

## Analysis of the national status quo - Slovakia



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## TABLE OF CONTENTS

<b>AUTHORS .....</b>	<b>4</b>
<b>TABLE OF CONTENTS.....</b>	<b>5</b>
<b>SUMMARY .....</b>	<b>7</b>
<b>LIST OF ACRONYMS .....</b>	<b>13</b>
<b>1. INTRODUCTION.....</b>	<b>14</b>
<b>2. OBJECTIVES AND METHODOLOGY.....</b>	<b>16</b>
<b>3. CONSTRUCTION SECTOR .....</b>	<b>19</b>
3.1 History.....	19
3.2 Basic characteristics .....	20
3.3 Construction sector in 2012 and its further development.....	24
<b>4. NATIONAL POLICIES AND STRATEGIES TO REACH THE EU 2020 ENERGY OBJECTIVES FOR CONSTRUCTION SECTOR.....</b>	<b>26</b>
4.1 Energy sector.....	26
4.1.1 National policies and strategies aimed at achieving energy sector goals by 2020 ....	26
4.1.2 Overview of activities planned within the implementation of the revised Energy Performance of Buildings Directive and the Directive on promotion of the use of energy from renewable resources (National Action Plan for Renewable Energy Sources).....	32
4.1.3 Relevant national laws and regulations in the construction sector, obligations arising from the Renewable Energy Sources Directive .....	33
4.1.4 The expected contributions of construction sector to achieve the 2020 targets Construction structures and standard requirements .....	34
4.2 Ongoing vocational education and training (VET).....	39
4.2.1 National policies and strategies related to green skills and professions The terms “green profession” and “green skills” are neither defined nor introduced in Slovakia; it is therefore possible to take-over any of the definitions adopted abroad.....	45
<b>5. INFORMATION ABOUT CONSTRUCTION AND ENERGY SECTORS .....</b>	<b>50</b>
5.1 Construction production development .....	50
5.2 Organisational development of construction sector .....	53
5.3 Employment in the construction sector.....	55
5.4 Buildings, in particular types of buildings (residential, commercial, industrial, public).....	58
5.4.1 Residential buildings .....	58
5.4.2 Non-residential buildings .....	65
5.5 The number of low-energy buildings, the annual proportion of new built energy-performing buildings and energy-efficient reconstruction .....	66
5.6 Statistics on consumption of energy and renewable energy in buildings, e.g. actual consumption of energy and types of renewable energy in the construction sector used directly in constructions.....	70
5.6.1 Statistics on energy consumption in buildings .....	71
5.6.2 Statistics on energy consumption and renewable energy in buildings, for example actual energy consumption and types of renewable energy in the construction sector used directly in constructions .....	74

5.7	Missing Data .....	75
<b>6.</b>	<b>EXISTING VET PROVISIONS .....</b>	<b>76</b>
6.1	The national system of vocational education and training for craftsmen and other construction workers in the construction sector .....	76
6.1.1	Responsible authorities .....	86
6.1.2	Accreditation bodies and relevant training providers within the sector .....	86
6.1.3	Number of courses / year, implementing authorities / organizations, the number of workers attending courses, content, certification, financial sources/ funding.....	91
6.1.4	The scope of the current system involving the skills implementing measures in the field of building energy performance and renewable energy sources.....	92
6.1.5	Existing tools to monitor market development in terms of requirements for technology, skills and training (e.g. Building Sector Skills Committee) .....	93
6.2	Existing training schemes and training courses related to energy performance of buildings and renewable energy sources in buildings that are not part of the national system of continuing VET, yet.....	94
6.3	Relevant national initiatives supported by the EU.....	96
<b>7.</b>	<b>SKILLS NEEDED TO ACHIEVE THE 2020 TARGETS .....</b>	<b>102</b>
7.1	Labour force qualifications and skills development.....	104
7.2	The needed skills and qualifications .....	105
<b>8.</b>	<b>BARRIERS .....</b>	<b>113</b>
<b>9</b>	<b>CONCLUSIONS .....</b>	<b>116</b>
<b>10</b>	<b>REFERENCES .....</b>	<b>120</b>
<b>11</b>	<b>DICTIONARY/GLOSSARY .....</b>	<b>124</b>

## SUMMARY

### Introduction

Reducing energy consumption and increase the use of renewable energy in buildings are important measures to reduce the EU energy dependence and greenhouse gases emissions, as buildings consume 40 per cent of energy and are responsible for 36 per cent of greenhouse gas emissions.

