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BUILD UP SKILLS
ENERGY TRAINING FOR BUILDERS

Best buildings in the Czech Republic, 'Building of the Year' show winners in the years 2001-2011

BUILD UP Skills – Czech Republic

Analysis of the national status quo

Final version, November 2012

BuildUpCz

CREDITS

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Executive summary

The built environment sector constitutes a significant and long-term factor and contributor to the Czech economy and the community as a whole, including related environmental and socio-cultural aspects, because it:

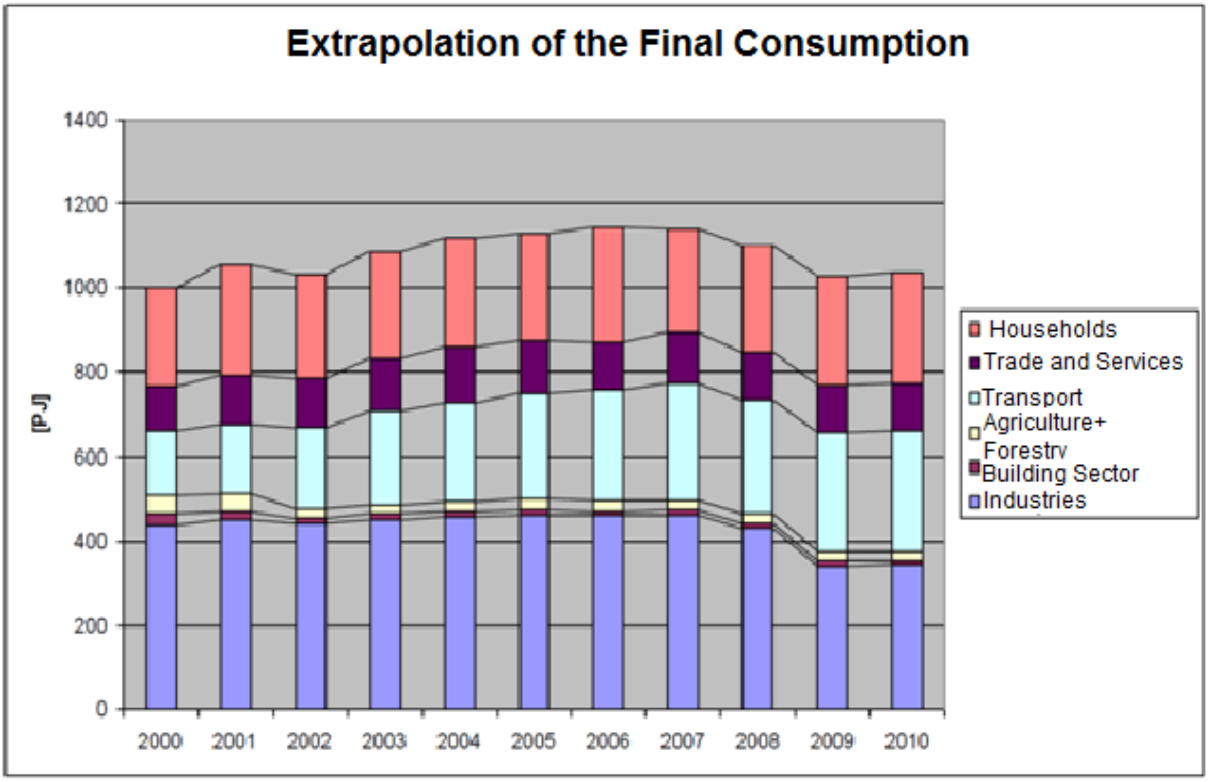
- Generates about **6-7% of the country's gross domestic product** (GDP).
- Employs about **9% of people working in the civilian sector** and is able to absorb a considerable portion of workforce with lower or diverse qualifications. The total number of workers in the construction sector amounts to about 450 thousand people at present (2012).
- Serves as a significant **multiplier and driver** in many related sectors of the manufacturing industry (with the **multiplier effect** index ranging from **3.2 to 3.5** depending on the type of construction investment).
- Buildings **consume a significant proportion of raw materials and energy resources** available to humanity:
  - The **extraction of building raw materials** and non-metallic materials intended for the production of building materials, accounts for more than **50% of the total domestic extraction,**
  - **Buildings** are responsible for about **40% of total energy consumption** and approximately the same percentage of greenhouse gases emissions (mainly carbon dioxide) and solid waste sent to landfill
  - The very building production shows a relatively **low energy intensity** (less than 2% of the final energy consumption in the Czech Republic), however, the share of RES in the sector 's final energy consumption still remains downright negligible,
- The sector's important particularity being its considerable, **roughly 45-50% share in public funds investments** (amounting to about CZK 250 billion from the state and municipal budgets on an annual basis)
- Due to the sector's above mentioned and other potential impacts (e.g., construction accidents, serious interventions into the environment, complex property issues) a great deal of responsibility is placed on the contractor of construction works, a fact that also predetermines **a high degree of control, regulation and involvement by the public administration** .

The built environment sector in the Czech Republic has been currently experiencing its third consecutive year of decline in performance. The immediate reason is the unprecedented cut in the volume of public procurement, in particular due to the underlying impact of the global crisis on the economy of the Czech Republic, or the Government's austerity program in response to this crisis. Another weakness of the Czech building industry, however, remains to be its below-average labour productivity (roughly one-third compared to the EU - 15) and a lower profitability of the industry. The public pressure for increased energy efficiency of both the sector and buildings, becomes an **integral part of a more general pressure** on the

overall modernization of the country's industry, starting from the employment of new technologies and materials, through the quality of management, capital stock growth to upgrading the skills of its workforce.

The efforts to **increase the energy performance of the economy and energy savings in the economy and households** are defined as one of the key priorities of the Czech Republic within the State Energy Policy in place. With regard to the RES, this document sets out the task of increasing their **share in energy production at least to 13% by 2020, about 17% by 2030 and to 23% by 2050**. The Czech Republic's commitment to generate 13% of energy from renewable sources by 2020 also stems from European Parliament and Council Directive 2009/28/EC of 23 April 2009.

Figure 1 Development of final energy consumption in the Czech Republic



Czech Statistical Office (ČSÚ), 2011

The built environment sector and building products producing industries will be significantly affected by the new directive on the energy performance of buildings (EPBD II - Energy Performance of Buildings Directive II), which was published in the Official Journal of the EU on 18th June 2010 under the number **2010/31/EU**. EPBD II sets out the 2020 targets of the European Community in the field of energy detailing the development steps to reduce energy consumption of buildings at economically viable investment costs. EPBD II provides for a fundamental obligation to design all new buildings in the "nearly zero" energy standard, namely:

- the new builds of public buildings from 2018,
- all new builds from 2020.

This is bound to significantly affect both the building sector's production profile and **qualification requirements** for its workforce. The requirement for energy efficient building, along with the general need of labour productivity growth (and thus the overall competitive edge of the Czech building sector) poses qualitatively new and quantitatively multiple demands on the **vocational education and training sector** development in the sphere of building industry. In this framework, the **adult education** will play the key role due to the following factors:

- an overall drop in the number of employees in the building sector expected in the 2020 horizon,
- based on the demographic development outlook, by the year 2020 the number of people reaching the secondary education age, plummets by about ¼ compared to 2010,
- lack of interest among the youth in preparing for blue collar (craft) occupations in the building industry: at present about 12,000 students attend vocational schools on aggregate, i.e. less than half their number 15 years ago,
- In the building sector it is typical both for fully trained operatives with apprenticeship certificates and secondary vocational schools leavers with GCSE to switch to different field professions, thus only few years after completing their studies about 40% of them work outside the field they specialized in.

In the building sector at present the primary (initial) education fails to offset the outflow due to retirement. The situation may improve by 2020, but probably not to the extent that primary education alone would meet the increasing demand for skills in the Czech building industry.
As for adult education in the building sector (and related occupations) in the Czech Republic, it is still very fragmented both with regard to its contents and organization. As to its contents, the implementation of the National Qualifications Framework and the National System of Occupations, seems to be promising a methodological unification. It is the NQF and NSO, along with the ever increasing demand of construction companies for the skills of their employees, that provide the required scope for the country's educational capacity to expand many times over. Some sort of barrier to making use of this scope, however, remains the fact that at present especially small and medium-sized businesses, operating in the building sector, whenever recruiting new operatives or using existing workers, still tend to depend more on their own experience with the worker's practical skills, rather than their formally acknowledged qualifications.

Currently, only **about one fifth of all workers in the industry** take part in some form of vocational education on average each year, moreover it is often rather patchy, i.e. addressing only partial aspects of the profession.
The general balance of up-skilling needs by levels of education highlights the paramount importance of lifelong learning for the qualification growth of the sector's human resources.

Table 1 - Skeleton balance of the educational needs by levels of education

Education level	2011	2011 – 2020 Drop	2011 Difference– drop by 2020	2020 Demand	2020 Unsatisfied demand
Basic school	14,0	4,5	9,5	8,6	- **0,9**
Secondary-level fully trained operatives	284,4	62,1	223,3	254,0	**31,7**
Secondary-level school with GCSE	126,0	18,0	108,0	116,2	**8,2**
University	42,0	5,4	36,6	51,7	**15,1**
TOTAL	466,4	90,0	376,4	430,5	**54,1**

ČSÚ Czech Statistical Office: Workforce survey, in-house calculation

The issue of adjusting the Czech Republic's building sector to new challenges, including the growing demand for energy-efficient building, is primarily related to **up-skilling the blue collar workforce, notably craftsmen.**

The solution of this problem by 2020 will require increasing capacities in primary (initial) education and adult education in the following professions:

- **Gypsum Plasterboard Fitters, dry assembly (no wood)**
- **Carpenter and Wooden Structures Fitter**
- **Construction carpenter (including wooden structures)**
- **Bricklayer ABP: insulation, plaster, stucco**
- **Electrician (low voltage distribution)**
- **Air Conditioning and Ventilation**

Content innovation will be imperative in virtually all fields of education in the run up to 2020, the need should be particularly strong in the following areas:

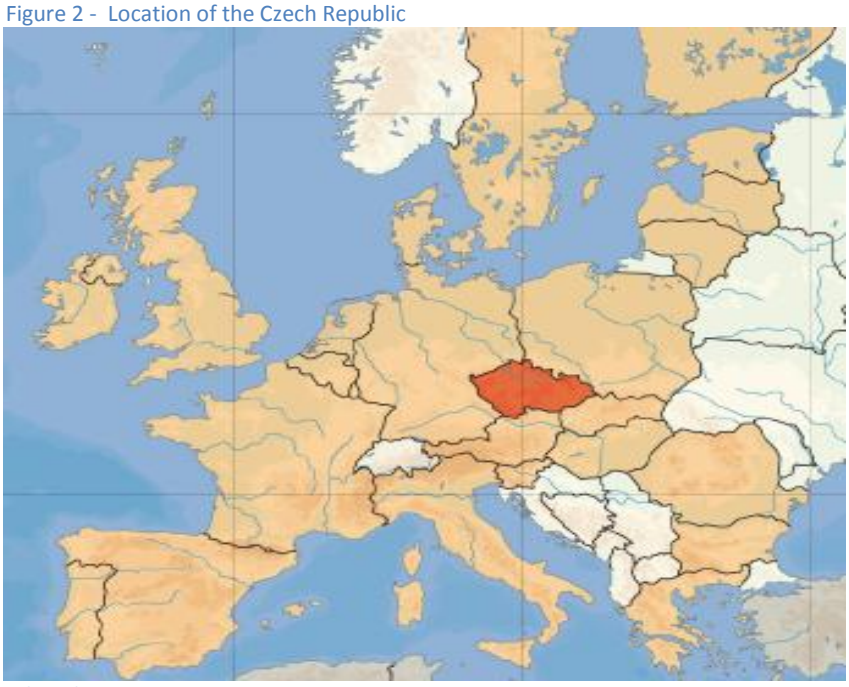
- **Bricklayer MBP**
- **Gypsum Plasterboard Fitters, dry assembly (no wood)**
- **Plumber-Heating Engineer**
- **Carpenter and Fitter of Wooden Structures**
- **Construction carpenter (including wooden structures)**
- **Bricklayer ABP: insulation, plaster, stucco**
- **Air Conditioning and Ventilation**

A host of barriers may be reckoned with on our path to the envisaged quantitative and qualitative benchmarks in pursuit of the workforce' qualification profile growth. The major ones include:

- **Lack of a uniform control system, strategic management and concept of the building sector**
- **Low productivity of labour in the construction**
- **Pressure by companies to use unskilled workers to keep labour cost down**
- **Low level of management**
- **Low interest of young people in the vocational education in this field**
- **Low interest in adult education among blue collar craftmen (low motivation)**
- **The unpredictability of the legislative environment**
- **Lack of readiness of the population to use and operate passive houses**
- **Low and unstable Government support for the use of RES**

1. Introduction

Figure 2 - Location of the Czech Republic



Wikipedia

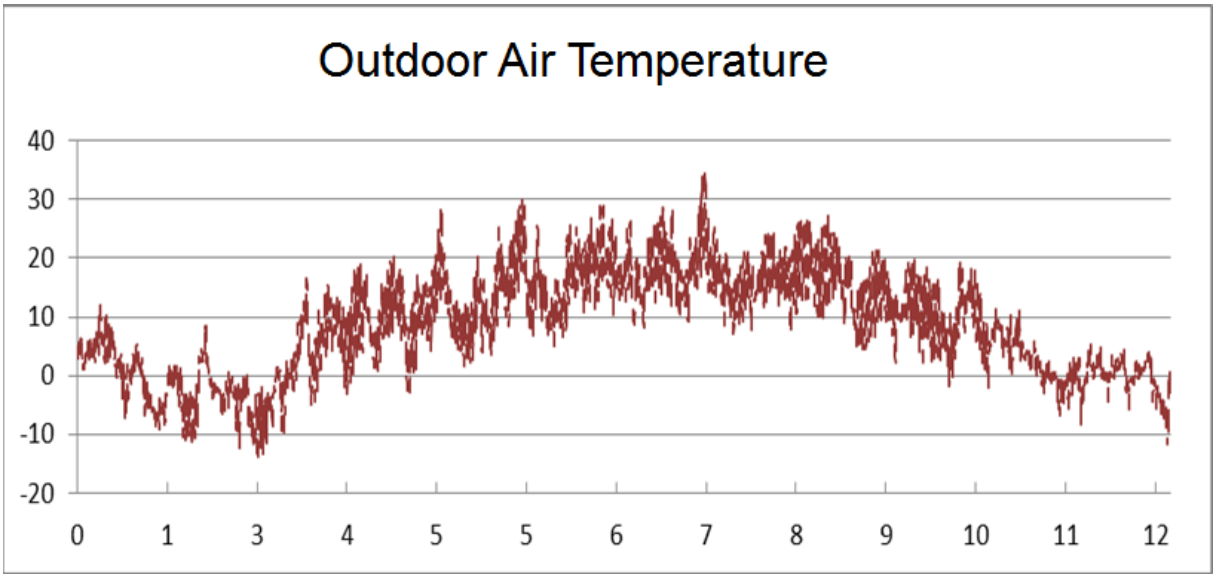
The Czech Republic is a landlocked country located in Central Europe. Along its entire perimeter (2260 km) it borders only with other European Union member states (Germany, Poland, Slovakia and Austria). It includes three historical lands of Bohemia, Moravia and Silesia, covering an area of 78,867 square kilometers, home to a population of 10.5 million. Administratively, it is divided into 14 separate regions. The capital is Prague. The head of state is the President of the Republic, the supreme legislative body is the bicameral Parliament of the Czech Republic. The Czech Republic is a member of the United Nations,

NATO, the OECD, the WTO, the Council of Europe, the OSCE, the EEA, the European Customs Union, EU, Schengen and the Visegrad Group.

The climate is mild in the Czech Republic, transitional between continental and oceanic type. Typical is the alternation of four seasons. It is characterized by the prevailing westerly winds and intense cyclonic activity. The maritime influence is manifested mainly in Bohemia, Moravia and Silesia already shows rising continental climatic influences. The biggest influence on the climate in the Czech Republic, however, has the altitude and topography. Of the total area of the state territory 52,817 square kilometers (66.97%) is at an altitude below 500 m, 25 222 km2 (31.98%) at 500 to 1 000 m and only 827 km2 (1.05%) at an altitude above 1000 m. The average height of the Czech Republic is 430 m.

The average air temperature is strongly dependent on the elevation. While on the highest mountain of the Czech Republic, the Sněžka (1602 m) it is only 0.4°C, whereas in the lowlands of southeast Moravia it is almost 10°C. The highest average temperature is in Prague, where there is a warming effect due to the urban climate - the "heat island". Maximum summer temperatures exceed 30°C, winter temperatures rarely drop to 20°C below zero. For six months at a stretch, however, temperatures can fluctuate around 0°C on a daily basis, **severely taxing all surfaces of building structures**. These conditions correspond to the historically different approaches to the thermal insulation employed in the Czech Republic as well as building heating regulations in place. In recent years, the rapidly growing demand for artificial cooling has been adding to the energy consumption of buildings, but in fact, the need for air-conditioning is limited to a few days a year only, or otherwise, due to excessive sunshine and overheating of badly designed spaces.

Figure 3 - Outdoor temperatures Balance in the CR



Source: Talk by Associate Prof. Jiří Hirš, MSc., PhD., at the Day of Engineering on 22nd October 2012

The building sector, power sector and energy-efficient construction are in terms of jurisdiction at the level of the Government of the Czech Republic, divided among several Ministries. The Ministry of Industry and Trade is in charge of building materials, construction,

energy, including energy legislation and regulation and business environment. The Ministry for Regional Development is responsible for planning and building regulations, housing policy, regional development, European funds and public procurement legislation. The Ministry of the Environment provides for environmental policy, assessments (including environmental impact) protection of waters, management of environmental and ecological damage, air, energy and climate protection and the issue of waste. Through its subsidy programs the Ministry intensively promotes energy-saving solutions in residential construction and housing. In this context, Ministry of Finance, too, plays an important role in drafting the state budget and allocating state funds. The Ministry of Culture provides care of the cultural heritage, monuments, which form a significant proportion of the built environment of historic cores in most Czech cities and make use of a large proportion of the available building capacity. The Ministry of Transport and Agriculture Ministry are in charge of the construction of roads and hydraulic engineering projects.

The Ministry of Education, Youth and Sports provides the conditions for education at pre-school, primary, secondary and vocational and university levels. Traditionally, the education system is administered separately from the building sector and Government program policies in the field of construction, a fact causing some of its academia, detachment from or lagging behind the needs of the building practice.

The issue of lifelong learning stands apart, being regulated only in the civil engineering profession by the Act 360/1992 Coll. on the Professional Practice of Certified Architects and on Engineers and Technicians operating in construction. As for craftsmen, the issue of continuing professional development is dealt with on a voluntary basis by professional guilds and is rather patchy or else by some manufacturers through a targeted promotion of new building materials and products for construction. In this respect the Architecture and Building Foundation is a positive exception, establishing the Department of Crafts, as a project of lifelong learning for blue collar craftsmen within its Czech Building Academy program.

Generally it can be said that the educational system in the Czech Republic in the field of construction, is based on the National Qualifications Framework, from which vocational education and training programs are derived. This register can be accessed on line by members of the public and is recognized throughout the Czech Republic. Its detailed description of the specific qualifications to enable their recognition under the Act No. 179/2006 is focused on the knowledge and skills rather than on ways and methods of acquiring them. This enabled the creation of the National Occupations System, which also describes the range of knowledge for individual professions to gain qualifications outside the basic education. The defined professions are gradually embraced by the Trade Licensing Act, which applies the processed knowledge and skills definitions while issuing trade licenses. Individual descriptions, catalogs are not yet fully compatible; they also do not address the issue of further or lifelong learning. The building practice gradually comes up with new demands for knowledge and skills, especially with the emergence of new products, technologies, design solutions. However changes are relatively slow - mainly due to rather conservative personnel policy pursued by construction companies (especially SMEs).

It is the objective of the present study to quantify these requirements and define in broad terms the demands for the vocational education and training of blue collar workforce in the building sector. And it's not just about the demands in response to the increasing emphasis on the energy efficiency both in the process of construction and of the buildings themselves. The economic situation demands new technical solutions for homes to meets stringent energy performance requirements, thus bringing about a significant change in the requirements for knowledge and multiplying demands on the skills of all craftsmen.

The assessment of the magnitude of the impending change is not easy, but we have tried to map the expected development trends and the scope of requirements for new knowledge and skills and competence requirements for fresh fully trained operatives.

It is typical for the Czech Republic that the private and non-profit sector, has taken the initiative and addressed itself to the task; its members are among the team of authors of the present study. They do so in the hope of pushing through some systematic measures to jumpstart and foster lifelong learning and facilitate an effective implementation of the requirements set out in the Directive 2010/31/EU (EPBD II).

2. Objectives and methodology

The specific objective of the present National Status Quo Analysis was to document the legislation in place, management of the entire built environment, evaluating the effectiveness of the educational system and its levels, assessment of available statistical data, forecasts and studies addressing individual partial issues, synthesizing these findings and formulating propositions and requirements and the subsequent verification of these conclusions at a session with representatives of the industry.

Due to the fact that the team of authors consists of a panel of experts from several organizations, it was possible for one thing to encompass relatively broad views and knowledge of the sector studies and analyses, and for another, it was necessary to reconcile the starting points, methods of evaluation and comparison of occasionally inconsistent input. An important aspect was to assess the available information on the building sector against the knowledge of its anticipated 2020 recast. A separate issue was the assessment of some specifics, such as the very uneven age pattern of the Czech population, Czechs' reluctance to move, the characteristics of the Czech climate, huge share of heritage buildings, sites and monuments in the built environment and a substantial proportion of the derelict building stock from the period of real socialism; the latter causing significantly distorted capacity and technological needs in the construction and maintenance of both residential and family houses. Only at present the state regulation of rents finally comes to an end; it has been gradually relaxed for 20 years to avoid a serious social impact on middle and weaker social strata. Therefore, only now inherent market forces can be expected to start operating normally, but they would take a long time to straighten socialist era deformities both as to the housing standard and in its spatial distribution.

On the other hand, it should be noted that the material and technological equipment, of the construction companies and their considerable aptitude to cope with the dramatic drop in orders, justifies the hope for a relatively flexible approach on their part to meet the challenge of 2020 targets. The experience of recent years with the 'Green Savings" (in verbatim Green Light to Green Savings) scheme has certainly both in the positive and negative sense, thoroughly examined all development partners, but above all it stirred interest in the public at large in the agenda of heat savings in buildings. The 'Green Savings' may mark just the beginning of the path, but it has been embarked upon, in a fairly big way. At present the vocational education and training of participants in the construction process in the Czech Republic is provided using a number of traditional instruments, legislative rules and practices involving a considerable number of organizations. Still, there is no uniform build up skills system in place, nor a clear-cut responsibility for its implementation, as a prerequisite for meeting the requirements set by the Directive 2010/31/EU of 19th May 2010 on the Energy performance of buildings, through acquiring and applying the necessary knowledge and skills in practice in the Czech Republic in good time and quality. The situation is most distressing especially in training and retraining of blue collar operatives involved in the construction process. Therefore, the team has focused on the following issues:

1) The detailed analysis of the existing legislation with a view to determine the responsibility for the construction process preparation, its approval and implementation. The present Analysis coincides with the debate on amendments to: the Building Act, the Public Procurement Act, the Energy Act, and the Act on Materials, the Act on Authorizing persons operating in construction.)
2) The Analysis of specific roles, functions on the building site and their respective responsibilities and existing requirements for their training and lifelong learning (Works foreman, Construction Supervisor for the Investor, Designer's supervision, Safety-at-work Coordinator, and more)
3) The Analysis of individual building professions, trades, which provide actual construction works, product and technology assemblies and requirements for their training, testing, and lifelong learning and their scope in the construction market.
4) The Analysis of the existing in-situ construction supervision system provided by the State, through the authorized Inspector and other professionals with a view to their training and holistic education requirements
5) The Overview of existing basic training facilities, also involved in screening and examining (testing, accreditation, authorization, etc.) and their capacity and readiness to meet new training requirements
6) A List of existing holistic professional education facilities, delivering both the comprehensive professional knowledge and the necessary retraining, their flexibility to conform to the new requirements as arising from the new Directive as well as the legislation in place, governing the accreditation, authorization and final exams.
7) A research of the construction market and its prospects in terms of its size and human resources required to ensure the transition to new construction

technologies and products, but also to ensure the operation of energy-efficient buildings.

8) The comparison of the Czech experience with the available foreign information.

The authors of the present Analysis had drawn on their own experience as well as some previous studies. They used materials that have been processed in each of the participating institutions also utilizing materials they compiled for the Czech Prime Minister's Advisory Board for the Building Industry in general and its working group on Human Resources in particular (the seesions of which the authors directly attend); Building Sector Council's materials and experience have been applied as well as quality control systems, which have been introduced by various guilds, professional associations, and professional chambers in the Czech Republic, including the already processed and readily available requirements for selected professions.

The report also taps from analytical materials on the development of the building industry as elaborated by the SPS (The Union of Entrepreneurs in the Building Industry in the Czech Republic) and in collaboration with URS Inc,, also using materials furnished by the Ministry of Industry and Trade, Ministry for Regional Development, Ministry of Interior and the Environment Ministry. The proposed amendments to the existing legislation have been mapped. In conjunction with ÚNMZ (Office for Standardization, Metrology and Testing) all current and envisaged modifications to standards and regulations in the Czech Republic have been documented. Separately, upcoming and ongoing reform amendments as prepared by the Ministry of Education and the Ministry of Social Welfare have been consulted and analyzed. The Analysis Report availed itself also of information sources available on the Internet, in printed materials, Czech Statistical Office data and consultations with the staff of the competent professional Associations, Chambers and Government Authorities of the Czech Republic.

The actual work on the Analysis, was conducted in the form of teamwork, in several ever more specific steps. In a string of sessions using brainstorming, the views and opinions of individual authors gradually crystallized. Following the initial definition of the work and goals to be achieved, individual authors selected relevant documents and records and pinpointed sub-branch propositions, the input materials and records were streamlined in several successive steps to acquire a coherent form, the wording of which was subject to repeated discussions, SWOT analysis was elaborated to formulate the major problems (barriers) and strategic propositions, followed by repeat check ups as to the proper use of input data, information and their relevance for the purpose of the Analysis.

For the purpose of the Analysis separate supplementary surveys using questionnaires, were conducted by the Passive House Centre in collaboration with the Association of Building Entrepreneurs of the Czech Republic, focusing on both the employer and employee. The questionnaires were also based on the brainstorming method and the questions so obtained, were then professionally adjusted for the questionnaire purposes. The results of these surveys will be used to verify the conclusions of the present Analysis and to elaborate WP3.

As for the SWOT Analysis it served mainly for experts to identify major problem areas and outline main strategies. Its complementary effect was that it facilitated the formulation and convergence of the team's views as well as choice of the approach to address individual problems. In identifying weak and strong points of the current readiness of the Czech Building Sector to meet the requirements set by the Directive 2010/31/EU (EPBD II) as well as of the blue collar operatives' knowledge and skills necessary for the successful implementation of the nearly zero energy building project in the Czech Republic, it was possible to define the main opportunities and threats and suggest possible strategies to be used in subsequent chapters of the BuildUpCz project to outline measures conducive to the Czech Republic's compliance with the Directive on the Energy Performance of Buildings . The progress of the work on the Analysis was regularly presented to National Qualification Framework sessions, which served- beside informing on the results by the working team-, also as a platform for a public examination of its processed parts. The aim of these sessions was also to enable wider professional public to embrace the knowledge and the conclusions drawn by the Analysis and to support pro-actively the implementation of measures that would ensue from the BUILD Up Skills program for the Czech Republic.

The penultimate part of the work features the graphic rendition of the Study complete with a cover presenting the best Czech building projects awarded the 'Construction of the Year' title in the namesake nation-wide Show over the last 10 years, which can serve as an eloquent evidence of the current level of the Czech architecture.

3. Characterization of the Building Sector

3.1. The Building Sector's Position in the CR's National Economy

The built environment sector constitutes a significant and long-term factor and contributor to the Czech economy and the community as a whole, including related environmental and socio-cultural aspects, because it:

- generates about **6-7% of the country's gross domestic product** (GDP),
- employs about **9% of people working in the civilian sector** and is able to absorb a considerable portion of workforce with lower or different qualifications
- serves as a significant **multiplier** and driver in many related sectors of the manufacturing industry (with the multiplier effect index ranging from **3.2 to 3.5** depending on the type of construction investment),
- Buildings **consume a significant proportion of raw materials and energy resources** available to humanity:
  - **The extraction of building raw materials** and non-metallic materials intended for the production of building materials, accounts for more than **50% of the total domestic extraction,**
  - **Buildings** are responsible for about **40% of total energy consumption** and approximately the same percentage of greenhouse gases emissions (mainly carbon dioxide) and solid waste sent to landfills
- the sector's important particularity being its considerable, **roughly 45-50% share of public funds investments** (amounting to about CZK 250 billion from the state and municipal budgets on an annual basis)
- due to the sector's above mentioned and other potential impacts (e.g. construction accidents, serious interventions into the environment, complex property issues) a great deal of responsibility is placed on the contractor of construction works, a fact that also predetermines a high degree of control, **regulation and involvement by the public administration.**

3.2. Building Sector's Basic Indicators for 2008-2011

After the year 2000, the Czech built sector was booming for seven years with its output volume growing year on year by **5-15%** in current prices, (hereinafter c.p.). The Czech Republic's overall construction output increased by **61.3%** in the period 2000-2007. Over the same period, the Western European countries recorded a growth of just **10.8%,** and by way of example neighboring Germany even saw a decline of **13.6%.**
It was the result of a large supply of available labour in a favourable combination with ample funds in both public procurement and the private sphere.

Table 2 = Basic data on the output by construction companies

Indicator	Unit	2005	2006	2007	2008	2009	2010	2011
Share of building sector in GDP	%	5,6	5,7	5,8	**5,9**	**6,6**	**6,5**	**6,4**
Building work (current prices)	in CZK billions	431, 4	472,6	521,5	**547,6**	**520,9**	**488,7**	**464,0**
Building sector workforce in total	in thousands of people	455,9	456,3	457,5	**473,9**	**494,0**	**483,7**	**466,4**
Share of the total workforce in National Economy (civilian sector)	%	9,5	9,1	9,2	**9,3**	**10,3**	**9,3**	**9,2**

Source: Czech Statistical Office (CSO)

The **year 2008** therefore marked a cut-off point for the built environment sector, when the sector's hitherto successful development was arrested. In **2009**, the on-going economic crisis manifested itself in its full-blown scope, (the Czech economy was in a phase of depression), yet still with a relatively low annual decline in construction output, (the fairly low drop of the construction output derived from the sector's certain momentum given by long-term cycle of construction, i.e. the 2009 results were still affected with projects that had been launched in 2008 or 2007, respectively). The sharp slump in the sector's output occurred in **2010** and continued in **2011**: the 2011 construction output fell year-on-year by 3.5% in constant prices. The 2011 output dropped by 11.2% compared with the boom year of 2008 and continues to decline in 2012.
The decrease in 2010 output was mainly due to architectural engineering works (construction of buildings). Civil engineering output began to fall year on year in 2010 and 2011 saw its steepest decline (-9.7%). The slump is closely related to the drop in tapping the EU grant funds. Surprisingly, in 2011, the building construction posted a decline of mere 0.4%.

3.2.1. Building Market - Public and Private Procurement

In **2010**, a total of **3,913** public tenders were floated, worth of **CZK 122,173 million** in aggregate (including VAT), out of which building construction accounted for **1715** contracts (43.8% of the total number of contracts awarded) worth of **CZK 46,519 million**. (38.1% of the total value of contracts awarded) and **2198** civil engineering contracts (i.e.56.2% of the total number of contracts awarded) worth of **CZK 75,654 million** (61.9% of the total value of contracts awarded).

The total value of contracts awarded in **2010** was down by **CZK 71.838 billion** compared to **2009** and against the year **2008**, the gap was as much as **CZK 86.135 billion**. In relative terms, the total value of contracts awarded in **2010,** dropped year-on-year by **37.0**%, out of which the building construction contracts by **12.9**% and civil engineering contracts by **46.2%,** out of which **transport infrastructure** contracts by a whopping **75.7%!**

Such a pronounced gap in the awarded contracts would inevitably manifest itself in the subsequent years through a decline of construction output for the public sector anywhere between 10 to 15% with a knock on impact upon employment rates in the building industry!

Construction enterprises with 50 or more employees concluded 47900 building contracts in the Czech Republic in 2011, and this number increased by 20.3% year-on-year. The total value of these orders dropped by 9.1% down to CZK 179.1 billion. The building construction companies signed up to new contracts worth CZK 77.0 billion, which, in year-on-year comparison represents a decline of 7.3%. The value of new contracts for civil engineering amounted to CZK 102.1 bn and compared with the same period last year, fell by 10.4%. From the above mentioned data it is clear that the average value of a building contract decreases, a fact ascribed to a dwindling number of large contracts in general and in the transport infrastructure in particular. The average value of a construction contract in 2011 was CZK 3.7 million, which in comparison with 2008, means a drop by more than a half. Negative trends in both the volume and structure of public contracts continue to persist in 2012, too.

Table 3 Year-on-year comparison of contracts by type of construction

Type of construction	Year 2008		Year 2009		Year 2010		Year 2011	
	Number	CZK millions	Number	CZK millions	Number	CZK millions	Number	CZK millions
Building Construction	1 426	47 686	2 113	53 380	1 715	46 519	1 629	36 053
Out of which : Communal facilities	1 232	43 884	1 868	48 416	1 465	41 142	1 397	32 761
Housing	194	3 802	245	4 964	250	5 377	232	3 292
Civil Engineering	2 202	160 622	2 279	140 631	2 198	75 654	1 961	82 557
Out of which: Transport infrastructure	1 006	116 015	935	97 502	761	23 722	736	27 559
Utilities	1 196	44 607	1 344	43 129	1 437	51 932	1 225	54 998
Total	3 628	208 308	4 392	194 011	3 913	122 173	3 590	118 610

Source: The Czech Construction, Prague URS Inc. 2012

The largest decline in the volume of public procurement, related to the largest contracting authority, i.e. the Government, where the volume between 2008 and 2012, dropped to about a quarter of the initial figure. Conversely, the municipal sector showed a greater resilience. Even so, the overall decline in public procurement is more than dramatic. And obviously, private investors were hardly in a position to offset such a yawning gap.

Table 4 -Year-on-year comparison of contracts by building promoter

Building promoter sector	Year 2008		Year2009		Year 2010		Year 2011	
	No.	In millions of CZK	No.	In millions of CZK	No.	In millions of CZK	No.	In millions of CZK
Government	1 056	125 886	1 021	87 809	714	33 692	789	33 286
Municipal sector	2 365	60 049	3 130	98 406	2 955	69 025	2 548	70 132
Rest of sectors	207	22 373	241	7 796	244	19 456	253	15 192
Total	3 628	208 308	4 392	194 011	3 913	122 173	3 590	118 610

Source: The Czech Construction, Prague URS Inc. 2012

3.2.2. Building Output Volumes and Pattern

In **2008**, the total construction output increased by **4.4**% (c.p.). Compared to 2007 the growth rate slowed down considerably, but despite poorer results at the end of the year the construction output ultimately did not drop year-on-year. The construction output in each quarter varied considerably. While growth was posted in the first and third quarters, a decline manifested itself in the second and especially the last quarter of 2008. The development was uneven also in the various categories of construction. There was a slump in buildings construction sector, notably in new construction and at an accelerating pace at that resulting in an increase of poultry **0.7%.** On the contrary, new construction, renovation, modernization and repairs and maintenance of civil engineering became the driving force achieving an increase of **14.8%.**

In **2009,** the building sector output declined by **0.1**% (c.p.). The construction output index was fluctuating throughout the year considerably. The year-on-year (yoy) index did not significantly reflect in growth values until November, when the building output matched the weak results of the late months of 2008, adversely affected by the crisis. Again the overwhelming credit for maintaining relatively good results in construction output, was due to civil engineering (especially transport infrastructure financed from either public or EU funds). The civil engineering achieved the average annual growth rate of **16.0%.** On the contrary, the building construction had to bear the brunt of recession, falling fast by **6.5**% year-on-year. Significantly greater growth rates achieved by the civil engineering as opposed to building construction, have thus become a long-term feature of the Czech construction industry. **In 2009, however, no major project was launched in transport infrastructure, which constitutes a key segment of civil engineering!**

In **2010**, the building output in current prices fell by **7.4%** year-on-year. The building construction posted a year-on-year decline of **7.6%** and civil engineering by **7.0%.**

The decline continued well into **2011**, when the building output dropped by another **5.5%**, and this negative trend, according to current estimates, would repeat itself in 2012.

