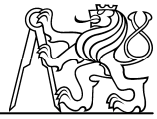
The Czech Technical University in Prague
Faculty of Civil Engeneering
Department of Steel and Timber Structures

ARCELOR MITTAL

Project on Affordable housing
The Czech Republic

growing steel house - family rules



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1. Socio – economic evaluation

1.1. General description of the Czech Republic

1.1.1. Basic information on the Czech Republic

The Czech Republic is located in Central Europe. It borders with Germany (810.3 km, in the west), Poland (761.8 km, north), Slovakia (251.8 km, east) and Austria (466.3 km, south). The country can be geographically divided into three regions: Bohemia, Moravia and a part of Silesia. It occupies an area of about 78,800 square kilometers and has approximately 10.5 million inhabitants as of 2009. The capital city is Prague which is located in the central part of Bohemia. The Czech Republic is a pluralist multi-party parliamentary representative democracy and is administratively divided into 14 regions.

Location of the Czech Republic in Europe *(source: wikipedia.org)*

1.1.2. Basic facts summary

Area	78,864 km^2
Population	10.47 million
Labor force	5.2 million
Capital	Prague
Language	Czech
Currency	Czech koruna (CZK)
Exchange rate:	1 EUR = 26.220 CZK (23/06/2009)

Division into regions *(source: www.eru.cz)*

1.1.3. Brief historical background:

Historically, the country was under the rule of the Habsburgs (from the early 16th century) and later became part of the Austro-Hungarian Empire. After the collapse of the Austro-Hungarian Empire in 1918 (after World War I) an independent Republic of Czechoslovakia was established. The country was then in 1938 (after the Munich Agreement) partly occupied by the Germans. In 1939, Slovakia proclaimed its independence and in the Czech part of the country the Protectorate of Bohemia and Moravia was established by the Nazi Germany. It was liberated in 1945 by the American Army (from the west) and the Red Army (from the east). In the election in 1946 (and 1948) the communist party obtained the majority of votes and the country became communist-ruled. In 1968 attempts to reform the regime occurred (referred to as Prague Spring), but these attempts were suppressed by the armies of the Warsaw pact (invasion). The regime collapsed in November of 1989. On January 1st, 1993 Czechoslovakia eventually separated into two independent countries, the Czech Republic and Slovakia.

1.1.4. Foreign Policy

The Czech Republic is a member of the following organizations: EU (European Union, since 2004), NATO (North Atlantic Treaty Organization, since 1999), WTO

(World Trade Organization), UN (United Nations), IMF (International Monetary Fund), OECD (Organization for Economic Cooperation and Development), IEA (International Energy Agency), IWC (International Whaling Commission) and many other international organizations.

1.1.5. Political system:

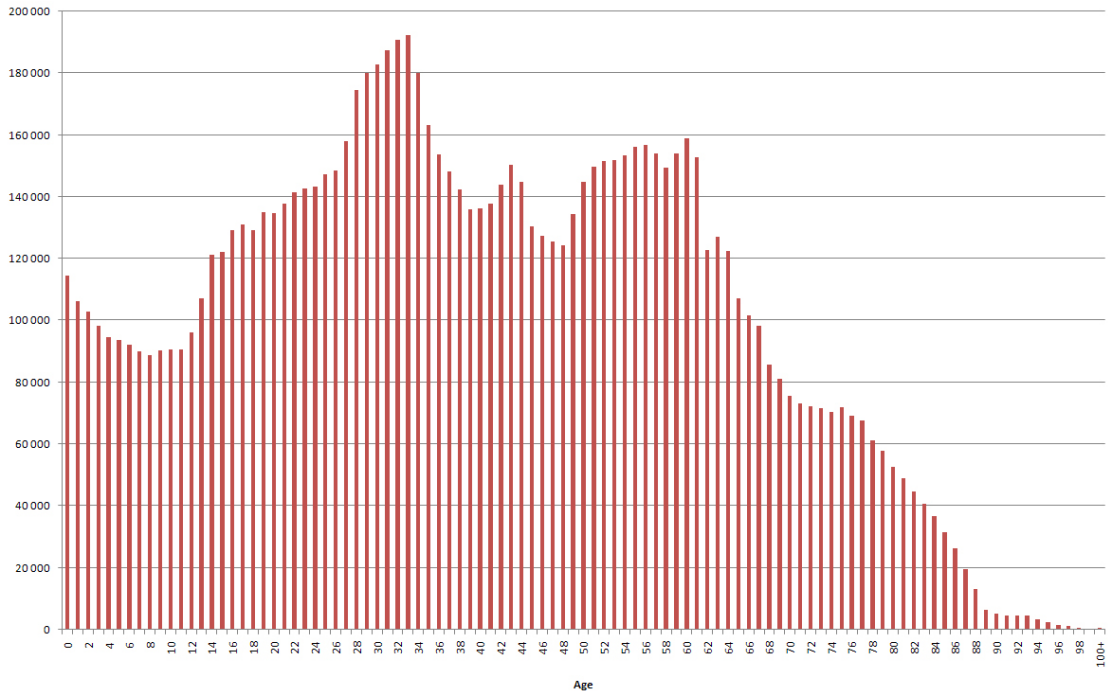
The Czech Republic is a pluralist multi-party parliamentary representative republic. The head of the state is the President. The head of the executive power is the Prime Minister, who is the head of government. The government is bicameral – constituting of the Senate and the Chamber of Deputies.

The Czech political scene consists of quite significant amount of parties ranging from extreme right (number of extremist nationalist parties) to extreme left (Communist party and similar). The major parties are: Civic Democratic Party (ODS), Czech Social Democratic Party (CSSD), Communist Party of Bohemia and Moravia (KSCM), Christian and Democratic Union – Czechoslovak People's Party (KDU-CSL) and Green Party (SZ).

Generally, most people vote for one of the larger parties, even though there are a number of smaller parties at the scene. Often a reluctant attitude towards political situation is observed.

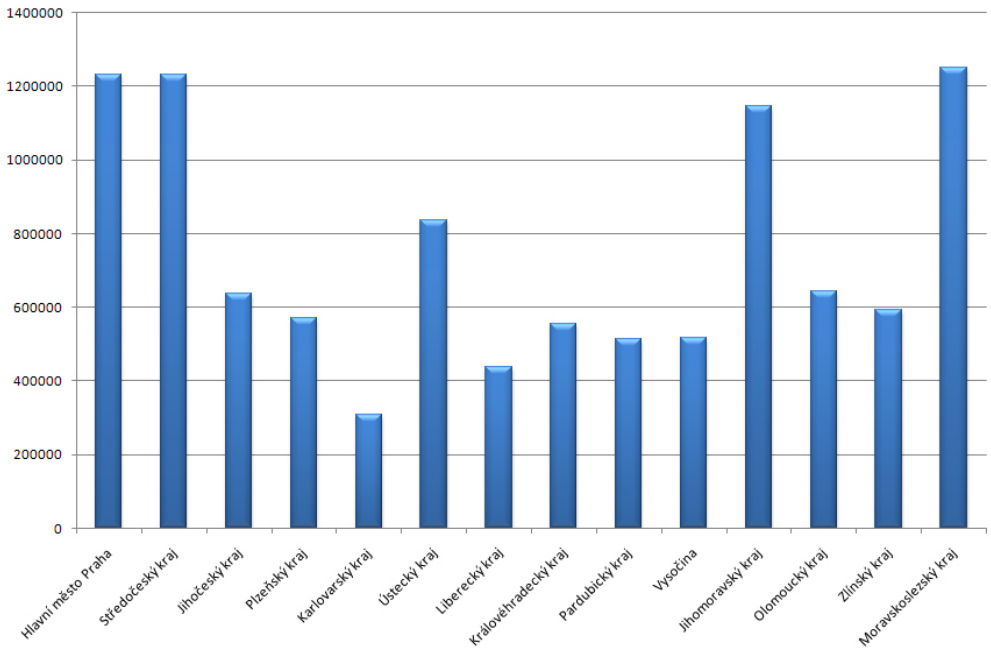
1.1.6. Population

As mentioned previously, the Czech Republic has almost 10.5 million inhabitants as of March 2009. The age distribution of the population as of January 1, 2008 may be observed from the following Figure. In this Figure distribution it is sex, marital status and similar are not distinguished.