Based on the 2000 Energy Policy (EP) of Slovakia (approved by the Government Resolution No. 5/2000), the total final energy consumption in Slovakia was 136.361 GWh (491 PJ) in the benchmark year of 1999, while non-production sector, i.e. residential buildings, office buildings and non-production buildings (tertiary sector) being the second largest consumer of energy accounting for 39.2 per cent share of the total final of energy consumption.

Projections estimate the amount of energy generated from renewable energy sources to slightly exceed 14 % share of total energy consumption (76 PJ), i.e. 6 PJ of energy from renewable energy sources might be transferred to other member states.

More information provided in Chapter 1.

### Objectives and methodology

The aim of this National Status Quo Report is to analyse the situation in lifelong learning in the construction and energy sectors, to identify the best practice examples in lifelong learning and to formulate a list of needs and priorities to support the measures related to individual occupations (changes in the existing and proposal of new measures), in the Slovak Republic.

The Status Quo Analysis methodology is based on:

- identifying stakeholders
- build up the National Qualification Platform (at three levels) and its five working groups
- information and data collection from available sources
- data collection through questionnaires and personal interviews
- analysis and synthesis of findings

More information given in Chapter 2.

### Construction sector

Construction sector developed gradually, especially after 1945, when many new buildings and apartments were erected. After 1989, an extensive restructuring took



place in the construction sector in Slovakia. In 1997, buildings represented 1.006 million m<sup>3</sup> of the built-up area.

In terms of share in per cent, roads and bridges, pipelines, utilities and similar constructions (heavy civil constructions) represented 28%, industrial buildings 27%, residential buildings 24% and residential infrastructure 21% of the grand total. A significant expansion of investment activities in the construction sector commenced in 2000 with the highest growth reached in 2005 and 2006, when the actual growth rates in construction production exceeded double-digit figures (14.6 or 14.9% when expressed in fixed prices of 2005). This growth was, though, followed by a fall as a response to the global financial and economic crisis, with a negative peak reached in 2009, when construction production dropped by 9.1%. Gradual downsizing occurred primarily in large construction companies, in particular related to construction of buildings and structures (residential and commercial). The mood of construction companies worsened again at the end of the year 2012, and the situation is expected to improve again in 2 – 3 years once prices are stabilised and property market renewed, which may also be supported by the announced PPP projects.

For more information see Chapter 3.

### **National policies and strategies for reaching 2020 EU energy objectives in the construction sector**

In Slovakia, there are number of national programmes/strategies and action plans aiming to achieve the 2020 objectives. Many of them are primarily focusing at improving the energy performance of buildings and the use of renewable energy. The key measure is to improve thermal performance of buildings and increase energy efficiency of technical equipment in buildings. Renovation of public buildings is one of the key public sector tasks formulated to contribute to reaching these goals.

The requirements on thermal performance of buildings are stricter, establishing thus a precondition for effective thermal protection needed to comply with the requirement for gradual reduction of energy consumption for heating of buildings. Revised standard STN 73 0540-2 entered into force on January 1<sup>st</sup> 2013, stipulating requirements for individual energy levels of buildings (low energy demand, ultra-low energy demand, almost 0 energy demand).

National Reform Programme of the Slovak Republic 2011-2014 emphasizes an increasing importance of lifelong learning due to the growing dynamics of society.

Lifelong Learning Strategy 2011 was adopted. The main stakeholders in the system of lifelong learning are citizens, educational institutions, counselling centres, employers, professional and trade associations, as well as local and regional authorities, personal recruitment agencies and NGOs.

No such terms as the “green skills” and “green professions” are defined nor introduced in Slovak Republic, yet, therefore any of the definitions defined in other countries may be adopted.