Table 5 - Building output (current prices)

Year	Total building output		Building construction		Civil engineering	
	Year-on-year index	Year average 2005=100	Year-on-year index	Year average 2005=100	Year-on-year index	Year average 2005=100
2000		60,5		64,3		50,6
2001	114,7	69,4	114,8	73,8	114,3	57,8
2002	105,6	73,3	105,0	77,5	107,8	62,3
2003	111,5	81,8	107,1	83,1	125,8	78,4
2004	112,9	92,3	111,8	92,8	116,2	91,1
2005	108,3	100,0	107,7	100,0	109,8	100,0
2006	109,2	109,2	108,2	108,2	111,9	111,9
2007	110,3	121,8	115,4	124,8	101,8	113,9
2008	**105,0**	**127,1**	**100,7**	**125,7**	**114,8**	**130,8**
2009	**95,1**	**127,0**	**93,5**	**117,6**	**116,0**	**151,7**
2010	**93,82**	**117,6**	**92,4**	**108,6**	**93,0**	**141,1**
2011	**94,95**	**111,7**	**x**	**x**	**X**	**x**

Source: The Czech Construction, Prague URS Inc. 2012

In 2011 the Building Authorities issued 107,231 building permits and their number grew by 1.4% year-on-year. The number of permits increased for all types of constructions with the exception of environment protection projects that were affected by permitting massive numbers of photovoltaic power plants and the high comparison base last year. The growth in the number of building permits is also related to the overall trend of reducing the size of the construction contracts. Major projects are few and hard to come by and even large construction companies are bidding for relatively small contracts now. The above mentioned trend corresponds with the development of the approximate value of issued building permits. In 2011 the aggregate approximate value of construction permits shrank by 14.8% down to CZK 339.9 billion. The decline in investment cost of structures with valid building permit is evident primarily with the new construction.

3.2.3. Building Work Price Development

After the sharp rise in prices of construction work in the early 90s (following the general rise in prices in the wake of the removal of price disparities from the previous period of the centrally planned economy), the price growth trend remained, but the annual rate has been gradually decreasing. In the period 2003 - 2006 the growth rate steadied at around 3%, in 2007 hovered at 4.1% in **2008 at 4.5%** and in **2009** dropped to **1.2%** and later in **2009** showed a negative value - **0.1%.**

In **2008**, the year-on-year price changes for each type of construction varied only very slightly with the difference between the minimum and maximum growth in **2008** reaching **0.2%.** In **2009,** this difference was **2.0%.** In engineering, the price growth in **2009** kept significantly above the overall growth. The year **2010** marked a return to minimal differences in changes

in the prices of each type of construction - **0.2%,** and the same trend was maintained in the years 2010 and 2011.

Table 6 - Price indices of construction work (annual)

Types of Construction	2005	2006	2007	**2008**	**2009**	**2010**	**2011**
Residential Bldgs	102,80	102,90	104,40	**104,50**	**100,80**	**99,90**	**99,50**
Non-residential Non-industrial Bldgs	102,60	102,90	104,40	**104,30**	**100,50**	**99,80**	**99,90**
Non-residential Industrial bldgs	103,10	103,00	104,40	**104,50**	**100,40**	**99,80**	**99,60**
Engineering structures Transport Infrastructure	103,20	102,80	103,80	**104,50**	**101,90**	**100,00**	**99,20**
Engineering structures Utilities	102,60	102,50	103,10	**104,30**	**102,40**	**99,80**	**99,80**
Year-on-year building works index (bldg works Total)	103,00	102,90	104,10	**104,50**	**101,20**	**99,90**	**99,50**

ČSÚ (Czech Statistical Office)

Development of construction work prices was influenced by the growth in construction input prices, namely the **energy, materials and products integrated in buildings**. The peak of the boom in the construction industry also played its role in 2005-2008. In the years 2009-2011, in the context of a decline in demand for construction and due to supply exceeding demand, there was a stagnation and even decline in prices. Segments of building construction responded to these trends most sensitively.

3.2.4. Productivity of Work

In **2009,** labour productivity declined in comparison with 2008 by **0.8%.** At the same time there was an increase in nominal unit labour costs by **6.4%**, which in real terms amounts to a growth of **5.1%.** In **2010**, labour productivity continued to decline, when weakening year –on –year by **4.9%.** There was also an increase in nominal unit labour costs by **7.8%,** real unit costs thus increased by **7.9%.**

This development is very alarming, because Czech Republic‘s labour productivity in the construction industry is in comparison with the EU-15 average still very low anyway: keeping **roughly at one-third its level**. The reason for the low labour productivity in the construction industry is a particularly small capital intensity and the sector's dependence on domestic demand and the prevailing local price level.

Table 7 – Productivity of Labour*

Companies with	*Productivity in thousands of CZK*		
	2009	2010	Index
20 to 49 employees	1 479,10	1 359,06	0,92
50 to 99	1 594,50	1 604,17	1,01
100 to 199	1 904,80	1 925,18	1,01
200 to 249	1 779,30	2 198,57	1,24
250 to 499	3 021,40	2 714,46	0,90
500 to 999	2 191,70	1 736,47	0,79
1000 and more	5 137,90	4 661,16	0,91
Average	2 234,70	2 131,08	´ 0,95

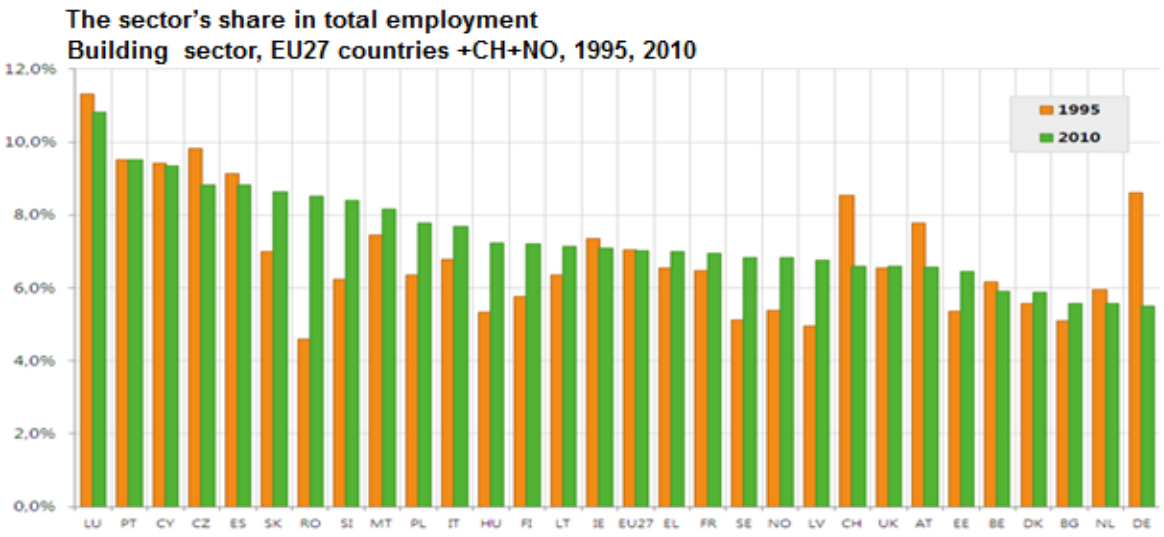
ÚRS PRAHA, a.s.
* Produktivity of labour derived from output in current prices (calculation)

3.2.5. Employment and Wages

The average number of persons employed in the construction industry has been increasing gradually, in the 70s it exceeded 400,000 keeping above this threshold to date. In the 2nd half of the 90s there was a slight decrease that was reversed later on to reach nearly 458,000 in the period between 2004 and 2005. In **2009**, the number of workers reached the highest figure over the period under review - 503,500 (including cooperating self-employed persons) and since then it has been decreasing steadily..

Despite this drop, the share of built environment workforce in the total CR's employment is significantly above the average in comparison with the rest of EU countries, because the corresponding EU average stands just over 7% of its total employment (see chart # 1)

Figure 1 -The share of construction sector in total employment



Eurostat: Eurostat online database – Structural busines statistics, December 2011

The decrease of the number of employees continued in 2011 - for example in construction enterprises with 50 or more employees there were 97,700 people employed in 2011 and the number shrank by 6.7% compared to 2010.

Table 8 Buil Environment Sector Workforce

Year	*Workersi* In thousands*	*Index-previous year = 100*	*Index-year 1990 = 100*	*Share in National economy %*
2005	457,5	101,4	113,7	9,5
2006	437,9	95,7	108,8	9,0
2007	453,1	103,5	112,6	9,2
2008	**461,9**	**101,9**	**114,8**	**9,3**
2009	**503,5**	**109,0**	**125,1**	**10,3**
2010	**465,5**	**92,5**	**115,7**	**9,3**

ČSÚ (Czech Statistical Office)

The built environment sector remains CR's third largest "employer" and also occupies the 3rd place in terms of the number of entrepreneurs. A specific feature of the building industry traditionally being the low proportion of employees - about **60%** (compared to other economic sectors with more than 80% share of employees) and a very high proportion of small and micro businesses.

Table 9 Numbers of employees by size of enterprise

Companies with: (number of employees)	**Average number of employees**		
	2008	*2009*	*2010*
20 to 49	47 726	45 961	45 152
50 to 99	32 739	31 705	28 139
100 to 199	23 496	23 994	23 102
200 to 249	6 845	5 311	5 282
250 to 499	13 794	15 038	13 539
500 to 999	12 834	11 787	11 593
1000 and more	20 011	18 612	20 063
Total	157 445	152 408	146 870

Source: ÚRS PRAHA, Inc.

In construction enterprises with 20 or more employees the nominal monthly wages grew continuously between 2003 and 2004 exceeding the rate of growth of +6% in 2005 and declined to less than + 4%, while exceeding +7% in 2006 and 2007.
In **2008,** the nominal monthly wage amounted to **CZK 24 506**. Compared to 2007 it increased by CZK 2 592, i.e. +11.8%. In **2009**, the nominal monthly wage reached **CZK 25**

932, an increment of CZK 1426 compared to **2008**, i.e. +5.8%. In 2010, nominal monthly wage increased to **CZK 26 312**, i.e. an increment of CZK 380 in comparison with 2009, i.e. +1.4%. As for the year 2011 the only available data concern companies with 50 or more employees: Their average salary was CZK 29 184 having risen by 1.5% year-on-year.

Table 10 - Monthly nominal wages by size of enterprise

Year	20 to 49	50 to 99	100 to 199	200 to 249	250 to 499	500 to 999	1000 and more	Average
2008	19 597	21 695	24 274	23 263	27 604	29 296	36 302	24 506
2009	20 496	23 384	26 710	26 711	29 616	30 516	36 592	25 932
2010	20 163	23 874	27 298	27 589	28 027	31 858	37 737	26 312

ÚRS PRAHA, a.s.

Monthly nominal wages largely derived from the size of the enterprise. While the average salary in enterprises with 20 to 49 employees in 2010 amounted to 76.6% of the total average, companies with 1,000 or more employees exceeded the average by 43.4%.

3.3. Number and Pattern of Building Companies

Out of the total number of registered companies of all sectors which amounted to **2,570,611** by the end of **2009,** the construction enterprises (CZ - NACE F Construction, 41-43) accounted for a share of **12.19%,** i.e. **313,358** companies.

Table 11 – Contruction Enterprises Pattern by legal Status

	2010		2011	
	number	%	number	%
CR's entrepreneurial businesses	2637551	100	2703444	100
Co.s with mainly building operations	322309	12,22	327	12,11
Building sector		100		100
out of which the self-employed	262958	81,59	265669	81,16
Registered Self-employed	2723	0,84	2795	0,85
Commercial companies	28673	8,9	30715	9,38
out of which Joint Stock Companies	1293	0,4	1393	0,43
out which Limited Liability Companies	26221	8,14	28174	8,61
Cooperatives	981	0,3	980	0,3
Government-run Companies	23	0,01	19	0,01

Source: ČSÚ Czech Statistical Office

Of the total number of registered construction companies about 82% were private entrepreneurs (natural persons) and 8% were companies

Enterprises with **20 or more employees** enjoy an important position, their number invariably exceeded **2 400** between 2004-**2008.** Their high credit is due to their share in construction output and employment generation. Since the year 2008 this group of companies was experiencing a substantial reduction in their numbers - **2010/2008** by **303** companies, i.e. by **14%.**

Table 12 – Building Sector Organisation Pattern

Category Size		2007	**2008**	**2009**	**2010**
20-99	Number of Businesses	2153	**2169**	**1992**	**1879**
	Employees in thousands	81,2	**81,8**	**80,4**	**73,3**
	'S' (in CZK billions)	124,5	**130,6**	**118,9**	**106,5**
100-299	Number of Businesses	235	**222**	**202**	**206**
	Employees in thousands	36,0	**34,0**	**32,2**	**28,4**
	'S' (in CZK billions)	71,5	**69,7**	**64,9**	**56,1**
300-500	Number of Businesses	28	**27**	**26**	**29**
	Employees in thousands	10,2	**10,4**	**10,0**	**13,5**
	'S' (in CZK billions)	26,3	**33,2**	**35,4**	**36,7**
500-999	Number of Businesses	16	**19**	**19**	**19**
	Employees in thousands	12,0	**13,4**	**11,2**	**11,6**
	'S' (in CZK billions)	28,0	**35,6**	**25,8**	**20,1**
1000-více	Number of Businesses	10	**9**	**10**	**10**
	Employees in thousands	20,3	**19,2**	**18,6**	**20,1**
	'S' (in CZK billions)	100,5	**97,5**	**95,6**	**93,5**
TOTAL	Number of Businesses	2442	**2446**	**2249**	**2143**
	Employees in thousands	159,6	**158,8**	**152,4**	**146,9**
	'S' (in CZK billions)	350,8	**366,6**	**340,6**	**313,0**

Source: ÚRS PRAHA, a.s. 'S' Total building output value (calculation)

3.4. Building Output Segments

From the second half of the 90s the **civil engineering (construction)** has become the strongest segment of the building sector, primarily owing to the Government procurement of **transport infrastructure**. (The civil engineering gained this position from non-residential building construction which was the strongest segment of the market in the first half of the 90s on the back of the then rapid development of the banking sector.) The share of the **building construction** segment (**construction, structural engineering**), which e.g. in Western economies usually enjoys a leading position, has to date invariably hovered at lower level in the Czech Republic. The poor showing of the **residential buildings construction** segment has been particularly conspicuous.

3.4.1. Building Construction

In **2008** the building construction increased by 0.7% (c. p.), while the civil engineering grew by 14.8% (c.p.). Repairs and maintenance expanded by 8.1% (c.p.) in 2008, their share in total domestic output grew at the expense of new construction, refurbishment and modernization.

The civil engineering (especially transport infrastructure projects financed from public and EU funds) had a decisive influence on relatively good results to be maintained throughout 2009. On the other hand the building construction faced serious challenges, falling by 6.5% (c.p.) year-on-year. Much higher increases as posted by civil engineering compared to building construction, have become a long-term feature of the Czech building industry. The sector's vulnerability to the economic slump has accentuated the difference even further. The performance of civil engineering benefited from the ongoing transport infrastructure projects financed from public sources. For the best part of 2009, the civil engineering was posting double-digit percentage growth compared to a steady decline in the building construction.

In **2010** the building sector experienced, the greatest drop in the history of the Czech Republic. Total building output fell by 7.4% (c.p.). The declining trend in building construction - a decline of **7.6%** (c.p.), was joined by the decrease in civil engineering – a fall by 7.0% (c.p.), (back in 2009 the civil engineering still managed to offset the drop by building construction). The poor performance of building construction was due to the delayed knock on impact of the global economic crisis, notably the persisting **weak demand by households and firms**. The uncertainty about future economic development, further aggravated by the Government's and financial institutions' austerity measures brought about the sector's unfavorable results.

These results were also reflected in a significant **decline in the share of the total building construction activities in the total building output**, when in **2008-2010** there was a drop by **15.2%** (from 54.8% to 39.6% in current prices).The adverse trend in the building construction was most apparent in the construction of residential buildings .

Housing

Housing construction is one of the most important and best documented segment of building construction, also constituting an important factor in the standard of living of the population.

Housing construction in 2008

- the construction of **43,531** flats was launched, i.e. a decrease by **0.6** %, compared to 2007
- In 2008, the construction of **38,380** flats was completed - a decrease of **7.8**%,
- the acquisition value of residential buildings completed in 2008 reached **CZK 92.6 billion**
- masonry prevailed - family houses **91.4** %, **69.2** % of residential buildings.

Housing construction in 2009

- the construction of **37 319** flats was launched, i.e. a decrease by **14,3** %,compared to 2008
- the construction of **38,473** flats was completed – an increase of **0,2** %,
- the acquisition value of residential buildings completed in 2009 reached **CZK 96,5 billion**
- masonry prevailed - family houses **89,8** %, **64.1** % of residential buildings.

Housing construction in 2010

- the construction of **28 135** flats was launched, i.e. a decrease by **24,6** %,compared to 2008
- the construction of **36 442** flats was completed – an increase of **5,3** %,
- the acquisition value of residential buildings completed in 2010 reached **CZK 99,8 billion**
- masonry prevailed - family houses **88,9** %, **56,7** % of residential buildings.

In 2011, the construction of 27,535 flats was started, 2.1%. below its 2010 record. This was the smallest number of dwellings since 1998. Compared with a peak in 2008, it was a drop of nearly 40% (16,000 apartments). The number of apartments increased only in the first quarter, during the rest of the year there was a decrease. Most of the dwellings were started in family houses, where there was a growth of 2.7% as against the year 2010. After a promising growth in the first quarter of 2011, apartments in apartment houses again began to lag behind and from the beginning of the year there was an overall drop of 13.5%. Thus the category of dwellings in multi-dwelling buildings contributed to the total year-on-year change most significantly. Compared to the same period in 2008, it was a slump of almost 65%.
In total 28,630 flats were completed in a decrease of 21.4%, which was the logical consequence of the decline in the number of dwellings started in the past. The stock of dwellings under construction has been dwindling steadily and further declines may be expected due to inadequate numbers of flats that had been started. Most dwellings were

completed in family houses, almost two thirds of the total, but there was a year-on-year decrease of 12.0%, anyway. Apartments in residential houses were again the most important factor in reducing the total number of completed dwellings, posting a year on year decline by more than four thousand apartments (-40%). Conversely, the number of completed dwellings in extensions or additional storey to dwelling houses grew by +9.8%.

Already for several consecutive years apartments in family houses have been gaining prevalence, in the years 2003 to 2007 their share exceeded 45%, in **2008** even **52%,** in **2009** and **2010** the figure exceeded **50%**. As to their number, apartments in residential houses placed second. In recent years their share amounted to one third of all dwellings started. The share of dwellings in extensions, additional storey or loft conversions had a downward trend, from 24.5% in 2000 it decreased to approximately 10% in 2010. Other flats, i.e. flats in nursing homes and homes - houses for the elderly, in non-residential buildings and in converted residential spaces have been in terms of their number of lesser significance.

The construction volumes and the pattern of residential units in recent years, still has been significantly affected by the inherited structure of the housing stock, which is marked by a long-term preference on the part of the pre-1989 regime to build residential houses (usually using pre-fabricated panel technology). Currently, the fluctuations in construction tempo and pattern of residential units have been caused by various external factors, such as the **gradual de-regulation of rents, rising VAT as well as changes in the Government support to mortgages and building saving schemes.**

3.4.2. Civil Engineering

After a period of boom in the year **2008** the civil engineering experienced a relatively **sharp decline** in the first half of **2009** that was observed since the second half of 2009 and continued until **2010.** The performance of the civil engineering has been exceeding consistently and significantly that of the building construction and the latter's current decline is milder.

The civil engineering previously occupied a dominant position within the Czech built environment with its share of **42.2%** that now increased to **51.1%** (as against the Western Europe's **21%**). On the contrary, in the Czech Republic, the share of commercial production dropped from **38.2%** to **30.3%** (as against **32.4%** in Western Europe). The share of housing in the Czech Republic did not change significantly, decreasing from **18.1%** to **17.1%,** but remains significantly lower than in Western Europe (2.5 times smaller).

The decline in the performance of the civil engineering was due to a significant drop in **public contracts**, which this segment of the building industry is completely dependent on, as it is based on the scope of public funds (state, municipalities, EU funds) to finance construction work. The **procurement volume** decreased in **2010** compared to **2009** by more than **25%.** The largest decline is evident with the environment protection building projects. The contracted value of the placed construction orders now stands at the 2003 level.

The drop in the performance of the civil engineering was mitigated in the period under review with the massive construction of solar power plants. In the area of transport infrastructure,

the highest increase in the proportion was recorded with highways, tunnels and subways, while a decrease occurred in rail transport and local and tertiary roads.

Table 13 Investment in transport infrastructure from the State Budget and STIF (in CZK million)

Type of infrastructure - Investor	2005	2006	2007	2008	2009	2010
Railway– MT	62,4	0,0	0,0	**0,0**	**0,0**	**0,0**
Railway - STIF	13 336,3	13 024,5	16 259,9	**22 532,5**	**18 903,0**	**14 054,0**
Railway– MT	15 554,0	5 916,9	3 300,0	**4 840,0**	**5 186,3**	**2 343,0**
Railway - STIF	24 049,9	29 111,2	35 785,8	**44 768,4**	**46 779,6**	**40 495,4**
Inland waterways – MT	0,0	0,0	0,0	**0,0**	**0,0**	**0,0**
Inland waterways - STIF	302,2	524,5	389,7	**538,4**	**1 557,1**	**1 462,1**
Air– MT	0,0	0,0	0,0	**0,0**	**0,0**	**0,0**
TOTAL – MT	15 616,4	5 916,9	3 300,0	**4 840,0**	**5 186,3**	**2 343,0**
TOTAL– STIF	37 688,4	42 660,2	52 435,4	**67 839,3**	**67 239,7**	**56 011,5**

Source: ÚRS PRAGUE, Inc.

In the area of technical infrastructure, a moderate increase was recorded in water construction works, as well as electric lines and pipelines. The construction and reconstruction of the existing technical infrastructure is not currently one of the key segments of the building industry, but it certainly constitutes a significant reservoir of construction tasks for the future.

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3.5. Impacts Affecting Built Environment Sector

3.5.1. Macroeconomic Framework

More than the rest of economic sectors the building industry is particularly vulnerable to the way how the overall economic situation of the Czech Republic would develop, as it is about 98% dependent on the domestic building market and the share of investments from public funds has been accounting for about half the contracts over the last several years.

- The prospects of a favourable development of the building sector depends primarily on the available wherewithal of the state budget and that of local and regional budgets or the participation of private resources. In the event of a cyclical downturn public budgets would undoubtedly be affected with a knock on impact on financing public construction contracts. The same effect can probably also be expected in the wake of even more pronounced changes in tax rates.
- The desired (and generally necessary) efforts to cut the budget deficit, would also have an adverse effect as the austerity measures may be reflected in the investment allocations from the state budget. By contrast, the availability of resources from the

EU budget may have a positive effect, although these sources can hardly replace the resources from the privatization.

- The estimation of demand for construction work from private business may be even more complicated. It depends on the foreign capital inflow, especially in industrial zones. A degree of saturation has apparently been reached as regards business expansion network as well as the needs of many financial institutions.
- Given a favorable economic development, private housing construction (the relevant demand by the population) may retain its current intensity for some time to come. The vulnerability to the overall economic situation is, however, quite considerable here. The mortgage loans repayment may, therefore, start to pose a problem, which may subsequently increase the offer of the existing housing stock.

While the public investment is fully dependent on the development of the economic situation of the Czech Republic and neighboring countries, the private investment is, among other things affected in the following segments.

- The housing market - in connection with the deregulation of rent and the previous decline in commercial leases, gradual increase of interest is expected in the form of rental housing, especially from clients under 30 years of age, and in case of small flats, from old-age seniors. Prices of apartments are derived mainly from the attractiveness of the locality in which they are situated. In the future, the market will be influenced by the housing market with residential rentals and especially due to related legislation amendments and the situation on the labour market. Defining the **social housing** will be playing an equally important role. The respective legislation is still missing in the Czech Republic.
- The market of warehouse real estate and industrial property market – has experienced a long-term annual growth. The current occupancy rate is high, although concentrated competition is forcing developers to increasingly build on a speculative basis, without known tenants. The regeneration of older industrial sites, so called brown-fields has usually been a flop. The supply of building plots on agricultural soil is, however, expected to shrink in connection with the charges levied for plot removal from agricultural land, which can be conducive to an increased demand for built up land in older industrial compounds. This trend is also confirmed by the experience gained by the developed European countries where these derelict industrial areas have undergone or still are undergoing a costly reconstruction, resulting in converted neighbouhoods with altered functions, such as providing multifaceted services.
- The building plot market - this particular segment of the market constitutes a priority from the perspective of the building sector. The plot is an essential part of the delivery of the building project. Its price often forms a substantial part of the final cost of the works. A specific particularity of the building plots is their limited availability, notably in areas with a higher concentration of population and economic activities. The plot prices are rising. The reason for this is the lack of land as also the development of land prices in Europe.

3.5.2. Profiling Trends in Built Environment Sector

In terms of the extent and degree of urgency the following areas are undoubtedly of paramount importance:

- construction of transport infrastructure,
- construction of engineering and utility networks,
- housing,
- environment protection projects,
- repairs and refurbishment of the existing building stock and building works.

The scope for the building sector as created within the development of industry, services and public administration may appear rather indistinct. The crucial factor here is the length of the boom cycle.

Transport infrastructure

The essential tasks of the transport infrastructure development are sure to include:

- continuous improvement of safety and reliability,
- construction of residential areas bypasses,
- modernization of the railway network including the development of transit corridors,
- reconstruction of the major railway junctions,
- upgrading traffic parameters of waterways.

Building a modern transport infrastructure is among the first priorities of any country. Owing to its extraordinary multiplier effect it is a kind of "engine" of the economy with a direct impact on the GDP growth. A rational promotion of investments into transport infrastructure would greatly boost the competitive edge of any country, and this makes it the number one priority.

Engineering Networks Structures

They are facilities providing supply, distribution and sewage of water for the needs of the population, industry and agriculture, construction, and facilities and equipment to ensure harvesting, treatment and disposal of sewage water and drainage of rain water /atmospheric precipitation from the territory, further building long-distance pipelines and gas distribution pipelines for industrial sites. Equally important is the construction of electricity distribution utilities, the development and maintenance of the electricity generation and transmission system, wiring new consumers and linking local grids in line with the requirements of the European electricity market. A similar situation exists in media distribution systems. The scope of operations is bound to expand considerably in the future, considering the ever increasing significance of the sector and the degree of disrepair, signs of neglect and obsolescence.

Housing

The construction of rental flats, either run by the "Government" or the "cooperative" enjoyed a clearly dominant position earlier. At present, there has been a obvious shift to owner-occupied housing, which continues to this day. This owner-occupied housing is still mainly focused on living in family houses or residential buildings, facilitated by housing mortgage schemes. In future, there may be a departure from this trend to allow for higher migration to meet the needs of growing economy which gives preference to larger and economically more efficient agglomerations. In the Czech Republic the readiness to change residence (migrate), has been traditionally one of the lowest in Europe.

Environment Protection Projects

The intensive industrial development of the past may have been beneficial in terms of economic growth, but it also caused a great deal of problems in relation to the environment. One of the trends nowadays is, therefore, the effort to try and re-develop the areas injured by the phased out mining or industrial activities. In this context, the emphasis is on projects of land reclamation and decontamination.

The construction of waste management facilities constitutes yet another area related to environmental protection, which has recently been attracting a lot of attention. It is mainly an attempt to reduce the number of unauthorized, unsecured and hazardous waste dumps and landfills.

The regulation of streams remains a priority as well as building dams, weirs reconstruction or construction of polders, sluices and passes as part of flood control measures and last but not least water resources provision, water treatment plants and construction of wastewater and sewage sludge treatment plants.

Intensive construction is expected also in the **implementation of renewable energy sources.**

Maintenance works and renewals and enhancements

The share of maintenance works and renewals of buildings in the Czech Republic will rise significantly in the future due to constraints on new construction (lack and cost of land, etc.), until it gradually aligns with the usual share in EU member states. This trend applies to both building construction as well as civil engineering.

As for the refurbishments of the existing buildings the scope of works would also include the implementation of measures to improve the energy performance of existing buildings, an effort supported from public funds.

Gradually, the concept of heritage buildings conservation would also need to transform in relation towards usability of such buildings either permanent or at least occasional. The cost of restoring listed buildings with no identifiable further use, would be prohibitive for any public investor in the future.

3.6. Building Sector's Legal Environment

The future of the built environment sector may be greatly affected by changing the related basic legislation in place, including legal instruments. What is meant here is in particular, the regulations governing the issue of town planning, building regulations, public procurement and expropriation of land or buildings. The provisions stipulating the basic requirements of public interest as regards building products as well as regulations reflecting the requirements of sustainable development may also be considered of key significance.

The agenda in particular includes amendments to the following sections:

- town planning and building regulations,
- protection of the environment,
- procurement,
- technical requirements for building products,
- energy performance of buildings.

3.6.1. Town Planning and Building Regulations

The legislation providing for spatial planning and building regulations consists particularly of the **Act No. 183/2006 Coll. Zoning and Building Code** (the Building Act) and regulations for its implementation. In terms of public interest these regulations especially address the following issues:

- Zoning and its changes,
- Land-use permit and land use changes,
- Building permits. (In comparison with the legislation previously in place the scope of buildings that can now be implemented without prior notice or based on an announcement to the Building Authority, is significantly broader. Hitherto mandatory final inspections have been replaced with fit-for-habitation clearance or approval advice. A system of regular inspections and check-ups of buildings has been rolled out. A greater emphasis has been on the responsibility of the investor, designer and construction manager)
- The building procedure's partial privatization through the newly established institute of the authorized building control inspector and the change of documentation requirements in a shortened building procedure

A major amendment to the Building Law has been in making for a fairly long time now with the objective i.a. to streamline and simplify, in some respects the spatial planning procedures and further expand the range of structures that no longer require land-use permission or approval.

The Act No. 184/2006 Coll. On withdrawal or restriction of ownership rights to the land or property (the Expropriation Act), is closely related to the Building Law. It provides for the withdrawal or restriction of ownership rights to the land or property to comply with the expropriation as stipulated by a special law while also providing a compensation.

3.6.2. Environment Protection

The Environmental impact assessment (EIA) is carried out for investment projects pursuant **the Act No. 100/2001 Coll. on the Environment Impact Assessment and Amendments of Related Acts** (the Environmental Impact Assessment Act).
The situation when the environmental impact assessment for the implementation of an investment project is carried out in accordance with a special law and the actual procedure concerning the location and building permit pursuant another Act, results in unnecessary double-tracking that makes the process unreasonably protracted and tricky. The Directive 85/337/EEC allows the inclusion of EIA to form a part of the administrative procedure to approve a specific project, a practice which, however, is yet to be translated into reality in the Czech Republic. This in turn, adversely affects the competitive edge of the country due to a long and complicated process to obtain building permits ..

3.6.3. Government Procurement

Public procurement is regulated by **the Act No. 137/2006 Coll., on Public Procurement**, which incorporates European Union regulations, providing for floating public tenders, design competitions and terms for maintaining a list of qualified contractors and certified suppliers.
At present it has become imperative to try and amend the Act, streamlining its provisions to boost the transparency of the public procurement system with an objective to create the most hostile environment for corruption as far as possible.
Legal terms and the standard procedure to be adhered to by the public authority in case of awarding concession projects based on public-private partnership (PPP)as well as the concession contract, are governed by the **Act No. 139/2006 Coll. on Concession Contracts and Concession Management**. The law creates opportunities for the public sector to make use of the financial resources and know-how of private entities, which creates favorable conditions for a potential increase in demand for the building capacity.This institute is yet to be applied in practice.
The latest amendment to the Act (**Act No. 55/2012 of Coll.**) came into force on 1 April 2012. This amendment should significantly enhance transparency in the management of public resources and reduce opportunities for corruption in public procurement. The significant changes introduced by the amendment include reducing the limits for public contracts awarded under the Public Procurement Act, increasing requirements for the preparation of the public orders elimination of draw, as well as introducing the obligation on the part of contracting authorities to publish the wording of the contract as also the price actually paid

for a public contract and a list of subcontractors. For the construction sector, however, the amendment also has a significant negative impact: it highlights the lowest cost as a key criterion pushing the building companies to resort to dumping prices, often at the expense of the output quality and increased operating costs for future occupants of the building.

3.6.4. Technical Requirements for Products

The fundamental legislation in the field of building materials and products for construction is the **Act No. 22/1997 Coll., on Technical requirements for products**, which , in particular provides for the method of formulating technical requirements for products that could pose a health or safety hazard to persons and similarly the rights and responsibilities of persons who market or distribute, or put these products into operation.

Procedures for the attestation of conformity of building products and basic requirements for them are stipulated by the Government in its **Regulation 163/2002 Coll.** that is laying down technical requirements for construction products. Technical requirements for building products to be placed on the market with CE label are included in the **Regulation No. 190/2002 Coll.**

laying down technical requirements for construction products bearing the CE marking. Thus the **Council's Directive 89/106/EEC on the approximation of laws, regulations and administrative provisions of the Member States relating to construction products, as amended by Council Directive 93/68/EEC (CPD)** has been recast as the above mentioned legislation of the Czech Republic.

The above mentioned EC Directive is repealed by the **Regulation of the European Parliament and of the Council (EU) No 305/2011 laying down harmonized conditions for marketing of building products and repealing the Council Directive 89/106/EEC** (CPR). The Regulation shall be binding in its entirety and directly applicable in all Member States. Its aim among others is to eliminate obstacles caused by different transposition of the hitherto Directive by the Member States and strengthen the credibility of the whole system.

3.6.5. Energy Performance of Buildings

A part of the building sector as well as industries producing building products for the building construction will be significantly affected by the **new Directive on the energy performance of buildings** (EPBD II - Energy Performance of Buildings Directive II). Legislative links between EPBD and the CR's legislation are further illustrated in the Figures 4 and 5. For more information on this topic see the Chapter 4.

Figure 4 - Links valid until December 31, 2012

Source: a talk by Prof. K. Kabele, M.Sc., PhD., during the Day of Engineering on October 22nd, 2012

Figure 5 - Ties valid from December 1, 2013

Source: a talk by Prof. K. Kabele, M.Sc., PhD., during the Day of Engineering on October 22nd, 2012

3.7. Institutions, Professional Bodies and Professional Associations

EU

- **The Standing Committee on Construction** (SCC) - established by the European Commission to examine the application of CPR, formerly CPD. It consists of representatives of the Member States (currently 2 representatives for the Czech Republic – from the Office for Standards, Metrology and Testing (ÚNMZ) and the Technical and Test Institute for Construction Prague (TZÚS Prague), State-run Enterprise,). The SCC discusses mandates for the creation of harmonized standards (hEN) and guidelines for technical approval (ETAG), permits the processing of European Technical Approval (ETA). Further it checks whether the outputs of the European Committee for Standardization (CEN) and the European Organisation for Technical Approvals (EOTA) are in line with the mission mandates.

CR

In order to ensure the sustained development of the building construction and streamline its implementation, an appropriate business environment must be established also by the state administration in being able to provide a conceptual management of the built environment sector, conceptually and operationally meet crucial challenges facing the sector as well as related issues (e.g. the method of procurement and its evaluation, harmonization of technical requirements for structures, the issue of property rights, addressing the requirements by governing bodies and interest groups, and many others). The state administration in the field of built environment sector is unfortunately very fragmented In the Czech Republic, which is the reason why an **overall strategy for a sustained development** in this field is conspicuously missing in this country.