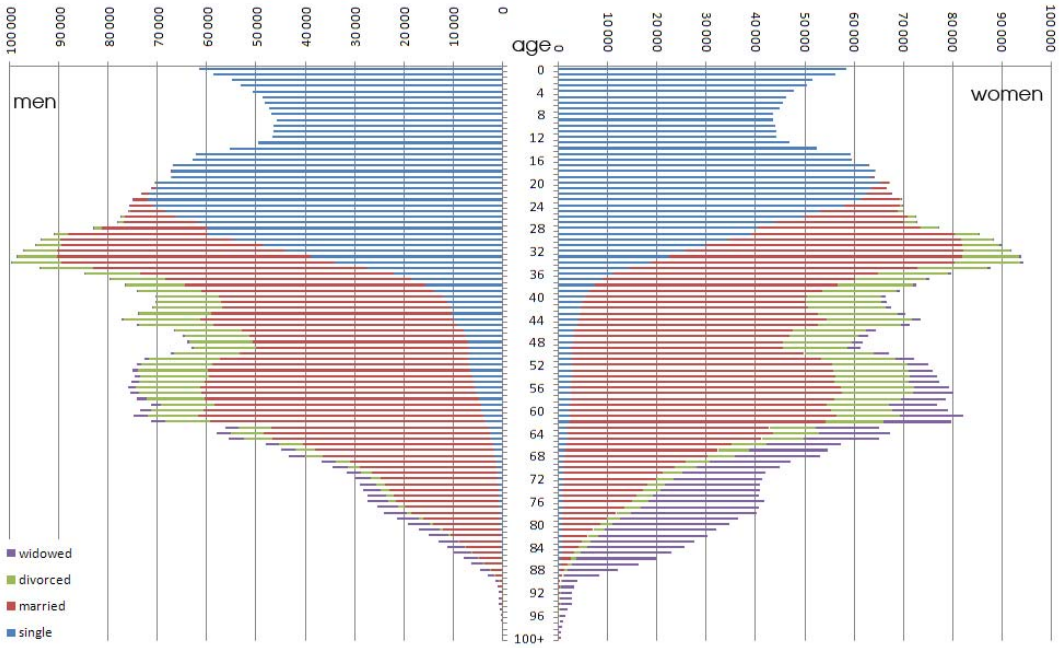
Population by age (*source:Czech Statistical Office)*

As in every country in the world, the population is not equally distributed within the country. The distribution of population (as of January 2009) in various regions can be seen in the following Figure. In this Figure, both sexes and all age categories are included.



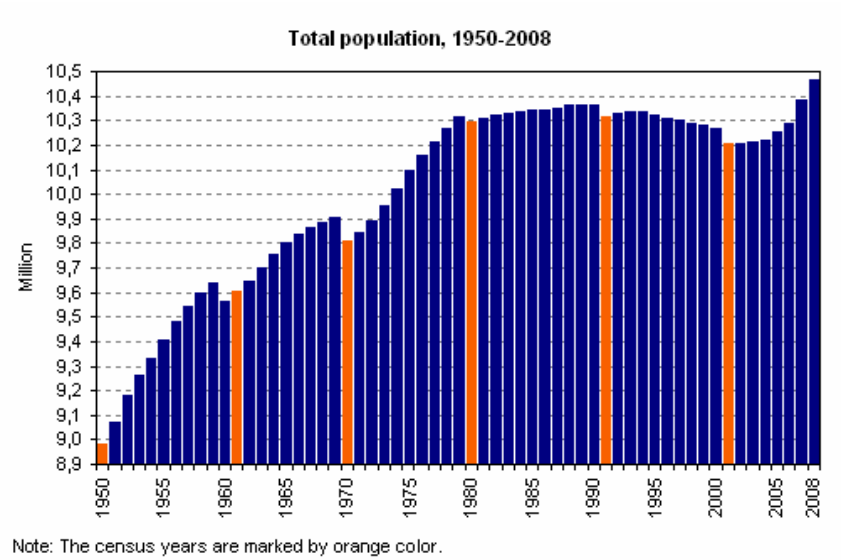
Population by region *(source: Czech Statistical Office)*

The following Figure shows the distribution of population based on sex, age and marital status as of January 2009.

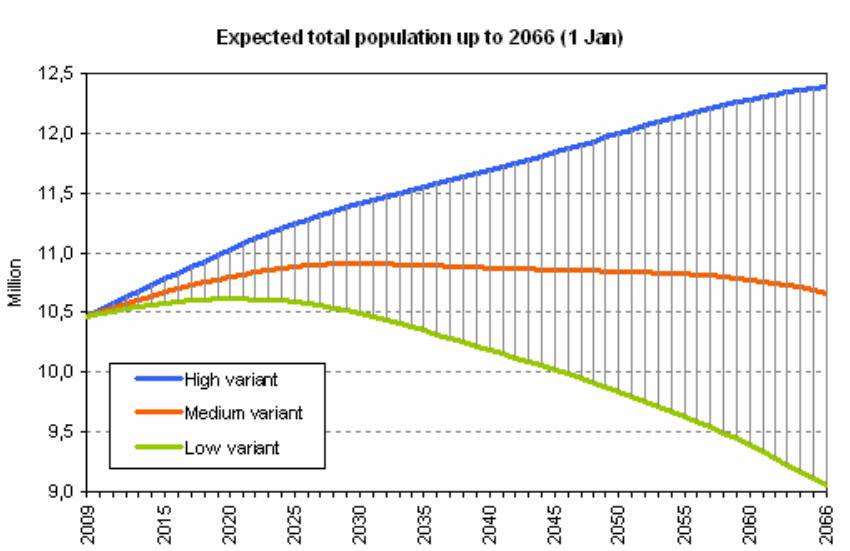


Population by age, sex and marital status ***(source: Czech Statistical Office)***

Population growth over the past 50 years and the expected population development in the future may be observed in the following Figures.



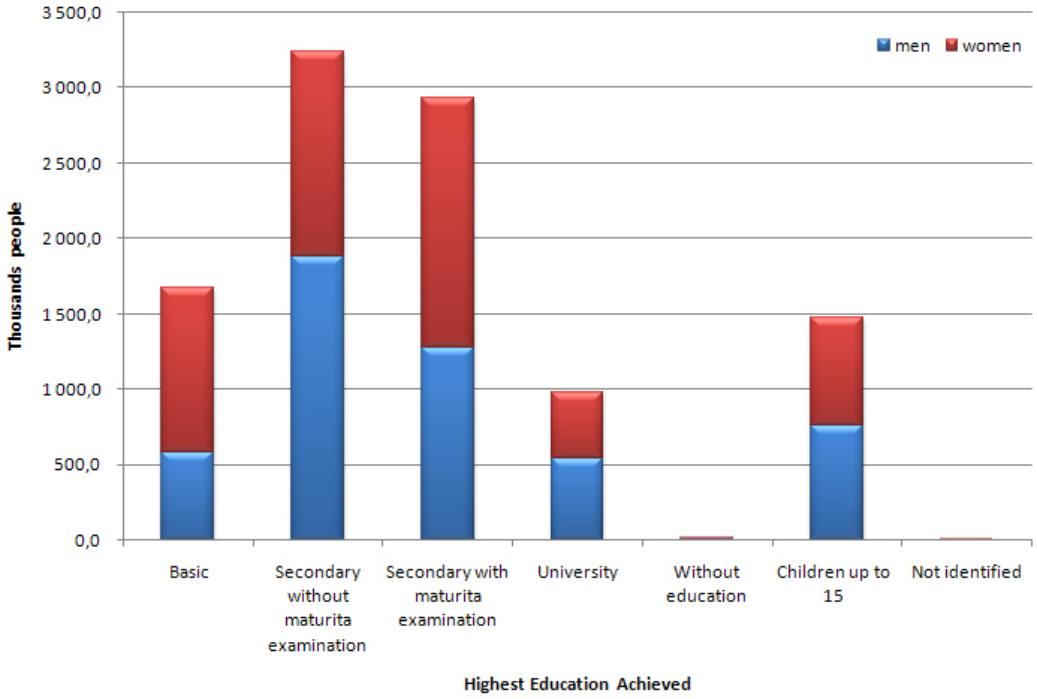
Population development 1950 – 2008 ***(source:Czech Statistical Office)***



Expected population development *(source: Czech Statistical Office)*

1.1.7. Labor market

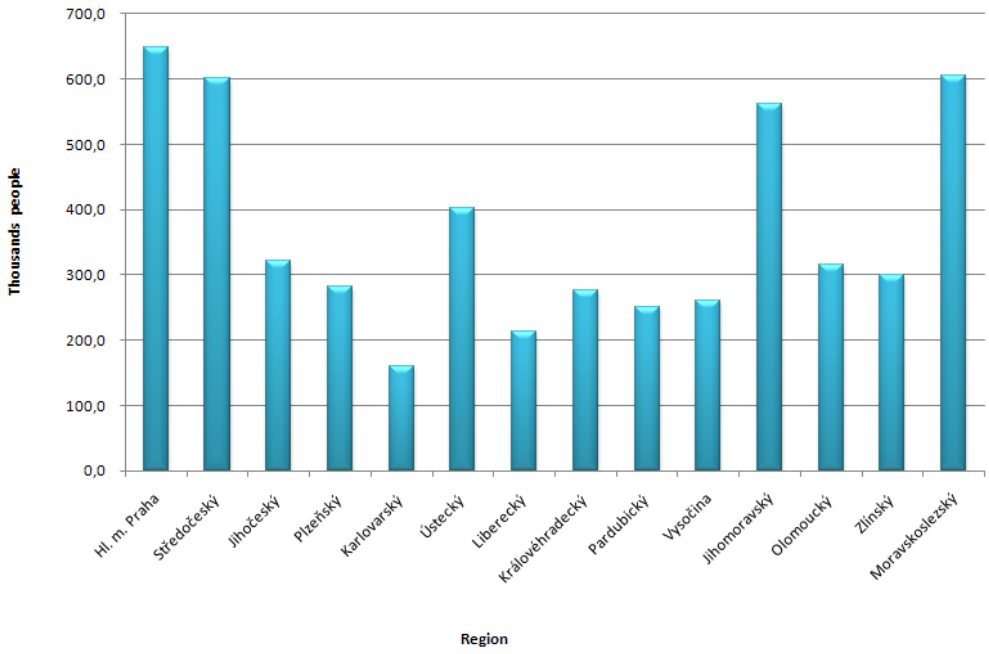
To better understand the Czech labor market, it is necessary to have a look at the population with respect to education. In the Czech Republic, around 9.5 % of the population has university education and around 60 % finished their secondary education. More detailed distribution as of 2007 can be observed from the following Chart.