There are few voluntary independent professional associations of experts in the Slovak Republic – called Sector Councils; with two of these being especially relevant for Build Up Skills – The Construction Sector Council and the Energy Sector Council.

More information provided in Chapter 4.

### Construction and energy sectors

Until the year 2011 (incl.), there were 1,889,845 apartments available both in residential and family houses, in Slovakia. 1,377,315 apartments were built from 1946 to 1993, of which 785,608 are in apartment blocks and 586,296 in family houses.

A database of apartments records 800,634 apartments in 21,723 apartment blocks, split to 52,496 sections.

There is a database available in Slovakia of non-residential buildings not used for production that includes 15,435 buildings (3,765 managers) owned by the state and local authorities, which represent app. 114,703,652 m<sup>3</sup> of built-up volume.

Since 1<sup>st</sup> of January 2008, energy certification is compulsory in the Slovak Republic; the issued energy certifications are registered by the Ministry of Transport, Construction and Regional Development since January 1<sup>st</sup> 2010. Energy certificates are not granted for all new and particularly not for all reconstructed (renovated) buildings; energy certificates audits will only commence from 2013, as a three-level control.

In the period of 2001-2010, app. 299,000 apartments were insulated; thereof 119,000 are in family houses and 180,000 in blocks of apartments.

Of the total number of apartments registered in 2001 both in family houses and blocks of apartments, about 299,000 were insulated in 2001-2010, i.e. app. 18%. In the Slovak Republic, there are no statistical data on energy and heat consumption in buildings. Ministry of Economy is currently introducing a monitoring system to track energy consumption for heating in buildings. For more information see Chapter 5.

### Existing VET

The Act. N°184/2009 Coll<sup>1</sup>. governs the coordination of vocational education and training for the labour market at

- national level
- regional level

There are many other actors involved in the process of training, in Slovakia - professional guilds, Slovak Chamber of Tradesmen; Slovak Tradesmen Union and other professional associations.

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<sup>1</sup> Transl. note: the Slovak Code

A document was prepared in Slovakia (38), defining the lifelong learning strategy - Lifelong Learning Strategy, based on the Lifelong Learning Memorandum of the European Commission. It is in line with other strategic documents of the Slovak Republic focusing on education and employment, and its objectives are in line with the basic principles of sustainable development in the field of lifelong learning. The objective of the Strategy is split to key priorities:

- Lifelong learning to be attractive to every Slovak citizen and supported by all its stakeholders
- Schools and educational institutions of further education, in cooperation with employers, shall provide education reflecting the labour market needs so that graduates and students may succeed in finding a job
- Counselling services in career orientation and training options shall be available for anyone who is interested
- Barriers to lifelong learning shall be removed so that people could learn new skills and acquire new competencies in order to be attractive for labour market.
- Professional and trade associations shall actively promote continuing education

REFUGE project can be used as a Lifelong Learning project example – a project supported within Leonardo da Vinci subproject - Multilateral Projects - Transfer of Innovation, in 2011.

A steady decline of students due to a general decrease in the number of children, fewer students being interested in vocational schools, and optimization of school network resulted in dropping number of schools. Apprentice Schools (SOU) were renamed to Secondary Vocational Schools (SOŠ) in Slovakia in 2008, and thus, the number of students of the former cannot be monitored separately.

In 2011, there were 470 Secondary Vocational Schools (SOŠ) attended by 168,974 students. For more information see Chapter 6.

### Gaps in current skills and needs to achieve 2020 targets

Qualifications, education and skills of employees are considered to be one of the key attributes for further development in construction sector. Similarly to many other sectors, individual qualifications represent an important factor for productivity growth at all levels.

Generally, manual skills of employees in the Slovak construction sector is considered to be very good; professional qualities of Slovak workers are perceived positively also abroad. The situation is significantly worse as to the work ethics of workers. Employers, having experienced the work quality nowadays suggest that, by average, 31% of their employees and 43% employees of their subcontractors need additional training.

The average productivity in construction sector reached €31,571 per person per year, in 2011.



For more information see Chapter 7.