In terms of Government institutions the Ministry of Industry and Trade constitutes the most important organ for the building sector. It is among other things responsible for the industrial and energy policy, integrated mineral use policy, entrepreneurship and investment promotion and standards, metrology and testing. **The Advisory Board to the Prime Minister for the built environment** has been emerging as another important body.

Apart from the two above mentioned bodies the competence in areas related to the built environment sector, is mainly divided between the following ministries:

- **Ministry for Regional Development** - in charge of matters concerning town and country planning and building regulations, investment policy and housing (housing construction), public procurement legislation, expropriation,
- **Ministry of Transport** - in charge of matters related to transport infrastructure development, further what is crucial from the building sector's point of view, is by way of example the formulation of technical requirements and project documentation of transport structures and their approvals,

- **Ministry of Environment** - in charge of the area of ecological monitoring and sustainable development in the built environment sector, natural resources protection, nature conservation, landscape and environment protection and its relevant constituents, such as streams and water resources, air quality, waste management, geology and others
- **Ministry of Finance** - in charge of preparing draft state budget and the budgets of state funds
- **Ministry of Interior** - in charge of fire safety of buildings, administrative law,
- **Ministry of Agriculture**: in charge of water management including technical conditions for water works and their approvals,
- **Ministry of Education**, **Youth and Sports**: in charge of providing training and education of the building industry workforce,
- **Ministry of Labour and Social Affairs** - in charge of the area of social welfare conditions and safety and health protection at work in the building industry,
- **Ministry of Culture** - in charge of heritage buildings conservation.

Another important organization for the building industry is **ÚNMZ** (Office for Standards, Metrology and Testing) – in charge of commissioning and elaboration of technical standards in harmony with those of the EU and control of the application of CPR (CPD).

The leading non-governmental professional organizations operating in the field of architecture, construction and building industry in the Czech Republic are members of **SIA CR - Council of Construction,** an association of the following legal persons

- **The Czech Association of Consulting Engineers,**
- **The Czech Chamber of Architects,**
- **The Czech Chamber of Authorized Engineers and Technicians operating in the building industry**
- **Czech Society for Construction Law,**
- **The Czech Union of Civil Engineers,**
- **Architects,**
- **Architecture and Building Foundation,**
- **Road Contractors Association, Prague**
- **Society for Environmental Engineering,**
- **Association of Building Entrepreneurs of the Czech Republic,**
- **Association of Testing Laboratories for the Construction**

CZECH CHAMBER OF ARCHITECTS

The Czech Chamber of Architects (CCA) is a self-governing professional association. It was established by Act No. 360/1992 Coll. on the profession of authorized architects and the profession of engineers and technicians operating in construction, as amended later on , as a public law entity with its headquarters in Prague and a nationwide competence; It also represents the profession in the international forum .

The CCA is responsible for the ethical and professional practice of architecture in the Czech Republic and for the integration of architects into European and other professional structures. Under this legislation it brings together all certified architects and authorized urban planners as well as chartered designers of territorial systems of ecological stability (TSES).

CCA grants authorization to architects of the Czech Republic and acts as the recognition authority for architects from the European Union and Switzerland, who choose to work in the Czech Republic as a guest or resident persons registering these persons for the discharge of this profession in the Czech Republic.

The purpose of the CCA is the service to the profession, their clients and the public. CCA prevents any unnecessary and unwarranted infringement on the rights of any of the market participants, promotes proper functioning of the market with architectural services.

CCA associates nearly 3,500 authorized architects.

CZECH CHAMBER OF CERTIFIED ENGINEERS AND TECHNICIANS EMPLOYED IN CONSTRUCTION (ČKAIT)

ČKAIT is a public professional organization, which was established in 1992 under Act No. 360/92 Coll. on the profession of authorized architects and authorized engineers and technicians operating in construction. This Act in selected activities in construction (building design and management of construction) provides for transferring professional responsibilities to individuals: certified architects, engineers, technicians and builders.

The Chamber membership today consists of more than 29,000 certified engineers and technicians who have been granted authorization on the basis of passing the prescribed examinations of professional competence.

ČKAIT grants authorization in several disciplines and specializations:

- Buildings
- Transportation projects
- Hydraulic structures and landscaping
- Bridges and engineering structures
- Technological equipment of buildings, utilities
- Technology of building environment
- Static and dynamics of structures
- Urban Engineering
- Geotechnics
- Fire safety of buildings
- Works geared to forest functions performance
- Energy auditing
- Testing and diagnostics of buildings.

The ČKAIT is a recognizing authority for construction engineers and technicians from the Member States of the European Union, European Economic Area or the Swiss Confederation, who choose to work in the Czech Republic as guests or residents.

ASSOCIATION OF BUILDING ENTREPRENEURS IN THE CZECH REPUBLIC (SPS)

The role of SPS in the Czech Republic is to be a partner of the public administration in solving strategic problems of the built environment sector in the country. SPS is aware of its strategic position in relation to construction companies and appreciates the fact that its main task is to support the construction companies on their path to higher effectivity, more effective learning, innovations as well as their efforts to improve the image of the building sector in the eyes of the general public.

CHAMBER OF COMMERCE OF THE CZECH REPUBLIC (CCC)

The Chamber of Commerce of the Czech Republic affiliates individual professional guilds, associations, communities and unions that in their turn bring together individual professional and business groups providing blue-collar construction work, delivery and installation of equipment for building site and other services for the sector. When it comes to drawing up the learning program curriculum for individual crafts these organizations prove to be truly indispensable for the field.

THE ARCHITECTURE AND BUILDING FOUNDATION (ABF)

The Foundation has been a non-profit educational and information institution for 44 years spreading information on building products and technologies to facilitate their marketing, evaluating completed building projects and providing in a consistent manner specialized lifelong learning programs within its in-house Czech Building Academy. The Academy features Departments of Construction Law, sustainable Development, as well as the Department of Crafts etc. that use the knowledge of experts from both academia and practice in its numeral education programs. The Foundation also provides secretariat services to the SIA Czech Republic – Building Council.

Organizations possessing significant statistical surveys results and a data concerning the sphere of construction and building industry include:

- **URS Praha, Inc.:** the basic activities of the company consist of building output valuation, industry analyses and development studies, strategies, statistics, the sector's development and concept analyses. At the international level, the company cooperates with Eurostat and is also a member of several international non-governmental communities (Euroconstruct, Edibuild, ICIS).
- **RTS Inc**.: The company is involved in developing software information systems, providing technical, economic and engineering services, creating tools to support the planning, organizing, control, management and human resources (management) for business entities.

Other organizations operating in the building sector in general and the energy efficiency, in particular, are:

- **Passive House Centre (PHC)** is a non-profit association of legal and natural persons, which was established to support and promote the passive house standard and ensure the quality of passive houses. The PHC is the leading consulting organizations aimed at raising awareness and providing information about passive houses and energy-saving building in the country. Its members are architects, designers, building companies, manufacturers and suppliers of building materials and components, and the rest of professionals with interest in passive houses.
- **Chance for buildings**: Chance for building represents a joint initiative of the Passive House, the Czech Green Building Council and the Association of Mineral Wool Manufacturers. The objective of the initiative is to contribute to quality implementation of the new directive on energy performance of buildings in the Czech Republic, and bring about multiple benefits that come along with energy-efficient buildings.
- **Association of Energy Auditors (AEA):** The purpose of this Association is to bring together energy auditors, maintain a high level of energy audits and assessments through their influence, education and activities, to actively participate in the creation of a legal framework for the activities of energy experts. Many AEA members are also specialists in evaluation of energy performance of buildings (with the authorization certificate granted by the Ministry of Industry and Trade).

3.8. Prospects of the Czech Republic's Construction Output

3.8.1. Short-term Outlook

The Czech building sector has been showing a steady downward trend (2012) for the fourth consecutive year. The outlook for 2013 currently suggests that a return to growth cannot be expected in the next year, either. On the contrary, there should be a further **decline of 3.8%.** This prospect corresponds with largely pessimistic views prevailing in a survey conducted among a representative number of managers in the building industry. Concerns are evident primarily in medium-sized and small companies, which often need to struggle to survive.

- The decline in sales is expected by nearly two-thirds of building companies. The 2012 sales are envisaged to drop across the entire market, large, especially engineering companies may have slightly brighter prospects, though according to current forecasts by directors of building firms the downward trend is not likely to be arrested in the year 2013.
- Building companies CEOs' confidence in beating their competition may have halted its long-term decline in 2012 but it is yet to start rebounding. Currently, less than half the directors still trust their companies in this regard.
- Tenders are currently considered by large companies to be the most effective way of bagging contracts. Conversely, the directors of medium / small building firms give preference to personal contacts.

- The proportion of firms willing to take risk to get a contract, has increased sharply.
- Only one of the two directors states that it is possible to bag a public contract without paying a bribe.
- The capacity utilization rate fell notably with building companies of medium or small size, on the contrary, large enterprises are reporting an increased workload. This corresponds to the stack of work that is most acute for large companies.
- The main constraints with the greatest impact on the economic performance of building companies are ascribed to the state bureaucracy, low demand financed from both public and private funds, last but not least a rather harsh and sometimes unfair competition, the CEOs concur.

3.8.2. Medium-term Outlook

The development of the building sector envisaged in the **medium term (2020) horizon** will be affected by the global economic developments and their reflection in the Czech economy and the specific terms and conditions for business, starting with the establishment of mandatory public investment policies, the development of territorial units and the requirements for availability of communal facilities. The building sector's contribution share in the creation of national income, is expected to be sustained roughly at current levels - only owing to the **growth of labour productivity.**

The building sector's pattern development will lead to a **reduction in market fragmentation**. This will bring a boost to the position of large, complex companies and medium-sized specialist companies. At the same time there would be a partial "cleaning" of the market, i.e. some financially, personally and technologically weaker companies will disappear.

Changes on the World's economic map will have a significant impact on the building industry: there will be a growth of building works exports as well as the export of capital (and the establishment of subsidiaries in new markets).

The labour productivity growth will be accompanied by cost-cutting, not only during the construction process but also as for the future operation costs of the new buildings. In line with EU objectives relating to energy conservation and environmental policies, **low-material intensity and energy-efficient buildings** will be promoted.

The proportion of energy generating structures is to grow (construction or renovation of power plants and other energy sources, development of the transmission systems, construction of gas storage facilities and pipelines) and construction of technical infrastructure (water management structures, drinking water sources and piping, sewage water treatment, landfills).The extent of **repairs and refurbishments** will also increase - which represents a chance for smaller firms in the industry.

In connection with the change in the demand pattern **new progressive materials and components**, supported by the use of modern technology would catch on in a massive scale. This will streamline the building production and change management approaches towards the concept of "lean construction". The use of information technologies would grow

in the field. The built environment sector will also need to respect the principles of low energy building. This will require a continuous learning and coming up with all kinds of innovations (technical, technological, organizational, commercial, etc.).

The introduction of new technologies and approaches will require **growing qualification levels on the part of building companies workforce** (from blue-collar workers to top managers). Education and training processes will form an important part of activities pursued by building companies, which will become more involved particularly in the education and training of blue-collar workers.

The challenge at present and in particular in the future is mainly **the missing binding concept of public investment development and adequate approach to construction, fragmentation and lack of coordination of available tools, as well as their inadequate financial security and its vulnerability in time.**

3.8.3. The Sector's Medium-term Employment-rate Prospects

As regards the **outlook of the branch structure** of the Czech economy, which could become an information base for expected changes on the **demand side of the labour market** (and in that sense also the starting point for further orientation of the whole system of education in the building industry), the basic trends are already evident, or "loaded" now: undoubtedly there is a further decline in employment in the manufacturing sector (agriculture, industry, construction), and the increase in the share of employment in the commercial and public services and a dynamic growth in the sphere of education, research and development.

These trends are dictated by external economic competition that "pushes" the CR's economic development to give preference to sectors with higher added value. These trends, however, are within the national economy "filtered" through a number of factors that determine the "absorption capacity" of the economy to adopt and effectively apply the changes.

Besides the quality of the country's Government and prevailing social - will characteristics (trust in society, political culture, the willingness to take risks, etc.) these factors also include the **availability of adequate quantity and quality of labour that is ready for the change.**

It is, therefore, difficult to accurately quantify future changes in the branch pattern of the Czech economy, as these predictions can have at most only a probabilistic character as shown by the changing results of the multi-criteria **mathematical model of forecasts concerning the balance of labour in the country**. Table (14) presents medium-term pattern development indicators of the national economy, which in 2007 predicted a dramatic decline in the building sector workforce.

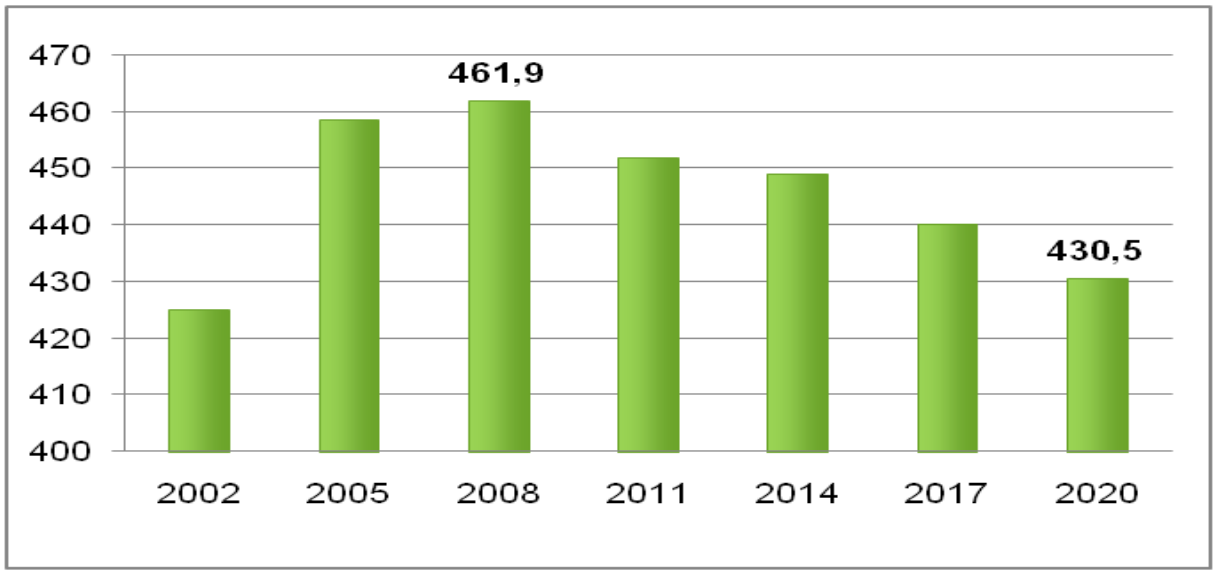
Table 14 Outlook of the branch structure of the national economy

Branch name	Number of workers 2006	Number of workers 2020	Difference 2020/2006 (%)
Agriculture, forestry, fishing	181,7	139,4	-23,3
Mining	54,9	43,1	-21,5
Processing industries	1361,4	1251,1	-9,1
Power Sector	76,7	67,2	-12,4
Building Dector	**456,4**	**363,8**	**-20,3**
Trade	613,5	616,0	0,4
Accommodation and catering	187,0	191,0	2,1
Transport, warehousing, communications	361,0	331,2	-9,3
Financial brokering	92,2	112,1	21,6
Properties, rentals, entrepreneurial activities	321,3	420,1	30,7
Veřejná správa a obrana	325,6	259,8	-20,2
Education	287,6	303,9	5,7
Health care and social wellfare	329,9	402,9	22,1
Other public social and personal services	198,0	224,5	13,4
TOTAL	**4827,1**	**4726,1**	**-2,1**

Workforce balance forecast by Věra Havlíčková, Michal Lapáček, Working Paper NOZV-NVF No. 4/2007

Using the same model (!) in 2011 the forecast of the employment rate development in the building sector was already considerably less dramatic (see Graph 2).

Graph 2: Prediction of employment in building sector



NOZV: Projections of employment in industries in the period 2009-2020, Prague 2011

Even this prediction, however, is to be taken as a guide. The results thus illustrate rather than accurately quantify a general consensus among experts in the Czech Republic, namely, that by the year 2020 there will be **a drop in the building industry workforce**. It is the 2011 forecast that would serve as the basis for further reflection on the quantification of training needs in the building sector (Chapter 6).

Contrary to those predictions no decline in employment in the building industry ever happened between the years 2006 to 2010 but instead rather a growth was the case. The favourable economic environment in which the building industry operated in the years 2000 - 2007, led in large part to the preference by companies of mainly **extensive development**, the concomitant of which being the growing demands on the volume of "live" work, that means work by less qualified blue collar workers . For a more extensive development of the field, however, there is **no economic or demographic potential** in the Czech Republic any longer. The objective of sustaining the building sector as a competitive constituent of the national economy pattern, therefore, requires taking the path of relatively radical technological, product and organizational **innovations** over the medium term. In connection with this trend, a lower demand for labour may be expected in the field, however, with much higher qualifications than before. This creates an unprecedented scope for the development of education in the building industry. The current employment trends in the sector between 2011 and 2012 may serve as a precursor of the turning point or possibly breakthrough, it is real and necessary.

4. National policies and strategies to contribute to the EU 2020 energy targets in buildings

4.1. National Energy Policy Objectives

4.1.1. The Country's Energy Policy

The supreme and most comprehensive document that addresses the issue of energy in the Czech Republic and sets forth long-term goals of development of this important segment of the economy, is the **National Energy Policy (NEP)**. The currently valid version of the NEP was updated in February 2010 proceeding from the National Energy concept as approved by the Government on 10th March 2004. The concept defines the priorities and objectives of the Czech Republic in the energy sector and describes the specific implementation measures of the country's energy policy. The State Energy Policy's vision specifies the country's priorities

and sets goals, the country wants to achieve through influencing the energy management over the next 30 years, in terms of a market-oriented economy.

The National Energy Policy constitutes one of the fundamental components of the economic policy of the Czech Republic. It reflects the state's responsibility for creating the prerequisites for a long-term reliable and secure supply of energy at affordable prices and for creating conditions for its effective use that would not threaten the environment as being in accordance with the principles of the sustainable development. The state meets its legal obligation in establishing a legislative framework and rules for the operation and development of energy sector.

The strategic priorities as stipulated in the NEP include a **rise of the CR's energy efficiency while achieving energy savings in both the economy and households**. As a target value (NEP performance indicator) the document sets out the **share of energy from renewable sources in the total final consumption at minimum 13% by 2020, about 17% by 2030 and approximately 23% by 2050.** As an implementation tool to achieve these goals NEP defines a National Action Plan for Energy Efficiency (NAPEE). The first NAPEE specifies the task of reaching total annual savings volume of 71.43 PJ by 2016 and 80 PJ by 2030. At present, the second NAPEE is in place (see below). The NAPEE focus is closely linked to the documents of the European Commission and the Council (see below)

The NAP currently contains a set of support tools, which should contribute to an increase in energy efficiency. First, it is the direct instruments of state support for savings (subsidies for home insulation and efficient heating systems - notably under the Green Investment Scheme), and second the implementation of environmental tax reform and finally the incentives to stimulate a change in consumer behaviour. However, the NAP does not explicitly tackle the **energy-efficient building** (or it fails to outline any sector-specific targets) while referring to the NAPEE, instead.

4.1.2. National Energy Efficiency Action Plan of the Czech Republic

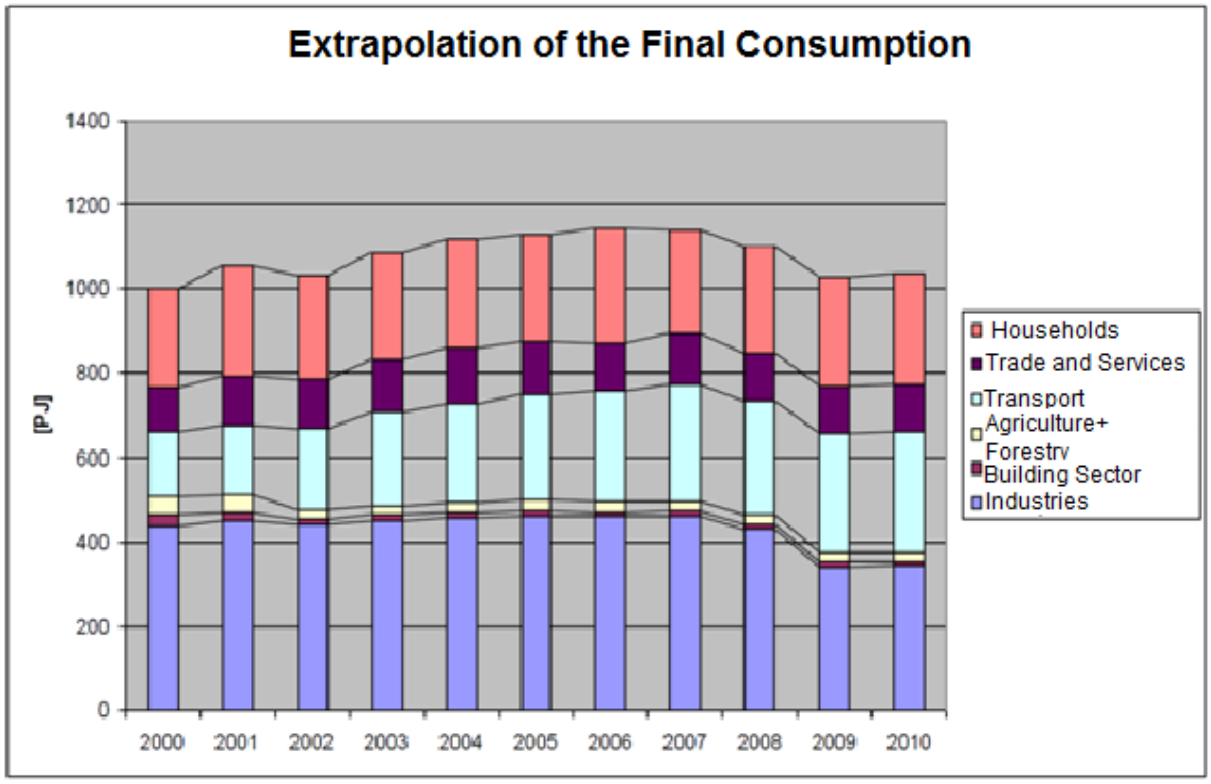
The fundamental document in the field of energy efficiency is the National Energy Efficiency Action Plan of the Czech Republic (NEPEE). Its update – the NAPEE II was prepared in 2011, following the European Parliament and Council Directive 2006/32/EC on end-use energy efficiency and energy services. The main objectives of the NAPEE are:

- Maximize energy and electrical energy efficiency and energy savings,
- Increased use of renewable and secondary energy sources,
- Increased use of alternative fuels in transport.

The aim of NAPEE is 9% energy savings in the final energy consumption in 2016. Geared to this objective the measures as set out in sub-chapters of the document, are to help and meet the task in households, services, industry, transport and agriculture. The basic source of information on a more efficient energy deployment, is an overview of the current final energy consumption as given in Figure 2. In 2009, there was a noticeable decrease in

energy consumption, influenced mainly by the downturn of the industry output in the Czech Republic and the global economic crisis. The quantification of the real achievements resulting from the measures mentioned in NAPEE, is very tricky (National Action Plan, 2009). In the area of renewable energy sources (RES) the National Action Plan for RES has been elaborated further to NAPEE as its complement.

Figure 6 - Development of final energy consumption in the Czech Republic



Czech Statistical Office (ČSÚ), 2011

. 4.1.3. CR's National Action Plan for Renewables

One option of increasing non-renewable resources savings is increasing the use of renewables. The deployment of renewable energy sources (RES) does not reduce the energy performance of the building, but it reduces the building's environmental impact and its dependence on centralized energy sources. The National Action Plan of the Czech Republic for energy from renewable sources in its updates, sets the rules for the RES development.
The latest update was in August 2010. Its 2012 update is being prepared according to the results of RES in previous years. The basic parameter of RES development is Czech Republic's commitment to generate 13% of power from renewables by 2020 as arising from the European Parliament and Council Directive 2009/28/EC of 23 April 2009. The National Action Plan (NAP) translates the RES development targets into the legislation of the country. The country's commitment of 13% (calculated in NAP with a reserve as 13.5%) is the third lowest in the EU after Luxembourg and Malta. It is, therefore, a relatively soft schedule. The country's energy mix backwardness and dependence for energy on unstable economies, can

have a crucial impact on the country's energy security. NAP RES creates de facto constraints for the development of renewable energy sources, which hinders their development potential beyond the agreed objectives thus responding to unstable market environment principles also criticized by the European Commission. For example, the premature fulfilling the objectives of photovoltaic power plants will mean a ban of their installation at least for 2013 and 2014. The question arises whether it is appropriate to put restrictions on the development of renewable energy sources other than the market environment.

Table 15 - RES deployment as envisaged by NAP RES

RES type breakdown of RES Share in the Total Energy consumption in the period 2010 to 2020												
Year		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Biomass (households)	%	44,07	39,91	37,62	35,14	34,89	34,03	33,45	32,81	32,13	31,86	31,62
Biomass (except households)		26,65	27,79	29,58	30,38	30,25	30,33	29,44	28,51	27,56	26,98	26,42
Hydroelectric Power Plants	%	7,28	6,50	6,05	5,72	5,48	5,25	5,09	4,91	4,72	4,61	4,50
Biodegradable part of Solid Municipal Waste (SMW)	%	1,67	1,59	1,46	1,36	1,29	1,23	1,65	2,36	2,26	2,20	2,13
Biogas	%	4,28	4,87	5,54	6,09	6,66	7,18	7,72	8,19	8,60	9,07	9,52
Biodegradable part of PRO and ATP	%	0,65	0,59	0,55	0,52	0,49	0,47	0,45	0,43	0,41	0,40	0,39
Heat pumps	%	1,81	1,86	1,95	2,04	2,15	2,25	2,36	2,45	2,53	2,63	2,73
Ground source heat pumps	%	0,00	0,00	0,00	0,28	0,48	0,46	0,44	0,42	0,41	0,39	0,38
Biofuels for transport	%	9,76	9,76	10,32	10,89	11,53	12,05	12,62	13,11	14,61	15,02	15,43
Solar thermal collectors	%	0,26	0,28	0,31	0,34	0,37	0,40	0,43	0,45	0,47	0,49	0,51
Wind farms	%	1,57	1,70	1,86	2,01	2,16	2,31	2,46	2,59	2,70	2,83	2,96
Photovoltaic systems	%	2,00	5,14	4,76	4,45	4,23	4,04	3,90	3,76	3,61	3,51	3,41
Renewables share in final energy consumption	%	8,3	9,4	10,1	10,8	11,3	11,8	12,1	12,5	12,9	13,2	13,5

(National Action Plan, 2012)

4.2. Commitment to Energy Efficient Buildings

Neither of the above mentioned program documents directly tackle the issue of energy-efficient construction even though the energy performance of buildings stands and falls with the sophisticated architectural and construction design of the building. For existing buildings the options are only limited, but by no means impossible. Naturally, new builds offer a far better starting point. You can find the application of the best available techniques and solutions here that will make the building very energy efficient. Unfortunately, today's priority is the construction costs "optimization" rather than the subsequent operation and maintenance costs. The newly adopted legislation introducing the classification of buildings in terms of their energy performance, however, should herald a desirable shift in this area.

4.2.1. Energy Management Act and Related Standards

One of the most important legal regulations in the CR in the sphere of energy is the **Act No. 406/2000 Coll. On Energy management**, amended several times, most recently in 2012.

The Act No. 406/2000 Coll. in its Section 6a Energy Performance of Buildings says:

- paragraph 1: "The builder-owner of the building or unit owners, respectively, shall ensure that the building meets the requirements for its energy performance as well as the comparative indicators *as stipulated in the implementing legislation*[11] and moreover that it complies with the requirements of the relevant *harmonized Czech technical standards*[2] ...."
- paragraph 2: The builder-owner of the building or unit owners, respectively, shall prove the building's compliance with the requirements of the preceding paragraph in showing the relevant **Energy Performance of Building Certificate**, which shall be submitted when substantiating its compliance with the *general technical requirements for construction*[3]. The Certificate shall not be older than 10 years and forms a part of the documentation in accordance with the implementing legislation for:

a) construction of new buildings,
b) major renewals of completed buildings with a total floor area over 1000 m2, which affect their energy efficiency,
c) the sale or lease of buildings or parts thereof, where these buildings are newly required to prepare a Certificate referred to in point a) or b)

Decree No. 148/2007 Coll. on the energy performance of buildings, which implements the provisions of the Act No. 406/2000 Coll. says in Section 4, paragraph 1, point 2: "building construction systems and their joints have the highest required heat transfer and thermal permeation coefficient"

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[1] *Decree No. 291/2001 Coll. laying down the details of energy efficiency for heating in buildings, this decree in no longer valid, it was repealed by Decree No. 148/2007 Coll. Energy Performance of Buildings effective from July 1, 2007, due to the fact that the original decree No.291/2001 Coll. is no longer valid, there would no way to prove the energy performance of the building starting from January 1, 2009. This is why the building authorities require an assessment "... in the form of data filled in the questionaire for the Energy Performance Certificate for buildings according to the Decree No. 148/2007 Coll ...." and data calculated on the basis of relevant standards (e.g. EN ISO 13790 Thermal performance of buildings and other) the periphrastic form is there just because it is not yet possible to require the Certificate.*

[2] *here the law does not specify*

[3] *The Decree No. 137/1998 Coll. on general technical requirements for construction, paragraph 6: Operators of buildings used for the purposes of education, health, culture, business, sports, accommodation and catering services, customer centers of the water management, energy, transport and telecommunications, and public administration with a total floor area of over 1000 m2 are required to display the Certificate in a prominent place accessible to members of the public in the building. Paragraph. 8: "The requirements of paragraph 1 may not be fulfilled ... for buildings containing internal heat source technology. The requirements need not also be met for production buildings in industrial areas, for businesses and non-residential agricultural buildings with low annual energy consumption for heating."*[1]

The Decree 148/2007 Coll. requires the EEB Certificate to be issued for the following categories of buildings: family house, apartment building, hotels and restaurants, office buildings, hospitals, educational facilities, sports facilities and commercial buildings. For industrial buildings and warehouses it is not necessary to produce EEB Certificates.
The fact that the energy performance requirements need not be proved for some types of properties, does not mean that these do not need to comply with the requirements of CSN 73 0540 Thermal protection of buildings, because this standard is mandatory by the Decree 137/1998 Coll.
The Decree 148/2007 Coll. also defines the precise form and calculation of data for Building energy performance certificates; the Certificate consists of a graphic visual and a protocol (usually giving about 10 pages of data and calculations pertaining to the new builds + recommendations on implementing measures for existing buildings).

CSN 73 05 40 Standard: Thermal Protection of Buildings

In the Czech Republic the CSN 730540 standard on Thermal Protection of Buildings is binding (except attachments marked as informative). This standard has four parts:

- 1-Terminology,
- 2-Requirements
- 3-Design values of variables,
- 4-Calculation methods.

Parts 2-Requirements and 3-Design values of variables are essential in order to identify requirements for the building . Attachments to the standard are either normative (then mandatory) or informative (non- binding).
Requirements for heat transfer coefficient according to this standard are directly defined in Table 3 of the standard. This table contains not only required values (i.e. mandatory), but also recommended (non-binding) ones. These values are the same for all climate regions of the Czech Republic and the prevailing internal temperature of 18-22^{o}C. The required coefficient values calculations for other temperatures are also defined in the same standard.

CSN 73 05 40-3 (11/2005) standard: The design values of variables are mentioned in normative Annex I.1 Design indoor temperatures in winter and design relative humidity of indoor air. These parameters are mandatory for the designer.
If no value is specified for a particular purpose in the standard, parameters can be adjusted to the needs of the operation and purpose of the building. It is always necessary to comply with such mandatory hygiene regulations (e.g. Act No. 258/2000 Coll. Protection of public health or Government Regulation č.178/2001 Coll. laying down the health protection conditions of workers at work, as amended later on).

Other related regulations

Decree No. 499/2006 Coll. on construction documentation, which is the implementing decree of the Building Act, in its Annex 1 states that: part of a comprehensive technical report documentation for building permit / notification must be Energy saving and heat retention solutions, **further requirements must be met for the energy performance of buildings**, including evidence of compliance with comparative indicators of a uniform method for calculating the energy performance of buildings and the determination of the overall energy consumption of the building.

The law on the promotion of renewable energy sources (Act No. 180/2005 Coll.)

It defines the areas of RES promotion. It regulates the rights and obligations of the RES power generating companies on the ground and conditions of purchase support and recording electricity generation from renewables.

The above mentioned law was replaced by Law 165/2012 Coll. Act on supported energy sources and amending certain laws, MPs approved it 31st January 2012 with the effect from 1 January 2013.

4.2.2. Development of Buildings ' Energy Performance Requirements

Historically, the Czech Republic requirements for buildings in terms of energy efficiency were determined by establishing minimum thermal technical properties of the building envelope, which had to be complied with by builders for both new builds and renovations of the existing ones. Since the mid-60s of the last century, these requirements have been derived from the national technical standard CSN 73 05 40: Thermal protection of buildings. The Standard CSN 73 05 40 has undergone several updates since its first release, all of which in essence particularly toughened those requirements.

Table 16 - Thermal permeability coefficients (U-value [W / (m2.K)]) required / recommended for new and renovated buildings in the Czech Republic according to standard CSN 73 0540 Thermal Protection of Buildings

Construction	1964 – 1974	1974 – 1994	1994 - 2002	2002 - 2005	2005 - 2007	2007 – 2012	2012 –
Walls	1.47	0.89	0.46/0.33/ 0.70*	0.38/0.25 (0.30/0.20)**	0.38/0.25 (0.30/0.20)**	0.38/0.25 (0.30/0.20)**	0.30/0.25 (0.30/0.20)**
Roofs			0.32/0.22/ 0.48*	0.30/0.20 (0.24/0.16)**	0.24/0.16	0.24/0.16	0.24/0.16
Windows			2.9	1.80/1.20 (2.0/1.35)***	1.70/1.20 (2.0/1.20)***	1.70/1.20	1.50/1.20
Floor			0.32/0.22/ 0.48*	0.60/0.40	0.60/0.40	0.45/0.30	0.45/0.30

Note: All values are for outdoor temperature -15 ° C and an average indoor temperature of 20 ° C.
*) Required / Recommended / Approved for reconstruction
**) For heavy construction (in brackets for light)
***) The new (renovated in parentheses for) windows
Since 2002, the standard also recommends to reach 2/3 of recommended values through direct use of solar energy, heat recovery, or electricity for heating and in the design of low-energy houses.

Other changes that have occurred over time, include expressing the requirements for thermal-technical properties of constructions through heat permeability coefficient U (effective since 2002) and mentioning next to the limit values of the factors that must be met by the builder, also recommended values as an aid for the implementation of more energy-efficient buildings standard (or an above-standard low energy consumption for heating). Furthermore, the footnote of the standard specifies recommendations for the values of the heat transfer coefficient that apply to low energy buildings, or buildings using solar energy, heat recovery, or electricity for heating.

Since 2002, the same thermal-technical standard addresses energy performance rating of buildings using labels and protocols, which provides a simple and easily comprehensible to layman description of the quality of the building. Here, the degree of energy intensity (DEI) served to evaluate the buildings using the specific energy consumption. In 2005, this rating was modified and coined as thermal efficiency degree (DTE). The average heat transfer coefficient Uem served as the principle evaluation criterion here. The current form of the standard in force since 2007, uses the classification index (CI) for the energy label, which is also based on the average heat permeability coefficient Uem. The building is then included in the energy class A to G. The energy rating label is yet to become compulsory, but such was required as part of applications for grants from the Environment Operational Programme in the third priority axis

In parallel with the labels existed the evaluation of buildings using **energy certificates** in accordance with Decree 291/2001 Coll. laying down efficiency details of energy use in heat consumption in buildings. This Certificate evaluated the building using energy needs for heating, the criterion was the specific heat value (per m2 or m3). With the implementation of Directive 2002/91/EC (EPBD) on the energy performance of buildings, the ordinance was repealed effective from the date the Decree 148/2007 Coll. on Energy Performance of Buildings came into force on 1st July 2007. This Decree fully implements the requirements of the European EPBD and establishes a more comprehensive evaluation of buildings using **building energy performance certificates.**

The current energy performance of buildings built in different time periods, however, involved not only the quality of the materials used at that time (to meet the required insulation properties), but also the professional level of construction work performed. So it is now common for the buildings from the late 80s of the last century, to feature more structural defects than buildings built in the 60s or 70s, with all concommitants including increased energy consumption for heating.

