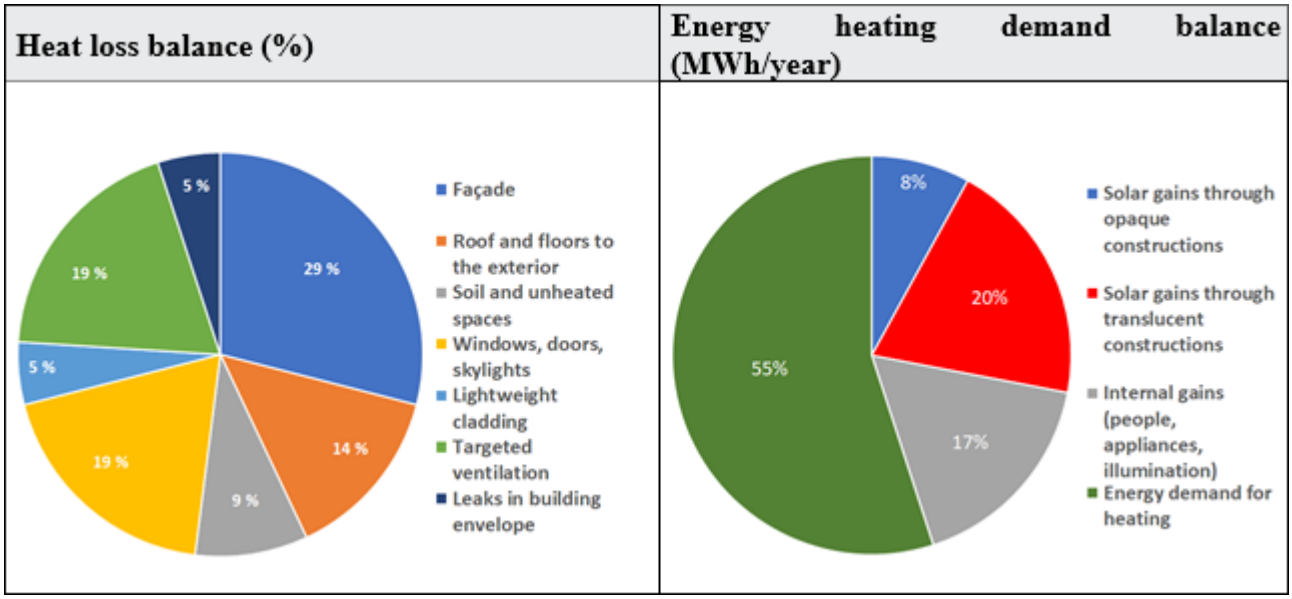


*Figure 6: Example of a new table in the EPC protocol showing the heating balance in the assessed building.*

An indisputable advantage for the EPC user is that the protocol compiles in one single place an overview of the fulfilment of all mandatory requirements for the building.

| PROPOSED SET OF MEASURES | | | | |
|---|---|---|---|---|
| **Set of measures description** | | | | |
| | **Energy demand for heating, cooling a hot water preparation** | **Total delivered energy** | **Primary energy** | **Primary energy class** |
| | kWh/(m².year) | kWh/(m².year) | kWh/(m².year) | |
| | **MWh/year** | **MWh/year** | **MWh/year** | |
| **Building assessment** | | | |  |
| **Set of proposed measures** | | | |  |
| **Achieved energy savings** | | | | |

*Table 10: Example of a new table in the EPC protocol dealing with measures for increasing the energy efficiency of the assessed building.*

Improved EPC design and clarity, in particular when accompanied by additional references to more freely available information, improves awareness of the use of the building and the potential energy savings and allows users to make more informed decisions when intending to buy, rent or renovate a building. Credibility and user acceptance are thereby bolstered, making the EPC an economically and environmentally beneficial tool that can help achieve the national and European goals for a carbon neutral future.