## Barriers

Barriers in achieving the 2020 targets were identified in two areas. The primary barrier lies in education and training. The second are the existing construction market barriers reflecting the current macro-economic, social and demographic situation, as all these form the construction sector environment.

Among others, the following barriers were identified in the field of education:

- low flexibility of the system and obstacles in the legislation
- lack of cooperation among schools, professional organizations and entrepreneurs
- lack of financial instruments for motivation

In the area of construction market and the sector as a whole, the following barriers were identified:

- low (decreasing) number of skilled workers (and other staff, as well)
- insufficient language skills of workers (and graduates)
- Insufficient technological discipline
- low level of work organization (and planning), including labour productivity
- unattractiveness of work in construction sector

For more information see Chapter 8.

## Conclusions

It is necessary to consider all the barriers in both areas - education and construction - and design a strategy that will eliminate these, and through lifelong learning, will help to meet the 2020 targets for improving energy performance of buildings.

We expect that at least 40% of workers involved in construction will need training / courses, or other forms to enhance their professional skills, in the years to come.

It needs to be emphasised that manual skills of workers in the construction sector in Slovakia are good. What seems to be especially problematic is the so called low technological discipline<sup>2</sup>, lack of work organization and thus, productivity. It is therefore important to focus on explaining the broader context of violation of technical procedures and reduced quality of the work.

Nowadays, construction companies in Slovakia send their employees for training / courses almost solely during their work time. In the vast majority of cases, employers are willing to release workers from work for training only for one work day.

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<sup>2</sup> *Transl. note. technical procedures are not obeyed*

In terms of training, the largest interest (45%) was to simplify contract awarding procedure. It can be reached through legislative changes defining the qualification requirements for workers. Also, interest was recorded in training courses on co-financing (state and employees), and tax reliefs related courses.



## LIST OF ACRONYMS

<b>AES</b>	- Adult Education Survey
<b>AC</b>	- Accreditation Committee
<b>APEE</b>	- Action Plan for Energy Efficiency
<b>BUSS</b>	- Build Up Skills Slovakia
<b>CVTS</b>	- Continuing Vocational Training Survey
<b>ČSN</b>	- Czechoslovak Technical Standard
<b>EPB</b>	- Energy Performance of Buildings
<b>EHPA</b>	- European Heat Pump Association
<b>EQF</b>	- The European Qualifications Framework
<b>EP</b>	- Energy Policy
<b>EPBD</b>	- Energy Performance of Buildings Directive
<b>EPS</b>	- expanded polystyrene
<b>EPS/F</b>	- expanded polystyrene (used for facade)
<b>ETA</b>	- European Technical Approval
<b>ETICS</b>	- External Thermal Insulation Composite Systems
<b>GDP</b>	- Gross Domestic Product
<b>MoE</b>	- Ministry of Economy of the Slovak Republic
<b>NAP</b>	- National Action Plan
<b>NBS</b>	- National Bank of Slovakia
<b>NQP</b>	- National Qualification Platform
<b>NSQ</b>	- National System of Qualifications
<b>NSO</b>	- National System of Occupations
<b>PPP</b>	- Public Private Partnership project
<b>REFUGE</b>	- Renewable Energy for Future Generations
<b>SIEA</b>	- Slovak Innovation and Energy Agency
<b>SME</b>	- Small and Medium-Size Enterprises
<b>STN</b>	- Slovak Technical Standard
<b>SO SR</b>	- Statistical Office of the Slovak Republic
<b>TSUS</b>	- Building Testing and Research Institute
<b>U</b>	- heat transfer coefficient
<b>VET</b>	- Vocational Education and Training
<b>WG</b>	- Working Group
<b>Coll.</b>	- the Slovak Code

## 1. INTRODUCTION

BUILD UP Skills project - Slovakia (BUSS) is aimed to prepare the first steps towards a national strategy to enhance training in the construction sector, focusing specifically on the future construction site experts, so that Slovakia and Europe will be able to tackle the challenges of the so-called green economy, i.e., energy efficiency (reducing energy demand), use of renewable energy sources, reduction of greenhouse gas emissions, meeting thus the 20/20/20 objectives by 2020.