The Act introduced, inter alia, the duty to prepare an assessment of the rational use of energy - the **energy audit** - for large energy consumers[4]), and subsequently also for buildings[5]) built before the set deadline.

[4]) *With the consumption above 1500 GJ of total annual energy consumption for constituents of the state administration, regions and municipalities or 35000 GJ/year for the rest of legal persons*

[5]) *With the consumption of 700 GJ/year and above*

Through follow up regulations a diverse range of requirements were further defined for an economical generation, transfer and finally end-use of energy in buildings, especially for heat. The regulations provide for the minimum efficiency of its generation from a variety of heat sources as also the heat loss limit during its distribution and an effective regulation of the heat supply (qualitative or quantitative equithermal, zone and individual control). These requirements must be met for new buildings, in some cases, even existing ones (e.g. mandatory installation of thermostatic valves on the radiators in all multi-dwelling buildings was stipulated late in 2007).

The regulations implementing the Act, also fixed the maximum permissible specific heat consumption for heating. The values varying according to the geometric characteristics of the building (A / V ratio) were calculated in a simplified manner and were mandatory for buildings and refurbishments financed from public and private funds, provided they exceeded the power consumption limit of 700 GJ / year.

Limits on heat consumption for heating and hot water were then fixed based on the rules for heating and hot water supply in buildings with a common billing place but with different occupants (a typical example of which being the multi-dwelling residential building).
However, these requirements have been modified significantly in connection with the Directive 2002/91/EC on the energy performance of buildings recast in the Act and its implementing regulations.

The Act Amendment, which came into force on 1st July 2006, replaced the existing simplified requirements for the energy performance of buildings with a comprehensive approach rating buildings not only in terms of their construction systems, but also their installed utility services. The buildings are assessed through the so called **Energy Performance Certificate** in terms of their energy consumption for heating, cooling, ventilation, air treatment and indoor air conditioning system, lighting and hot water supply.
At the same time, the amendment extends the existing provisions, adding the mandatory inspection of boilers and air conditioning units. The method of determining the energy performance of the building involves calculating an aggregate annual energy need model for heating, ventilation, cooling, air conditioning, hot water and lighting in its standardized use.
For mutual comparison of the energy performance of buildings of the same type the specific annual energy consumption of the building is determined, which is expressed as the ratio of the total annual energy supplied per unit of total floor area of buildings in kWh/m2.

Table 17 - Comparison of energy audits and building energy performance certificates

Energy Audit	**Energy Performance of Building Certificate**
Based on national legislation	Based on the European legislation (EPBD1 and 2)
Decree 425/2004 Coll.. specifying energy audit requirements details	Decee No. 148/2007 Coll. on energy efficiency of buildings
Since the year 2000	Since the year 2007
Applicable for all types of buildings, but not applied for family houses (due to prohibitive price). Mandatory for all public buildings with annual consumption exceeding 1500 GJ and for private buldings with consumption exceeding 35000 GJ (20000 GJ from 2013) a for certain support programs.	Applicable for all building types, without exceptions (EPBD1 exempts agricultural and industrial buildings, new builds under 50 m2, refurbishments under 1000 m2, buildings occupied for less than 4 months per year and temporary buildings.
Operation assessment = both of building and occupier's behaviour, based on energy consumption as per invoiced amount	Calculated quality of building (occupier's behaviour eliminated), based on a standadized use of the building, requirements are set according to specific need of heat per floor area (or specific energy supply)
More detailed, all appliances and energy sources are assessed	Heating, cooling, ventilation, hot water preparation, lighting and auxiliary energy (e.g. fans, pumps)
Price EURO 1000 – 25000	Price EURO 100 – 5000
Dozens of pages (40 – 150)	Certificate + about a 10-page protocol
Approximately 500 auditors	Approximately 800 persons

The calculated (model) specific energy consumption is then compared with the limit values prescribed for different types of buildings (see table below) the classification is carried out, in the energy class A to G with a reference value, which may not be exceeded by the building under review, is always considered to be the threshold value between classes C and D. The Certificate must also include recommendations to reduce energy consumption.

Since 1 January 2009 the Energy Performance of Building Certificate has become a compulsory part of the project documentation to obtain building permits for all new buildings and major renovations of existing buildings. On the basis of the Act 183/2006 Coll. (Building Act) and its implementing Decree 499/2006 Coll. on Construction Documentation the Building authorities require a low energy performance of buildings to be duly substantiated. The Certificate may be issued only by a person authorized by the Ministry of Industry and Trade.

For new buildings with a floor area exceeding one thousand square meters the Certificate is to include also an assessment of alternative heating systems. Moreover, if the property serves for the purpose of education, health, culture, business, sports, accommodation and catering services, customer centers of the water, energy, transport and telecommunications, and public administration, the resulting energy performance of the building certificate in a graphical form needs to be placed in a prominent public place.

A positive aspect in the approach to the evaluation of the energy performance of buildings, is the close link between the economical use of energy and the deployment of renewables. Since the energy intensity of buildings is evaluated in terms of the amount of energy (of various forms), supplied to the building from the parent distribution systems, a lower energy consumption can be achieved both through savings as well as the deployment of renewables.

4.2.3. Energy Efficient Buildings Prospects

A hope can be expressed that the requirements of Directive 2001/91/EC, which have been recast in our legislation through relevant regulations, will positively influence the development of energy efficiency of buildings in the coming years. While the average energy efficiency of new residential buildings now stands at 80 to 120 kilowatt hours of heat consumption for heating per square meter of floor space, after adopting this Directive there should be a natural motivation to reduce the energy intensity.

However, it is not only legal rules and standards, that encourage a greater efficiency of energy use in buildings today, but also the rising price of energy, particularly electricity and gas.

This fact is reflected in the growing interest of investors in new construction solutions in low-energy standard, especially for young families, but also in the rapidly advancing renovation of the existing housing stock situated in residential buildings. The improving economic situation of the population as well as the instrument of building savings, PANEL program and especially Green Savings scheme have been playing a positive role here.

Part of the construction sector and industries producing building products will be significantly affected by the new directive on the energy performance of buildings (EPBD II - Energy Performance of Buildings Directive II), which was published in the Official Journal of the EU under the number **2010/31/EU** on 18th June 2010. (Implementation of EPBD II is sponsored by MIT).

EPBD II sets out the objectives of the European Communities in the field of energy by 2020 detailing the development steps to reduce energy consumption of buildings at economically viable investment costs.

The modernization of buildings are important from a macroeconomic point of view, as by way of example the extraction of building (silicate) materials accounts for about 50% of its total domestic mining, buildings are responsible for about 30% to 40% of energy consumption and

about the same percentage of greenhouse gases emissions (mainly carbon dioxide) and solid waste sent to landfill.

EPBD II provides for a basic obligation to design any new building's energy standard "near zero", namely:

- the new builds of public buildings from 2018,
- all new builds from 2020.

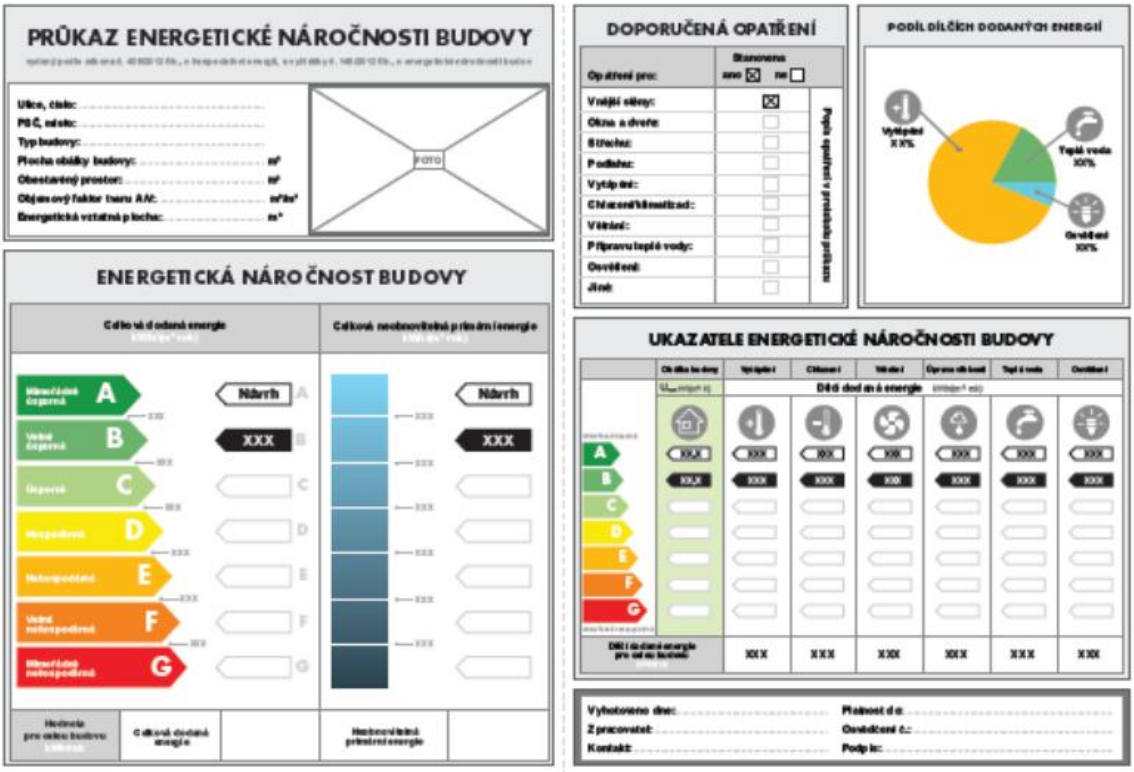
A building in the "near zero" energy standard is a building with almost zero or low consumption of energy, that is covered to a large extent from renewable sources, including renewable energy generated on-site or in its vicinity.

EU Member States are obliged to adopt and publish the laws, regulations and administrative provisions to comply with the articles mentioned in the Directive before 9 July 2012.

The implementation of the EPBD II will require:

- An amendment to Act No. 406/2000 Coll. on Energy Management
- A new Decree to replace Decree No. 148/2007 Coll., on the energy performance of buildings.

Figure 7 – "Energy label "- The energy performance of buildings (EPB) Cerrtificate



5. Statistics on building and energy sectors

5.1. Production, Consumption and Prices of Energy Sources

5.1.1. Energy Resources and their Pattern

Energy input into the Czech economy has been significantly affected by the business cycle. During the transformational recession years 1990-1993 consumption of primary energy sources declined, in the expansion phase of the economic cycle of the years 1994-1996 consumption grew and in the recession years of 1997 and 1999 it again declined. The economic growth in the years 2000 to 2005 was accompanied by a renewed growth of primary energy sources, an average of 2.1% per year. By contrast, from 2006 to the present, the total amount of primary energy has been stagnating at about 1.9 thousand energy units.
The relatively substantial transformations occurred in the structure of primary energy sources. The main features of these changes were a reduction in the share of solid fuels (from 64.9% in 1995 to 48.2% in 2005 and 40.5% in 2010) and an increase in the share of natural gas from 10.8% to 17.6 %, or to 19.2%, respectively .

Table 17- Primary energy sources

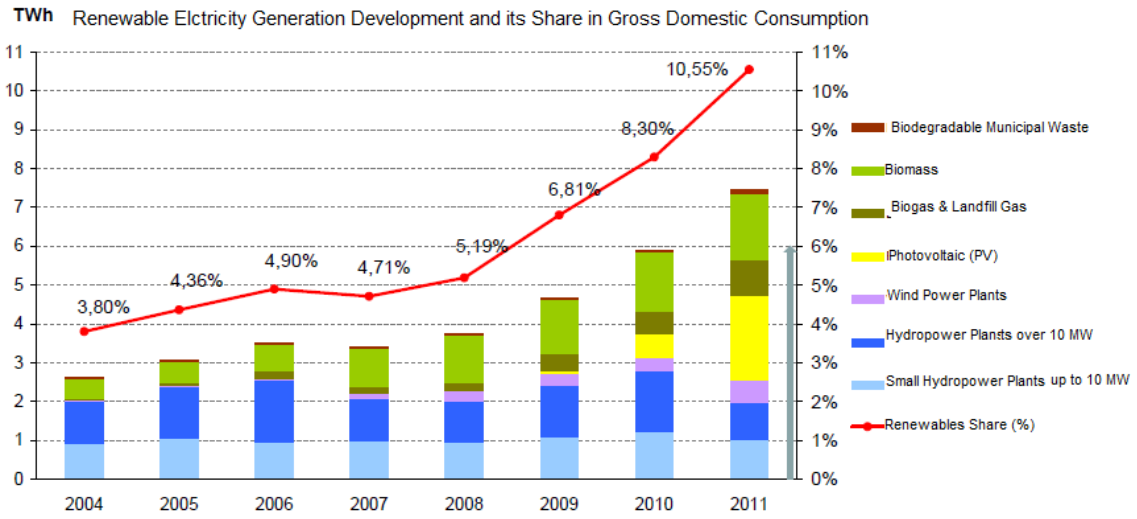
Year	2007		2008		2009		2010	
	PJ	%	PJ	%	PJ	%	PJ	%
Solid fuels	852,5	44,7	814,4	42,9	743, 8	41,2	754,1	40,5
Liquid fuels	405,2	21,2	407,6	21,5	398,5	22,0	377,2	20,3
Gaseous fuels	332,2	17,4	333,6	17,6	313,9	17,4	357,3	19,2
Primary source heat	285,5	15,0	289,6	15,3	296,8	16,4	305,4	16,4
Primary source electricity	-50,2	-2,6	-33,1	-1,7	-39,0	-2,2	-40,4	-2,2
Renewables (RES)	83,8	4,4	86,8	4,6	93,4	5,2	107,7	5,8
TOTAL	1 909,1	100,0	1 898,9	100,0	1 807,4	100,0	1 861,4	100,0

Energy balance of the Czech Republic, RES data, CR's Industry & Trade Ministry

The dependence of the economy on imports of energy sources has been increasing in the long term. While in 1990 the share of imports of primary energy sources amounted to 32.1%, in 1995 it was 41.5%, in 2000 44% and in 2005, the total share of imports of energy resources reached 45% and kept steady at this level to date.

RES are one of the fastest growing resources, their **absolute share, however, still remains very low** (2010: 5.8%, excluding hydro, 8.3% including hydroelectric power plants).

Chart 3: Share of RES in gross electricity consumption



Source: Talk by Prof. František Hrdlička, M.Sc., Ph.D. at the Day of Engineering on 22nd October 2012

As for their further prospects, RES can be characterized as follows:

- Hydroelectric power plants of the CEZ utility - 723 MW in the storage group VE (the Vltava cascade + other minor ones) and 1145 MW pumped storage power plants, the average production of the natural flow of about 950 GWh, no changes are anticipated,
- Hydropower plants of independent producers - due to small increments at the end of the interim period (until 2040) through installed capacity of about 400 MW and generation of about 1.35 TWh,
- New hydroelectric power stations - according to a research study three highly promising sites have been shortlisted (in total 21 localities have been identified, with an estimated output of 12 thousand MW). Investor interest in these investments has been significantly increasing during 2011 due to the demand for storage and buffer capacities related to growth of RES output. We can envisage the realization of the total capacity in the range of 880 to 2800 MW with a total cost of CZK 25 to 90 billion by 2025. The proportion of construction costs depends on the location, but it typically accounts for well over 50% of the total cost.
- Wind power plants - after a period of faster development until the year 2015 there will be some saturation, the overall performance will reach a maximum of 1400 MW (more likely, however, is the achievement of the overall performance of the 1000 MW), the installed capacity utilization is expected at the level of 1200 to 2 000 hours per year.
- Photovoltaics, solar power plants - the current installed capacity of 1965 MWp has reached its short-term peak due to favourable legislation and increases in the coming years will be in the order of ten MW / year. However, in the period 2015-2020 at the latest, the PV production costs are expected to drop significantly below the end-user prices level for both households and industrial businesses. This will trigger a new

wave of growth in the PV power to hundreds of MW (total potential is in the order of thousands of MW). Another big growth after 2018 will be down to the legislation on passive and low energy houses, with PV panels as an integral part of the solution. With the falling prices of the technology the share of construction costs of new installations will increase.

Transmission system (CEPS, Inc.)

The development and restoration of the transmission system in accordance with the requirements to steer out new sources, hook of new consumers and strengthen and adjust the network in accordance with the needs of the European electricity market, will be a major and most important task for the next period. The total investment in the development and rehabilitation of the transmission system will reach approximately 4 billion / year. The scope for 400 kV facilities will be up as much as twenty percent by 2022. Specifically, five new 420 kV substations and more than 675 km of new 400 kV lines are to be built. Along with that over 1200 km of existing lines will be restored. In the case of the lines, the cost of construction work (including the construction of masts) hovers around 90% of the total cost, for the construction of substations it is around 20% of the total costs.

5.1.2. Energy consumption

The final consumption of fuels and energy used in the national economy including household consumption decreased in 2005 compared to 1990, from 1 303.2 PJ to 1 122.9 PJ, i.e.down by 180.3 PJ. In this period, the pattern of the final energy consumption was gradually changing in favor of noble forms of energy while the consumption of solid fuels was decreasing. While in 1990 the final consumption of solid fuels amounted to 27.5%, in 2005 it was 13.9% of the total final consumption. The balance has shifted primarily to natural gas - its share in total final consumption increased from 13.6% in 1990 (including town gas) to 22.2% in 2005. The share of electricity in final consumption in recent years has increased by 3.7 percentage points from 13.5% in 1990 to 17.2% in 2005.

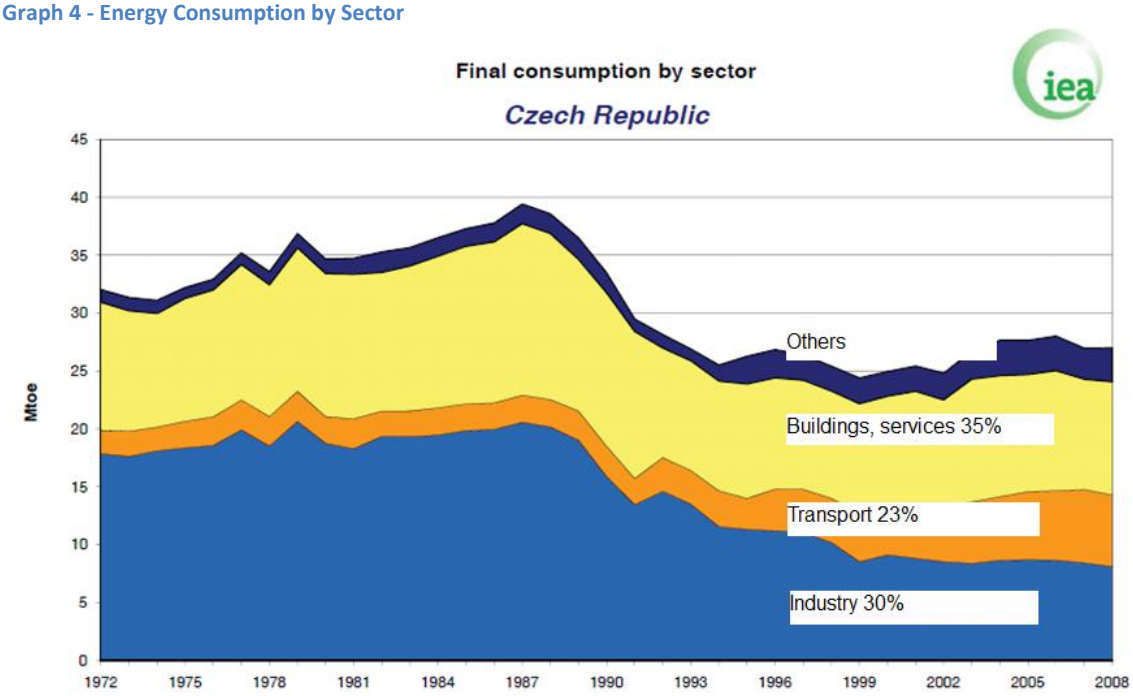
Table 18 - Fuel and energy pattern of the final consumption in households

	1990	1995	2000	2005	2010
Solid Fuels	47,1	33,0	21,5	20,3	19,5
Liquid Fuels	12,8	0,0	0,2	0,2	0,2
Gaseous Fuels	15,0	28,9	37,5	38,9	40,0
Heat	15,8	16,8	19,2	19,5	19,6
Electricity	9,3	21,3	21,6	21,1	20,7
Total	100,0	100,0	100,0	100,0	100,0

ČSÚ (Czech Statistical Office)

In the structure of final energy consumption by sector, the share of industry in 1990 amounted to 48.0%, in 1996 to 43.7% and in 2005 to 40.9% and in 2010 to 40.0%. In contrast, the share of transport was up to 22.4% in 2005, respectively. 23.1%. The proportion of households accounted for 25.4% of final consumption in 1990, in the subsequent years their consumption declined and in 2005 and in 2010, 22.4%, respectively 22.0% of final consumption was consumed in households.

Graph 4 - Energy Consumption by Sector



Source: Talk by Prof. K. Kabele, M.Sc., Ph.D. at the Day of Engineering on 22nd October 2012;

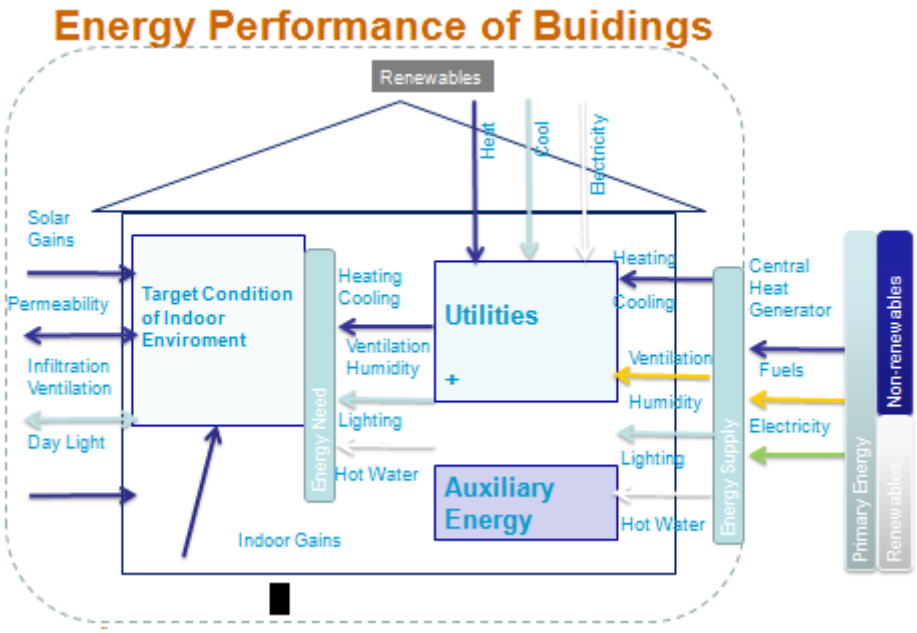
5.1.3. A Summary of the Major Trends in the Czech Republic

- In the structure of energy sources the share of solid fuels declined in the Czech Republic and the share of gaseous fuels was growing. In terms of international comparisons, the CR remains among the countries with a high share of solid fuels and a low share of gaseous fuels.
- In the structure of energy consumption in the Czech Republic the share of transport was increasing and the share of industry and households decreased. In an international comparison, the Czech Republic belongs to countries with a high share of energy consumption by industries and a low share of consumption in households.
- The energy intensity of the GDP in the Czech Republic declined in the long-term on average by 2.0% per year. From the perspective of international comparison, the Republic belongs to the countries with high energy intensity, but in terms of per capita consumption of energy resources, the position of the Czech Republic is close to the EU average.

- The prices of energy resources in the consumer market of the Czech Republic grew very dynamically, faster in the 2nd half of the 90s, more slowly in the years 2001 to 2006. The consumer energy prices in 2006, based on the parity of purchasing power, got above the average level of prices in the EU.
- Long-term prospects of the energy sources development in the EU by 2030, reckon for the run up to 2020, with a slowdown in the growth rate of energy sources to be followed by a period of stagnation in the consumption, but at double the growth of renewable resources.

5.2. Building Stock Energy Performance

Figure 8 - Schematic energy performance of buildings

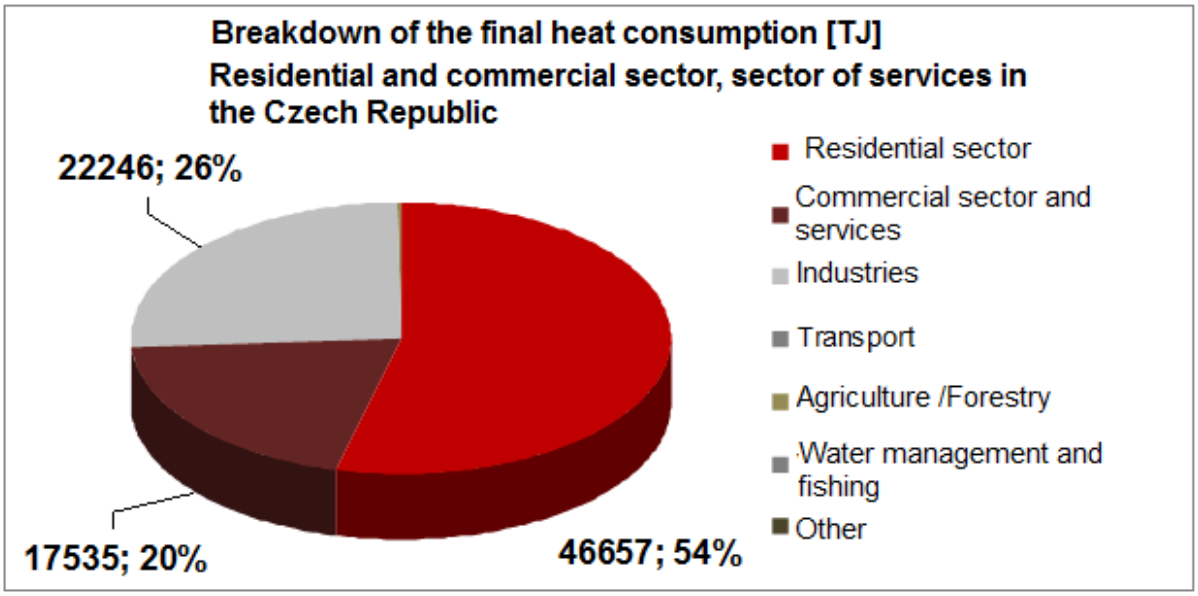


Source: Talk by Prof. K. Kabele, M.Sc., Ph.D. at the Day of Engineering on 22nd October 2012;

5.2.1. Analysis of Energy Consumption

For the purpose of the present analysis of the energy consumption in buildings and its comparison with the total consumption in the Czech Republic, the statistics of the International Energy Agency for the year 2009 were used (more recent data are not available).

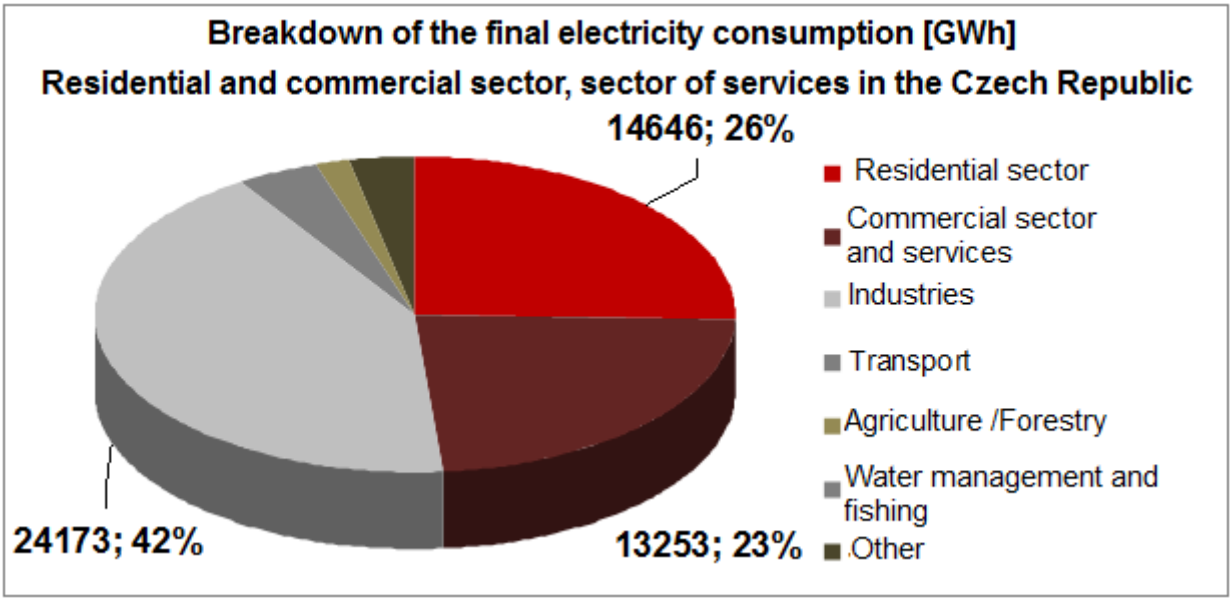
Chart 5 Breakdown of the final heat consumption



Source: Interational Energy Agency (2009)

Buildings, i.e. residential sector, commercial sector and services consume vast amounts of heat produced in the Czech Republic - about 64 thousand TJ / year. The reduction of heat consumption in buildings through both the new construction and refurbishment to meet the passive house standard, would bring about substantial heat savings, also diminishing the load on the environment (less fuel consumption, less waste, lower emissions).

Chart 6 – Breakdown of final consumption of elektricity



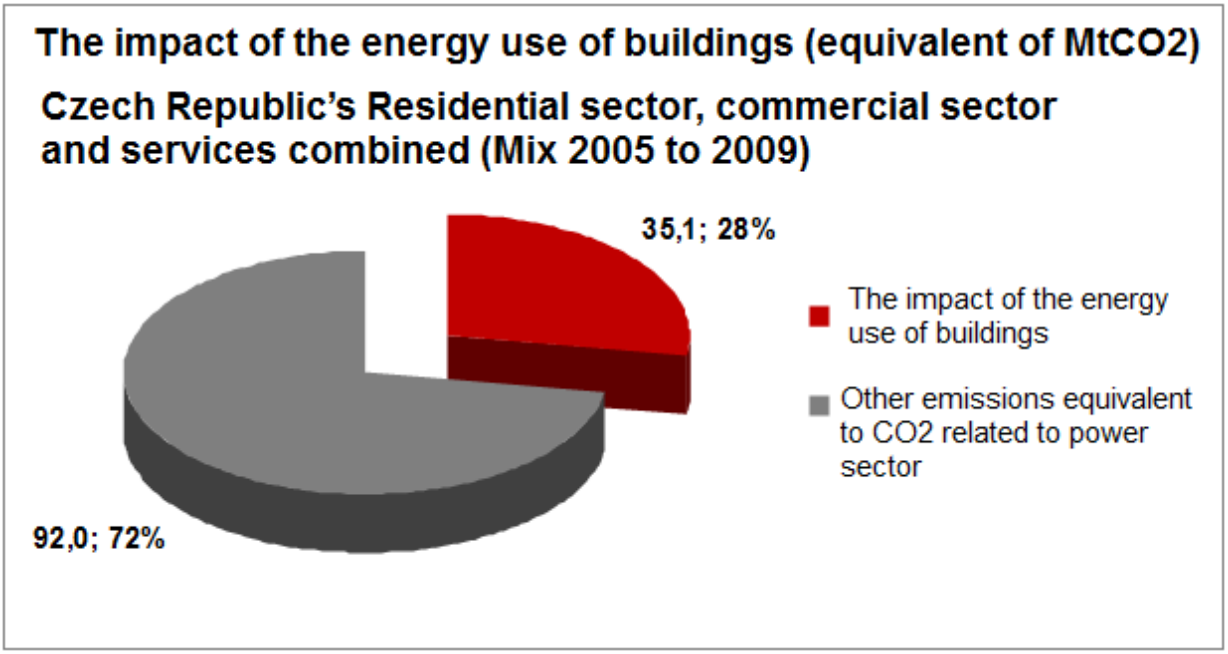
The International Energy Agency (2009)

Buildings account for a substantial consumption of electricity. Residential sector, commercial sector and services combined, consume about 28 GWh / year of electricity, which is more than the industrial sector. Again, the reduction would manifest itself in a very positive manner.

5.2.2. Buildings Operation Impact on CO2 Emissions in the Czech Republic

The energy consumption in buildings - as well as any other consumption of energy from renewable sources produces CO2. According to indicators abroad, buildings account for about 40% of total CO2 emissions. The following chart shows the situation in the Czech Republic.

Chart 7 - The impact of the energy use of buildings



Source: The International Energy Agency (2009)

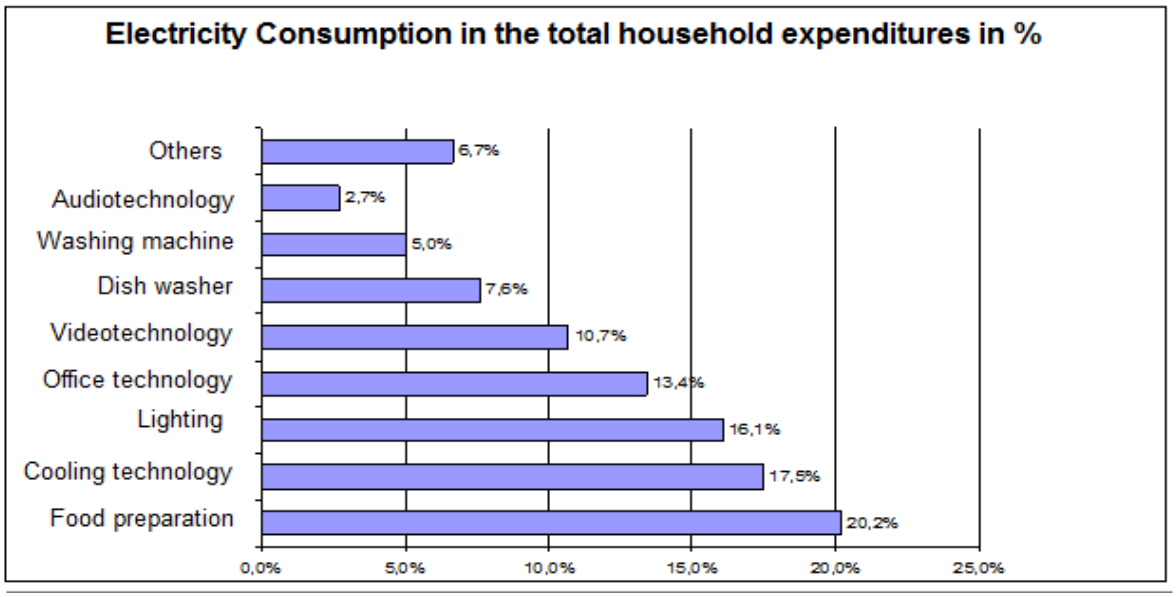
In the Czech Republic, the CO2 emission ratio is smaller, fluctuating around 28%. It is mainly due to a different base - in the Czech Republic industries account for more CO2 than it is the case in other countries. The reduction is also affected by a large availability of district heating, i.e. combined heat generation and power plant. The resulting heat is "waste heat" hence with no CO2 emissions. The actual CO2 emissions are shown in the electricity generation, only.

5.2.3. Electricity Consumption in Households

The graph below shows the structure of the electricity consumption in Czech households. The chart intentionally disregards heating and hot water, to highlight the operation of other appliances, which are typically found in a normal household.