Population by education attained *(source: Czech Statistical Office)*

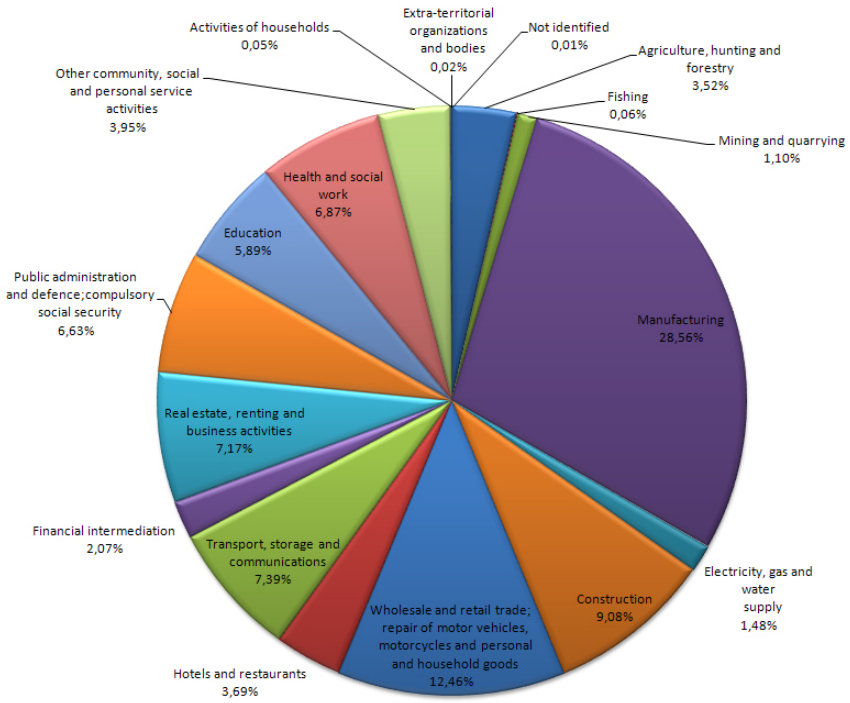
Labor force distribution

As already mentioned in the brief overview of basic facts, the labor force in the Czech Republic comprises of about 5.2 million people (both employed and unemployed). The distribution of labor force among regions approximately reflects the distribution of population in regions, however, slight differences may be observed (such as highest amount of labor force present in the capital city). The distribution of labor force (as of 2007) according to regions may be observed from the following Chart.



Labor force in regions *(source: Czech Statistical Office)*

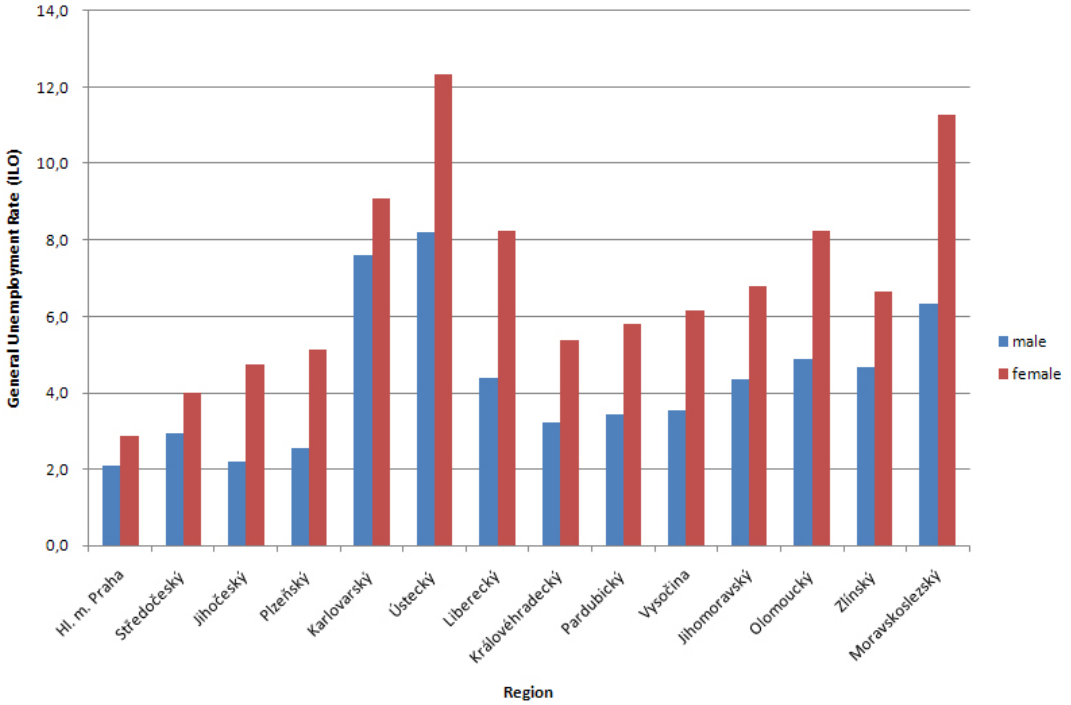
The following pie chart summarizes the distribution of labor force among various branches of economy as of 2007. In general, it may be said that about 3.5 % of the force is employed in agriculture, 40 % in industry and construction and the majority (55 %) in services.



Distribution of labor force according to branch of economy
(source: Czech Statistical Office)

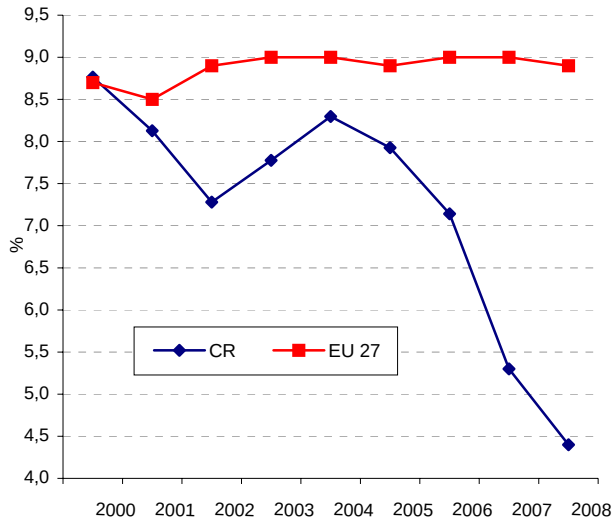
1.1.8. (Un)employment rate

Currently (as of March 2009), the general rate of unemployment is 5.8 % (according to ILO). The unemployment rate varies with age, region and education. Most unemployed people may be found in the group with only basic education (20.1 % specific unemployment rate) and, as expected, the smallest percentage of unemployed people is found in among the university educated people (only around 1.7 % specific unemployment rate). The general rate of unemployment with respect to region and sex (as of 2007) may be observed in the following Chart. As it may be observed from this Chart, the lowest rate of unemployment is generally in the capital.



General Unemployment Rate by region *(source: Czech Statistical Office)*

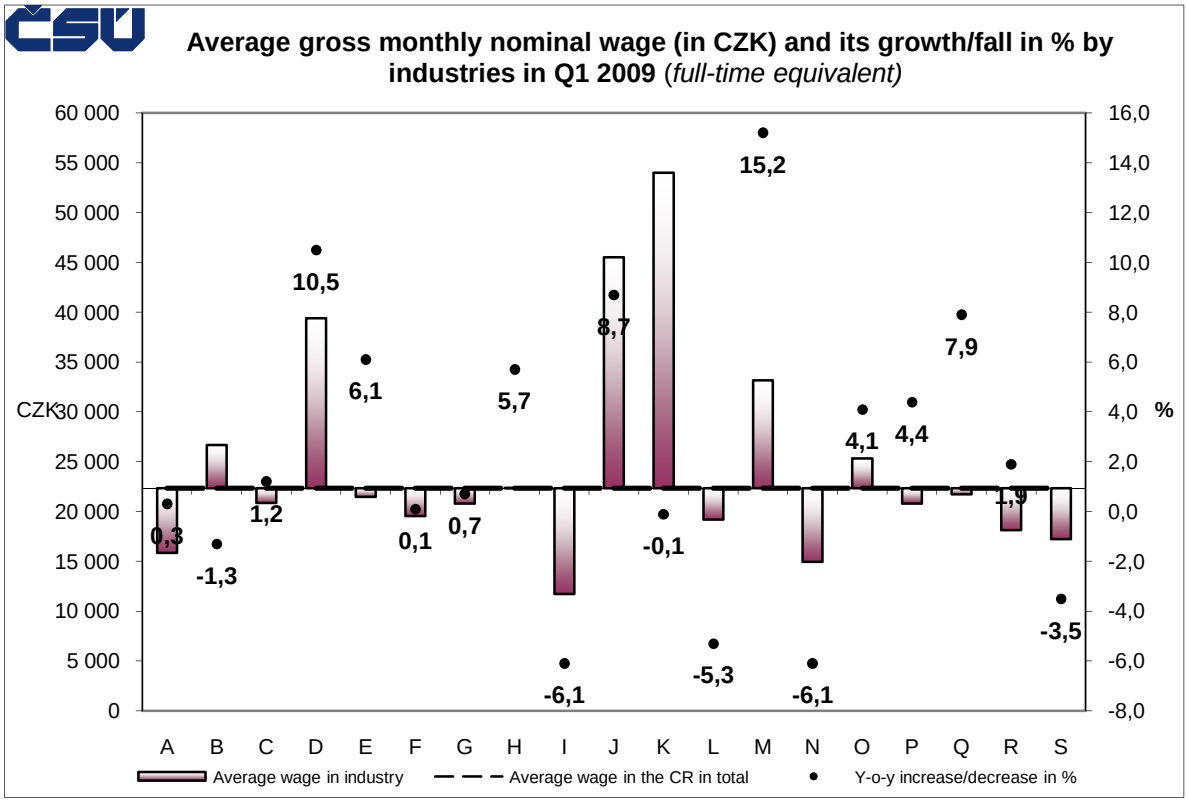
In the following Chart the comparison of rate of unemployment in the Czech Republic and other European countries may be observed.