# 4. Conclusions, future plans

The Czech Republic devotes significant attention to the energy performance of buildings, and the country is continuously transitioning construction standards towards NZEB levels. Many seminars, webinars and lectures are currently taking place in order to assist architects, builders and designers with this transition. In parallel, significant effort is put on educating experts in the field of energy and construction. The year 2020 is the date of implementation of the revised EPBD and it is important to monitor what impact the relevant adaptations have on the building sector.

Future plans are deeply connected with the Long-term Renovation Strategy and its implementation. The Strategy identified barriers against renovations for different parts of the building stock, which must be dealt with. In the residential building sector, the Czech Republic will focus more on raising awareness in the field of energy efficiency and acceptance of effective energy management in houses (use of energy efficient appliances, forced ventilation installation, etc.) by the general public. Funding for energy efficient building transitions will be maintained as was until now, but with improved access to it.

The situation is similar for apartment buildings. There, the aim is to improve the quality of renovations and to manage its complexity, especially in the case of multi-ownership. In the case of individual owners, finding the concrete factors which trigger renovation (e.g., the technical condition of the building) and introducing appropriate instruments that increase interest in and motivate action for renovation is key, especially at the municipal level. As in the case of single-family homes, a campaign to bring energy efficiency closer to the general public will be crucial for the period 2020-2030.

For the public sector, the aim is to increase the number and depth of renovations. Quality of renovation works is not considered a key issue in this sector because renovation projects are normally implemented in

coordination with experts. Support for renovations in the public sector will require targeted instruments. It is therefore necessary to maintain the current financial scheme, i.e., a subsidy scheme; however, it is necessary to modify the specifications to better meet municipalities' needs and requirements. As it appears that the motivation factor for renovations in the public sector is cost savings, it is necessary to help municipalities in the implementation of energy management to be able to identify the potential for reducing energy consumption and operating costs.

Understanding current energy management is crucial for the development of new tools to support the renovation of buildings in the private sector. Despite the fulfilment of legal obligations (obligations to carry out energy audits or the energy management in place), entrepreneurs have limited understanding about energy costs. At the same time, saving operating costs is a motivation for them to carry out renovation works. In the coming period, it will be necessary to provide entrepreneurs with tools to improve energy management in the business sector. The availability of such (financial or quality control) tools should ensure greater motivation to implement building renovation projects. For commercial companies, increasing the number of building renovations will depend on whether, thanks to financial support, the project payback period can be reduced to an acceptable timeframe (e.g., 5 years). It is this requirement that may be a barrier to the implementation of measures for buildings (long-term return on projects aimed at improving the quality of the building envelope) that do not require renovations or whose technical condition does not require an investment.

## Endnotes

1. https://portal.gov.cz/app/zakony
2. The external floor area of all spaces with a conditioned indoor environment on all floors of the building or part of the building,
3. https://csnonline.unmz.cz/
4. The Strategy is part of the National Action Plan according to the Energy Efficiency Directive 2012/27/EU and can be found at https://www.mpo.cz/cz/energetika/energeticka-ucinnost/strategicke-dokumenty/narodni-akcni-plan-energeticke-ucinnosti-cr--150542
5. The link to the new LTRS will be added in the future (currently it must be approved by the Government – the final version will then be published on the ministry website).
6. mpo-efekt.cz/cz