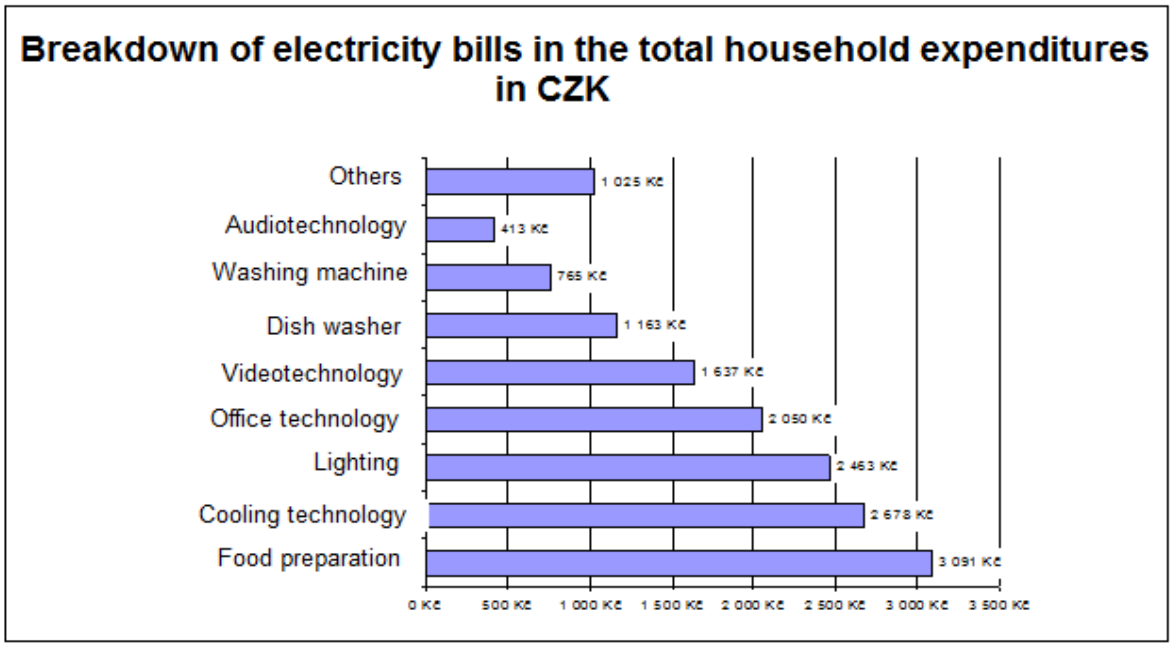
The largest energy consumption is for the preparation and storage of food, that is cooking and cooling food. The energy consumption due to the use of office equipment (computer, router, printer, etc.) has recently also emerged in Czech households.

Chart 8 – The share of electricity costs



Source: PRE, SEVEn; Three-person household

Chart 9 - Breakdown of bills in household (2010)



Source: PRE SEVEn; Three-person household

5.2.4. The use of RES in Buildings

Types of renewable energy, which are used in buildings in the Czech Republic

The following renewable energy systems are most commonly used in the Czech Republic and are most likely also to feature in passive buildings. This trend will entail a need for professionals in the following fields:

- Solar energy (use of thermo-solar collectors, the use of photovoltaic panels)
- Heat pumps
- Biomass

Table 19 - Statistics regarding RES 2011

	Gross power generation from RES		Installed electricity output from RES		Used installed output
	2011		2011		2011
	[MWh/r]	[%]	[MW]	[%]	[h/r]
HP TOTAL excl. (PSHPP)	1 963 154,0	2,78	1 054,6	5,21	1 861,5
HP > 10 Small Hydro	945 276,0	1,34	748,7	3,70	1 262,5
Small Hydro (upto 10 MW)	1 017 878,0	1,44	305,9	1,51	3 327,6
including:Small Hydro <= 1,0 MW	458 598,0	0,65	141,7	0,70	3 235,7
Small Hydro 1,0-10,0 MW	559 280,0	0,79	164,2	0,81	3 406,9
Biogas, Landfill Gass	932 576,0	1,32	x	x	x
Biomass	1 682 563,0	2,39	x	x	x
Wind Farms	397 003,0	0,56	218,0	1,08	1 821,1
FVE	2 182 018,0	3,09	1 971,0	9,73	1 107,1
Biodegradable Municipal Waste	90 190,0	0,13	x	x	x
∑ (ecl. PSHPP**)**	**7 247 504,0**	**10,28**	**3 243,6**	**16,02**	**2 234,4**
Gross electricity consumption in the ČR	**70 516 541,0**		**x**		**3 482,3**
Inst.el.output in the ČR	x		20 250,0		

Ministry of Trade and Industryof the Czech Republic, SEVEn

Legend:
OZE – RES
Hydroelectric Power Plants (HP)
Small Hydro
Pump Storage Hydroelectric Power Plant (PSHPP)
Wind Farms
Photovoltaic Power Plants
Biologically Degradable Municipal Waste

Austerity measures in residential buildings

Similarly as it is the case in the sector of renewable energy sources, austerity measures, too, will require certain professions in the time to come. With the construction of efficient new

builds, the downward pressure on consumption in existing buildings will grow rapidly. Their owners may rightly fear an outflow of tenants to newer, efficient and more affordable buildings. Therefore, it is imperative to analyze the austerity measures in relation to the professions.

Reduce the need for heating:

- Thermal insulation of external walls
- Thermal insulation of roofs
- Replacement of windows
- Insulation of unheated basement or ground floor on the ground

Increase the efficiency of heat generation and transfer:

- Replace the existing one with an efficient heat source
- Replace the heating system
- Weather-compensated and thermodynamic control, thermostatic valves

Ensure the supply of fresh air:

- Forced ventilation system with heat recovery

Heat recovery of exhaust air and waste water:

- Recovery of heat from exhaust air
- Recovery of heat from waste water

Savings on hot water:

- Eliminate circulation in hot water pipes
- Insulation and regulation of the circulation mode
- Aerators, flow reducers

Install of renewable energy sources:

- Solar thermal systems for hot water preparation
- Photovoltaic systems

Savings on Lighting:

- Fluorescent lamps
- LED technology

Savings on socket electricity:

- Efficient Appliances
- Stand-by mode

Austerity measures in office buildings

Administrative operations are very specific, and often situated in state-of the-art buildings, also very energy intensive.There are three basic administration energy conservation strategies - architectural, technological and operational. Architectural strategies are applied in the design stage of the building, and can basically save most and without extra costs; followed by technological measures such as efficient power supplies, control and energy recovery, which usually really require extra costs, but are worth it. Finally, the operational phase provides scope for further significant savings.

Architectural strategies:

- The shape and orientation of the building
- Solutions of the building envelope - thermal insulation, percentage of glazing, passive solar gains, shielding excessive gains and other
- Zoning, layout solutions
- Heat accumulation
- Strategies for natural ventilation
- Strategy of daylight to the interior of buildings
- Deployment of renewable energy sources

Technological strategies:

- Efficient heating and hot water sources , cooling, ventilation
- Combined sources of heating / cooling / ventilation / power
- Transfer of energy - heat and cold in the building - with the surrounding environment
- Recovery of heat from exhaust air and waste water

Operational strategies:

- Evaluation of measurement data
- Quality settings of control technologies and systems

It is clear that many saving measures can be applied for a new building to achieve a truly green building. The built environment has on the contrary few options that would be economically recoverable. Still the following concrete measures may be worthwhile.

Technologies:

- Effective regulation of air flow
- Installation of frequency converters, heat recovery ventilation system
- Installation of more efficient light sources and lighting control
- Elimination of stand-by consumption
- Use of waste heat from cooling
- Use freecooling
- Night precooling storage structures for summer operation of the building
- Installation of heat pumps
- Savings on the hot water circulation

Operation:

- Optimize time modes of technologies
- Optimize control technology profiles
- Optimizing the desired parameters of the internal environment
- Managerial incentives and training for employees in savings

5.3. Energy Sector - A Chance for Building Industry

5.3.1. Situation of Investments in the CR's Energy Sector

Electrical Power

- Investors in the energy sector are, besides ČEZ Čepro and MERO ČR, Inc., large private companies.
- Investments related to the construction of new sources and connections are very high and their implementation and return typically have a long-term character. "The power sector players", therefore, need to carefully consider primarily the financial efficiency of investment projects.
- Due to the previous point, investors require a business environment to be created, in which the investments would be worth making, i.e.:
  - "a defined and stable" energy policy
  - a stable and transparent state administration (predictable and consistent, long-term decision-making by the Government in its exercise of executive powers),
  - stability in the legislation (both European and domestic),
  - reduce the administrative burden of disproportionately protracted approval processes dogging the development of new sources and connections.
- The investor also needs to carefully consider the long-term availability of raw materials and energy efficiency of their use. (Coal deposits are limited and the mining and burning coal entails a huge burden on the environment. Nuclear power plants are relatively "clean" and effective, however, involve huge construction and spent fuel disposal costs.)
- Similarly, the investor needs to make an assessment of the future energy market.
- At present, investors also need to take into account the trend of ever-increasing environmental requirements. In this context, the development of European legislation on carbon dioxide emissions and pollutants cuts, constitutes a key factor.
- Regulatory risks associated with further changes in market rules, in particular the extent of market distortions (RES support + forced buyouts, environmental taxes and levies).

All these and other factors complicate investors' decision making process on what and where to build. Counting in their understandable desire for keeping their own business plans in "secret", the forecasts regarding investment in the energy sector proceeds from highly confusing and difficult-to-predict background.

Due to the ambitious cost-demanding investment involved as well as a host of regulatory risks, larger projects (over 100 MW) are currently actually prepared only by large energy companies CEZ, Inc., Alpiq Generation (CZ) Ltd. (in the long term also the Czech Coal Group Inc.). Only for major sources of RES (such as pump storage hydroelectric power plant) the possible participation of large industrial or financial foreign consortia can be

anticipateed. In the sphere of lower output, there are dozens of industrial and financial investors on the ground.

In 2010 the companies of the CEZ group alone spent a total of CZK 61,715 million in capital construction.Total electricity sector investments (i.e. investments in reconstruction of sources and in the transmission system development and rehabilitation) can be envisaged to amount to approximately CZK55 to 75 billion / year in the next period. The share of the construction works in the total investment is yet to be specified – a conservative assumption of a 30% share represents about CZK 20 to 25 billion/year in favour of the building sector.

Gas and liquid fuels

In the field of gas and liquid fuels industries, the preparation of a number of projects is currently underway that could make use of the capacities of construction companies in the future.

Pipelines

- Záhoří - Spáleniště, investment of about CZK 0.75 billion
- Břeclav - Reintal, CZK 1.75 billion investment, investor NET4GAS,
- Třanovice - Lanžhot, Moravia gas pipeline, CZK 5.37 billion investment, investor NET4GAS.

Underground gas storage facilities

- Uhřice - South, CZK 1.2 billion investment, investor MND Inc. to expand the capacity by 80 million m3,
- Dambořice CZK 10 billion investment, the investor Globula of the MND group, construction of a new reservoir with a capacity of 580 million m3,
- Břeclav, CZK 5 billion investment, the investor Czech Oil Ltd., construction of a new reservoir,
- Rožná, CZK6.5 billion investment, investor GSCeP Inc. construction of a new reservoir.

Transport and processing of liquid fuels

- ČEPRO Inc. – the construction of the new product pipeline route linking Loukov and Sedlnice storage facilities constitutes an envisaged investment project (budgeted cost of about CZK2-3 billion),
- MERO CR, Inc. - investments ensured by MERO ČR, Inc., are difficult as it is necessary to address land issues, which are often tricky to solve because they have no basis in law. No specific investment projects are planned for the medium term. The only exception might be the Litvinov-Spergau pipeline, its implementation is, however, so far confined to the phase of potential project and it is not clear what option would be implemented, from which the investment costs could be derived.
- Paramo, Inc. - development of the company will be fundamentally limited by the Act on Integrated Prevention

- Czech Refining Company, Inc. - although, no comment is available from the company, it can be presumed that like PARAMO, Inc., the company's development will be restricted mainly by the Law on Integrated Prevention.

In the field of gas and liquid fuels, companies have indicated their intention to invest in the Czech Republic in the short to medium term, (in the next about 10 to 15 years) the amount of approximately CZK 70 billion, i.e. CZK5 billion/year – the realistic assumption of a 50% share of involved construction work represents about CZK 2-3 billion/year in favour of the building sector.

Revitalization of regions with active or terminated mining operations

A major step towards a successful completion of the coal sector transformation and restructuring in the Czech Republic was the state intervention initiated in 2002, in the environmental and partly economic revitalization of regions damaged with active or terminated mining operations, in case of Moravian Silesian Region also with metallurgy.

The legal terms of financing the related programs are defined in the section 5, paragraph 3 of Law No. 178/2005 Coll., on the Abolishment of the National Property Fund of the Czech Republic and the jurisdiction of the Ministry of Finance in the privatization of the Czech Republic (the Act to abolish the National Property Fund), in which it is stated that the property earmarked for privatization and the proceeds from the sale of these assets as well as profits ensuing from the state-owned stake in commercial companies, can be used in accordance with the decision of the Government for the following purposes:

- to cover the rehabilitation costs of damage to the environment caused by the hitherto operations of companies
- to cover costs and promote investment and non-investment efforts to repair the damage to the environment caused by mining of minerals and revitalize such areas
- financial support for development projects of areas designated for industrial use as approved by the Government.

The revitalization of regions with active or terminated mining operations will require a sum of money, needed for additional funding of projects under implementation agreements and a financial amount of approximately CZK 28 billion for co-financing projects approved by the interdepartmental commission, where the contractor is yet be selected. Revitalization programs should take another 7 years to complete, i.e. average expenditures of CZK 4 billion/year – a realistic assumption of an 80% share of involved construction work represents about CZK 3-3.5 billion/year in favour of the building sector.

5.3.2. Support Programs

Funds raised from the sale of emission credits

Funds raised from the sale of assigned amount units (AAUs assigned amount representing tradable right of a country to emit one tonne of CO2 emissions in the period 2008 to 2012) constitute in accordance with the section 12a, para (3) of Act No. 695/2004 Coll. on Conditions for trading in allowances of greenhouse gas emissions and management thereof, pursuant the Act. No. 315/2008 Coll., revenues for the State Environmental Fund.

These funds can only be used to support activities and measures conducive to the greenhouse gas emissions cuts. The management of these resources is governed by Act No. 388/1991 Coll., On the State Environmental Fund of the Czech Republic.

Funds raised from the sale of AAUs are earmarked to support the Green Savings program, which is geared to energy savings and the use of renewables in residential buildings in the form of direct one-off subsidies to offset proven investment costs.

Changes in emission credits trading after 2012

The Draft Directive of the European Parliament and Council Directive 2003/87/EC, for the purpose of improving and extending the system of emission credits after 2012 brings a number of significant changes to the system in force until 2012. The most important of these is the gradual departure from the allocation on the basis of historical emissions towards the system of auctions, (in the power sector, however, the full effect of the auction method is anticipated from as early as 2013).

The proceeds from such auctions are most likely to be channeled to national governments' coffers, while the draft Directive foresees using at least 20% of the proceeds for measures to prevent and mitigate climate change. This change will be associated with a significant increase in the price of CO2 emissions, resulting in an increase in production costs for a group of manufacturers that would need to resort to emission trading.

The utilization of the remaining 80% of funds raised through auctions, is not yet specified in any way in the current draft directive.

Possible alternatives:

- return these funds to economic entities and leave the allocation of these funds for their consideration,
- to minimize the impact of the policy of reducing climate change on the economy and promoting economic growth, economists recommend the use of these proceeds to cut other existing taxes. Like the rest of regulations, the climate change policy, too, would prompt hikes in costs for both firms and households. They entail similar effects as taxes do. Proceeds from the auctions if used to relax existing taxes, may significantly reduce these costs.
- under the RGGI (Regional Greenhouse Gas Initiative) participating countries plan creating separate funds to administer proceeds from auctioning the allowances. These funds should support projects aimed at improving energy efficiency.

Green Savings Scheme

Since launching the Scheme on 31 December 2011 as many as 80,341 applications have been received and processed, out of which 50,017 have been disbursed in full. The registered support of projects to reduce carbon dioxide emissions, amounts to CZK 10.6 billion. The disbursement of all available funds under the Program is expected to be completed by the end of 2012. Under the Program, inspections are also underway to check the implementation of measures by applicants that may account for 5% of disbursed applications under the Program by the end of 2012.

The external solid wall insulation scheme thus obtained through the sale of AAUs (Assign Amount Units) to abroad a total CZK 19.7 billion (from NEDO, Mitsui & Co., Ltd., Spain, Austria and the World Bank). The available resources are assumed to be sufficient to cover the received as well as still pending applications under the Program.

The Environment Ministry managed during April and May of 2011 to conclude two emission credits sale contracts of nearly 2 million AAUs (worth about CZK 400 million) to the Japanese firm Mitsui. The proceeds have been used to boost the income of the Green Savings Scheme. At present the processing of the remaining applications is underway as well as the preparation of a follow up program, including its volume and its technical parameters.

New Panel Program

Financing of housing policy support programs - that falls under the jurisdiction of the Ministry of Regional Development - exclusively from the state budget is unsustainable in the long run, hence a part of the proceeds obtained from the sale of carbon credits after 2012, is is envisaged to be used to support the New Panel Program. The scheme has served as State support (in the form of grants to offset interest incurred on commercial loans) for repairs, modernization and insulation of older homes since 2001. In supporting the programs launched by the Ministry for Regional Development (or the State Housing Development Fund), while maintaining the cooperation of the Ministry of the Environment, there is clearly a chance to increase the efficiency in the use of the funds raised.

6. Existing Vocational Education and Training (VET) provisions

6.1. Labour Market - Workers and their Qualifications

Through the nature of its work, applied technologies, the changing conditions of location and type of constructions, the building sector is significantly different from the rest of economic sectors. In many aspects it is not comparable to any other industrial activity. New technologies, machines, materials and processes, may be of help in reducing the physical burden of work while increasing its productivity, but the basic nature of the involved operations and thus also the requirements for professional staff structure, remains essentially unchanged. The building sector will remain also in the future, greatly dependent on the skills of its blue collar workforce.

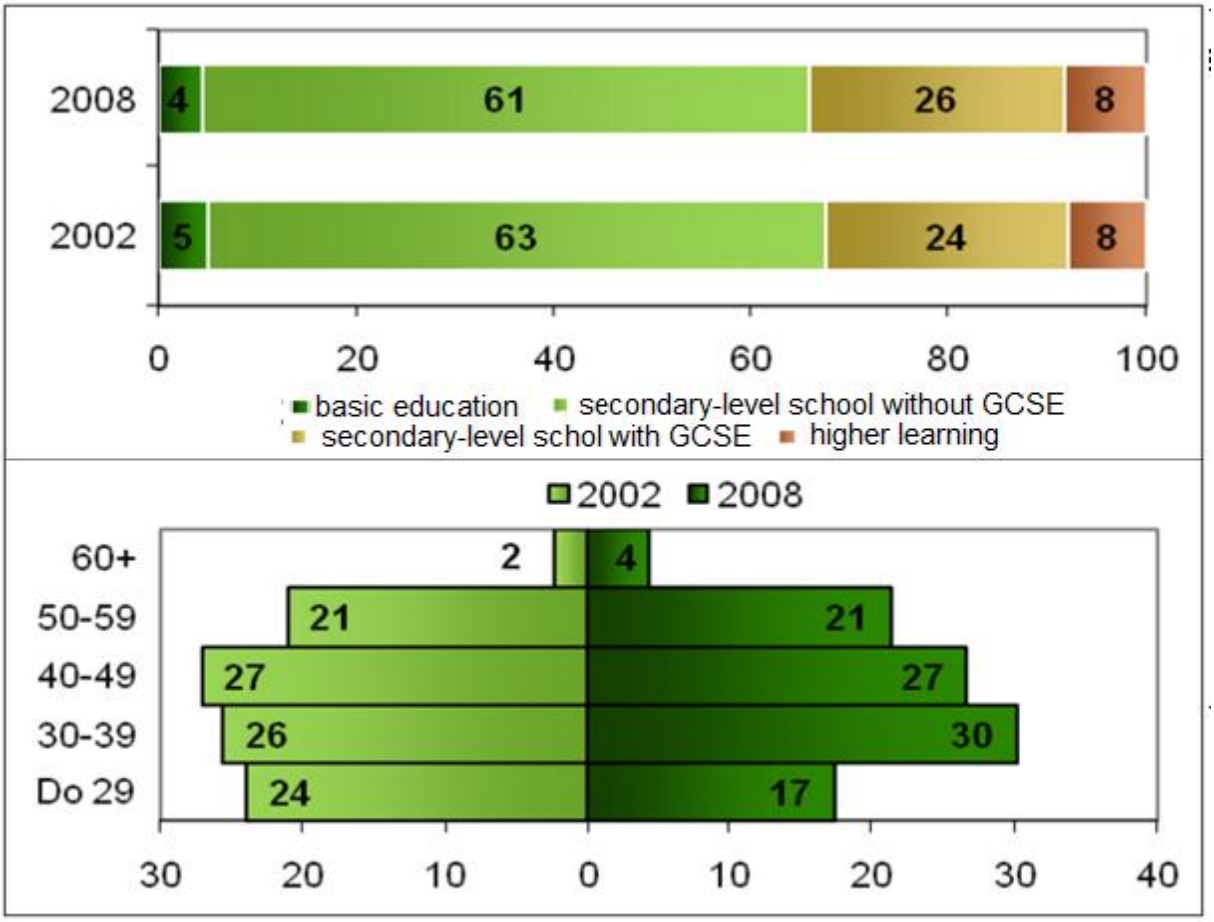
6.1.1. Operatives and Their Qualifications

The majority of the jobs in the building sector (2008) is made up by **qualified craftsmen** (61%). In recent years, however, the proportion of technical workers in the building industry in the CR has increased from 11% to 16%. Compared with the EU this is a very high proportion: in the EU-15 in 2007 the technical staff accounted for 6% of workforce, only. The shares of the rest of professions are similar in the Czech Republic and the EU, except for the share of unskilled workers, which is slightly lower (4%) in the Czech Republic, compared with 9% in the EU-15. In terms of the qualifications structure, notably the share of people with tertiary (University) education in the building sector of the Czech Republic, may slightly lag behind the EU, but the gap is not as big as that of other (e.g. industrial) sectors (8% versus 12%).

The vast majority of workers in the building industry in the Czech Republic have completed the secondary-level of education, the proportion of workers with basic education in the building sector of the Czech Republic makes up 4%, while in the EU-15 it is 42%! The actual proportion of low-skilled workers in the building industry in the Czech Republic may be in reality higher than indicated by the data ensueing from the Labour Force Survey conducted by the Czech Statistical Office. The building sector is more than other industries challenged with the problem of illegal employment of foreigners, (usually) low-skilled workers who do not feature in the survey. Regardless of this factor, however, the gap between the number of workers with secondary education in the Czech Republic and the EU - 15 is mainly due to different traditions in the educational system in general, and the structure of basic education, in particular.

The correlation between skills or education of workers and their age is a significant characteristic for the building industry in the Czech Republic. With increasing age, there are decreasing levels of formal qualifications and education. Workers aged over 50 years (among whom a large share of retirements can be expected between now and 2020) feature an above-average proportion of workers with basic education (5%), higher proportion of apprentices (69%), by way of contrast a lower proportion of people with GCSE (20%) and higher learning (6%).

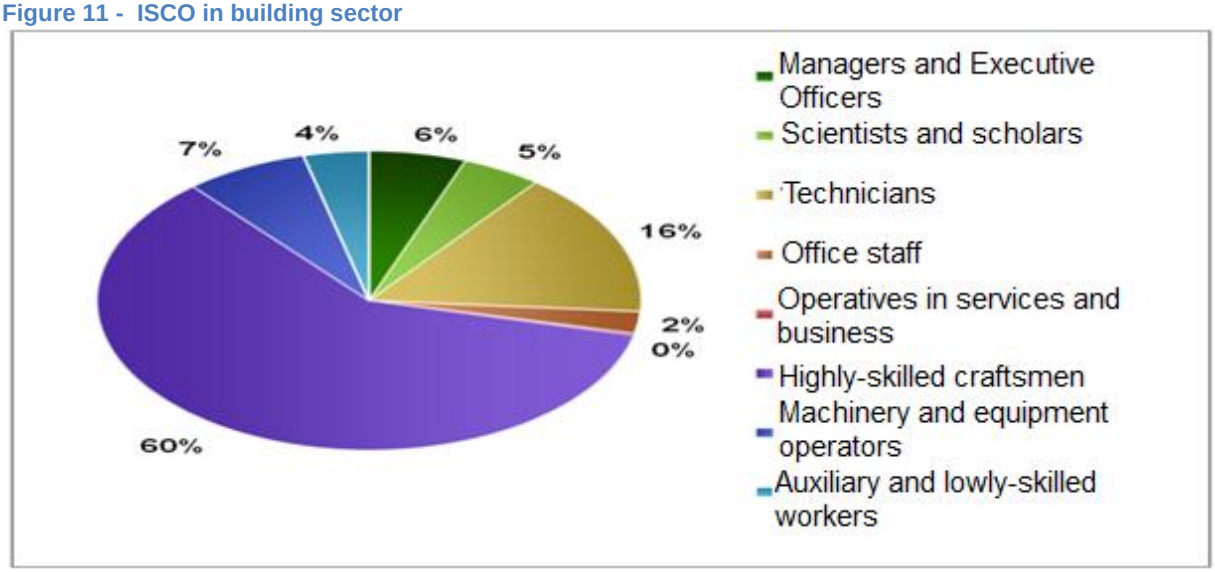
Chart 10 - Education and Age Structure of Workers in Building Sector



ČSÚ: CSO survey on workforce, conducted in the second quarter of the school year

Qualifications and education structure of workforce in the building sector is reflected in the proportion of each category of employment (ISCO).

Figure 11 - ISCO in building sector



CSO: Labour Force Survey (2011)

In terms of its requirements on labour supply the building sector has been facing the challenge of the **steadily deteriorating situation.** The average age of employees has been rising perpetually and disturbingly. The position in the professional group of blue collar or manual workers (craftsmen) is downright alarming. The first prerequisite to change the unfavorable trend in the age structure, is to ramp up the number of employees from the ranks of young people entering the profession. The second prerequisite is the development of lifelong learning (see below).

Graduates

In this case, we can say that in terms of their numbers, graduates represent the least problematical group. Yet, the lack of people interested in studies at the faculties of civil engineering has been more and more pronounced. This situation stems from the overall low popularity of technical fields.

For a comprehensive training of students it is imperative to increase the proportion of economic disciplines, help them to master the rudiments of law (especially in the fields of administrative and commercial law) and acquire personal skills in management and dealing with people, principles of construction organization, building approval proceedings, etc.

Secondary-level vocational schools leavers, (Technical college graduates)

Neither this group of graduates poses a major problem. Even here, however, it is necessary to focus the courses more on providing useful skills for future practice combined with greater depth of knowledge and attention to detail while increasing the skills in dealing with people. An essential part of the curriculum of the secondary-level education with this particular orientation, needs, therefore to be gaining practical experience, which requires a greater involvement of specialists from practice and a pro-active participation of related enterprises.

Vocational schools leavers

The long-term policy of underestimating the problem of craftsmen, has led to the present disastrous situation in the building sector which – unless truly thorough measures are applied - would defy any short term attempts at remedy. Over-aged employment base, particularly in connection with the planned pension reforms, create a situation where the physical frailties of older workers, who cannot count on the help from their younger colleagues, would prompt their early retirement or switch to a different business line.

Students with low aptitude and weak motivation to work, tend to enroll in apprenticeships. Streamlining the apprenticeship system, therefore, requires an intensive involvement of entrepreneurs in the training of apprentices through enhancing their skills, which besides giving the students a good professional starting point, will also inspire a lasting and widespread interest in working in the building sector.

6.1.2. Current VET Supply and Needs in Building

The availability of skilled workforce is one of the risk factors determining the level of the building sector. The situation is especially critical in the availability of highly skilled building craftsmen, i.e. in the sphere of apprenticeships.

At present about 12,000 students are preparing for (vocational) occupations in the building industry in all classes combined, i.e. less than half the number of 15 years ago. About 450,000 operatives, including those from related disciplines, work in the building sector. Over 10,000 on them leave the profession for health reasons and because of retirement on an annual basis. In their place only 3,500 freshly trained workers may come, leaving schools every year. Even this number is only hypothetical, since only a part them actually start to work in their profession.

The situation in primary (initial) education in technical fields exerts pressure on the chances of acquiring and building up the professional competence of the population in other forms of education:

- Acquiring professional competence pursuant to **Act No. 179/2006 Coll., On verification and recognition of further education and amending certain laws**. The Act has created the legal framework for recognizing professional qualifications of employees acquired outside the school system.
- **Retraining** constitutes an indispensible source of labour from the labour market, particularly through retraining job seekers. It is quite clear that for many less demanding construction professions the necessary skills can be acquired in a relatively short period of time, without any special prerequisites based on prior schooling.

6.1.3. Labour Cost and Migration

The labour cost forms a major cost component of the building production. Among the fourteen monitored employment sectors in the Czech Republic the building sector has placed **ninth in average hourly earnings**. One of the reasons is the high number of small construction companies up to 20 employees and medium-sized companies up to 500 employees that work in lower cost and wage conditions than it is the case of large firms.

The current problem of blue collar workforce shortages with lower skills is often solved through employing foreigners. In fact, the aliens (within the meaning of the Employment Act are largely recruited from among non-EU citizens) work in exchange of lower wages, which correspond to their low skills. It is a fact that there is basically no interest among the unemployed Czech population in the work that these foreign employees perform.

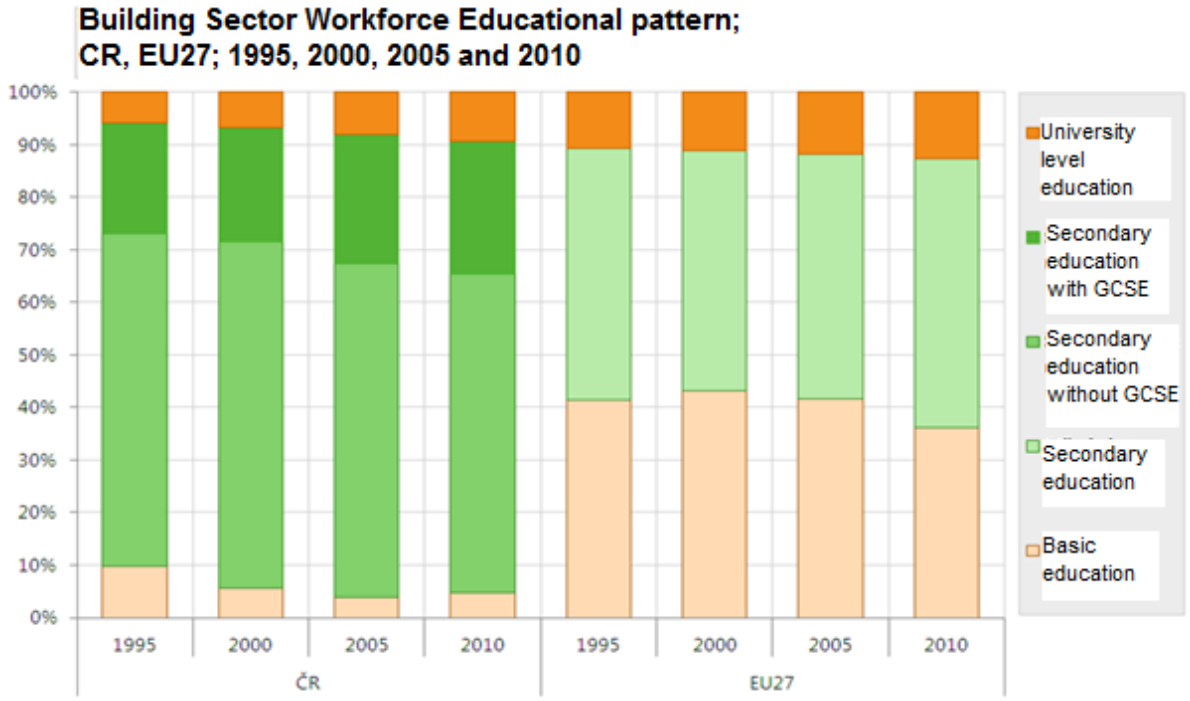
One-off (often apparent) economic effect of employing foreigners can be very risky. The employment of foreigners involves the inherent risk of illegal aliens work in the Czech Republic where people may be working without work permits and/or without residence permit. The illegal employment is then more often than not within the client system in the hands of illegal structures and the system poses a direct threat to businesses.

Nowadays, the Czech building sector, however, can hardly do without foreigners, notably when it comes to lower skilled jobs.

6.1.4. International Comparisons

Regarding the share of workers in construction occupations in the European Union, it is the largest in countries with relatively substantial economic problems - Spain, Ireland, Greece, Portugal and Italy, out of the new entrant countries, it is Slovakia, Czech Republic and Hungary, that also exceed the 6% threshold proportion of workers in construction occupations within the whole economically active population. Also, the structure of education in the Czech construction industry – is in comparison with the situation in the EU - atypical.

Figure 12 Educational structure in the building sector of the EU and the Czech Republic



Source: Eurostat

6.2. Initial Education for the Building Industry

6.2.1. General or Professional Education Pattern of Secondary-level Students

Since 2000, in accordance with the school policy of the Government the ratio was gradually shifting between students entering the GCSE schools and those **striving for certificates of apprenticeship**, in favour of the higher-level of education. The proportion of students enrolled in courses of vocational education was gradually declining, down to 30% in 2008. This long-term trend, however, of persisting decrease in the number of students in each coming school year could not but manifest itself in the labour market in lower numbers of

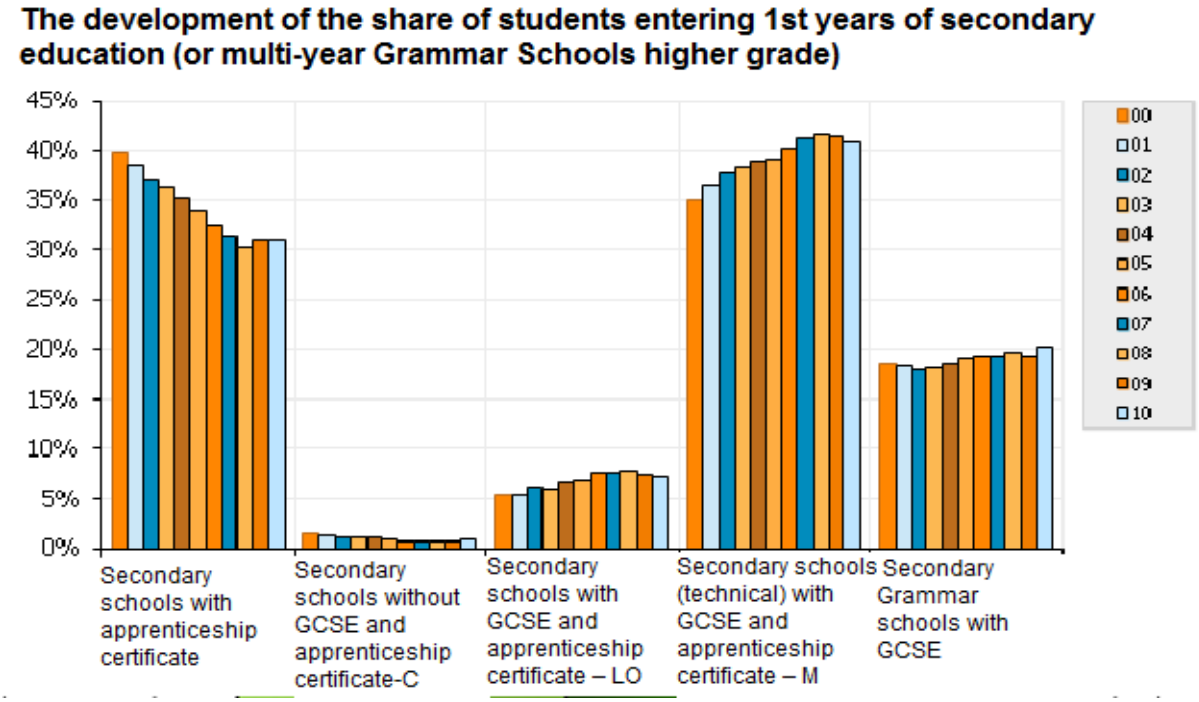
freshly trained blue collar workers, sparking concern among employers over the imminent lack of necessary skilled labour.