Unemployment rate *(source: Czech Statistical Office, LFSS)*

1.1.9. Wages

As far as the average gross wage is concerned, its average value in the first quarter of 2009 reached 22,328 CZK/month (i.e. around € 850/month). The following Chart shows the gross nominal wages in the first quarter of 2009.



A Agriculture, forestry and fishing
B Mining and quarrying
C Manufacturing
D Electricity, gas, steam and air conditioning supply
E Water supply; sewerage, waste management and remediation activities
F Construction
G Wholesale and retail trade; repair of motor vehicles and motorcycles
H Transportation and storage
I Accommodation and food service activities
J Information and communication
K Financial and insurance activities
L Real estate activities
M Professional, scientific and technical activities
N Administrative and support service activities
O Public administration and defence, compulsory social security
P Education
Q Human health and social work activities
R Arts, entertainment and recreation
S Other service activities

Average gross monthly nominal wage *(source: Czech Statistical Office)*

As the Czech Statistical Office informed, the impact of economic crisis on wages was uneven and the labor market response varied by industry type. The biggest impact was observed in the area of manufacturing, where dramatic number of dismissals occurred (a drop in number of employees of approximately 9 %). This was caused mainly by the decrease in non-domestic orders, resulting in a slump of production. On the other hand, the impact of the crisis in market and trade services and also in construction is hardly to be seen (they are not affected by any

unexpected change of the trend). The drop of employment in agriculture seems to be a steady trend and thus also most likely unaffected by the crisis.

1.2. Economic situation

The development of Czech economy reflects the worldwide development (culmination of economy in 2007 and a steep fall in 2008). In 2008, Czech economy slowed down in almost all fields. The growth in gross domestic product (GDP) slowed to 3.2 %, and also the gross domestic income (GDI) was significantly reduced, due to worsening of the terms of trade (relationship between import and export prices). The national work was devalued. The gross domestic final expenditure slowed down significantly in 2008, this is contributed mainly to the fall in household expenditure which was caused by a small growth in wages caused by the high rate of inflation. The below average growth in industry, especially the processing industry, caused some structural changes on the supply side of the economy. The gross added value grew faster than production and intermediate consumption. From the point of view of the branch structure, the tertiary sector strengthened its position in the demand structure and its share of the gross added value. In 2008, the rate of unemployment decreased and the rate of employment reached its highest level (since 1996).

The estimated total GDP (PPP) for 2008 is 262.2 billion US dollars, and per capita GDP is 25,395 US dollars.

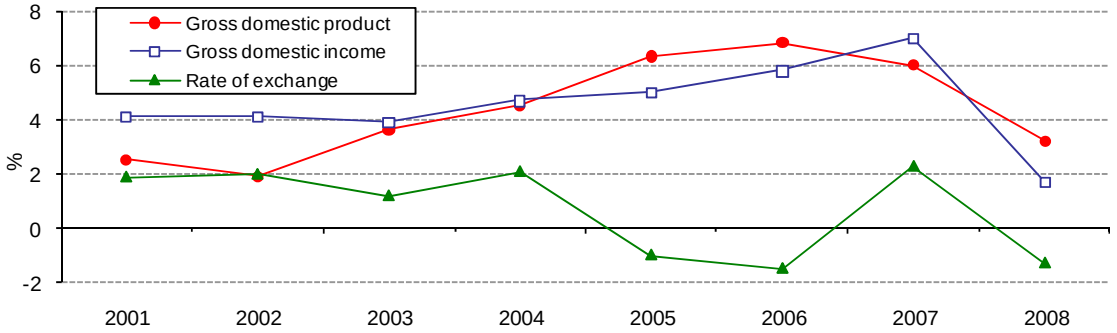
The following table shows the GDP – material and time structure.

in billions of CZK at current prices

	2008				The change in 2008 compared to 2007			
	1st Q	2nd Q	3rd Q	4th Q	1st Q	2nd Q	3rd Q	4th Q
Gross Domestic Product	876.9	949.1	937.1	942.8	59.0	52.8	43.9	19.9
Final consumption	593.0	643.6	655.9	700.0	41.0	48.7	48.6	38.0
- households	420.5	453.7	466.8	471.3	37.4	39.3	37.9	28.4
Gross capital formation	218.7	243.9	234.0	231.5	10.6	-12.2	-15.0	8.3
- fixed	200.7	228.6	225.5	233.5	10.2	10.9	7.4	2.1
Net exports	65.2	61.6	47.2	11.3	7.4	16.3	10.3	-26.4
Informatively								
Total exports	734.5	749.1	698.3	665.4	57.7	44.5	-0.8	-84.4
Total imports	669.3	687.5	651.1	654.1	50.3	28.2	-11.1	-58.0

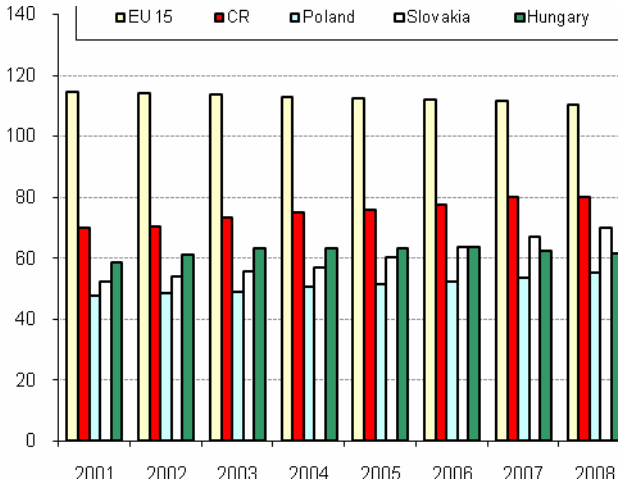
Gross Domestic Product – the material and time structure *(source: Czech Statistical Office)*

The following Chart shows GDP and GDI development.



Gross domestic product, gross domestic income (in %, year-on-year, constant prices 2000) and the terms of trade (in %, year-on-year) *(source: Czech Statistical Office)*

The following Chart shows the comparison of GDP per capita of various relevant countries and EU15.



Gross Domestic Product per capita (in PPS, EU 27 = 100) (*source: Eurostat*)

The following Table shows the production, intermediate consumption and gross added value of the past years

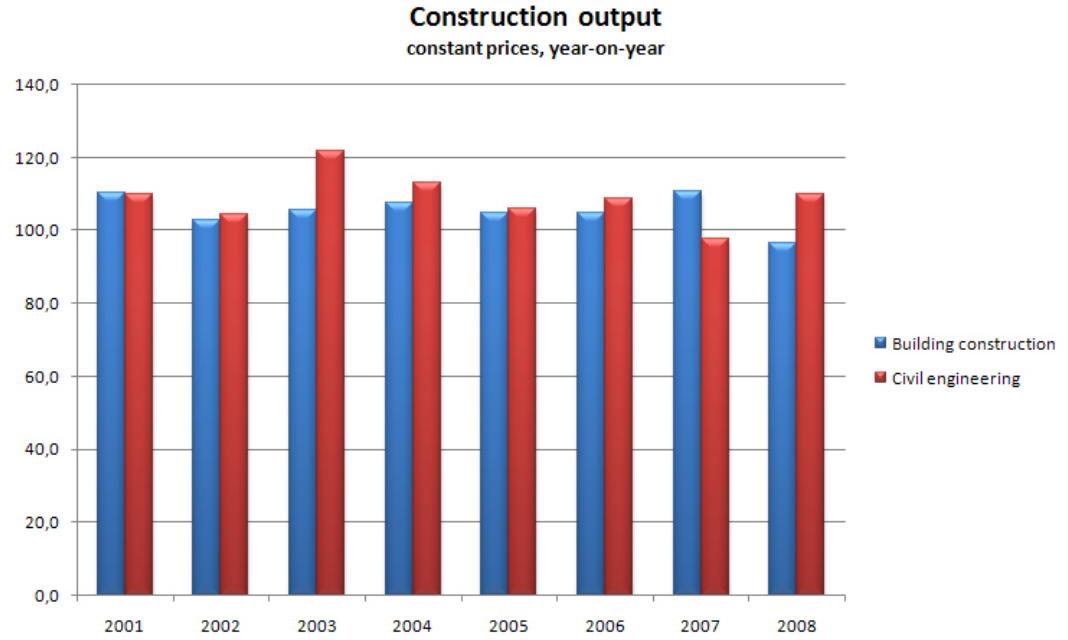
	2001	2002	2003	2004	2005	2006	2007	2008
Production – billions of CZK, current price	5 874.0	6 033.2	6 385.4	7 059.4	7 437.0	8 318.0	9 058.0	9 374.2
PR = 100.0 from the constant price	107.3	103.1	105.1	106.8	105.3	110.0	107.1	103.5
Intermediate consumption - billions of CZK, current price	3 741.6	3 793.1	4 042.3	4 529.4	4 761.7	5 417.7	5 876.2	6 055.6
PR = 100.0 from the constant price	110.1	103.4	106.4	108.2	104.7	111.5	107.8	103.5
Gross added value - billions of CZK, current	2 132.4	2 240.1	2 343.1	2 529.7	2 675.3	2 900.3	3 181.8	3 318.6
PR = 100.0 from the constant price	102.5	102.5	102.9	104.5	106.6	107.1	105.8	103.6