# Annexes - Key Indicators & Decisions

## Key Indicators & Decisions – General Background

| no | Key Implementation Decisions – General Background | Description / value / response | Comments |
|---|---|---|---|
| 01.01 | Definition of public buildings (according to article 9 b) | No | No definition provided in the legislation |
| 01.02 | Definition of public buildings used by the public (according to article 13) | No | No definition provided in the legislation. It is understood as a building intended for public use. |
| 01.03 | Number of residential buildings | 1,766,046 | Source: Czech Republic's LTRS |
| 01.04 | Number of non-residential buildings | 613,134 | Source: Czech Republic's LTRS |
| 01.05 | If possible, share of public buildings included in the number given in 01.04 | 19.2% | Source: Czech Republic's LTRS |
| 01.06 | If possible, share of commercial buildings included in the number given in 01.04 | 80.8% | Source: Czech Republic's LTRS |
| 01.07 | Number of buildings constructed per year (estimate) | 14,901 | Average over the period 2012-2018 |
| 01.08 | If possible, share of residential buildings constructed per year (estimate, included in the number given in 01.07) | 91% | Based on the average of buildings constructed between 2012 and 2018 |
| 01.09 | If possible, share of non-residential buildings constructed per year (estimate, included in the number given in 01.07) | 9% | Based on the average of buildings constructed between 2012 and 2018 |
| 01.10 | Useful floor area of buildings constructed per year in million square meters (estimate) | 3.03 | Based on the average of buildings constructed between 2012 and 2018 |

## Key Indicators & Decisions – New Buildings

| no | Key Implementation Decision – New Buildings | Description / value / response | Comments |
|---|---|---|---|
| 02.01 | Are building codes set as overall value, primary energy, environment ($CO_2$), reference building or other? | Primary energy in kWh/($m^2$.year) | Defined as energy class to be met and also as NZEB requirements to be met |
| 02.02 | Requirements for energy performance of residential buildings in current building code | As above | As above |
| 02.03 | Requirements for energy performance of non-residential commercial buildings in current building code | As above | As above |
| 02.04 | Requirements for energy performance of non-residential public buildings in current building code | As above | As above |
| 02.05 | Is the performance level of nearly zero energy (NZEB) for new buildings defined in national legislation? | Yes | Not directly as a number in kWh/($m^2$.year) |
| 02.06 | Nearly zero energy (NZEB) level for residential buildings (level for building code) | Yes, indirectly | Calculation of the energy performance is based upon comparison with the reference building. The reference NZEB has stricter requirements on the building envelope (0,7x $U_{m,R}$ (average U-value) and a reduction in primary energy compared to the reference building) |
| 02.07 | Year / date for nearly zero energy (NZEB) as level for residential buildings (as indicated in 02.04) | 1 January 2020 | |
| 02.08 | Nearly zero energy (NZEB) level for all non-residential buildings (level for building code) | | |
| 02.09 | Year / date for nearly zero energy (NZEB) as level for non-residential buildings (as indicated in 02.06) | 1 January 2020 | |
| 02.10 | Are nearly zero energy buildings (NZEB) defined using a carbon or environment indicator? | | |
| 02.11 | Is renewable energy a part of the overall or an additional requirement? | Yes, indirectly | Based on calculation |
| 02.12 | If renewable energy is an additional requirement to NZEB, please indicate level | Not in kWh/($m^2$.year) | Depending on used technical building systems and building envelope quality |
| 02.13 | Specific comfort criteria for new buildings, provide specific parameters for instance for airtightness, minimum ventilation rates | Indirectly | Specific comfort criteria can be found in Czech standards<br>For example, Czech standard ČSN 73 0540-2 defines airtightness depending on the type of ventilation systems used, the intensity of air exchange in the used room, the thermal stability, etc. |