The subsequent flurry of information campaigns promoting selected fields of apprenticeship in the form of scholarships while highlighting employer interest in skilled craftsmen, has, however, brought about some effect, since at present there has been an increase in the proportion of students entering schools with a vocational certificate. The proportion of students in this category stands at 31% now. **Nevertheless, the number of students entering apprenticeship courses dropped between 2009 and 2010 by more than 4,500 students.**

The underlying cause being the overall significant decrease in the number of students entering the first year of secondary schools. In 2009, it was a fall of nearly 4,000 in **2010 of nearly 15,000 students**, **which represents a drop of 11.5%.** This drop affects all groups and levels of education, albeit differently. A similar loss of students can be expected in the years to come, too.

The decline of students has also hit vocational schools with GCSE but without training - a total of 7,000 students, which is 12.9%

Chart 13 - Development of the proportion of students entering the first year of secondary schools



Source: National Institute of Education (NUV), Building sector's professionals hitting the labour market, 2011

6.2.2. College Education in Building Trade, Geodesy and Cartography

Since 2001 the drop in the number of secondary students of building professions (with the certificate of apprenticeship and vocational leaving examination combined) has been tracing the total decline of students in the 1st years of secondary schools in general. In the school year 2010/11 a total of 7,249 students (4,360 to courses with a vocational certificate and

2,889 students in the fields of education with GCSE) were enrolled in the first years of secondary-level courses in the building sector, which corresponds to the 6.4% proportion of all students admitted to the first years.

In the case of blue collar professional education courses with apprenticeship certificates the decline in number of students was reversed in 2009. In 2010, their number has **dropped again by 408 students, but their share increased significantly to 12.4%. Most students get enrolled in occupational courses Bricklayer, Plumber, Masons and Carpenter.**

A completely different trend is observed in building courses with GCSE. In this case, there has been slightly decreasing both the number and proportion of students in the 1st years for several years now. Almost 80% of students have been entering the building sector.

Table 20 - The number of students of No.36 group Building trade, Geodesy and Cartography in the 2011/12 school year

Occupation	1st yr.	2nd yr.	3rd yr.	4th yr.	TOTAL	Newly admitted	Graduates / Trained operatives
Cobbler	6	4	0	0	10	5	4
Plumber	1263	1253	1300	0	3816	1197	847
Stonemason	7	6	5	0	18	7	10
Stove fitter	8	9	11	0	28	8	7
Tinsmith in construction	33	16	23	0	72	31	10
Tinsmith in production	0	0	67	0	67	0	88
Chiney sweep	105	58	42	0	205	101	30
Painter	0	0	61	0	61	0	68
Painter&varnisher	219	208	192	0	619	191	125
Mechanic-gas appliances	53	42	35	0	130	52	30
Dry structure fitter	99	66	83	0	248	83	71
Floorer	14	33	31	0	78	12	11
Flooring	30	24	12	0	66	29	14
Roofer	72	48	46	0	166	63	21
Roofing works	9	16	13	0	38	9	12
Glazier	1	1	0	0	2	1	0
Glazing work	14	0	2	0	16	14	8
Construction	53	27	0	0	80	43	25
Building construction	75	107	0	0	182	68	66
Carpenter	440	426	415	0	1281	405	262
Carpentry	75	71	52	0	198	71	32
Water Engineer	11	7	0	0	18	11	0
Masonry	503	386	336	0	1225	457	236

Bricklayer	1050	977	975	0	3002	940	692
Total	**4140**	**3785**	**3701**	**0**	**11626**	**3798**	**2669**
	1st yr.	**2n yr.**	**3rd yr.**	**4th yr.**	**TOTAL**	**Newly admitted**	**Graduates / Trained operatives**
Geodesy and Cadastre	182	192	136	165	675	172	139
Building materials	5	20	32	35	92	5	16
Structural Engineering	2200	2208	2455	2356	9219	2125	2096
Technical utilities of buildings	249	273	317	253	1092	241	222
Total	**2636**	**2693**	**2940**	**2809**	**11078**	**2543**	**2473**
	1st yr.	**2nd yr.**	**3rd yr.**	**4th yr.**	**TOTAL**	**Newly admitted**	**Graduates / Trained operatives**
Electrician, Installer	227	290	243	186	946	220	151
Total	**227**	**290**	**243**	**186**	**946**	**220**	**151**
	1st yr.	**2nd yr.**	**3rd yr.**	**4th yr.**	**Total**	**Newly admitted**	**Graduates / Trained operatives**
Construction operation	249	157	0	0	406	239	79
Gas Appliances, heating system	29	14	0	0	43	28	16
Total	**278**	**171**	**0**	**0**	**449**	**267**	**95**
	1st yr.	**2nd yr.**	**3rd yr.**	**4th yr.**	**Total**	**Newly admitted**	**Graduates / Trained operatives**
Civil Engineering	49	36	15	0	100	48	17
Heritage Renewals	15	8	8	0	31	15	19
Heritage & Landscape Protection	0	0	8	0	8	0	10
Building Construction	27	14	15	0	56	25	0
Structural Engineering	38	11	6	0	55	26	7
Railway Engineering	0	0	13	0	13	0	6
Total	**129**	**69**	**57**	**0**	**255**	**114**	**49**
	1st yr.	**2nd yr.**	**3rd yr.**	**4th yr.**	**Total**	**Newly admitted**	**Graduates / Trained operatives**
Plumber	23	10	0	0	33	23	11

Chimney sweep	10	0	0	0	10	10	0
Dry structure fitter	15	0	0	0	15	14	0
Floorer	15	0	0	0	15	15	8
Roofer	1	0	0	0	1	1	0
Carpenter	4	0	0	0	4	4	0
Bricklayer	1	0	0	0	1	1	0
Total	**69**	**10**	**0**	**0**	**79**	**68**	**19**
Full-time studies	**7252**	**6728**	**6698**	**2809**	**23487**	**6790**	**5305**

NÚV, (National Institute of Education), 2012

6.2.3. Secondary–level School Leavers' Attitude to the Field and Profession

Graduating or acquiring qualifications does not necessarily mean the people will also start working in the given field. The National Institute of Vocational Education (NÚOV), therefore, conducted several surveys among secondary school graduates in the past to determine their attitudes and beliefs before entering the labour market.

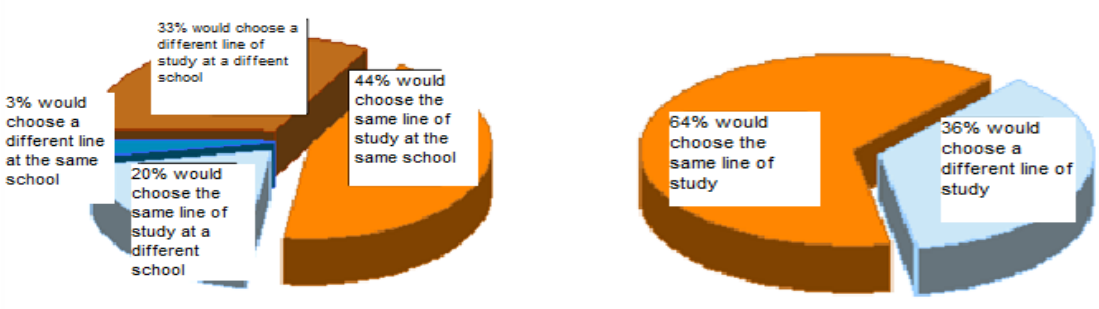
Secondary school graduates' satisfaction with their choice of line of study and school

Graduates' satisfaction with their program of studies is expressed by the so called degree of identification with the field, which indicates the percentage of graduates, who would choose the same line of study again.

Approximately two thirds of apprentices (64%) are satisfied with the program they have chosen and would take up the same course again. On the contrary, about a third of freshly trained operatives (namely 36%) would change their choice of study line and would rather pick up another field. Similarly, about two thirds of secondary technical schools graduates would choose the same field of study (64%) again and almost a third would change their choice of study, instead. Part of the graduates would like to study the same course again, but would prefer a different school (20%).

Chart 14 - Secondary school graduates' interest to work in the field they studied

Apprenticeship graduates **Graduates of Secondary Vocational Schools with GCSE**



Source: NUV, National Institute of Education, (Building Sector) Vocational Education Graduates hitting the labour market, 2011

A serious issue for many secondary school graduates is whether they are actually interested to work in their profession after graduation. That is, if they want to make their mark in their field or a related field, or whether they would seek a job outside their original line of study in which they are fully trained, for example, say, due to their dissatisfaction with the working and salary conditions in the field they studied, or because they have trouble getting a job in that field that would offer good prospects. Thus the difficulty getting a job in the field they studied or lack of interest on the part of the graduates to work in the field, may be the reason underlying their decision to become non-practitioners and leave the field.

In general, 61% of fully trained operatives with an apprenticeship certificate, show interest in working in the field they studied in case of graduates from secondary vocational schools with GCSE it is 64%. At least another 12%, or 9% respectively, of graduates would like to try their hand in a profession that is related to their field, **while 27% of graduates just before completing their schools are not interested in working in the field, or they do not care.**

Tab. 21 Interest in getting a job in the field

Interest to work in the field they studied	In their field	In a related field	Outside their field or they do not care
Fully trained operatives	61%	12%	**27%**
Secondary Technical School graduates with GCSE	64%	9%	**27%**

Source: NUV, National Institute of Education, (Building Sector) Vocational Education Graduates hitting the labour market, 2011

Graduates' involvement in their fields and reasons for their switching to another field

In surveys conducted three and six years later, the graduates were addressed again, to find out about their actual position in the labour market.

The objective was to establish whether the graduates had a job that corresponded with their line of study or switched to another field. A massive departure from the original profession may indicate that the involvement in the field is not attractive for the graduates, or the employers in the field show little interest in the graduates and this is why the graduates need to seek jobs in fields with a greater demand for employees.

It is common for apprenticeship courses as well as technical colleges with GCSE that a substantial number of graduates switch to another field after completing their education or training and the outflow from the field they studied, continues in the years following their graduation. **A few years after graduating about 40% of secondary school graduates work outside the occupation they trained for.**

The most common reasons for leaving the profession are:

Fully trained apprentices

- low pay (the reason stated 33% of those fully trained operatives who work outside the field);
- difficulties in getting job in the field (24%);
- lack of interest in working in the field (14%);

- poor working conditions, specifically working environment, working hours or the need for commuting (11%).

Graduates

- lack of interest in working in the field (the reason stated 43% of graduates who work outside the field);
- unsatisfactory working conditions (40%);
- dissatisfaction with low pay (32%);
- failed to get a suitable job in the field (33%).

Education and job congruence assessment

The congruence of school-leavers' jobs with their vocational education can be traced also from the CSO data, specifically from its Labour Force Survey. In this case it is possible to compare the respondents' education with the job they eventually perform.

The results show that from the entire gainfully occupied population, 43% work **in perfect harmony** with their educational attainment. Another 11% in partial congruence with their educational background and qualifications, i.e., using their skills only partially, 13% of the gainfully occupied population make relatively little use of their education. The relatively high proportion of the gainfully occupied with secondary education (fully trained apprentices and technical education graduates) falls into the category of gross incongruence – it is **33%** of secondary-level school graduates who **do not actually use acquired skills in their jobs**. More pronounced differences are evident from the breakdown to secondary school graduates and fully skilled apprentices.

Fully skilled operatives reach relatively high degrees of **full congruence (47%),** on the other hand, there is also a high proportion of those who do not actually use acquired skills at all **(37%)**. Fully trained operatives in the age group 20-29 years also exhibit similar values.

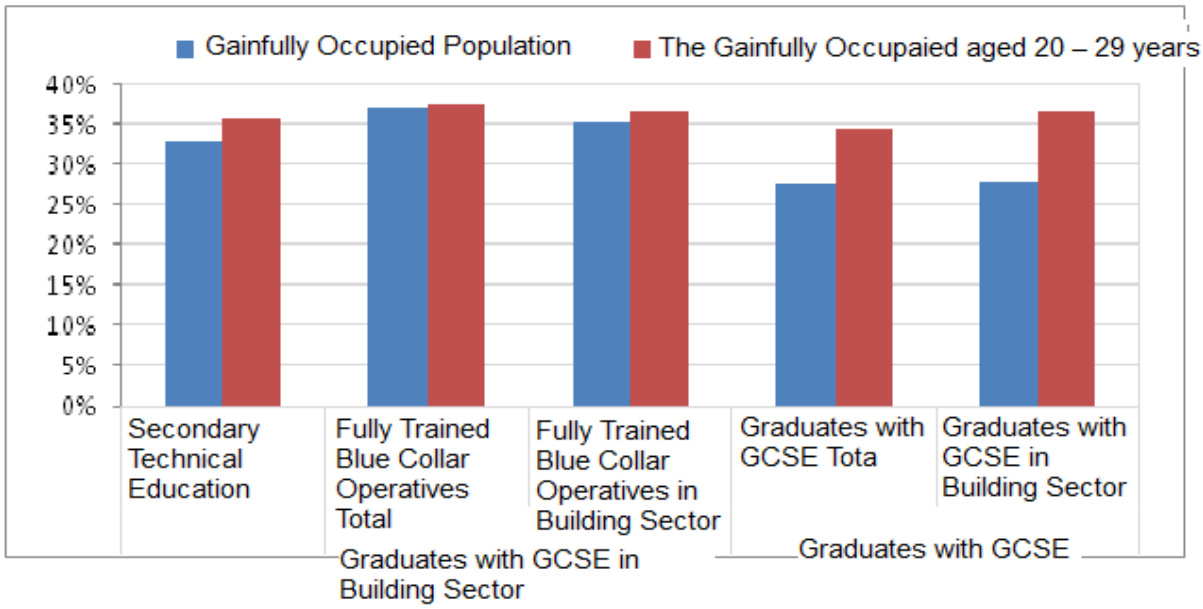
Graduates with technical education backgrounds find their jobs **in complete congruence** with their level of education and expertise **in only 39%**, but a high proportion of graduates hold positions that are classified as partially matching (19%), which is made possible owing to a wider preparation offered in secondary technical education. A **gross mismatch** of education and jobs occurs with **28%** of vocational education graduates. In the age group 20-29 years, the share of employees in positions that do not correspond to their attained education reaches up to 34%. These graduates thus make no use of their acquired skills. Young graduates are, therefore, more likely to work outside their field than the overall total of graduates with GCSE.

Nearly 37% of fully trained operatives with building apprenticeship certificate or GCSE aged 20-29 years work in positions that do not at all correspond to their attained education - i.e. completely outside the field. The rating of **building sector** graduates may be described as **average** in terms of training and job congruence.

High values of gross incongruence on the one hand indicate the discord between the pattern and numbers of graduates and the pattern of needs of the labour market, on the other hand, they may be due to an inappropriate vocational guidance, training and subsequently occupation choice. As for fully trained operatives the satisfaction with working and financial

conditions their job offers, is a significant factor. On the other hand, the present data also indicate the adaptability and flexibility on the part of graduates.

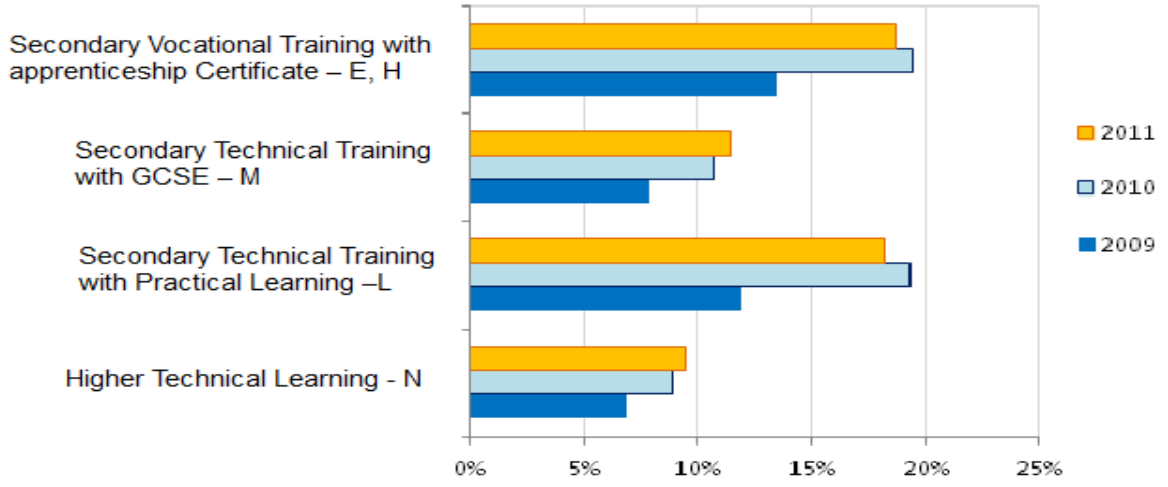
Chart 15 - Proportion of employees who perform work that is not related to their education, workers making no use of their qualifications



Source: NÚV National Institute of Education, Building sector graduates hitting the labour market, 2011

Unemployment of Graduates

Graph 16 - Unemployment rate of graduates in the Czech Republic by education categories (April 2009, 2010 and 2011)



Source: NÚV National Institute of Education, Building sector graduates hitting the labour market, 2011

The most frequently presented indicators of the employability of graduates are absolute **numbers of unemployed graduates and the rate of unemployment**. Both indicators can be considered very important. The objective assessment of graduate unemployment, however, should be based primarily on the **unemployment rate of graduates**.

The unemployment rate of graduates reflects the percentage of graduates without job who got registered with the labour offices. Generally, the April value is considered as it better captures the situation of graduates in the labour market, because the market had plenty of time to absorb a wave of fresh graduates.

In 2008, the graduate unemployment rate reached the lowest values ever. Due to the economic downturn, however, the situation of fresh graduates entering the labour market, deteriorated after 2008, hitting graduates of all levels of education. Latest values of graduate unemployment as established in April 2011 have not been markedly different from those of 2010, the situation of graduates in the labour market has thus been stagnating at a high. However, there are large differences in the unemployment of graduates depending on their attained education and qualifications.

The highest unemployment rate (nearly **19%**) threatens secondary education graduates with apprenticeship certificate, as late as in 2008 it was only 6.9%.

Also in the **building trades**, the situation of graduates was very favorable in 2007 and 2008. Mirroring the sustained economic growth, the sector was booming due to the construction development and the surge in demand for construction work, which was also reflected in a decreasing unemployment rate of building trades graduates with apprenticeship certificate, which was **only 6.8% in 2008**.

Unfortunately, with the onset of the economic recession, there was a significant decline of the construction industry (mainly on the back of a reduced demand for construction of commercial buildings), which was reflected particularly in the unemployment of graduates of secondary-level education with apprenticeship certificate, which was reaching well above average rates for a second consecutive year.

At present (late April 2011) **596 unemployed building trades graduates with apprenticeship certificates are** registered with the Labour Office, which corresponds to almost **25% unemployment** in this group of graduates. **This rate is significantly above average among graduates with a vocational certificate. In the current situation the revival of the industry cannot be expected any time soon, so the situation of this year's graduates will also be quite difficult.**

The building sector is notorious for employing cheap labour from abroad as well as employing local workers illegally, where some of them can also be registered with labour offices as unemployed.

The unemployment rate of graduates of secondary vocational education with GCSE also showed steady decline in the years of economic growth, falling from 15% in April 2004 down to 5.7% in April 2008. During 2008 comes a turning point in the development of unemployment of fresh graduates of secondary vocational education with GCSE (without apprenticeship), which is caused by the downturn of economic development leading to an increase in the value of this indicator to **11.4% in April 2011**.

In the case of graduates from building trades schools with a diploma, the situation is similar, the unemployment in this group of graduates reached 12.7% in April 2011, which is slightly above the average value, while back in 2008, the unemployment of graduates from building trade schools with a diploma was **below 5%.**

Long-term unemployment of graduates

Long-term unemployment among graduates is monitored using the indicator of the proportion of graduates unemployed for more than five months to the total number of unemployed graduates. This indicator decreased to 2008 in line with the total unemployment. Since April 2008, with the onset of the economic crisis its continuous growth has been recorded.

Due to the stagnation of the labour market situation in terms of graduates, the proportion of graduates unemployed for more than five months between 2009 and 2010 increased significantly (by at least one third), in the case of **fully trained building craftsmen with apprenticeship certificate, it even doubled to nearly 60% .**

Secondary vocational schools graduates with a diploma are also grappling with long-term unemployment, where almost half of the unemployed graduates have been seeking work for more than five months. **Graduates from building trade schools with GCSE are registered as unemployed for more than five months in 46%.**

Transition from secondary schools to tertiary (University) education

Not all graduates with GCSE enter the labour market directly, opting to continue their studies at colleges or Universities instead. This section provides information about the interest of graduates with GCSE to study at colleges and Universities and their success in the transition to tertiary education.

In 2009 a total of 81% of graduates – i.e. graduates from full-time secondary schools (including Grammar Schools), applied to study at Universities and 63% were admitted. The interest in higher technical colleges on the part of vocational school graduates, is traditionally much lower - 11% of graduates applied for studies, a total of 9% were admitted.

Secondary vocational schools graduates with GCSE typically apply to study at Universities also to a relatively large extent (72% of graduates, out of whom 53% are admitted). The interest on the part of secondary vocational schools graduates in studying at Universities or higher technical colleges, varies greatly in dependence on their fields of study completed at their secondary schools.

Table 22 – The interest of secondary school graduates to study at Universities or higher technical colleges

	Applicants for Univerity studies	Admitted for University studies	Applicants for Higher Technical Colleges	Admitted for Technical Colleges
Secondary Schools Alumni	81%	63%	11%	9%
Grammar Schools Alumni	100%	95%	4%	3%
Secondary Tech. College Alumni	72%	53%	15%	12%
Idem in the field of 36 Building trade, geodesy a cartografy	**79%**	**68%**	**6%**	**5%**

Source: NÚV National Institute of Education, Building sector graduates hitting the labour market, 2011

Candidates from among graduates of secondary vocational building schools, as well as the rest of secondary vocational schools, are successful in admission procedure to Universities, 84% of applicants who set for entrance examination at colleges and even 86% of applicants to the Universities, were admitted. Building Trades Graduates typically apply for the studies of Civil Engineering (70% admitted) and Architecture (11% admitted), or, even though already to a lesser extent, to the studies of other technical disciplines and economics.
After graduating a total of 1880 (or 72%) secondary school graduates, continued in further studies in 2009, 700 building trade graduates entered the labour market.

Table 23 – Which Universities and Higher Technical Colleges most frequently admit this particular group of candidates and what was their success rate in entrance examinations

Candidates admitted to higher learning	Share of those admitted	Admission success rate
36 Construction, Geodesy, Cartography	70%	87%
35 Architecture	11%	61%
39 Special interdisciplinary fields	8%	86%
Candidates admitted to higher technical colleges		
36 Construction, Geodesy, Cartography	60%	91%
35 Wood processing and musical instruments manufacturing	17%	100%

Source: NÚV National Institute of Education, Building sector graduates hitting the labour market, 2011

6.3. Adult Education in the Building Sector

6.3.1. National System of Occupations and the National Classification System

The labour market situation has been changing dynamically and a rapid progress can be observed in many fields and professions. Simultaneously, there is a growing need for these developments to be comprehensively monitored while conveying the respective information to parties, such as job seekers, educators/teachers, employers, the Labour Office of the Czech Republic, etc. For a long time, however, we lacked a comprehensive fact-finding system to monitor the developments, to classify each occupation and share the information among all parties concerned. This gap has been recently filled with systems e.g. **National System of Occupations (NSO)** and the **National Qualifications Framework (NQF),** which come into being by courtesy of employers associated in sector councils.

National Qualifications Framework Project

The project, officially entitled "Development of National Qualifications promoting links between initial and further education" has been elaborated by the Ministry of Education, Youth and Sports in conjunction with the National Institute of Vocational Education. It was co-financed by the European Social Fund and the state budget of the CR. The Act 179/2006 on

Verification and Recognition of Further Education provides for the establishment of the NQF. Using qualification and assessment standards the National Qualifications Framework describes not only full qualifications that a person usually receives at school, but also partial qualifications that are part of a profession.

National Qualifications Framework has been created to help people who have acquired professional skills beyond their initial education, but have no proof thereof. By virtue of the mentioned standards it will be possible for such people to set for tests and receive a certificate to prove their skills.

Building Sector Council

The Council for the Building Sector has been working to implement the NSO and NQF systems since its establishment in early 2011, and currently has ten members. The Sector Council associates representatives of major employers, professional organizations, educators and other professionals in the field of human resources in the given sector or industry, with the objective to become a mouthpiece and a tool for employers to promote the interests of the sector, in relation to the Government and educational institutions.

The main roles of the sector council are:

- monitor the labour market and identify its trends and changes
- state the needs of the sector particularly in the sphere of human resources development
- pro-active support to vocational education, training and development of skills in the sector
- communication with the Government and educational institutions in order to promote the needs of the sector
- work on NSO and NQF systems (National Qualifications Framework) and drafting and implementating sector-related agreements

Sector Council's work usually begins with **describing the current occupations in the labour market**. With the help of dozens of other experts involved in the working groups, the sector council analyzes what they do and what skills are required from qualified operatives in the given profession.

The Building Sector Council now manages as many as 71 ready-made positions featuring in the NSO catalog of professions available on the website www.nsp.cz. What is meant is for example the position of Architect, Interior Architect, Civil Engineer Designer, Self-employed Building Technician, Foreman, Concreter, Stove Builder, Painter, Masonry Systems Fitter, Floorer, Roofer, Carpenter, etc. For the next period of its activity the Building Sector Council plans to revise approx. 19 descriptions of further positions according to the demand of the labour market (for example, Cartographer, Geodesist, Surveyor, Specialist in the field of construction, land surveyor, etc.) and process the position Property and Buildings Manager.

In the second stage it is the task of the Sector Council to define **qualifications** – i.e. the set of competencies necessary for the performance of activities involved. In the catalog of the National Qualifications Framework (www.narodni-kvalifikace.cz) you can now find a number of qualifications in the field of construction, which are in great demand for retraining, and many candidates have already passed the respective required tests. By way of example we are talking about qualifications such as Plumber, Stone Mason, Chimney sweep, Floorer, Glazier, Carpenter, Water Engineer, Mason or Stove Builder. One of the most frequently tested professional qualifications is Chimney sweep - flues revision technician; by the end of 2011, as many as 129 candidates were granted a certificate of this particular qualification. Another major task of the Building Sector Council for the future, among others, would be defining duties in the form of an occupation description for various construction machinery operators and describing the profession of different machinists and machine operators in the building sector.

The culmination of the work of the sector council will be **identifying the most problematic areas of the labour market** - for example the bottleneck qualifications in the next few years. At this juncture employers make use of materials from independent market researchers and subsequently hold discussions with other key players - educators, regional politicians, ministries, seeking to reconcile mutual pressures and activities in order to arrive at the most efficient and fastest solution to the problem.

The European Qualifications Framework

Since 2008, the European countries assign within the so called assignment process all qualifications to eight levels of a single European Qualifications Framework EQF. The EQF aims at the clarity and comparability of qualifications in the European countries. The EQF Coordination Centre ensures the process of assigning individual qualifications to the EQF within the EQF NCP project in the Czech Republic. The Czech assignment process and its results are described in the National Assignment Report of the Czech Republic. On 13th December 2011 Czech representatives defended the National Assignment Report of the Czech Republic before the EQF Advisory Group in Brussels. EQF Advisory Group consists of representatives of the European Commission, Cedefop, the Council of Europe, European social partners (UEAPME, BUSINESSEUROPE, etc.) and the EU Member States. The presentation and publication of the official results of the reference process was carried out in line with the timetable set by the Ministry of Education, Youth and Sports. Like other national coordination points (National Coordination Points) in the countries that have already ended the reference proces, the Czech Coordinating Centre for EQF, before its own defense, had received the comments, which the representatives of the Czech Republic responded in their defense. In presenting The Reference Report to the EQF Advisory Group the Czech Republic has fulfilled the first task ensuing from the Recommendation on the implementation of the EQF thus helping its European implementation. During the year 2012 the CR's Assignment Report has been in the process of updating. An updated version of the Report will be published in September 2012.

Levels of qualifications in the National Qualifications Framework

Each complete and partial qualification within the NQF has a certain skill level described through working skills/competencies (capabilities). Qualification levels form a universal scale for the classification of all complete and partial qualifications and are shared by both the National Qualifications Framework and the National System of Occupations. The draft qualification levels also reflect their reference to the levels of the EQF.

The National System of Occupations

The National System of Occupations (NSO) occurs as a continuously developed, open catalog that is accessible to everybody through the Internet. It reflects the real situation on the national labour market. Mainly it consists of a detailed description of the requirements for work performers in the form of general and professional competencies. The basic source of information processing is the work of Sector Councils.

The main objectives of the NSO are:

- strengthen the role of employers in the development of human resources
- create a database of occupations - the basic source of information on labour market needs and demands
- ensure awareness among educators/VET courses providers about the needs of the labour market for human resources
- promoting labour market needs in the education system
- through Sector Councils ensure a massive involvement of experts among social and other partners in the processes of collecting and processing information on the skills as needed on the labour market
- increase mobility and flexibility in the labour market in the Czech Republic and EU

However, the fact that at present especially small and medium-sized businesses, operating in the building sector, whenever recruiting new operatives or using existing workers still tend to depend more on their own experience with the worker's practical skills, rather than their formally acknowledged qualifications, continues to act as a certain barrier to achieving the objectives of the NSO and NQF.

6.3.2. Organization of Adult Education in the Building Sector[2]

Analysis of the current demand for adult education in the field

The adult education in fields related to the **preparation, implementation, sales and investment management** constitutes an immense and inherently rich segment of human resources development in the country. Potentially it affects the order of 500 to 550 thousand

[2] *The Chapter proceeds from the document ‚'Strategy of Development' by the Czech Building Academy, ABF Foundation, 2009*

gainfully occupied people (both employees and the self-employed), or about 12% of the total of the gainfully occupied population in the national economy.

This is an extremely varied terrain in terms of requirements for specific directions of educational activities according to individual professions, levels of prior education or placing potential training candidates next to their peers against the firm's management pattern vertical etc., while simultaneously, it is a terrain already partially occupied by specialized education providing institutions (see below)

On the demand side, as **extreme**ly limiting proves to be the **organizational fragmentation** of both the building sector alone (see Chapter 3), and even more importantly of the rest of players involved in the preparation, execution, trading and investment or property management. A **big gap between potential and actual demand** for education is down to the above mentioned underlying facts.

The education as a market pursuit needs to be primarily tailored to the needs of various segments of the demand. "The adult education market" in the sphere of built environment and related fields can be divided from several aspects, which leads to a very diverse pattern. **A threefold division**, however, appears to be as fundamental:

a) According to the different stages of the investment process (and by individual professions within this process)
b) Whether pertaining to private or public sector
c) According to the degree of the demand's organization

As for the investment process, it can be divided into four stages (broken down into private and public sectors) as follows:

1) Preparation of investment
2) Technical implementation of investments
3) Commercial implementation of investments
4) Investment (Property) Management

The **first group** includes occupations such as private investors (investment organizers) and developers, localizers, town planners, architects, building designers, building geologists, surveyors, EA / SEA assessors (the private sector) or Building Authorities officers, conservationists, Investment Departments personnel in public administration institutions (in the public domain).

The **second group** includes building materials and equipment manufacturers and distributors and a number of professions involved in the actual building production (in the private sector), or building inspection, energy audit etc., work safety supervision (public sector)

The **third group** consists of real estate brokers, leasing company staff, price appraisers, business department staff of building organizations (private sector), or cadastral offices personnel and court-appointed experts (the public sphere).

Finally, **the fourth group** includes (in both the private and public spheres) varied professions of maintenance and repairs of properties and property administrators.

Also the breakdown by **level of organized demand** is interesting. The organized demand is the demand for professionals, de facto required by law in order to maintain (and guarantee) the quality of the profession. Unorganized demand is then that which depends on a purely voluntary decision by a potential client whether he shows it or not - generally based on demand-related expenditure **efficiency calculation**. Finally an "Intergroup" of semi-organized demand is sandwiched between the above mentioned two primary groups when end-users of educational services are directly recommended courses or training providers by various interest groups (of which they are members).
Undoubtedly, the **unorganized market** is potentially the largest, though unfortunately, there also exists the greatest disparity between the potential range and effective market demand. The total extent of effective demand for voluntary educational activities can, therefore, be derived from a comprehensive quantification of the target group, i.e. approx.**150 thousand people**. The **intensity of this demand** is, however, adversely affected by factors, such as its sector-related and territorial fragmentation, strong sensitivity to price and the seasonal factor. By and large the actual extent of this demand may be estimated at about **150 thousand man-days of training per year.**

As for the organized demand, it is derived from the application of legal standards stipulating the special vocational competences. In the Czech Republic 864 such standards are currently in force, albeit with different legal force (from laws to decrees and regulations), often related to each other and varying in detail. In terms of their field orientation, these standards are typically concerning spheres far fetched from the present topic (such as finance, medical and veterinary care, transportation, mining, national security, defense, agriculture, social welfare, education, etc.), the built environment is very fortunately affected by a tiny fraction of the mentioned legislation, notably:

- Act No. 183/2006 Coll. on Zoning and Building Code, as amended later on and implementing regulations to this Act
- Act No. 360/1992 Coll. on the Profession of authorized architects and authorized engineers and technicians operating in the building sector, as amended later on and implementing regulations to this Act
- Act No. 312/2002 Coll., on the Local Government officials, as amended later on, and Decree No. 512/2002 Coll., on the special competence of Local Government officials
- Act No. 100/2001 Coll. on the Assessment of impacts on the environment and amending certain related laws, as amended later on
- Act No. 114/1992 Coll. on Nature and landscape protection, as amended later on, and Decree No. 468/2004 Coll. on Authorized persons in accordance with the Act on the Protection of Nature and Landscape

- Act No. 254/2001 Coll., on Waters and on amendments to certain laws and Decree No. 590/2002 Coll., on the Technical conditions for water works, as amended by Decree 367/2005 Coll.
- Act No. 274/2001 Coll., on Water supply and sewage systems for public use and amending certain laws, as amended later on
- Act No. 200/1994 Coll. on Land Surveying and amending some acts related to its introduction, as amended later on
- Act No. 458/2000 Coll., on Business conditions and public administration in the energy sector and on amending certain acts (the Energy Act), as amended later on
- Act No. 179/2006 Coll., on Verification and recognition of further education and amending certain laws, as amended later on
- Government Decree No. 591/2006 Coll. on Detailed minimum requirements for safety and health protection at work on construction sites
- Decree No. 368/2004 Coll. on the Geological documentation
- Decree No. 213/2001 Coll. Issuing details of energy audit requirements, as amended by Decree No. 425/2004 Coll.

In terms of forming an organized demand for adult education the first three of these standards are at the core. In the first two cases, the "guarantors" of demand as stipulated by Law, are two chambers (CCA, ČKAIT), which, for the benefit of their members, determine the conditions for the required professional education, the Ministry of Interior being the third guarantor, but here only through the accreditation of educational products (of which, however, only a minority concerns topics of our interest, i.e. the Building code, etc.).
A total of about 32,000 members of these two chambers are subject to the compulsory education within the CCA and ČKAIT. Another estimated 3,000 employees in public administration (in fields related to construction) are subject to the compulsory education according to Act 312/2002 Coll. The intensity of effective demand for education of this target group (**total of 35 000 people**) is quite high - it can be set at approximately **100,000 man-days of training per year.**
Sandwiched between the free and organized demand, there is a demand that is recommended to its members by professional umbrella organizations such as the Chamber of Commerce, Association of Building Entrepreneurs, Architects, Czech Union of Civil Engineers and in particular numerous professional interest organizations of the guild type. The impact of these recommendations helps to **structure the demand** for education and training (through highlighting the preference of training topics or educational organizations), rather than prompting its quantitative growth.