Production, intermediate consumption and gross added value *(source: Czech Statistical Office)*

1.3 Construction market

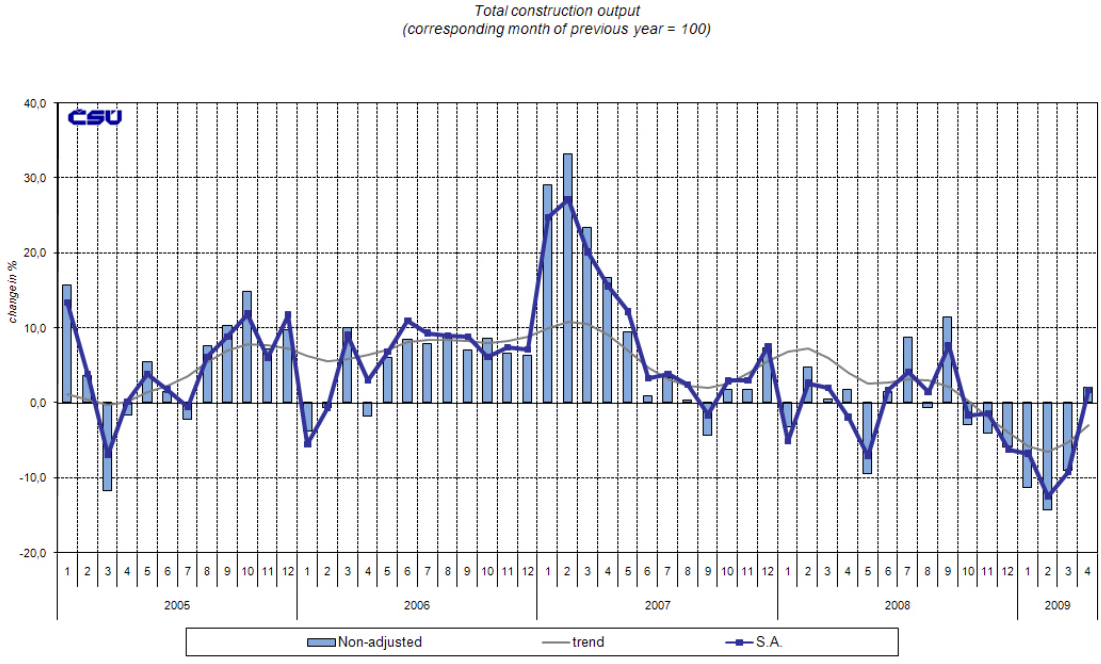
1.3.1. General information

The Czech Republic has always had a good basis of silicate material sources and a good tradition of quarrying and therefore such materials are still widely used. With this said, it is obvious, that the most used construction materials are concrete and masonry. Steel is also used for construction (especially for large span structures), but not as widely as in other developed countries. Although concrete plays major role in today's Czech construction industry, it should be said that most Czech people are very reluctant to use of precast concrete mainly due to massive precast concrete construction in the second half of the 20th century. These days, also other materials (such as timber) come more into focus, but their use is still somewhat hindered, mainly due to their price and other disadvantages. Also, the possible hindrances in use of other materials come from the fact that buildings build from these materials are often seen as not "full-value" buildings by many people. But this opinion is slowly starting to wane as the ideas of green building, affordable construction and fast construction enter the Czech construction market. The most commonly built objects in the Czech Republic are housing structures and civil engineering structures. The construction output in Building structures and Civil engineering structures may be observed in the following Chart.

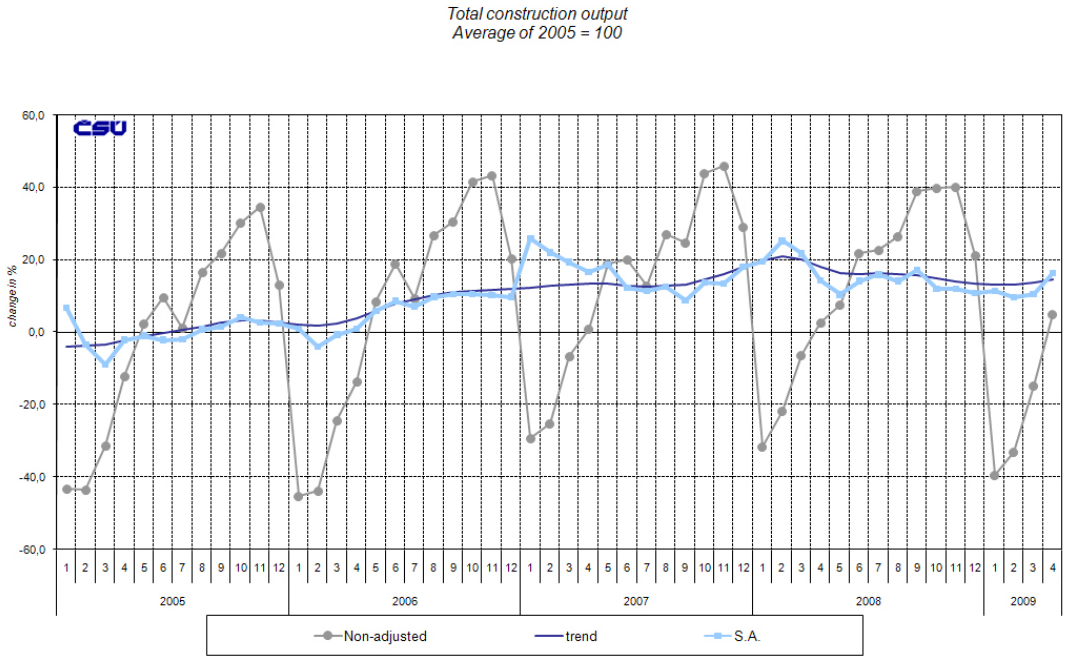


Construction output 2001 – 2008 by type of construction *(source: Czech Statistical Office)*

The following Charts show the total construction output over the past 4 years based on: corresponding month of the previous year and the average of 2005.



Total construction output (corresponding month of previous year = 100) *(source: Czech Statistical Office)*



Total construction output (average of 2005 = 100) ***(source: Czech Statistical Office)***

1.3.2. Current performance of the construction market

In April 2009 construction output increased by 2.1% at constant prices compared with April 2008, working day adjusted construction output increased by 3.2%. Seasonally adjusted construction output increased by 5.2% compared with March 2009. Like in the previous months building construction output continued decreasing (contribution –5.3 p.p., drop by 7.1%) and civil engineering output growing (contribution 7.4 p.p., growth by 29.1%). The growth of civil engineering output was partly contributed to by favorable climatic conditions (in April 2009 the average daily temperature was by 4.2°C higher compared with April 2008), which enabled to perform outdoor construction works in bigger scope. The growth of construction output came also from additional invoicing for certain bigger constructions especially in the area of transport infrastructure.

The average registered number of employees in construction enterprises with 50 or more employees increased by 0.3% compared with April 2008. Their average monthly nominal wage increased by 23.7% compared with April 2008 and reached CZK 30 909. A significant increase of the average wage in April 2009 came from payment of remunerations for results in 2008.

1.3.3. Investors

The investors in the construction sector may be divided into several categories, mostly by the type of the owner, i.e. private investors, state (public) investors and their combination (Public Private Partnership projects). State investors are usually the main investors for industrial construction and infrastructure. Among the largest state investors the following should be mentioned: Road and Motorway Directorate of the Czech Republic – road and motorways management; Railroad transport administration – railroad management and Municipalities.

1.3.4. Construction Process

The construction process is legally backed by the Act no. 183/2006 Coll. on town and country planning and building code (commonly referred to as "Building act"), the Act no. 360/1992 Coll. on exercise of authorized architect, authorized engineer and authorized technician profession and the act no 184/2006 Coll. on withdrawal or limitation of proprietary rights to a property or a building (commonly known as "Expropriation act"). The new Building act replaced the old Building act from 1976 and presented the most significant changes in the past decades. The major changes were the following: the core of the decision making process was moved to regional planning and building permit proceedings became more technical. It also, on one hand, widened the range of building that do not require building permit but on the other hand requires more documentation submitted for such objects.