The Build Up Skills project in Slovakia is dealt by a five-members consortium led by the Association of Construction Entrepreneurs of Slovakia; other members of the team are TSUS (Building Testing and Research Institute), Congress and Educational Centre, Slovak Innovation and Energy Agency – SIEA, and EkoFond – a non-investment fund established by SPP. For more information and the latest documents - check on <http://www.buildupskills.eu/national-project/slovakia>.

The main task of the Status Quo Analysis is to evaluate the situation in Slovakia in the field of lifelong learning in the construction and energy sectors, with the primarily focus on those who are already active at the labour market, as well as to prepare documents for a Roadmap.

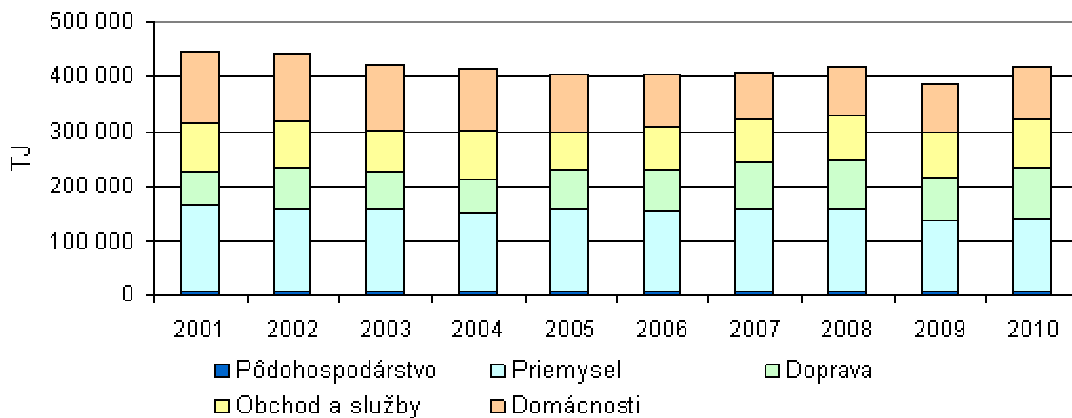
This analysis should provide a general overview of:

- the current situation in the construction sector
- the current professional qualifications of the so called “green professions”
- educational needs
- existing regulations, requirements to change training schemes, quality requirements for constructions, and quality education through accreditation
- potential barriers in training of construction workers, and
- examples of good practice

Slovakia and other EU member states need to accomplish the below specified objectives regarding energy demand and climate changes impacts:

- Overall EU energy consumption to be reduced by 20%
- by 2020, greenhouse gas emissions to be lowered by at least 20% compared to 1990
- to increase the share of renewable energy in final energy consumption to 20%, by 2020.





Source: [www1.enviroportal\\_1.sk](http://www1.enviroportal_1.sk)

Chart 1.1 - Share of individual sectors in final energy consumption, in Slovakia (agriculture / industry / transport / shops and services / households)

Reducing energy consumption and increase the use of renewable energy in buildings, are important measures to reduce the EU energy dependence and greenhouse gases emissions, as buildings consume 40 per cent of energy and are responsible for 36 per cent of greenhouse gas emissions. Based on the 2000 Energy Policy (EP) of Slovakia (approved by the Government Resolution 5/2000), the total final energy consumption in Slovakia was 136.361 GWh (491 PJ) in the benchmark year of 1999, with the non-production sector, i.e. residential buildings, office buildings and buildings not used for production (tertiary sector) being the second largest consumer of energy accounting for 39.2 per cent share of the total final of energy consumption.

Projections estimate the amount of energy generated from renewable energy sources to slightly exceed 14 % share of total energy consumption (76 PJ), i.e. 6 PJ of energy from renewable energy sources might be transferred to other member states.

The involvement of public administration in improving energy efficiency and use of renewable energy sources is supported by the Covenant of Mayors - a European movement bringing together cities and regions that voluntarily agreed to increase energy performance and use renewable energy. Signatories of the Covenant of Mayors initiative agreed to meet the European targets "3x20" by the year 2020. At present, there are more than 4,300 European cities involved in the Covenant of Mayors, representing 170 million people. In the Slovak Republic, there are nine municipalities and one region involved in the Covenant of Mayors.