Analysis of the current offer in the field of adult education

The offer of training activities with all their parameters (volume, price, quality) differs rather sharply depending on whether it is:

a) Education pursuant to Act No. 183/2006 Coll., 360/1992 Coll., or 312/2002 Coll. ("Organized").

b) Routine Training ("voluntary")

As for the volume involved, the critical capacities are offered within the group a). The reason is that the law provides that:

- The education is compulsory.
- Chambers, or Local Authorities are required to ensure a system of up skilling and develop a plan of vocational education and training, which in the case of CCA and ČKAIT operates with the need to earn a certain number of "credits", in the case of Local Government directly defines the schedule of the official's up skilling sessions of at least 18 days for the period of three consecutive years (i.e. on average, 6 training days per year).
- Training can be provided by organizations that are recognized by Chambers or institutions accredited by the Interior Ministry.
- The Laws provide for continuing professional development during the officer's entire career.

The laws thus generate a strong and stable demand for further education, while linking certain qualitative requirements to meeting this demand – such as "recognition" or "accreditation". The competition on the supply side, therefore, involves only a part (albeit large) of educational organizations providing "recognized" or "accredited" programs. At the same time, however, the number of these programs is set quite generously, both in its total and individual topics. As a rule, therefore, thematically same or similar courses are offered by several dozens of "authorized" organizations.
Despite the highly competitive environment, this particular segment of the market remains **very attractive** for education providers: higher quality (at least from a formal point of view) education and simultaneously its higher attractiveness to customers (as dictated by law), leads to higher realized prices, despite the scope for significantly cutting the costs of holding the courses (e.g., due to repeat runs, holding sessions at the customer's premises, etc.). Even here, however, the situation varies in terms of course typology as defined by Law – on the whole the relatively least attractive courses are routine (usually one off) programs, continuing education (usually long-term) is more attractive, similarly as managerial training, while special professional competence tutorials and verification are considered to be the most attractive.

As for B group, the offer here is even more competitive: there are no statutory limits in place, while the demand is generally limited by the mentioned laws, albeit indirectly (clients interested in learning logically prefer "mandatory" up skilling to "voluntary" tuition). A long-term success in this area involves, therefore, such offer, which is supported by pro-active marketing, tailored to the current needs of the customer, offering high quality information at a reasonable price, at an appropriate time and in an appropriate place, at that.

Another important breakdown of the "education market" is that into short and long term courses. Generally, the delivery of long-term courses brings higher added value and thus profit potential, however, accompanied by a higher risk factor. Short-term courses are less risky in terms of implementation, which (generally) corresponds with their lower profitability.
In terms of organization, all market segments overlap: it is usual that the same organization offers both "mandatory" and "voluntary" courses, short and medium term ones. As a result, the total capacity on the supply side, is even more difficult to assess.

Sources of information on this topic are both incomplete and inconsistent. The number of organizations in the Czech Republic involved in education and training i.e. their business line has been duly **registered, is 547** (Source: Business Register). They operate in the building sector or related fields, such as management and organization etc. The figure, however, disregards businesses registered in other Registers, such as the self-employed or not-for profit organizations, foundations or institutions for which adult education (especially in this field) is not their mainstream activity, whether it is a secondary school or University (holding such extension courses to complement their professional capacity), or manufacturing companies (especially in the fields of building materials, construction equipment, but also in computer science, etc.) for which training activities are often part of advertising or marketing. From this broad perspective, it is, therefore, possible to estimate the total number of providers (at least potentially) forming the supply side of the market, at **minimum 1100.**

However, only a small part of the above mentioned businesses can be described as entities operating in the CR's market **permanently and in a larger than negligible extent**. The ČKAIT and CCA register, which includes organizations of all types as mentioned above, could serve as a "clue" as to how large a fraction of the market they represent. In acknowledgement of their educational activities they are entitled to grant credits to members of the Chambers. There are currently **267** such organizations. Some of these organizations, of course, also operate in the "free" market, the number of the rest of organizations working exclusively in the free market, can perhaps be estimated at about **100 – 150.** Thus, the total number of practicing participants on the supply side of the market in the sphere of adult education in the field of building and construction, can be estimated at about **400 entities**.

These companies, however, do not form a homogeneous group, be it in terms of available capacities, degree of specialization, the manner of supply or their business strategy.
As for the total volume of supply, none of the organizations operating in the market can be labeled as dominant - the market is highly fragmented in this respect even the most energetic players in the group are still small by size. The largest (in terms of volume of supply) of these small-size providers form a group of less than seventy (69) organizations listed below.

Even this limited range of organizations, which offer a total of about **45,000 man-days of training per year** (thus covering about one fifth of effective demand) reflects the diversity of the supply side of adult education in civil engineering and construction.

First, it is clear that only a minority (16) of these organizations is not narrowly specialized. This group includes ABF Foundation – the mastermind behind the Czech Building Academy project. Apart from the ABF, there are Universities (3), commercial corporations (5), non profit organizations (3), umbrella and professional organizations (4).
In contrast, most organizations are very narrowly specialized in their offer, often VET providers (25) are in fact promoting their own products. This group indeed pursues a different business strategy, which offers its courses almost for free, while covering the cost from their **advertising and marketing expenditure** allowance**.** Using the same tactics a number of other "specialized" entities within their fields also act as de facto agencies of large companies which also cover (entirely or a great deal of) the cost of training. On the whole, it can be estimated that half the training capacity is offered to participants more - less free of charge. This practice, of course, makes the situation very difficult for those organizations that cannot but offer their services in exchange of direct payment from their immediate customers.

Regarding the **number of participants**, unfortunately, credible information for the whole set of entities operating in the educational market, is missing and we can only resort to estimates. Very roughly we can deduce that the total effective supply can be currently reaching approximately **120,000 man-days of training per year**. This means that the offer nowadays covers only about half the effective (available) demand. It is tricky to define, where exactly there are currently major "gaps" in the available supply. By and large, the largest scope seems to be both for 'basic' education (continuous education of lower-skill occupational categories, whether blue collar or not), and – by way of contrast -"premium" education and training that caters to **executives** of larger organizations and creative professionals from the fields of preparation or realization of investments.

Another reason why the demand fails to be met, is its considerable spatial dispersion. In contrast, educational services are offered predominantly in Prague and the rest of regional or larger cities, whereas rural areas including small towns typically show lower coverage. For those interested in the training who come from remote parts of the country, both time and financial expenditures naturally increase, often reaching prohibitive limits. The paradox of the situation is that candidates from rural regions, who would objectively need VET most of all, (no matter if from "organized" or "free" market), have the most difficult access to such services. This situation is a natural consequence of the free market regulation of supply and demand - in other words, vast "peripheral" areas of the Czech Republic are not attractive enough to justify adequate adult education offer on a commercial basis.

ČKAIT Lifelong learning

ČKAIT-run lifelong learning allows you to keep abreast of the technical and scientific progress. ČKAIT lifelong learning (LLL) constitutes a gateway to the latest information and knowledge. It is the key to understanding and embracing the ongoing and ever-accelerating change. The need of consistent lifelong replenishment and expansion of knowledge stems from the rapid pace of new information influx and previous knowledge obsolescence.

Education ceases to be a one-time process, ending with your leaving school. About half the knowledge in various fields and specializations becomes obsolete on average over 5-7 years. Lifelong learning is an essential prerequisite for the high professional erudition of authorized persons and their proficiency growth.

The ČKAIT run lifelong learning (LLL project) project serves to meet these objectives. The (LLL) Project is governed by a Commission appointed by the ČKAIT Board of Directors. The Chairman of the Lifelong Learning Commission becomes a member of the ČKAIT Profession Promoting Council. The Lifelong Learning Centre runs the LLL Project Information System.

7. Skills gaps between the current situation and the needs for 2020

7.1. Set Priorities for Human Resources Development of in the Building Sector: the Levels of Primary and Secondary Education[3])

7.1.1. Support for the Involvement of Social Partners in the Development and Implementation of Educational Programs

A lack of interest on the part of employers, partly because firms with insufficient capacities for cooperation prevail in the region, may be acting as a major obstacle to establishing cooperation with the social partners. The choice of the social partner is related to and has a feedback effect on school's educational program (CEP). Schools frequently collaborate with companies that employ their graduates. There is a certain readiness to involve practitioners in creating the SEP. The greatest degree of cooperation with social partners is reported from technical colleges. Some consideration is given to tax incentives to employers if providing practical training for schools, but the viability of this idea is not yet clear. Similar situation exists regarding scholarships for some sectors or contracts with future employers. Equally uncertain is the school-employer-region model of cooperation, as a clear-cut framework for such cooperation is still missing. Another proposal involves establishing Sector Councils under the auspices of the Ministry of Labour and Social Affairs, notably in regions notorious for a long-term gap in demand/supply alignment of graduates that would justify direct financial support from the regions. Representatives of employers would also be invited to have a say in the SEP.

[3] *Thw Chapter is based on the* ***Draft List of Human Resources Development Priorities in the built environment sector: basic and secondary-level education****, as elaborated by the Human Resources working group of the Building Sector Advisory Board to the CR's Prime Minister*

7.1.2. Apprenticeship / Vocational Training Promotion (communication support)

The (2011) updated Vocational Education and Training (VET) Action Plan is to include specific measures to promote technical occupations. The interest in Secondary Vocational Schools with both GCSE and Apprenticeship Certificate, etc. in the fields related to the building sector, has been essentially stagnant. In contrast, the number of training programs has practically doubled in response to developments in the labour market. The interest on the part of vocational graduates in working in their field of specialization, stands at about 60%, the rate of satisfaction is higher in technical fields with GCSE.

Failure rate of students in the new GCSE examination reached 19.5% in 2011, which is roughly double the number of previous years. While the failure rate at vocational secondary schools with GCSE was around 16.5%, at VTS with Apprenticeship Certificate it was staggering 33%. The Vocational Training System is to introduce a new exam (National Education Development Plan). The problem is that it is impossible for schools to be properly evaluated due to their increasingly vague FEPs and SEPs. The Vocational Training Schools development should be geared back to the centralization of the general (core) training in vocational schools which would also lead to a greater prestige of such studies and a higher success rate in State graduation exams. The new school-leaving examination would facilitate comparisons among disciplines - such as fields related to the building sector. The problem of the lack of technically skilled workers, which had been temporarily overshadowed by the economic crisis, has become more acute again, currently constituting a major barrier to the development of about 13 percent of enterprises. More than a third of companies (36 percent) believe that the availability of skilled workers has deteriorated this year. The labour market statistics on employment in the building sector are typically distorted by seasonal fluctuations – notably regarding low skilled operatives.

The share of engineering graduates from University Technical Colleges has increased (source: NERV), their unemployment rate is comparable to that of other industries. The Czech Republic boasts of a strong tradition in technical / vocational education, to build upon. The upcoming University reform is to divide higher learning into Universities and University Technical Colleges. The simultaneously envisaged tuition fees may prompt a greater interest in technical studies if supported by say scholarships. The option to obtain a small doctorate after completing the bachelor's course combined with a lengthy vocational practice, has been shelved for the time being. In technical areas, specifically in the building industry, however, the need to raise the number of university-educated people may not be absolutely necessary, our attention should rather focus on profiling and up-skilling graduates of secondary, extension and bachelor's courses.

7.1.3. Development of Vocational Guidance

So far inadequate vocational guidance with the involvement of employers has a role to play in the future. The importance of promoting vocational / technical education is equally

underestimated. The public may in principle have no awareness about the scope of building professions in the labour market – including the employability of graduates.

7.2. Set Priorities for Human Resources Development in the Building Sector: University-level Programs to Boost the Country's Competitive Edge in the Building Sector and Transport

The results of a long-term monitoring Technical University graduates in the labor market over the last 20 years, speak volumes about the established trends and tendencies in both the success of graduates in practice and the assessment of the contribution of higher learning in terms of practice.

It is a time proven fact that Technical Universities graduates operate primarily in the disciplines they specialized in, in the course of their lifetime careers, as employees (although many of them try their hand at business simultaneously), both as leaders and executives. In terms of practice, graduates and their employers alike, tend to evaluate most positively their acquired technical education, technical thinking and expertise as well as their ability to further enhance their skills, which is crucial for competitiveness.

7.2.1. Maintain the High Quality of University-level Technical Education

in concentrating on vocational education and good knowledge of theoretical disciplines such as mathematics and physics. Promote research activities to maintain high quality education of the university type. It is necessary to consistently ensure the quality of theoretical training, i.e. theoretically oriented subjects in the study plans. In the long term, high quality theoretical and professional studies from the perspective of practice (graduate, employer) are evaluated very positively. The lower rating is mainly associated with the interface between theory and practice, i.e. the education process may be perfected probably in turning the focus more on interwoven disciplines, contexts, while tracking connectivity and links to the rest of faculties.

7.2.2. Promote the Ability to Apply the Acquired Knowledge and Skills in Practice

It is a must to promote high ability to solve problems, lead teams and work in teams (current lines embraced by the Word's important accreditation committees, such as ABED - Accreditation Board for Engineering and Technology).

Surveys results have confirmed deficiencies in the abilities of recent graduates and by way of contrast an acute need in practice for management, organization of work, leadership, presentation skills, teamwork skills, etc. At this juncture, we wish to offer our recommendation to try and redress the situation. (Note: CTU and its faculties have made a number of positive steps over the last ten to twenty years to remedy the situation).

It was also established while evaluating the knowledge acquired by University graduates, that in terms of practical needs there are persisting shortcomings in higher learning. Of course, it is necessary to take the personality of the graduate into account, with his or her personal knowledge, abilities and skills that the system molds and develops primarily.

Again, the findings show that the majority of graduates from technical universities possess high quality knowledge of theoretical disciplines as well as knowledge pertaining to their field of studies- specialization, strongly enhanced by their technical style of thinking. At the same time both the graduates and their employers demand a higher level of ability to manage and lead, the so-called soft skills. The level of soft skills is given by the individual's personality and some of them cannot "be taught" (such as creativity), but there are skills, such as communication, presentation, self-presentation, ability to work in a team, which can be cultivated through "training" and which can significantly help the graduate to be successful in the labour market. A major problem is often their inadequate level of language proficiency (English and other foreign languages), which blunts the competitive edge of the Czech building sector and limits the chances of its foreign operations

7.2.3. Provide an Objective Assessment of Current Bachelor's and Master's Programs

Since 2003, students have been mainly enrolled in Bachelor's undergraduate programs for 3-4 years (four years in case of the Faculty of Civil Engineering), followed by a Master's program of 1.5 years (with 3-year Bachelor's - two years). Construction companies and other enterprises assumed, as it is in the case of the Western Europe, that Bachelors, perfectly prepared to lead work teams, would join as site managers, etc. But the reality is different. Bachelors in 99% continue with their Master's programs, because the Bachelor's program is not currently conceived for the graduates to be adequately prepared for practice, but rather reckons with a further Master's course. Starting from the year 2011 it is expected that only 50% of Bachelors will continue with their Master's program – which leaves students in doubt whether the decision would not adversely affect their position on the labour market, building companies are not ready either (no pay-bracket as yet), while there are enough secondary-level technical building school graduates. Bachelors may possess extensive theoretical knowledge in mathematics, physics and technical disciplines, but practical subjects are conspicuously missing in their study programs at the required levels.

If only 50% of Bachelor graduates continue in their Master's courses, the quality of University technicians, critically needed to support the country's technological and industrial advancement, would decline dramatically, moreover technical fields studies are demanding, hence, a thorough preparation is necessary to meet the challenge. On the other hand, only a negligible number of graduates are unemployed, the labor market needs them now as well as in the long term. Provided it is decided that half the Bachelors will go directly into practice, it would be necessary to fundamentally modify their study programs according to the needs of individual sectors and companies. It is also important to explain to businesses - employers that the undergraduate program is fully-fledged for business after modifications have been duly carried out.

7.3. Set Priorities for Human Resources Development in the Building Sector: Adult Education in Building Sector

Significant changes are underway in the building sector or will be in the future. The decline in demand (capacity crisis) will have its economic impacts on the structure of construction firms and designing companies as well as serious social remifications. The user's new approach to energy and environment will call for new products and technologies. The legislative and budgetary pressure on the efficiency of both State and private investors would rise. Major restructuring can be expected to meet the requirement of so-called "lean building sector", which would need new skills, new professions, and would result in retraining of many employees.The demand for further education of most operatives involved in the building process, would rocket to new heights.
Change drivers are as follows:
Government policies (spatial development policy, housing policy, policy related to architecture, energy policy, etc.), legislation (amendments to: Building Act, the Public Procurement Act, Environment Protection Laws, Land, Air and Waste Management Laws and Safety and Security legislation, the Heritage Act), European legislation (Euro codes, Thermal Protection Guideline, etc.) innovation (products, technologies, IT, communication skills, new forms of financing and organization of work and Project and Construction Approval Proceedings), retraining (especially for blue-collar workers and technicians, gaining new skills, getting a new specialization, social safety net), Building Authority officials' specialization (expertise of all officials involved in the approval process and building permits, not only regarding the process, but also the architectural design, Public Procurement Authorization, etc.).

7.3.1. Support Stabilizing Lifelong Education as Provided by ČKAIT and CCA,

which pursuant the relevant law developed lifelong learning systems for authorized persons (civil engineering technicians, civil engineers, architects, urban and town planners, etc.) and invite the Chamber to work together to ensure the respective Government pursuits, see the content of education.

7.3.2. Put into Practice the Adult Education and Professional Qualifications Recognition Law. Significantly Develop the System of Re-training

in order to curb in this manner the growing blue collar craftsmen deficit as well as to arrest the decline in numbers of vocational schools graduates and fully trained operatives, while

also responding to the interprofessional fluctuations, the incidence of which is typically significantly higher in these occupations than that of University graduates. Provide through Regulations for retraining as a recognized method of acquiring new professional skills (in the building sector). The training is to be geared primarily to new technologies and products but also to managerial knowledge of contractual relations, warranty terms, addressing the end customer, dealing with major contractors or the use of modern communication technologies.

7.3.3. Improve the Competence of Civil Servants, Building Authorities Officials, Participants to Building Proceedings and Public Procurement Administrators. Launch Lifelong Evaluation of Buildings,

with the objective to significantly cut down on the number of Building Authorities (the original intention of the amendment to the Building Act) and to promote and apply the concept of the "authorized inspector" who owing to his or her high-level qualifications can replace and privatize the role of the Planning Authority. In the field of public administration the educational process is to expand and cover in particular the urban planning and social and economic conditions for the development of individual municipalities. Improve the level of all the participants to the planning and building process (nature protection and environmental impact assessment, heritage sites protection and maintenance, fire protection, utilities administration, etc.) the factual knowledge of technical and economic conditions of the construction and building process, which is directly affected by their opinions often causing absurd cost overruns. It is also highly expedient to provide special education and training necesery for granting public procurement authorization and public procurement assessment by professional committees.

7.3.4. Promote the Efforts for the People of the Czech Republic to Embrace Sustainable Development,

particularly in the implementation of the European Directive on the energy performance of buildings, stipulating that all the new build and renovated buildings need to meet the passive (nearly zero) standard by 2020, which will call for changes not only in the building sector but also the use of these buildings by all citizens. To promote civic engagement in the care of built cultural environment in municipalities and regions as part of the national policy of construction culture and public space cultivation.

7.4. Set Priorities of Human Resources Development in the Building Sector: the Labour Market and Human Resources Development

The labour market, which affects the condition of the building sector, encompasses not only the construction industry, building contractors (about 31,000 law firms and 263,000 registered self-employed persons), but also manufacturers and distributors of building materials, products, construction equipment and an extensive design and investment sector (about 58 thousand entities operating in the area of design and engineering activities) as well as all workers involved throughout the entire construction process. It naturally includes the Government, that is in charge of the process of planning and building approvals. Significant is also the current status of educational and research institutions, aimed at preparing new professionals for the construction industry. The construction as a whole, is not tracked separately in statistics, but can be estimated at about 500,000 people. The number of employers in the building sector has decreased by 10% and the number of employees by 16% since 2008.

If starting from second quarter 2010 the entire economy and job market has been rising slightly, the building sector and its labour market have continued to decrease with no sign of an imminent growth as yet!

Since 2000 the number of those employed in the construction industry, has been slightly fluctuating between 381 thousand persons (in 2002) and 407 thousand persons (2007) with a slightly increasing trend. The figure reached a peak representing 411 thousand employees in the year 2008. The current (2Q2011) number of employees is 391 thousand persons. A similar development has been traced in the number of employees of the building sector as a whole.

The downturn in the construction industry hits employees harder than the self-employed. (A similar development has been observed in the overall labour market in the Czech Republic, which reached a record high in Q4 2008 followed by a subsequent low in the 1Q 2010, reaching 4.83 million people employed, and slightly growing ever since this quarter.) The construction industry labour market responded to the coming crisis with a decline even a quarter before the entire economy of the Czech Republic did, which is an interesting contradiction to the decrease in construction volume that occurred with a one year delay. The labour market in the construction industry in recent years has been accounting for about 8% of the entire labour market of the Czech Republic, in Q1 2011 it dropped to 7.7%. The construction output in current prices declined from its culmination in 2008 (548 billion) by 60 billion in 2010 (apartments fell by 24 billion, other building construction fell by 36 billion, reconstruction declined by 16 billion CZK, civil engineering increased by 17 billion!), there would be a significant drop in civil engineering only in 2011. The construction output has been permanently! declining for four months, i.e. April through July in the year-on-year comparison (-6%, -5%, -6.3%, -11%!) with the rate of decline accelerating. The information about the percentage of unemployment in the individual qualification groups can serve as an Interesting illustration: 2.8% of University graduates, vocational schools with GCSE - 5.2%, 8.6%, fully trained apprentices, blue collar operatives with basic education 25.0%. The

situation for secondary vocational schools graduates is particularly distressing with the unemployment reaching 24%.

The labor market in the construction industry can be primed with the effect of counter-cyclical measures by the Government, such recommendations are due to the inherent multiplier effect of the construction industry perceived as a pro-growth support for other fields and in the case of infrastructure projects as a tool for enhancing the country's competitive edge as well.

Legislative changes towards the liberalization of the labour market can help and increase the employment in the construction industry. The construction has a seasonal character using a significant proportion of the self-employed to supply small and large structures. It depends to a considerable extent on the flexibility of its labour force both in terms of location and the succession of professions operating on one building site. The process is constrained by legislative and administrative barriers. (The employment of foreign workers forms a separate issue).

Ensure a long-term stabilization (or rather demand now) of project preparation, which means work for the sector and survival of sophisticated teams of experts - designers, but mainly a source of readily available projects crucial for a rapid response to the sector's recovery if any. Simultaneously, the stop to a series of design projects may pose a risk mainly due to the length of time required for project preparation, often in the order of ten years, thus potentially adding to long term persistence of stagnation even at a point of time when the availability of resources has already been authorized.

7.5. Quantification of Training Needs in the Building Sector

The extent of the building sector training needs is also highlighted by the table (1) with the total anticipated gap by the year 2020 in different educational categories.
The total gap estimate is based on the following assumptions:

- Drop of total employment in the construction industry according to the 2011 prediction (Chapter 3)
- The education pattern of workers' total in the construction industry in 2011 and the workers aged 50 years and above (Chapter 6)
- The forecast of the employment decline in the construction industry due to retirement (a multiple of the current annual loss - see chap. 6)
- Construction workers' educational pattern prediction by 2020 (on the basis of current trends, comparison with the EU - 15 and transforming quality requirements for individual professions- Chapter - 7.6.)

Tab. 24 Education Needs Bilance by Education levels

Level of Education	2011	Loss over 2011 - 2020	Difference 2011 – Loss 2011/2020	2020 target Need	2020 gap
Basic	14,0	4,5	9,5	8,6	- **0,9**
Secondary with Apprenticeship Certificate –	284,4	62,1	223,3	254,0	**31,7**
Secondary with GCSE –	126,0	18,0	108,0	116,2	**8,2**
University	42,0	5,4	36,6	51,7	**15,1**
Total	466,4	90,0	376,4	430,5	**54,1**

Czech Statistical Office: Workforce Survey, in-house calculation

The above calculation can, of course, be understood only as a guide. Yet, it highlights the overall nature of the problem: it is clear that in terms of quantity **the current capacities of primary or initial education in the field of civil engineering at secondary schools and universities, are sufficient.**

This does not imply that the issue of upgrading skills in construction occupations is automatically resolved. The opposite is true, as the achieved level of formal education speaks little of the construction workers' readiness to meet the 2020 challenges whether they are related to the energy-performance of buildings targets or have to do with the general growth in the sector's competitive edge.

The Czech Construction adaptation to the new conditions of development, therefore, relies on the primary education only to the extent that it will be necessary to slightly change the mix of various educational programs in the apprenticeship training, secondary education with GCSE and higher learning and generally improve the quality of the education process - without necessarily significantly raising the total number of graduates.

The adult education, therefore, needs to become the main tool for improving skills in the building sector - as to quantity defined in Chapter 6.

7.6. Training Needs in Terms of Quality

7.6.1. Structuring the Needs

The BuildUp program wishes to formulate the knowledge and skills necessary to achieve objectives set by EU and national policies for energy savings by 2020. This requirement affects both people and professions that are directly involved in construction, as well as the general lay public, basically all the country's population. The Catalogs of professions that form part of the country's NSO and NQF include almost all professions involved in the

construction process and the implementation and maintenance of buildings. For the purpose of the present Analysis the professions are divided into **four groups**.

The Czech legislation, however, ascribes the crucial responsibility for the preparation, implementation and operation of buildings mainly on the "builder" - the owner, they form the first professional group. The second group is composed of the professional specialists involved in the preparation of the investment. In the third group there are professionals who manage and control the actual construction, finally, the fourth group covers building craftsmen who by virtue of their skills and knowledge materialize the building project. From the latter, the ones can be chosen, who are significantly affected by the new approach and those only indirectly affected by new demands or just very slightly.

First group:

Owner - developer (builder) is a critical entity in determining standards and requirements for the construction. He decides regarding the selection of land, building orientation in the field as well as the compass, sets the building program, selects and approves on the recommendation by the designer the spatial solution of the structure, its structural design as also the choice of contractor. Through his financial limit he determines the quality and durability standard of the solution. In a decisive manner he contributes to the equipment of the building. He or she is the guarantor and responsible person accountable for use of the building, its operation and maintenance. The builder can in principle be a lay person (owner of the property, house, workshops, offices, surgeries, etc.), the criterion for builder's decision making being the price versus performance of the function for which the building is acquired or converted. The builder can be a person pursuing development goals. The decision making criterion is then primarily the price and a quick profit in the event of sale of the property or the conditions for long-term gain for properties with a space to let, apartments and the like. In this sense, the current economic conditions: a relatively low price of energy on the one hand and the higher acquisition cost of energy-efficient buildings on the other, still fail to exert a natural pressure on natural interest in passive houses. The Government has, therefore, adopted a subsidy policy to offset this lack of interest while supporting building insulation and the installation of renewable energy sources, which, despite the emergence of some disproportions, has gradually awakened public interest in energy-efficient buildings. An extra support was also granted to products, technologies and equipment necessary to enhance energy performance of buildings. The gradually rising energy prices, on the one hand and the rationalization of newly applied construction technology creates a prerequisite to boost the economic competitiveness of the savings program. The requirement of energy audits and labeling of buildings constitutes a significant legislative support in publicly declaring that the energy performance target has been met. The labels will be mandatory for the new build, reconstructions and shall be displayed in a prominent place. Labels shall also form an integral part of all contracts of lease. Nevertheless, the full awareness of this goal is still ahead of Czech society. The hitherto knowledge remains unsystematic, often distorted or making little economic sense. The issue of further education of the builder is outside the scope of the present Analysis.

Second group:

The second group includes:

- professional investor and engineering organizations and individuals representing the owner in dealing with the designer, in entering into a contract for work on the project documentation, in proceedings conducive to building approval, in dealing with the contractor and contracting the building construction;
- architects, designers and energy auditors, processing individual stages of the project documentation, reports, opinions and making recommendations of appropriate solutions, products and technologies;
- civil servants and professional organizations, involved in the zoning process, changes to the purpose of the building, building approval and final inspections. Pursuant a legislation in place the authorized inspector is entitled to carry out a limited extent of the above mentioned activity in a privatized form.

The execution of this preparatory phase predominantly involves architects, engineers and technicians. The exercise of their profession is made conditional on their authorization by professional associations for project development activity (ČKAIT and CCA). Officials of the state administration (civil servants) are, required to be granted a "special competence" by the Ministry of Interior and the Ministry for Regional Development, a group of independent energy auditors are provided for by the Ministry of Industry and Trade, authorized inspectors and other specialists practicing their professions on the basis of a Certificate of expertise and skills. Authorized Inspectors (AI) are members of one of the chambers, who are required to pass a demanding exam mainly from procedural rules, before the Coordinating Board, appointed by the Minister for Regional Development. The AI profession requires many years of practice. All these jobs and professions are subject to the obligation of lifelong learning. Somewhat different is the engineering investment activity, where the systemic expertise is not hedged. It monitors the economic aspects of the preparation and construction phases and professionally ensures most public procurements. Here, too, however, there is a new requirement in the offing (to enter into force from 2014) for a special competence of civil servants and public officials in charge of public investments.

These experts whose action can significantly direct requirements of the client (builder), may propose appropriate solutions, may also apply the requirements given in legislative regulations and standards. The awareness of builders is often completely dependent on their preparedness and professionalism. Their actual preparedness, similarly as that of the new generation of engineers and technicians is still insufficient. The fact has recently percolated in connection with the launch of the ‘Green Savings’ subsidized scheme. It is just this experience that serves as the basis for changes in degree programs at universities and vocational schools curricula. Both chambers ČKAIT and CCA, have devoted themselves to the issue of lifelong learning. The latter issued for the benefit of its members a "Manual of energy-efficient architecture" in 2010. The Passive House Centre has also played an Important role in training designers through its regular courses on the requirements set for

the buildings completed after 2018 or 2020, respectively. The general embracement of green building may be in process, yet the new build with only a precious few exceptions still fails to meet the 2020 targets. It is necessary to state, though, that the path of initial and lifelong learning for these professions in the field of energy saving construction, has been embarked upon. Discussions on new technological solutions are underway and the Czech building research, too, has already clearly focused on the issues of energy efficient and sustainable building. The conclusions of the present Analysis, however, do not deal with the balance of this group.

Third group

Another group of professionals who already have direct relevance to the implementation of the building, are the on site professional and managerial occupations. They include the construction manager, technical supervision for the investor and supervision by the designer and professions involved in control activities during the construction process and prior to the handover of the building for use.

The site manager is a representative of the contractor, involved in construction management, coordinates supplies by subcontractors, jobs by craftsmen, ensuring that they are implemented according to the design and construction budget. His role is essential for the construction quality and technological processes compliance. This is why this function is subject to the authorization by CKAIT, which creates the conditions for the authorization as well as the relevant lifelong learning for this profession. Not all contractors have a sufficient number of authorized site managers at their disposal, let alone emerging smaller building companies and the demand has been rising steadily over the recent years in the Czech construction industry. Therefore, in collaboration with SPS in the Czech Republic and with the help of the Architecture and Building Foundation, the ČKAIT has been providing preparatory courses for authorization of site managers and lifelong education for this profession.

Technical supervision of the client (builder), is none of that clearly defined profession and does not have systematically hedged lifelong learning either. It is the most highly specialized occupation on the site. The technical supervision is in charge of the investor's requirements ensuring that the construction is carried out in compliance with all the obligations of the client, according to the approved project and within the agreed budget. An often uncomfortable eye-opener for the builder, public and private alike, may be the inherent fact that builder himself is actually accountable for any mistakes and ignorance on the part of his "supervisor". Here, therefore, a pressure is expected to mount from public authorities as well as private builders for the certification of persons providing these services especially during the investment activities downturn, when builders can choose from their surplus in the market. Technical supervisors' background typically includes practice in engineering or supply activities with secondary or University-level technical or engineering education. Lifelong learning programs for this profession are entirely voluntary. If interested, candidates may pick from the courses available in the market.

Supervision by the designer is a function performed by an authorized designer (or his authorized representative), who ensures that the construction has been carried out according to the design in adequate quality, properties and dimensions in compliance with the project and general legal regulations and that the builder actually gets the building, he ordered. Yet, in practice, this activity is often carried out by an assigned person. The authorized person, however, remains fully accountable in legal terms and this is why persons with adequate training are in great demand. Relevant lifelong education programs are offered by the Czech Building Academy.

Another group of professionals representing the builder, discharge various control activities during construction and prior to its completion.

Safety Coordinator performs on behalf of the client on-site supervision, checking whether all safety measures are in place, especially in buildings where a number of suppliers or subcontractors are involved. The aim is to coordinate the construction process, while ensuring the safety of on-site workers as well as monitoring the impact of the building on its surroundings. This profession requires technical or safety education and can be performed on the basis of a special certificate after passing required tests. Lifelong learning is available for this profession.

The Building Authority official or an authorized inspector carries out construction supervision and inspections. These checks are performed in the presence of the above professions and their aim is to check whether the construction proceeds in accordance with the approved documentation and other conditions specified in the building permit, and does not adversely affect its surroundings. The dates of controls and their content are determined by the Building Act. The relevant training for these occupations has been integrated in the system of lifelong learning.

Inspection technicians of gas equipment, electrical wiring, appliances, chimneys, lightning rods are specialized professionals providing assembly and inspection procedures, required by relevant legal regulations, in particular with regard to the safety of these devices. Professions may be performed based on a test and a 'certificate' valid for five years which is issued by the Institute of Technical Inspection of the Czech Republic. Within the five year cycles the mandatory up-skilling can be acquired to meet the BuildUp targets.

Fourth group

The fourth group consists of traditional hands on construction professions. Having said ’traditional’, let us immediately note that the ongoing developments, i.e. restructuring and innovations in construction technologies, mainly due to the current crisis interfere with this traditional definition. Efforts to increase labour productivity, using various sophisticated technologies and precise composition of building parts, which would minimize material losses, the complexity of a number of structures that are composed of materials of various properties that cannot be freely interchanged, increasingly sophisticated industrial prebabs, but also requirements for tightness of passive houses and interaction their individual technical sections, place the rapidly growing need for coordination of almost all construction professions with each other pushing the traditional craft to the very border of sophisticated

technical and engineering activities. In the process of such transformation in building methods, the traditional sharp distinctions have been blurred, such as that between the work of an experienced craftsman and an engineer or technician who is also the engineer and fitter of sophisticated structures and equipment. An important feature of this process is the fact that many of these specialized activities are no longer provided by the main contractor, but rather a small specialist, as evidenced by the pattern of Building Entrepreneurs of the Czech Republic and a huge number of the self-employed who are involved in this activity. A large proportion of work on the reconstruction and refurbishment of the building stock, which is provided by these small firms often does not require any building proceedings and is implemented without project documentation. The chosen solution simply taps from the experience and skills of the particular craftsman. Therefore, in addition to traditional crafts we can witness the emergence of a variety of new ones and conversely some traditional professions gradually change the contents of their activities and need to adjust to new challenges. Nevertheless, we have tried to outline the following professions, as they occur in the Czech Republic nowadays stating their proportion of total construction activity including the expected shifts as to their required knowledge and skills. The issue of the actually needed proportion of trained craftsmen to the total number of blue collar workers, who carry out their job under the immediate supervision of a competent craftsman, is still relevant for the building sector. The National System of Occupations (NSO) has been launched to grant the official proof of qualifications obtained in partial specializations. In larger construction companies it is up to the management to decide on the skills necessary for their workers. It is understood that the competitive environment will lead to the introduction of lifelong learning systems and already at present really large construction companies tend to establish their own education institutions, academies and organize other forms of in-house training, often to get a competitive advantage. The new requirement by the Trade Act for a proof of professional competence particularly affects small companies and the self-employed. The amendment recognizes both the basic training, apprenticeship, and the process of obtaining partial qualifications on the basis of professional practice and a composite test to prove the skills. The help to small and medium-sized businesses is based mainly on the activity of individual professional guilds, which are composed of the leading craftsmen and interested in the quality and reputation of their profession. Suppliers of building materials, products also play a positive role as they are genuinely interested in an optimal incorporation of their products in the construction process. Yet, the experience of guilds or the Architecture and Building Foundation with its in-house Czech Building Academy's Department of Crafts , show how difficult such efforts can be and that they obviously may not do without a systemic financial assistance from the Government or the European Union.