The building process now follows these steps (for buildings that require building permit):

- check of local planning documentation(before purchasing the property or lot)

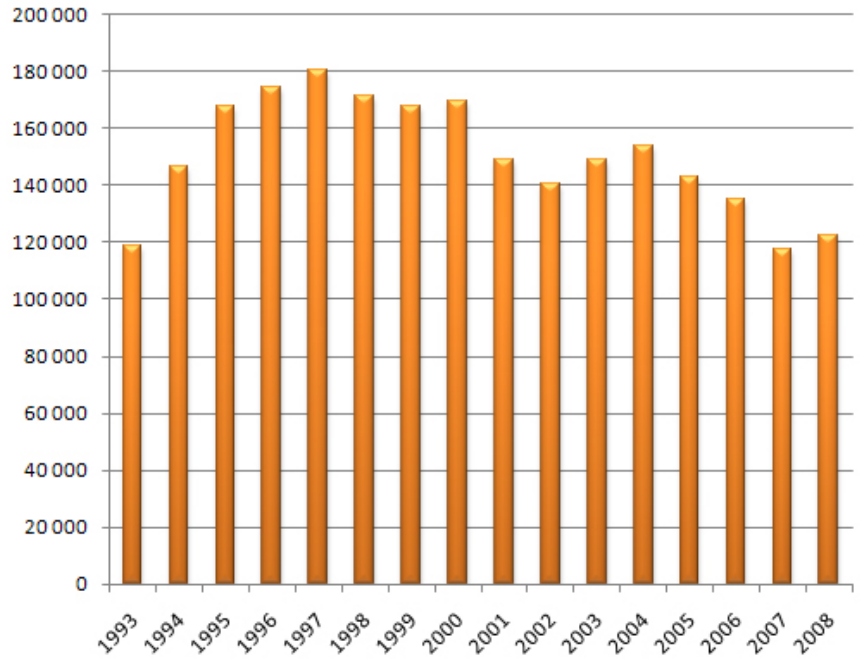
  This should be done by the investor in order to see that construction (and what type) is permitted in the certain place/region.
- *Planning permission* and *Decision of the location of the structure*

Somewhat simplified design needs to be submitted to the "Building office" of the municipality. This step also often involves oral sessions at Municipality's office and discussion with aggrieved parties. The Planning permission is valid for 2 years after its issuance.

- permission to build

  According to the new Building act this step may be performed in two different ways – via the services of *Authorized inspector* (new method) or via *Building permit proceedings*.

  - The introduction of the *Authorized inspector* position into the decision making process is a new and therefore somewhat unknown feature. The basic idea is that the Inspector leads all of the proceedings and solves possible problems and in general deals with the Building office in place of the investor (for which he is paid based on an agreement between himself/herself and the investor). The result of this proceeding is issuance of a *Certificate.*
  - *Building permit* proceedings are the traditional way of getting permission to build. If the investor chooses this option, he/she will be dealing with the Building office. The result of this is the issuance of a *Building permit*. The development of the number of issued building permits may be observed in the Chart below.



Number of Building permits granted in the Czech Republic *(source: Czech Statistical Office)*

- initiation of construction process

  The construction process needs to be started within 2 years from the issuance date of the permission to build (either Certificate or Building Permit).

- after completion

  After the completion of the construction process, the "real state documentation" needs to be carried out and the Building office needs to be informed about the completion. This is done by delivering a *Notification of intention to use the structure* to the Office 30 days prior to using it. The office then provides Final inspection and either allows the use or points out things that need to be repaired before the building is occupied. If there is no response from the Office within 30 days, it is assumed that the building is alright to use (as if the opinion of the office was positive). For structures with properties that cannot be affected by future users (such as hospitals, blocks of apartments, schools, etc.) the so called *Final inspection approval* is needed.

1.3.5. Public procurement

If the investor of the construction is state (or it is financed by state finance), the selection of the developer/builder needs to follow public procurement legislation. Public procurement is discussed in Act no. 137/2006 Coll. on public procurement. This Act is concerned with allocation of state money. It is, in general, applicable to all projects that are financed, supervised or managed for more than 50% by public authorities (with taxpayer money). For the purpose of public procurement there are 3 types of contracting bodies (contracting authority, subsidized contracting entity and sector contracting entity) and 3 types of public contracts (according to subject-matter) – public supply contract, public works contract and public service contract; and 3 types of public contracts (according to estimated value) – above-the-threshold public contract, below-the-threshold public contract and small scale public contract. The different types of contract have different proceedings and conditions. In general, the awarding process follows these basic steps:

1. Intention
2. Preparation of conditions
3. Public contract – start
4. Envelope opening
5. Offers examination
6. Offers assessment
7. Public contract – signing
8. Corrective measures

In the process the offers should be judged based not only their price, but also credibility of the offer and other important aspects. Often, more rounds need to be performed in order to select the proper candidate.

1.3.6. Major construction companies – overview

SKANSKA CS a.s.

- leader of Czech construction industry
- scope: complex supply of construction works
- established: 1953
- member of SKANSKA group: since 2000
- employees: 7,078 (2007)
- revenues: 35,380 million CZK (2007)
- net profit: 1,278 million CZK (2007)
- share of the Czech construction market: 5.2 % (2007)

METROSTAV, a.s.

- Czech second largest construction company
- scope: complex supply of construction works
- established: 1971
- member of DDM group: since 2000
- employees: 3,633 (2007)
- revenues: 21,980 million CZK (2007)
- net profit: 816 million CZK (2007)
- share of the Czech construction market: circa 5 % (2007)
- construction production: 21.2 billion CZK (2007)

Stavby silnic a železnic, a.s.

- scope: mainly road and railroad construction
- established: 1952
- employees: 2,079 (2007)
- revenues: 15,112 million CZK (2007)
- net profit: 866 million CZK (2007)

STRABAG, a.s.

- scope: complex supply of construction works
- international company (Germany)
- established: 1930

- employees in CZ: 4,186 (2007)
- employees in total: 61,125 (2007)
- output in CZ: 864 million € (2007), i.e. 8 % of total
- output total: 10,746 million € (2007)
- total net income: 207.6 million € (2007)

HOCHTIEF CZ, a.s.

- scope: complex supply of construction works
- originally VSB, established in 1950s
- member of HOCHTIEF concern: since 1999
- employees: 1,536 (2006)
- construction works: 5,571 million CZK
- net profit: 126 million CZK

OHL ŽS, a.s.

- scope: complex supply of construction works
- established: 1952
- member of OHL Group: since 2003
- employees: 1,794 (2007)
- revenues: 10,226 million CZK (2007)
- net profit: 257 million CZK (2007)

PSJ, a.s.

- scope: general construction supply
- established: 1991
- employees: 274 (2007)
- revenues: 3,271 million CZK (2007)
- net profit: 91 million CZK (2007)

Konstruktiva BRANKO, a.s.

- scope: mainly building construction supply
- established: 1929
- employees: 207 (2007)
- revenues: 1,230 million CZK (2007)

Průmstav, a.s.

- scope: mainly building construction supply
- established: 1953
- employees: 436 (2005)
- revenues: 1,869 million CZK (2005)
- net profit: 49 million CZK (2005)

1.4. Affordable House Market

The main role in the affordable house market in the Czech Republic performs the government. It conducts several programs to support housing needs in CZ. The main products are listed below.

1.4.1. Building Saving

Building saving is stated in the Act no. 96/1993 Sb. and shall be provided only by building and loan associations. There are five in Czech Republic: „Modrá pyramida" of Komerční banka, „Buřinka" of Česká spořitelna, „Liška" of ČSOB, Raiffeisen and Wüstenrot building and loan associations.

benefits:

- government support of up to CZK 3,000 per year. (15 % of the saved amount per year)
- the building savings funds covered by insurance under the Act up to 100 % of the saved amount (maximum of EUR 50,000)
- possibility of income tax base deduction of credit interests paid (maximum of CZK 300,000 per year)

conditions of the subsidy:

- Czech citizenship
- citizenship of EU member country with a residency permit and assigned personal ID
- natural person with permanent residence in CZ and assigned personal ID

1.4.2. Tax Reliefs

Tax reliefs are intended for natural person which solves housing needs by mortgage, real-estate credit and all credits, where the guarantee for a loan is a real-estate. The conditions are stated in the Act no. 586/1992 Sb., § 15.

benefits:

- deduction of interest paid from the tax base (maximum of CZK 300,000 per year)

conditions of the subsidy:

- loan is used for housing needs
- in case of purchasing a flat or house, the tax payer shall have residence in there

1.4.3. Loan for Young

The loan is officially called „Úvěr 300" (Credit 300) and it is provided by the State Fund for Promotion of Housing („Státní fond rozvoje bydlení"). It is an independent body corporate but its assets is a part of the government assets. The loan is stated in the Act no. 616/2004 Sb.

benefits:

- provision of a low-interest loan (2 % p.a.) up to CZK 300,000, mature at the latest in 20 years

conditions of the subsidy:

- applicant shall be a married couple if at least one of them has not reached the age of 36
- applicant shall be a single person which has not reached the age of 36 and nutures at least one minor
- loan shall be used for housing needs
- loan cannot be provided repeatedly to the same person
- loan cannot be provided to the person which ownes any habitable real-estate

1.4.4. Interest Subsidy for Young

The aim of the subsidy is to increase the availability of older property housing for young people. It is in the form of individual subsidies to instalments of mortgage. The conditions are stated in the Act no. 249/2002 Sb. as amended by Act no. 32/2004 Sb. The government subsidy is set to the 1st of February by the Ministry for Local Development.

benefits:

- interest subsidy is 1 to 4 percentage points depending on the average interest rate on new loans in the previous year. If the interest rate drops under 5 %, the subsidy for new contracts is zero. For the term 1.2.2009 - 31.1.2010 is the subsidy 1 % point.
- the subsidy amount is valid for the validity time of the interest rate, maximum of five years
- interest subsidy is provided for the time of mortgage repayment, up to ten years
- interest subsidy is provided to the mortgage or its part up to CZK 800,000 for a flat or CZK 1,500,000 for a house

conditions of the subsidy:

- applicant shall not reach the age of 36 (in the case of married couple none of them)
- loan cannot be provided to the person which ownes any habitable real-estate (in the case of married couple none of them)
- loan shall be used for purchasing a flat or house which is older then two years and is located in CZ
- applicant shall reside in the purchased flat/house for the time of drawing the government subsidy

1.4.5. Housing Benefit

Housing benefit is one of social benefits which are provided by the state to socially weak classes. The benefit depends on the normative housing costs which are derived from the locality, number of family members and the ownership of the flat.

The up to date normative costs can be found in the Ministry of Labour and Social Affairs.

benefits:

- the amount of the benefit is determined from the formula „normative housing costs – 0.3 x household income" (in Prague 0.35 instead of 0.3)

conditions of the subsidy:

- applicant shall be an owner or tenant of a flat, who has a residence in there and 30 % (in Prague 35 %) of his/his family income is not sufficient to cover the housing costs
- housing costs shall not exceed the normative costs

1.5. Low cost housing

1.5.1. Acceptable cost of housing

To define acceptable cost of housing is quite problematic. How to define it?

We may look at this problem in at least two ways. The first one is that we take the cost of the housing as the acceptable and the second one that we take the whole cost which covers all the expenses which may appear during the use.

Our opinion how to reach the solution of the first idea is to take an average person with average income and let him to search for housing. Definitely he will come into the situation when the desires will not meet the real offers. Now how the solve situation like this. The market is full of housing offers located directly in the city center. These areas are immediately taken out of the suggested group because the price varies between 1500 – 3000 €/m^2 when we talk about capital city. Some possibilities of acceptable and mainly affordable housing may be found on the outskirts of large cities, but we have to have in mind that these real estates are usually in state before reconstruction. Expenses which will cover necessary upgrades and remedial works will of course raise the price but in heights which are already imaginable (800-1400 €/m^2).

The second way how to reach the acceptable cost of housing is to build practical house. House like that should be always low cost. It should be designed to

sustain everyday use for at least 20 years because the further events in such horizon are not predictable. Also after this time period the total or partial (installations) reconstruction is almost unavoidable. We also have to have in mind that build the super low cost housing is one thing but the expenses for service such as heating, power supply and water supply are other. When we think about construction we should have in mind also price for the removal of used materials. There is a significant difference even between the amounts of construction materials; i.e. the volumetric amount of brick and volumetric amount of mineral wool used as primary insulator which has also great advantage - the possibility to recycle.

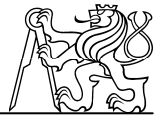
We have now moved into the sphere, where used materials decide about the total price. When we talk about the main material in the construction it is possible to say that there is not a minor difference between brick or sandwich timber. The difference is though hidden in the expenses used for heating. Studies show that the price for heating is up to five times lower when we use timber instead of bricks. The lowest expectable lifetime of timber structure is approximately about 120 years. In Czech Republic is though not common to use timber as main material for the construction. The reason is probably in the past when during the communism era were popular panel houses. The market had to change and companies which used to design timber structures were almost forced to switch their main scope onto concrete structures. After the end of this era the trend continued and the timber structures are coming slowly into the market nowadays. Limited amount of companies and know-how of the valuable design are main deciding factors.

2. Traditional housing concept

2.1. Geographical, geotechnical, structural and architectonical constraints in Czech Republic

2.1.1. Geographical

From the geographical point of view the only restrains are given by the climate, the duration of the seasons and the landscape type of the proposed build area. There is no prescribed type of structure or material to be used. As the Czech Republic due to its area is lying in one climatic zone for the most parts of the country



the seasons have common development**,** although differences between the North-West and the South-East part of Czech Republic are observed.

For the different parts of Czech Republic, different snow and wind load values should be taken in to account which can be found in the national annex of the relevant Eurocode.

2.1.2. Geotechnical

Geotechnical restrictions are given by the site conditions and the valid national code. The site conditions may be obtained by proper site investigation or by existing geotechnical records. The design itself should be done according to Eurcode 7 or the existing Czech national code ČSN 73 1001 - Foundation of buildings. The whereabouts of Czech Republic are not in seismic active zone thus no special requirements for seismic foundation design are to be taken in to account.

The foundation design should be approved by authorized person and by the local authorities.

2.1.3. Structural

The design of the structure should fulfil the requirements set by the authorities and by the law and be done according to the valid national code. No specific construction restrains are applied as to the type of the construction or the materials used.

The structure design itself again should be approved by the local authorities and done by an authorized person. In some cases specific requirements may be applied due to the local site conditions or the buildings surrounding the proposed structure.

2.1.4. Architectional

From the architectional point of view there are strict requirements that should be fulfilled given by the locality of the proposed structure, local landscape and the historical value of the surrounding buildings.

The authority which approves construction in area with particular historical value is the National Heritage Institute. Restrictions about roof shape and roof angle and building high according to the local rules are to be considered after consultation with the local authorities in historically sensitive locations.

2.2. Overview of Legislation and of the boundaries

Construction in the Czech Republic follows the Construction law 183/2006 – "Zákon o územním plánování a stavebním řádu", The Law of planning proceedings and building regulation, and the related notices and enactments. In the year 2008 these notices were in charge including technical requirements for structures, as a executing prescripts of the Construction Law:

Notice no. 137/1998 Sb., about general technical requirements in word of notice no. 491/2006 Sb. and notice no. 502/2006Sb

vyhláška Ministerstva pro místní rozvoj č. 369/2001 Sb., o obecných technických požadavcích zabezpečujících užívání staveb osobami s omezenou schopností pohybu a orientace, ve znění vyhlášky č. 492/2006 Sb.

Notice no. 369/2001 Sb., about general technical requirements for using the building by handicapped people in word of notice no. 492/2006 Sb.

Notice no. 26/1999 Sb., of capital city Prague about general technical requirements in word of later enactments.

Notice about general technical requirements for construction defines certain limitations for elaboration of planning documentation, for designing, placing, approving or notifying, constructing, house inspection, using and removing of structure and during performing state inspection. The most important limits from it are:

Structure has to be designed and built to be suitable for the proper using respecting the economic point of view and to meet the basic requirements, which are:

a) Mechanical resistance and stability

b) Fire safeness

c) Protection of health and healthy environment conditions and environment

d) Protection against noise

e) Safeness during using

f) Energy saving and heat protection

2.2.1. Mechanical resistance and stability

Structure and its changes have to be designed and realized in such way that the loading and other influences, to which it is exposed during construction and usage including proper maintenance do not cause sudden or gradual falling, or other destructive damages of any of its part or adjacent building, bigger deflection than is acceptable, damage of serviceability or menace of serviceability of technical equipment close to the structure.

2.2.2. Fire safeness

General requirements:

For prevention of loosing human lives and health of people or lives of animals and for prevention of damages of structure must the structures be built, maintained and used in such way that it:

a) Kept stability and load bearing capacity for the required time

b) Protect against creation and spread of fire and fouling within fire compartment inside the building

c) Protect against spread of fire outside the building

d) Enable safety evacuation of people and animals from the building on fire or from its part on fire to outside zone.

e) Enable effective and safety action of firemen during fire extinguishing and fire-fighting work.

For the structure only materials which meet the standards can be used. The structure has to show its fire resistance which is given by the standards.

2.2.3. Protection of health and healthy environment conditions and environment

General requirements:

Structure must be designed and realized not to threat lives, health, and healthy conditions for living for people who are using it and even for people using the surrounding of the structures and not to threat healthy environment mainly caused by:

a) Releasing danger substances

b) Presents of dangerous elements in the air

c) Releasing danger radiation, especially ionized

d) Adverse effect of electromagnetic radiation

e) Polluting of air and soil

f) Insufficient disposal of sewage water, smoke, solid and liquid waste

g) Presents of moisture in the structure or on the surface of structure inside the building

h) Insufficient noise insulation

All flats has to be insolated.

2.2.4. Protection against noise and vibration

The structure has to resist harmful effect of noise and vibration. Structure has to maintain the noise and vibration on such level, which does not threat health of

people and ensure night silent hours and which is sufficient for residential and working environment including surrounding land and buildings.