There are obligations resulting for Slovakia and other EU member states when meeting the targets by 2020; these are in particular changes in building structures requirements and changes in construction technologies that need to be introduced, and, at the same time, rapidly change skills of workers in construction sector which need to be reflected in changes introduced within vocational education.



## 2. OBJECTIVES AND METHODOLOGY

The aim of this National Status Quo Report is to analyse the situation in lifelong learning in the construction and energy sectors, to identify the best practice examples in lifelong learning and to formulate a list of needs and priorities to support the measures related to individual occupations in the Slovak Republic.

The Status Quo Analysis methodology is based on:

- Identification of stakeholders - particularly investors, manufacturers, ETICS contractors, workers assembling roofs and installing doors, windows etc., and also heating and cooling systems, hot water production equipment, ventilation and lighting systems, boilers, heat pumps, and photovoltaic systems.
- Establishing a National Qualification Platform comprising a consortium (the leader), relevant ministries, educational institutions, associations and other stakeholders.

National Qualification Platform was established on two levels; the 1<sup>st</sup> level of National Qualification Platform Council is a consortium of the project (i.e. its members). The second level of the National Qualification Platform comprises various institutions thematically divided into three areas:

Institutions representing the executive power:

- Ministry of Transport, Construction and Regional Development of the Slovak Republic
- Ministry of Education, Science, Research and Sport of the Slovak Republic
- Ministry of Labour, Social Affairs and the Family of the Slovak Republic
- Ministry of Economy of the Slovak Republic

Professional associations and organizations:

- Association for Thermal Insulation of Buildings;
- Slovak Roofers Guild
- Association SLOVENERGOokno
- Slovak Association of Refrigeration and Air Conditioning Technology
- Slovak Association of Photovoltaic Industry
- OZONE XXI, o.z.<sup>3</sup>
- Slovak Association of Civil Engineers
- Slovak Green Building Council

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<sup>3</sup> Transl. note: o.z. stands for “civil association”



- Slovak Technical Standards Institute
- Institute of Economics and Civil Engineering Ltd
- Association of flat owner,s and
- Eurostav Publishing House (media partner)

The third area is focused on education and comprises the following institutions:

- National Institute for Lifelong Learning
- National Institute of Vocational Training
- Faculty of Civil Engineering within the Slovak University of Technology in Bratislava
- Faculty of Civil Engineering within the Technical University in Košice
- Secondary Vocational School at Ivánska cesta in Bratislava
- Secondary Building School in Žilina;
- Combined Secondary School Kremnička, Banská Bystrica;
- Secondary Vocational School, Nové Zámky
- Secondary Electro-technical School, Trnava
- Secondary Vocational School, Prešov

Five working groups were established within the National Qualification Platform, focusing on different outcomes of the Analysis of Status Quo; WG-2, WG-3 and WG-5 form one group to consult, review and comment on partial conclusions of the analysis:

- WG-1 - market situation and trends in the construction sector
- WG-2 - national legislation on energy demand of buildings, existing and potential sources for financing the proposed training
- WG-3 - existing education and training schemes in Slovakia and abroad
- WG-4 - existing skills and theoretical knowledge of construction workers
- WG-5 - drafting future education and training schemes (in collaboration with WG-3 and WG2)

A detailed scheme of the National Qualification Platform, including its working groups and committees, is set out in Annex 1.

The below tools were used in data collection and analysis, in drafting the Analysis of Status Quo:

- Survey of information available on internet
- Survey of data available in hard copy
- questionnaires (relevant ministries and institutions, schools, investors, construction companies, construction workers) (Note: detailed information - questions and potential answers - are given in Annex 2)
- Interviews (representatives of relevant ministries, institutions, vocational schools, and investors)
- information collected in workshops, discussions and brainstorming

During the analysis, primarily the information acquired from individual sources was used (split by the method of acquisition), and then, it was evaluated according to the frequency of responses to the formulated questions. After the statistical analysis of data was made, and if justified, the so-called outliers were excluded, findings were synthesized and cross-checked based on the survey results from multiple sources (areas) related to construction sector and its education. Outcomes were presented and commented at the National Qualification Platform workshop on November 19<sup>th</sup> 2012, in Bratislava. Framework solutions were proposed based on these outlines for the existing situation reflecting the project objectives, which were later discussed and commented by individual working groups. Having approved the submitted data, strengths, weaknesses, opportunities and threats were identified and SWOT analysis was prepared.