## Key Indicators & Decisions – Existing Buildings

| no | Key Implementation Decision – Existing Buildings | Description / value / response | Comment |
|---|---|---|---|
| 03.01 | Is the level of nearly zero energy (NZEB) for existing buildings set in national legislation? | No | The building owner can, however, ask the EPC issuer to prepare recommendations in order to meet the NZEB requirements (even though not set as legislative requirements for renovations). |
| 03.02 | Is the level of nearly zero energy (NZEB) for existing buildings similar to the level for new buildings? | Yes, partly | In case of a change of an existing building, when the total energy reference area expands to at least two and a half times the original total energy reference area, NZEB requirements must be met for the whole building. |
| 03.03 | Definition of nearly zero energy (NZEB) for existing residential buildings (if different from new buildings) | No | - |
| 03.04 | Definition of nearly zero energy (NZEB) for existing non-residential buildings (if different from new buildings) | No | - |
| 03.05 | Overall minimum requirements in case of major-renovation | Yes | Combination of energy performance indicators must be fulfilled by either:<br>• primary energy and average U-value or<br>• total delivered energy per year and average U-value or<br>• U-value of each construction element within the system boundary and energy efficiency of the technical building systems |
| 03.06 | Minimum requirements for individual building parts in case of renovation | Yes | |
| 03.07 | National targets for renovation in connection to Long Term Renovation Strategy (number or percentage of buildings) | Yes | See the table in section 2.II.iv. |
| 03.08 | National targets for renovation in connection to Long Term Renovation Strategy (expected reductions and relevant years) | Yes | See the table in section 2.II.iv. |

## Key Indicators & Decisions - Energy Performance Certificates

| no | Key Implementation Decision – Energy Performance Certificates | Description / value / response | Comment |
|---|---|---|---|
| 04.01 | Number of energy performance certificates per year (for instance average or values for of 3-5 years) | 2018 – 52,382<br>2019 – 54,444<br>2020 (for the time being) – 11,843 | |
| 04.02 | Number of EPCs since start of scheme | 207,358 | Since the start of the database |
| 04.03 | Number of EPCs for different building types | Family houses – 139,845<br>Apartment buildings – 33,429<br>Administration buildings – 8,274<br>Buildings for food and accommodation - 3,450<br>Buildings for health care – 1,041<br>Buildings for education – 3,857<br>Buildings for sport – 1,199<br>Commercial buildings – 3,987<br>Cultural buildings – 958<br>Other buildings – 11,318 | |
| 04.04 | Number of assessors | 1,331 | |
| 04.05 | Basic education requirements for assessors | Yes | |
| 04.06 | Additional training demands for assessors | Yes | |
| 04.07 | Quality assurance system | Yes | Done via State Energy Inspection |
| 04.08 | National database for EPCs | Yes | ENEX database |
| 04.09 | Link to national information on EPCs / Database | Not provided | Database is intended only for experts and the Ministry of Industry and Trade. It is not a public database. The direct link leads to a login area without any additional information. |

## Key Indicators & Decisions – Smart Buildings and Building Systems

| no | Key Implementation Decision – Smart Buildings and Building Systems | Description / value / response | Comment |
|---|---|---|---|
| 05.01 | Is there a national definition of smart buildings? | No | |
| 05.02 | Are there current support systems for smart buildings? | Yes | The Czech Republic currently runs several financial tools to support implementation of such systems. |
| 05.03 | Are there currently specific requirements for technical building systems (for instance in building codes)? | Yes | |
| 05.04 | Are there current requirements for automatics (for instance in building codes)? | Yes | |
| 05.05 | Chosen option A or B for heating systems (inspection or other measures) | Inspections | |
| 05.06 | Number of heating inspections; reports per year (if option A) | 2018 – 1,731<br>2019 – 1,676<br>2020 – 255 | |
| 05.07 | Chosen option A or B for cooling systems (inspection or other measures) | Inspections | |
| 05.08 | Number of air-conditioning / cooling system inspections; reports per year (if option A) | 2018 – 94<br>2019 – 138<br>2020 – 27 | |
| 05.09 | Is there a national database for heating inspections? | Yes | ENEX database |
| 05.10 | Is there a national database for cooling / air-conditioning inspections? | Yes | ENEX database |
| 05.11 | Are inspection databases combined with EPC databases for registration of EPCs and inspection reports? | Yes | |
| 05.12 | Link to national information on Inspection / Database | Not provided | The database is intended only for experts and the Ministry of Industry and Trade. It is not a public database. The direct link leads to a login area without any additional information. |

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