The highest value of noise and vibration for each type of houses is given by special regulation.

All the technical equipments which are part of the structures and which make noise (for example, lifts, pumps, air conditioning, etc.) has to be in residential building placed and installed to limit transfer of noise and vibration to the structure and its spread, mainly to acoustic protected rooms (for example, libraries, hospital rooms, residential rooms etc.)

2.2.5. Safeness during using and maintaining structures

Structure must be designed and realized to prevent from accidents caused by slipping, falling, burning, stroking by electric current, exploding inside the building or in the surrounding of the building.

2.2.6. Energy saving and heat protection

Structures have to be designed and realized to have the lowest possible consumption of energy for their heating, ventilating or air conditioning. Energy demand is needed to influence by shape of the building, its dispositions, orientation and size of windows, used materials and heating systems. During the design of the building climatic conditions of the locality (temperature of outside air and its coagulation, intensity and direction of wind, intensity of rain etc) has to be respected.

Structures with required state of inside environment have to be designed and realized to meet the requirements for:

a) Thermal comfort

b) Required thermal-technical properties of structures

c) State of inside environment for technological activities and for animal husbandry

d) Low energy intensity during using of the building

These thermal- technical properties are stated in standards.

2.2.7. Cost of traditional housing concept in Czech Republic

We can say, that traditional housing concept in the Czech Republic has two faces in last 50 years. The first face is devoted to the traditional housing concept from rural point of view and the second one from town point of view.

At first we will pay our attendance to the village life. In our region as well as over the whole Czech Republic, there are two types of family houses. The first type is let say single generation house and second one double generation house. It was division according to social point of view and now we focused on financing.

The first option is significantly more expensive, because at first you need same space if you want to build a house, if we do not consider inheritance. So we have to pay for it and it means our first cost. In countryside the price of one squared meter for building depends on location of course and so on. But usually it is between 500-1500 Czech crowns. We will consider 900 Czk/m^2. For usual family house 4+1 we need space about 110-130 m^2, let´s consider 120 m^2 and also a garden is usually required so our building side has about 600 m^2(15*40m). The price for land is 600*900=540 000 Czk. The self house could be built for price 2.1-2.8 million Czk. We also need some equipment. It is difficult to set price of equipment, because it depends on each person, what he wants to have in his house, but we can consider price about 350-500 thousands Czk to equipped whole house. To complete our dreamed house costs totally about 0.54 + 2.5 + 0.5 = 3.54 million Czech crowns.

The double generation house in Czech Republic means, parents have their single story house and when their children are adult, they build second story, where for their child. The price of this living is much lower than in the first case. To build new floor of house costs about 500 thousands Czk included new roof and we again need some equipment, let´s consider same price like in first case, it means about 500 thousands Czk. Total price is about 1 million Czech crowns, but it depends if the money which we save for building worth to live with parents for whole life.

If we consider living in the city, it means much more money. It is almost impossible to have own house in let say wider centre of the Town, because only the place for building of new house is almost impossible to buy. On one side there is a problem with free space in cities, because most of places are already settled and the second problem which is in most cases the significant one is price! To buy the building space in the wider centre of the city means to pay tens thousands of Czk for square meter and it is reliable only for flat hosing. And it is probably only one possibility of let say housing concept in city. So let´s focus on costs. Prices of one square meter of flat in wider centre of city costs from 25-100 thousands Czk. But we do not want to buy flat in direct centre of Prague, so let us assume price about 40 thousand of Czech crowns. We have same requirements like we have in case of village, it means flat 4+1 with spacing about 100 square meters so the total price if we are lucky is about 4 million Czk. We again need some equipment and again we consider same equipment like in the case of village and it is 500 thousands. So total price is about 3.5 million Czech crowns. There is also third possibility and its hiring a flat. It is usual for young people who do not know where they want to settle or for them who do not have enough money to have their own flat. The price for renting of a flat 4+1 in Prague again very depends on destination and also on the state of flat and also on access to public transport. Renting of "normal" flat in Prague with specified requirements cost from 15up to 30 thousands Czk. Again consider equipment for price 500 thousands. So from short time point of view it is the best economical solution. But you have to pay all the time and if we consider our living there for 15 years ti means costs 12*15*20,000=3.6 million of Czech crowns.

During our living we have to pay also water, energy and so on. For each person it is monthly from 200 up to 1000 Czk. Let´s consider family with two children so 4*400=1600 Czk per month.

Now few words about financing of the housing. It is not usual to finance purchase of flat or house from your own money. It means we need mortgage. It again depends on the type of bank, on the length of repayment period and definitely on hired figure. But usual repayment is similar to the hiring of the flat, which we

considered above. It is because of strategy of banks and owners of flats, because if one of them will have lower price, the second one will be looser.

If we try to sum whole housing concept in Czech Republic, we have to say, that from economic point of view is the most comfortable solution double generation house, but it has few problems as we said. Other possibilities are almost equivalent and it is depending on each person how he wants to have it in his life.

2.2.8. Traditional housing in the Czech Republic

Construction of dwellings on the territory of the Czech Republic in the course of history differed mainly in connection with the traditions of the region. There were used solid bricks mainly in cities, wood mostly in mountain and foothill villages. Urban Area consists of family houses and apartment housing. Larger buildings, usually associated with caring for livestock and land, dominated in rural areas. These buildings always survived their builders and served to next generations.

Building continues still in this spirit, even if the solid bricks were replaced with ceramic or light-weight concrete blocks, brick construction still accounts for the highest proportion of new buildings for us.

Timber structures, which were mainly typical for mountain areas in recent years are beginning to expand into the other areas. Still, there is a considerable degree of mistrust to these structures, particularly because of the loading capacity, fire resistance, and durability, which is in the Czech tradition so important. Many applicants for new housing build not only for themselves but also for their children and grandchildren, even though there is a increasing number of those who give priority to speed of construction and price.

It began a great construction of prefabricated houses in the second half of the 20th century in the larger cities. This provided housing for many families in a small space, but on the contrary, it caused the loss of privacy and opportunities to spend time on their own garden. Because of all this people began to move from cities to their surrounding area and the satellite towns were created. Unfortunately, mainly

because of land prices in these locations, the houses are so close together that the renovation of privacy failed there.

2.2.9. People for new housing

Newcomers have significantly younger average age, form a coherent family or young couples and prefer establishing a healthy environment. The group of new residents is largely represented by people with secondary and higher education, higher income categories, namely general high social status. Newly developed areas occur frequently in contact with old buildings, which are populated with the original population with a different social structure. This is a significant polarization of socio-spatial structure of the population of urban communities. This differentiation may lead to an overall strengthening of the social environment of the village, but it can lead to a wide range of problems caused by social inequalities, both groups of the population. These problems have often the cause in a different way of life each of residential groups. Sharp contrast in the social position of both groups is very clearly visible in the variation of buildings in new and old part of the village There is the division of the social environment within a small place with a distinct social separation of the new population. In some Western European countries and the United States the spatial separation of different social or ethnic different locations is very often. In extreme cases are as follows quarters placed side by side surrounded by high walls and guarded by armed civil patrols or guard agency. These are known as the "gated communities". In the vicinity of the City of Prague we can also find modern "Ghetto of rich" who feel the need to be physically separated from the outside world. Probably it is their wish for anonymity and confidentiality of their social position, or an effort to protect their assets, what makes them to live in such a place. New residents have often greater ability to influence decision-making on public issues of community, bring, a wide range of contacts in a new environment and often have even greater political power than the original population of the village. Coexistence of the population after a longer period may result in the ideal case, the mutual adaptation of old and new residents, and enhancing the impact of community participation, for example, new residents in the village prosecutor. In the opposite case it can lead to a antipathy and hostility.

2.2.10. Family house - for and against

Apart from a number of positive features, which include in particular the high-quality family housing, stay and relax at your own garden, developed social communication in the neighborhood, etc., reported living in family houses a number of negative characteristics. These include in particular the relative costs for the customer, an excessive burden household work related to the operation and maintenance of the house, which leads to the restriction of certain social activities. Furthermore, the impaired availability of civic facilities and the deterioration requiring additional transportation costs of commuting, both financial and time. In addition, this form of housing has some of the other economic consequences, which have sub-social effects. In the construction of traditional insulated houses is an increased occupation of land, increasing the cost of communication and other, which causes spreading of the investment resources. Suburbs with the uncontrolled rolling countryside to represent not only a serious urban, but also social problem.

2.2.11. In view of the future

Bring value to the environment, but to think about possible change of external appearance and volume - of the future extension or superstructure without significant hit to the organism of the house and in accordance with the surroundings, even a possibility of division of the self-section (basic design, installation wiring). Ensure the use of internal variability by using different concentrations and the separation of different parts of the house - again without any major building adjustments. Consider the ratio of clear identification of rooms and multipurpose rooms, or ambiguous predetermined (heating, lighting both natural and artificial). Assemble a list of requirements and needs of individual household members within the envisaged timeframe. Note that the representative functions and rigid beautiful are the last what contributes to well-being. Do not reduce housing just on overnight sleep, bath, sitting by television or fireplace, dining and the preparation of semi-finished products. The grand double bed, corner or free-standing bath, spectacular seating and dining set or kitchen set, or a luxury model "they sat and looked, then went to sleep, and if not died, living the same way till today".