### 3. CONSTRUCTION SECTOR

Construction sector generates architectonic and cultural works that last for a long time. Furthermore, it is a production sector with significant aesthetic, environmental and social impacts, and also a major consumer of various kinds of energy, raw materials, materials and products, as well as a generator of enormous amount of construction waste, demolition debris and emissions. Having said the above, thus, an important and not insignificant relationship exists between urban development and the environment on one hand, and a sustainable development on the other Side. Compliance with the principles and rules of sustainable development is therefore of particular importance for construction sector.

Construction is an important indicator of the cyclic development of the whole economy; it is closely tied to economic deviations and movements. In this sense, it directly and immediately responds to changes in the business cycle, having multiplying effects on development of other industries. This means that an investment in the construction sector is followed by an entire demand chain for goods and services in related sectors, which is positively reflected in particular in economic activity, employment and, consequently also in the public budget.

#### 3.1 History

Construction sector was developing gradually, especially after 1945, when many new buildings and apartments were erected and become of great economic importance to the country. Their value in prices of 1997, including the value of buildings and civil constructions, amounted app. 4,205 billion SKK (€140, 17 bill.), of which buildings amounted 3,007 billion SKK (€100, 23 bill.) representing more than 1,006 million m<sup>3</sup> of built-up area. After 1989, construction sector underwent an extensive restructuring, in Slovakia. In 1997, buildings represented 1.006 million m<sup>3</sup> of the built-up area. In terms of share expressed in per cent, civil constructions represented 28%, industrial buildings 27%, residential buildings 24% and residential infrastructure 21% of the grand total.

From the total number of buildings and structures built in Slovakia in the 20<sup>th</sup> century, 12.7% were built until 1950; 19.5% were built from 1950 to 1970, and buildings and constructions built between 1971 - 1990 represent 56.1% of the total, while only less than 12% were built in the last decade of the last century. This very brief analysis shows that gradually, in the 20<sup>th</sup> century, the landscape changed significantly, equally significantly changing the composition and age of structures and buildings, and reflecting the necessary social changes.

Slovakia was developing dynamically both in agriculture and in industry, especially after WWII, while, at the same time, its social and demographic structure was changing with the ever growing role of the cities. All that greatly influenced the construction sector. Traditional construction technologies were not sufficient to keep

up with the latest requirements; i.e. expansive panel systems primarily used for residential buildings and prefabricated skeletal system in civil and industrial constructions, were replaced with a combination of precast and monolithic structure formwork systems, initially in engineering and later also in land constructions.

Requirements to speed up construction limited contractors, builders, architects and designers in using the wide range of architecturally and urbanistically attractive buildings. Price and material control affected the actual quality and durability of residential buildings, as well as civil constructions. Available funds were primarily allocated for new, though limited construction and no funds were allocated for repair and maintenance. Therefore, buildings built in this period don't mirror their actual age, and many of them show static, hygienic and other deficiencies.

The 90s were characterized by a decrease in investment activity, and thus, a significant gap between construction works supply and demand. In terms of quality, all the restrictive regulatory pricing rules ceased and the basic requirements for construction works were enhanced. The full-type panels and prefabricated skeletal system almost completely disappeared. Import and use of previously scarce materials resulted in particular in high quality renovation of technological equipment of buildings, and led to a fundamental change of structures, perimeter and exterior walls characteristics, and interior design, as well.

New changes of ownership relations enhanced the responsibility in care of property, and lifespan of already existing buildings was increased. Gradually, in the early years of twenty-first century, a targeted renovation of residential and non-residential buildings commenced, with an emphasis on achieving the required energy performance.