7.6.2. Demands on Individual Professions

The present overview of crafts is divided according to the structure of building works as published traditionally by URS Praha Inc., so as to give a rough idea on the financial volume of construction work involving these crafts

Table 25 - Professions providing the main construction works (MCW) and the pattern of their costs in 2011 building projects

Building Jobs and Crafts Pattern in % of the Main Construction Works in 2011 Building Projects					
	Construction and Building Crafts	Communal Facilities	Residential Buildings	Production &Services Halls	Production & Services Buildings
1	Earth-moving works	1,9	1,0	3,8	3,1
2	Foundation	4,8	5,0	7,7	7,4
3	Vertical and complete structures	13,5	16,6	10,1	13,2
4	Horizontal structures	12,2	9,1	4,7	8,6
5	Communications	0,1		0,7	0,3
6	Surface finish, flooring	5,7	6,2	6,8	7,3
7	Piping	0,1	0,1	0,2	0,3
8	Other structures and demolition	4,0	3,7	3,0	5,2
9	MCW materials transportation	2,9	4,6	3,4	2,8
	MCW Total	45,2	46,3	40,4	48,2

Source: URS Praha Inc.

Profession providing the main costruction works (MCW):

1. Bricklayer (MCW)

The universal mason profession has been experiencing significant changes. The original profession included tilers, plasterers, workers in stucco, walling systems fitters and the latest addition being also insulation systems installers. A good mason can actually do a bit of all construction professions. However, these partial masonry professions have their independent professional guilds (Guild of tilers, Guild for building insulation, etc.) and are deployed in various stages of construction. In the process of Main Construction Production (MCP) masons with other craftsmen are involved in foundation works, vertical and horizontal supporting structures. Two trends have been observed at this stage of construction: one leads to a number of different building materials (brick, breeze blocks, masonry blocks) and gradually the proportion of prefabricated concrete, steel and wood structures has been mounting. Traditional building materials are supplied in the ranks of assembled fittings, are adjusted to jointless masonry and some have built-in thermal insulation. Different types of masonry materials require different technology and subsequent assembly of walling materials in their final finish. The second trend is the demand for accuracy and the requirement to brick up all openings, grooves, holes in the basic construction, without till today traditional cutting grooves for the subsequent sanitary ducts, wiring , piping, heating or electrical installations. It requires to proceed consequently according to the project instead of building from memory, as it has been the case till today. The work of individual professions needs to be meticulously coordinated starting from early stages (the shell). In connection with the BuildUp scheme even greater accuracy and professionalism can, therefore, be

expected. Any increase in productivity should be underpinned with a trend of fewer but better skilled masons.

2. Concrete and steel structures fitter

The concrete and steel structures fitter is a profession, which separated from the traditional mason with the emergence of prefabricated buildings and the development of prefabricated steel buildings. The installer is much more dependent on the exactly predetermined assembly technology. The assembly can be used for foundations, walls and horizontal skeletal structures. The knowledge and skills of a mason on the one hand, and locksmith and welding work needed for the steel structures on the other side, highlights the range of skills required. In terms of BuildUp, however, the energy efficiency features need to be already built in prefabricated components and the assembler must be trained mainly in the necessary coordination and informed about the purpose of the assembled system.

3. Concrete and iron work

The professions that emerged through specializing from the masonry profession with the emergence of monolithic concrete. The erection of formwork, reinforcement, iron work and concrete pouring inherently involves works performed by fitters, carpenters and joiners, locksmith and welders or concrete workers. In terms of BuidUp agenda if the monolith is employed in some designs, no significant change in working practice can be expected, though there might be more pronounced requirement for precision and the execution of all penetrations and partial modifications in the phase of carcass (shell) to address thermal bridging with structures that link spaces of different temperature standard. Thus in terms of the rest of professions the basic skeleton of the house the concreters build, can either facilitate or dramatically complicate their work.

4. Gypsum plaster board fitters, dry assembly and installation of wooden structures form an important occupational group that participates intensively in the efforts to enhance the passive standard of buildings. Even these professions are divided into several separate guilds, such as The Guild for dry construction in the Czech Republic, The Association for the construction of prefabricated wooden houses, etc. It is this Association that in cooperation with manufacturers has been intensively preparing for its members a package of necessary knowledge, skills and requirements for the individual technologies and their deployment in the building process. The method of spreading this knowledge and the respective skills will be covered in the next phase of the BuidUp project.

5. Machinists, machine operators, crane operators, drivers, scaffolders are professions, or services that in terms of the BuidUp agenda do not directly affect the energy performance of buildings, but have no doubt, an important role to play in creating conditions for the rest of professions. They can in particular benefit from the BuildUp program in getting the information on ongoing major changes to the building process and the requirements for the supply coordination and timely deployment of technical support for other professions.

Professions providing the associated construction works (PSV)

6. Insulator, moisture and water proofing, insulation against chemical influences, roof insulation are professions significantly affecting the structure of the building envelope. The assembly of insulating layers of solid wall cladding, roof solution, or for the ground moisture and groundwater protection of the building is always dependent on the overall composition and the materials used in the other layers, the application of the thermal insulation, its water absorption properties, the protection against external effects, humidity control in different modes of the building interior. The careful insulation design (bottom structure, exterior walls, roof or spaces partitions within the building) must be addressed in a comprehensive manner. It is mainly the idea of passive houses with heat recovery systems that calls for fundamentally new requirements as to the knowledge and skills of insulators and the manner and quality of the insulation execution. In sandwich structures the laboriousness is bound to increase dramatically. The trend may be offset by higher productivity and complex insulation systems employed in sandwich wall, floor and ceiling (roof) structures.

7. Plumber, sanitary systems and equipment fitter provides works related to water supply and distribution, sewage and gas piping, handles the installation of fixtures, hot water installation. Specialized work is provided be workers with special credentials and certificates: gas equipment and systems technician, gas equipment mechanic who provide the installations and inspections prior to the equipment's commissioning as well as its regular annual inspections. The Guild of Plumbers Czech Republic strives for the development of this profession as also other institutions do: Czech Association for technical equipment, Czech Gas Association, Association of entrepreneurs in the field of technical equipment of the Czech Republic. Sewage water heat recovery systems, which are currently in the stage of verification, seem to spearhead a new agenda. The related professions decisively add to the present concept of passive houses. In particular, the method of piping and ductwork insulation against heat loss, their passage through structures while preserving their tightness, selection and installation of energy efficient appliances and equipment. The coordination of work with that of the rest of professions has been becoming ever more difficult, yet increasingly important, the excellent workmanship is often crucial for the correct functioning of the passive house similarly as the high quality solution of architectural details and interiors addressing thermal bridging problem.

8. Plumber - heating engineer
installs hot water piping, heaters and water geezers. This profession gradually peeled off from the universal plumber. The profession's advancement is promoted by the Association of the heating equipment manufacturers, Heating Engineers and Plumbers Guild of the Czech Republic and District Heating Association of the Czech Republic, which develops the central heat sources, heat distribution, heat exchangers and end-consumer piping in houses.

Technical advances in materials and heat distribution technologies, in the types of heating, the transition to low-temperature heating, the departure from traditional radiators, control methods, variants of heat sources based on different renewable energy alternatives, just as the process of transition from remote heat sources, through the phase electrical heaters to the ever-expanding gas heating indicate the extent and dynamics of the profession, which needs to respond to innovative offer from the industry on an annual basis and increasing demands on the energy efficiency and performance of the freshly installed and reconstructed heating systems of buildings. With the arrival of thermal insulation integrated into the building envelope in combination with heat recovery requirements, many traditional practices and principles as so far applied in this profession, have changed in principle. There is even a greater demand for coordination than it was the case of traditional plumbing. It is not just about the spatial and time coordination of construction technology, but the proper involvement in the entire building physics resulting in an economical operation of the building.

9. Stove builder, chimney sweep

represent traditional professions, ensuring heating in local heating fire places. An important element of this work is to provide for fire safety of buildings. The use of renewable energy sources, such as biomass marks a reinvigoration of these occupations. Similarly, through many renovations of existing homes the use of local heating has been retained. The professional development of these occupations is fostered by the Guild of old stove fitters of the Czech Republic and the Fellowship of chimney sweeps of the Czech Republic. New requirements for energy-saving building would naturally significantly affect these professions because the requirement for thermal performance of individual devices would drop due to good insulation, while the question of the amount of CO2 in the room, just as requirements for airtightness of space equipped with heat recovery, would probably call for systematic changes in the use of heaters, their location, features and service.

10. Carpenter, fitter of wooden structures in wooden houses

Carpentry work is traditionally associated with the construction of roofs, so it is roofed by the Guild of tinsmiths, carpenters, roofers and joiners of the Czech Republic, which actually comprises three separate professions involved in the construction of conventional roofs. With the development of wooden structures, however, the profession is newly applied in the overall construction of the basic structure of the house (included in HSV). In both cases, the carpenter participates in the creation of the roof or wall and floor of the building envelope and fully extends to the concept of the passive house. The traditional knowledge of the fundamental material, wood, is now to be advanced to include information on the functioning of various composite structures in terms of their interaction, creating vapour-permeable and airtight barriers in structures, creating a standard climate in the interior, keeping the humidity and CO2 at standard values. Apart from these new aspects of work, there is still the issue of wood protection against drying, moisture, mold and the like, which significantly affect the durability of wooden structures.

11. Roofer, laying of hard roofing

The Roofer is the third traditional profession involved in the construction of roof cladding made of tiles. The tin roofs are made by the plumber/tinsmith, flat coated roofs by insulators. Even the concept of a traditional roof has been changing fundamentally. Roofing has become part of most sandwich roof constructions, providing a thermal comfort in the roof space and the issue of its composition, auxiliary insulation ventilation, maintenance, and solutions of passage openings, offer by manufacturers who supply complete systems including various fittings and ancillary parts and components, place new demands on the profession.

12. Plumber, tinsmith

provides roof accessories, gutters, eaves, valleys and the whole metal roofing. Limits of the work performed by the plumber and the roofer overlap to a large extent with assembled, prefabricated systems. Therefore, the requirements for roof solution and their influence on the overall building envelope, as described above for carpenters and roofers, also apply to plumbers. After all, their common Guild also suggests the proximity of their activities.

13. Construction carpenter

The construction carpenter, now more often than the fitter, ensures windows and doors production and installation. These products including glaziers work have been almost entirely shifted to the factory production, also a substantial share of traditional wooden structures has been replaced by a plastic or metal frame. Nevertheless, the correct mounting of windows and doors, especially those that form part of the exterior building envelope is essential for the desired effect of the thermal insulation of buildings. Errors arise in production and during the assembly as well as positioning the window in the wall and its subsequent sealing. A good passive house needs to have both an excellent design and window or door mounting of external cavity walls. Similarly, after the emergence of heat recovery systems, internal doors installation, too, has been undergoing changes that must be familiar to the assembler. He needs to respect the concept of internal space physics in accurately installing all products.

14. Locksmith

Locksmith is a profession providing metalwork and has several roles to play during the in situ construction process. The locksmith is involved in the installation of the basic metal structure (though this is now mostly done by the specialized assembler assigned by the steel structures supplier), further he is present during the installation of additional metal structures (such as windows, greenhouses, elevator shafts, bearing structures for various technical facilities or interior, etc.), provides handrails or fencing. The locksmith cooperates with the welder, whose profession is promoted by the ANB Czech Welding Society. Like the carpenter, the locksmith, too, enters the construction processes and provides structures that are directly related to the design and execution of the building envelope. In this sense, he significantly contributes to meeting the desired target values.

15. Floorer

The profession is in practice often divided into a number of sub-specializations according to material and technology he uses. The suitability of the chosen material and its proper application is often critical for nearly zero energy homes. The proper execution of the floor layers, issues of moisture and vapour penetration or else floor heating and many other floor properties, may form a stumbling block even if quality materials have been used otherwise. In terms of this profession it will be of particular relevance for flooring manufacturers to prepare "good practice sheets" relating to individual technological procedures.

16. Painter, varnisher, decorator

This trio of traditional occupations is associated in the common Guild of painters and decorators of the Czech Republic. Their work is crucial for the final impression the completed new build or reconstruction may give, even though it can obviously make no difference as to its structural solution. The building physics enhanced with heat recovery features, is particularly vulnerable to the actual permeability or tightness of the space, the water vapour condensation and other factors related to this profession.

17. Bricklayer in the associated building production (PSV)

The mason in the PSV is involved in a number of relatively independent phases of work for which separate sub-professions are formed and which develop under the umbrella of separate professional Associations and Guilds. Lately, it is especially the insulation systems fitter, who ensures the complete insulation system design, including the final plaster and render. Gradually, some progress is being made by practitioners in increasingly sticking to the specific authorized and verified ETICS. Yet, a considerable number of details of balconies, parapets at the foundations of houses etc., still show early stage defects that are being eliminated only gradually. CR's Guild for building insulation is in charge of this process. Emerging materials with higher insulating value (vacuum insulation, etc.), are steadily mounting pressure on corresponding innovations in the building process. Let us mention by way of example the use of polyurethane foam for roof insulation, which called for new professions to be created under the umbrella of PUR Association – The Czech Society for polyurethane construction. The plasterer or stuccoer thus abandons some classic external plasters. The internal plaster situation is similar to that of the above mentioned profession of decorator and painter. The repairs and restoration of heritage building requires a separate specialization.

Tilers form another profession that originated from the masonry. They are members of the Guild of Tilers of the Czech Republic. Even with this traditional Czech occupation similar conclusions can be drawn as in case of painters, decorators. However, it should be emphasized that the new sandwich constructions on top of which the tiles are laid, may often behave differently thus requiring different workflows and methods. This issue is important for example, in case of external tiling on the balcony or terrace, wherever joining the basic insulated structure of the house. The solution must address water logging and drainage

problems as also the effect of water especially at temperatures around the freezing point. The Tilers' Guild tackles this and many other questions.

Table 26 - Professions providing PSV construction works and the pattern of their costs in 2011 building projects

Building Jobs and Crafts Pattern in % of the PSV Works in 2011 Building Projects					
	Construction and Building Crafts	Communal Facilities	Residential Buildings	Production &Services Halls	Production &Service Buildings
10	Water-proofing	1,2	0,8	1,4	1,6
11	Roof Insulation	2,2	1,4	3,2	3,1
12	Thermal Insulation	1,9	1,4	2,2	2,0
13	Acoustic & antivibration measures	0,4		0,1	0,1
14	Insulation against chemicals	0,2		1,2	1,1
15	Sanitary technology and internal sewage	1,0	0,8	0,5	0,6
16	Sanitary technology and water piping	1,0	1,2	0,4	0,5
17	Sanitary technology and gas piping	0,1	0,2		
18	Sanitary technology and machinery	0,1	0,1		0,1
19	Sanitary technology and fixtures	1,1	3,1	0,2	1,6
20	Installationsí+B62 prefabs		4,0		
21	Central Heating , boiler rooms	0,2	0,4	0,3	1,7
22	Central Heating , utilities	0,3	0,2	0,1	0,6
23	Central Heating, distribution pipes	1,1	1,5	0,9	1,0
24	Central Heating , fittings	0,9	0,8	0,6	1,2
25	Central Heating, radiators	0,8	1,3	0,5	0,4
26	Constructions, glass-crete		0,1	0,1	
27	Constructions, carpentery	0,6	1,2	0,4	0,3
28	Constructions, wooden	0,2		0,9	0,1
29	Constructions, tinsmith'	1,1	1,3	0,9	0,7
30	Constructions,- hard roofing	0,1	0,4	0,2	
31	Constructions, joinery	3,4	6,9	0,4	0,7
32	Constructions, metal accessories	10,4	6,9	9,7	9,6
33	Flooring of tiles	2,1	1,5	0,6	0,8
34	Flooring of natural or artificial stone	1,0	0,1	0,1	0,1
	Flooringof cast terrazzo			0,1	0,1
36	Flooring, parquetry	0,1	0,1		0,1
37	Flooring, coated	1,2	2,0	0,1	0,2
38	Flooring, synthetic	0,7	0,9	1,1	0,8
39	Lining and facing	2,7	1,4	0,8	1,3
40	Reverrment	1,0	0,1		
41	Paints and coats	1,2	1,2	3,2	2,1
42	White-washing, wall painting	0,3	0,8	0,2	0,2
43	Upholstering	0,2	0,4		
44	Glazing	0,5	0,3	0,4	0,1
45	Kitchen furnishing	1,0	0,3		
46	Lundry and dry cleaning equipment		0,1		
47	Local heating facilities				
48	Others		0,2	0,2	
	PSV TOTAL	40,3	43,4	31,0	32,8

Source: ÚRS Praha, Inc.

Finally, let us mention the stonemason, who provides the stone as a variant to ceramics. Stonework sticks to practices proven over centuries. Yet, the employment of stone in nearly zero energy houses will need an informed consideration, whether new requirements on interior and external surfaces can be met using traditional methods.

Table 27 - Professsions providing the Mcen main construction and their cost patter in 2011 building projects

Building Jobs and Crafts Pattern in % of the costs Mcen in 2011 Building Projects					
	Construction and Building Crafts	Communal Facilities	Residential Buildings	Production &Services Halls	Production &Services Buildings
49	Heavy Current	5,7	4,9	3,8	4,4
50	Communication & Security Equipment Assembly	1,7	1,1	0,5	0,6
51	Piping Assembly	0,1		0,1	0,1
52	Air Conditioning Assembly	2,7	0,9	1,4	0,8
53	Transport Equipment Assembly	2,0	2,6	0,2	0,4
54	Pumps and Compressors Assembly	0,1			0,3
55	Measuring and Regulation Equipment Assembly	0,5	0,3	0,3	0,6
56	Steel Structures Assembly	1,3	0,3	21,9	11,1
57	Earth-moving works			0,2	0,1
58	Other jobs as per Assemblies (M) P	0,4	0,2	0,2	0,6
	Assemblies (Mcen) TOTAL	14,5	10,3	28,6	19,0

Source: ÚRS Praha, Inc.

Professsions ensuring (Mcen) assemblies:

18. Heavy - current electrician

The work by electricians has been getting ever more complicated due to new requirements for physical properties of walls, especially their sandwich structure. Electrical wiring routes and passageways need to be either determined and adjusted in advance, or placed into the structure in a manner that would not impair its airtight properties, or cause thermal bridges or disrupt humidity permeability through layers or spaces. The architectural requirement naturally is to hide the wiring. The solution calls for maximum cooperation of the project and the concerned building professions. An energy passive or even active house saves or even generates energy using photovoltaic panels. The Czech Lightning Conductor, the electrical engineering association, promotes the solutions to the new tasks facing the profession, such as minimizing operation costs, new lighting systems including location and choice of lighting fixtures .

19. Electrician - Low voltage distribution systems

An economical operation of the house is hardly imaginable without the intelligent control of heating, ventilation, lighting and shading. The operation of the equipment using renewable energy sources, solar and wind power, geothermal heat, just as environment friendly operation of a wide range of appliances depends on measurement and control systems. Comprehensive 'intelligent house control systems have found their niche in the market. In this respect the profession may have a high level of expertise and a narrow specialization. Yet, it is of critical importance for the final efficiency of measures conducive to the desired energy performance of the house and its resulting low-cost operation.

The security systems form another similar group. The security of the house includes a number of measures, products and technologies, such as shatterproof glass, safety locks, fencing, etc. and derives mainly from electronic security systems, CCTV systems, etc., connected to the control system of the intelligent house and the security guards.

Finally, the traditional low voltage wiring, such as aerial wiring, bells, telephone and through its lines operated internet, pose in terms of their routing and mounting on and in the structures, a similar problem as that of power systems.

20. Installation of HVAC equipment

Installation, assembly and cleaning of air-conditioning ductwork, filters and air handling and heat recovery units represents one of the occupations facing best prospects for its expansion, notably in homes where it has so far been used only rarely. Heat recovery and ventilation equipment of the Passive House is one of the "hottest news" for its future occupants. Their installation will, therefore, be for some time to come, always accompanied with the requirement of education. You can now safely assume that, just as in the case of gas boilers revisions, the need of sanitary inspections is bound to grow as also that for professional cleaning of installed distribution ducts. This profession is represented by the Association of refrigeration and air conditioning technology. A relatively large footprint of HVAC air duct system and the rest of equipment including cooling, heating and heat recovery units, calls for relevant provisions to be made in the phase of the project. HVAC systems will draw attention of all masonry and plumbing professionals who will provide passages through the structures for air ducts, outlet vents or air return grilles, wiring etc. The coordination of all crafts and professions thus constitutes one of the fundamentals of the future building productivity.

21. Installation of additional equipment

The installation of additional equipment requires specialized professions for the assembly: pumps, compressors, hydraulic equipment, transport equipment (elevators and escalators) and other devices. Each of these specializations is based on the specific application of industrial products to be permanently built in the construction. Some of them directly determine or affect the energy performance of the passive house (heat pumps), others provide traditional services (lifts).The Installation of these devices into the newly designed

space of the passive house has many features in common with that of ventilation equipment and other technical installations. The Fellowship of lifting equipment technicians, the Association of pressure equipment workers, the Union of elevator industry are the respective umbrella organizations. The training of these professions is primarily dependent on the specific manufacturers. In terms of the building process it is again the need for coordination and insight into the working practices of other related professions that take up where installers left off, that matters a lot.

7.6.3. Scope of innovations as Required in Adult Education in the Building Sector

For the Czech building industry to adapt to the ongoing modernization trends within the sector and to meet the 2020 targets for energy performance of buildings, it will be necessary to increase the initial education and adult learning capacities in the following blue collar crafts:

- **Gypsum plaster board fitters, dry assembly (no wood)**
- **Carpenter and fitter of wooden structures**
- **Construction carpenter (including wooden structures)**
- **Bricklayer PSV: insulation, plaster, stucco**
- **Electrician, low voltage distribution**

In virtually all fields of education there will be a need to carry out substantial changes in the run up to 2020, the changes should be particularly strong in the following areas:

- **Bricklayer HSV**
- **Gypsum Plaster Board fitters, dry assembly (no wood)**
- **Plumber-heating engineer**
- **Carpenter and wooden structures fitter**
- **Construction carpenter (including wooden structures)**
- **Bricklayer PSV: insulation, plaster, stucco**
- **Air**

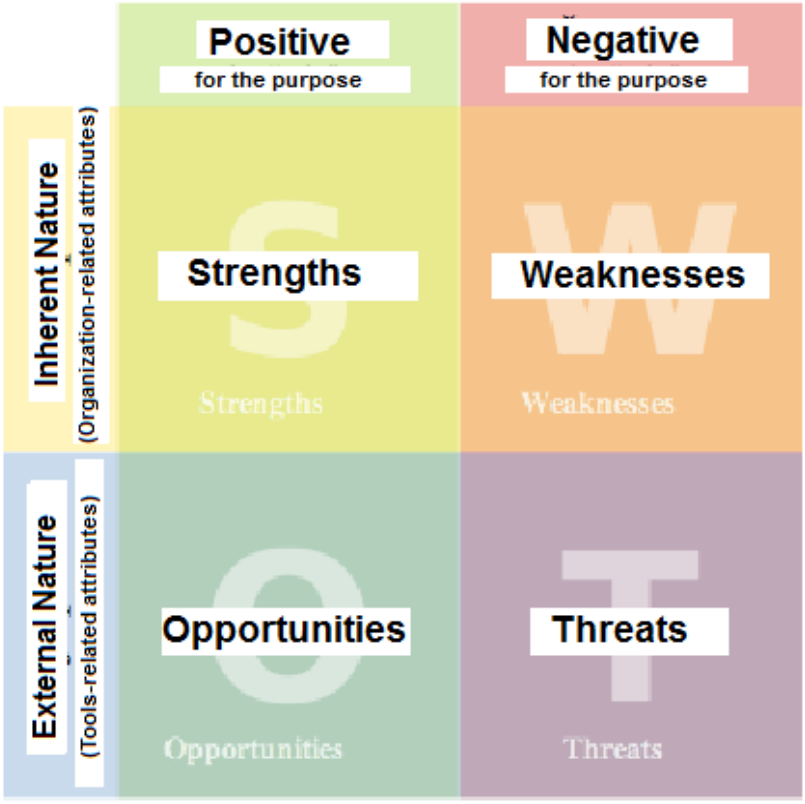
Table 28 - Quantitative and Qualitative 2020 building professions needs estimate

No.	Crafts	Expected growth or decline by 2020	Degree of innovations, knowledge&skills by 2020
	HSV		
1	Bricklayer HSV	Slight Decline	**System innovation**
2	Concrete&Steel Structures Fitter	Slight Decline	Partial innovation
3	Concrete&Steel Works	Slight Decline	Partial innovation
4	Gypsum Plaster Board Fitter (excl. wood)	**Slight Growth**	**System innovation**
5	Machinist, Machine Operator, Crane Operator, Scaffolder, Driver	Stable share	Basic information
	PSV		
6	Insulator, water-proofing, roof insulation	Slight Decline	Partial innovation
7	Installer, water, sewage, gas	Stablne Share	Partial innovation
8	Installer-Heating Engineer	Decline	**System innovation**
9	Stove Builder& Chimney sweep	Decline	Partial innovation
10	Carpenter&Wooden Structures Fitter	**Growth**	**System innovation**
11	Roofer, Roof Tiler	Stable Share	Partial innovation
12	Tinsmith, Plumber	Stable Share	Partial innovation
13	Joiner (including wooden structures)	**Slight Growth**	**System innovation**
14	Locksmith	Stable Share	Partial innovation
15	Floorer	Stable Share	Partial innovation
16	Painer, Varnisher, Decorator	Stable Share	Partial innovation
17	Mason PSV: Thermal Insulation, Plasters, Stucco Tiler (Stonemason)	**Slight Growth**	**System innovation** Partial innovation
	Mcen Assemblies		
18	Heavy-current Electrician	Stable Share	Partial innovation
19	Weak-current Electrician	**Slight Growth**	Partial innovation
20	Air&Ventilation Technology	**Large Growth**	**System innovation**
21	Other Equipment Assembly	Stable Share	Basic information

8. Barriers

The SWOT - Analysis method was used to define obstacles in upgrading skills in the Czech building sector. The aim of these efforts was to **reconcile through a moderated discussion varied professional expertise** as espoused by individual members of the team of authors and to try and identify both the main sticking blocks and gaps as well as strategies to bridge them.

Chart 17 - SWOT Analysis



How to talk over SWOT Analysis: proceed according to the following steps:

- set targets
- identify strengths and weaknesses (internal environment)
- identify opportunities and threats (external environment)
- outline strategies: so, wo, st, aw

8.1. SWOT Analysis

STRENGTHS
• stabilized pattern of companies capable of responding flexibly to the current situation • quality material base • base of technical and technological equipment of buildings • a stable quality system of apprenticeship, secondary and tertiary (University) education • the existence of SPS (Association of Building Entrepreneurs in the Czech Republic), guilds and chambers that are concerned with the profession

WEAKNESSES
• lack of a uniform system of construction, strategic management, field concept • low interest among young people in upskilling in the field • Low labour productivity in construction • Poor coordination of work, low management level . • Inadequate check-ups of the quality of work • Lack of building operation and management specialists • Low interest in blue collar crafts adult education and training (low motivation) • Inflexible education system in relation to new technical and technological approaches • Language barriers • Lack of interdisciplinary education

OPPORTUNITIES
• Mandatory energy audit • A great scope for reconstruction and modernization of existing buildings • State support to environmentally beneficial measures (ZÚ, SFŽP, OPŽP,..) • Support for non-profit and private commercial educational institutions • Tap European funds to finance vocational training and further education

THREATS
• The unpredictability of the legislative environment • Difficult access to capital • Continuing decline in public procurement

- Inefficient Public Procurement Act (obsession to minimize investment regardless of operation costs, low price at the expense of quality)
- Lack of readiness of the population to use and operate passive houses
- Low and unstable Government support for RES
- Growing incompetence at all levels of public administration in the building sector
- Further decline of interest in apprenticeship
- No requirement to prove professional qualifications in technical supervision licence applications
- Discontinuity of education programs funded by one-off grants
- Unskilled workforce deployment to cut costs

8.2. Rizika

SWOT - Analysis statements on weaknesses and threats are crucial for the purpose of identifying obstacles. They pinpoint the risks involved in meeting targets as outlined in Chapter 6

The major obstacles, therefore, include:

- **Lack of a uniform strategic management system, field concept in the building sector**
- **Low labor productivity in construction**
- **Pressure by companies to deploy unskilled workers in order to cut costs**
- **Low level of management**
- **Low interest of young people in the education field**
- **Low interest in blue collar crafts adult education and training (low motivation)**
- **The unpredictability of the legislative environment**
- **Lack of readiness of the population to use and operate passive houses**
- **Low and unstable Government support for the use of RES**

9. Conclusions

The National Status Quo Analysis is the first output of the BUILD UP Skills Czech Republic Project, whose **primary objective** is to review the training needs of building sector's blue collar operatives against the energy performance of buildings targets, as defined by the Directive 2010/31/EU (EPBD II) and the related national legislation.
The National Analysis findings will become a mainstay for the work in subsequent phases of the BUILD UP Skills Czech Republic Project, notably the National Roadmap, which will come

up with its own proposals for the required VET and up-skilling of building sector blue collar workforce.

The Roadmap proposals will need to take into account in particular the following National Analysis conclusions:

- The requirement for energy-efficient building in the CR forms a part of a wider set of **modernization** targets of the industry, which – in order to maintain its competitive edge - will need to fulfill other tall tasks by the year 2020, such as labour productivity growth, higher quality of management, organizational restructuring, capital facilities growth, acquisition of modern technologies and materials, etc. For this reason, the demand for enhanced green skills of the blue collar workforce in order to meet the construction energy efficiency targets, forms only a partial aspect of the CR's building sector profile advancement.
- Vocational education and training of workers in the CR's building Industry needs to respect the specific characteristics of the pattern and traditions of the Czech educational system, which is known to "produce" a substantial number of workers with **secondary education** (which also includes apprenticeships). By virtue of this mere fact, the already existing educational pattern of building sector workers in the Czech Republic is in formal terms relatively high. The education pattern, however, says little about the actual level of qualifications as acquired by graduates, let alone their skills to address new challenges.
- The demand for higher skills moreover coincides with the **shrinking employment** in this sector
- Demographic trends in the Czech Republic indicate a stagnation of total labour force in the national economy (by the year 2020), as well as less numerous age groups to enroll in schools, or get their first jobs.

These factors combined, result in shifting the up-skilling challenge in the Czech Republic's building sector to the sphere of **lifelong learning** (adult education), rather than the initial/primary education. Hence, rather than increasing its absolute capacity, the initial/primary education would need to be streamlined to offer a modern education process closely linked to the prospective labour market needs.

Further vocational education and training of blue collar craftsmen is a "bottleneck" within the framework of lifelong learning as it currently faces the barriers of low interest, both on the part of individual craftsmen and small and medium-sized companies. As shown in the National Analysis findings - **the focus of efforts** to overcome this "bottleneck" is to be predominantly on green skills.

The National Analysis, however, reveals other key issues that the National Roadmap will need to zero in on. Besides the already mentioned **lack of motivation** in VET on the part of both craftsmen and a large part of their employers, it is the lack of a **uniform strategy management system** in the building sector. This, further aggravated by the current rather

poor quality management of the construction companies, threatens the future growth targets of the Czech construction industry.

At present the risks to the future **program implementation in practice**, therefore, seem to be even more crucial than those arising from the fact that the National Analysis job has not been fully completed in its scope. Specifically, it is the senior and middle management training needs analysis and the financial cost analysis of the different forms of education. Unfortunately, adequate input could not be traced for these issues. Otherwise, the rest of issues related to green building, have been tackled in the present National Analysis, (Status Quo and development prospects of the construction industry in the Czech Republic, legislation to improve the energy performance of buildings, the Status Quo and development prospects of the energy sector in the Czech Republic, the current qualification pattern of building sector workforce and determination of qualitative and quantitative requirements for the sector's future qualification profile).

The National Roadmap should further pursue the results of the National Analysis, in terms of fundamental up-skilling strategies for blue collar workforce in the Czech building sector. These strategies build on **SWOT - Analysis,** which coincides with the National Analysis, and summarizes the most important facts (as shared in the research team) related to this issue. Proceeding from the SWOT - Analysis four types of strategies can be defined as follows:

SO Strategy (maxi-maxi)

SO (maxi-maxi) Strategy is trying to make use of as many strengths as possible so that the ensuing opportunities be fully availed of.

- Make use of existing training capacity within primary education for retraining and other forms of adult education
- Tap on the expertise of the non-governmental, non profit education institutions, Secondary Vocational Schools and guilds to transform the lifelong learning in the Czech Republic
- Enhance the flexibility and quality of the construction companies management and their material base to deploy RES in an expedited manner

WO Strategy (mini-maxi)

WO (mini-maxi) strategy aims at overcoming weaknesses so that the ensuing opportunities be fully availed of.

- Make the requirement of system quality management of buildings conditional on Government support
- Tap European funds to boost the interest in blue collar vocational education and training
- Boost the interest of the self-employed in professions that are newly in demand

ST Strategy (maxi-mini)

ST (maxi-mini) Strategy employs strengths to eliminate threats

- Establish a central state administrative body for construction
- Gain investor interest through public presentation of innovative and efficient technologies
- Make lifelong learning system accessible to foreign workers
- Create continuous funding system for BuildUp Skills program

WT strategy (mini-mini)

WT (mini-mini) strategy solves the accumulation of adverse factors through minimizing adverse effects.

- Improve linguistic proficiency of foreign workers
- Boost the interest in apprenticeship through enhanced links and interactions with the practice

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12. Glossary

Budova s téměř nulovou spotřebou energie = Nearly zero energy building (nZEB)

Další vzdělávání a výcvik = Vocational education and training (VET)

Energetická náročnost budov = Energy performance of buildings

KVET (Kombinovaná výroba elektřiny a tepla) **= CHP** (Combined heat and power)

OZE (Obnovitelné zdroje energie) = **RES** (Renewable energy sources)

Národní kvalifikační platforma = National Qualification Platform

Národní kvalifikační rámec = National Qualification Framework

Národní plán vzdělávání ve stavebnictví = National Roadmap

Řídící výbor = Steering committee

Zainteresované osoby = Stakeholders

Annex 1 Stakeholders (National Qualification Platform)

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BACK COVER

BUILD UP Skills

The EU Sustainable Building Workforce Initiative in the field of energy efficiency and renewable energy

BUILD UP Skills is a strategic initiative under the Intelligent Energy Europe (IEE) programme to boost continuing or further education and training of craftsmen and other on-site construction workers and systems installers in the building sector. The final aim is to increase the number of qualified workers across Europe to deliver renovations offering a high energy performance as well as new, nearly zero-energy buildings. The initiative addresses skills in relation to energy efficiency and renewable energy in all types of buildings.

BUILD UP Skills has two phases:

I. First, the objective is to set up national qualification platforms and roadmaps to successfully train the building workforce in order to meet the targets for 2020 and beyond.

II. Based on these roadmaps, the second step is to facilitate the introduction of new and/or the upgrading of existing qualification and training schemes.

Throughout the whole duration of the initiative, regular exchange activities are organised at EU level to underline the European dimension of this important initiative and to foster the learning among countries.

The BUILD UP Skills Initiative contributes to the objectives of two flagship initiatives of the Commission's 'Europe 2020' strategy — 'Resource-efficient Europe' and 'An Agenda for new skills and jobs'. It is part of the Commission's Energy Efficiency Action Plan 2011. It will also enhance interactions with the existing structures and funding instruments like the European Social Fund (ESF) and the Lifelong Learning Programme and will be based on the European Qualification Framework (EQF) and its learning outcome approach.

Best buildings in the Czech Republic, 'Building of the Year' show winners in the years 2001-2011