Overall, the Slovak construction sector has demonstrated great flexibility in the organizational sphere, in the structure of construction works carried out and in structural and design systems in construction. The skills of Slovak builders deserve to be assigned a big contribution to these results.

### 3.2 Basic characteristics

After 1989, an extensive restructuring took place in construction sector, in Slovakia Next to a significant improvement in the level of architectural quality and engineering, also the number and size of construction companies changed. Furthermore, legal form of businesses changed, accompanied by fundamental changes in ownership structure of construction companies. During the Slovak economy transformation, construction sector proved its ability to adapt to a modern market conditions, showing though some threatening oscillations. The volume of construction production decreased significantly in the early stages of transformation, primarily due to disintegration of centrally managed economy, and certain effects occurred after the independent Slovak Republic was established, in 1993. Another distinctive period for the construction sector ended with the end of 1999, and it can be described as a period of gradual recovery of the construction market, comprising periods of growth - 1995-1997 and those of stagnation or decline - 1998-1999.

In 2000, construction and investment boom commenced, with a regular increase in construction production. Nevertheless, the level of production recorded in 1998 was not copied, not even in 2001. The highest growth was reached in 2005 and 2006, when the actual growth rates of construction production volume exceeded a double-digit figures (14.6 or 14.9% when expressed in fixed prices of 2005). These growth rates were considerably higher than those in other EU countries.

Once transformed, the organizational structure of Slovak construction sector was similar to that widely applied abroad. A natural hierarchy of small (up to 49 employees), medium-size (up to 250 employees) and large (more than 250 employees) enterprises was established with structure reflecting the structure of contracts and demand. Self-employed contractors, i.e. tradesmen active in construction sector, form a special group thereof. Each of these groups had established its natural place within the construction market.

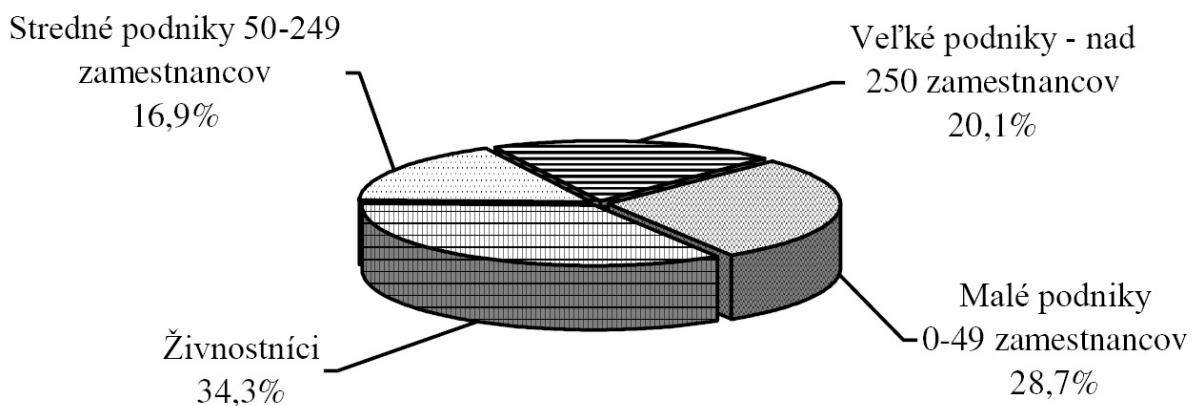


Chart 3.1 - Structure of construction by businesses - 2011 [35] (tradesmen 34.3%; medium-size enterprises with 50-249 employees 16.9%; large enterprises – more than 250 emp. 20.1%; small enterprises 0-49 emp. 28.7%)

Gradual downsizing occurred in the area of construction of buildings (residential and non-residential), primarily in large construction companies, which, however, grew in capital. Alongside foreign investors, significant domestic investments were made by Slovak enterprises. The industry needed also new production halls, infrastructure, stores etc., alongside new technologies. Investors commenced a number of projects of administrative, shopping, leisure, sports and residential centres, in the past. Property business recorded a unique boom until mid-2008, and weakened slightly late in 2008, as a result of the global economic crisis. In 2009, a significant decline in the housing market occurred that only recovered late in 2010, and early in 2011.

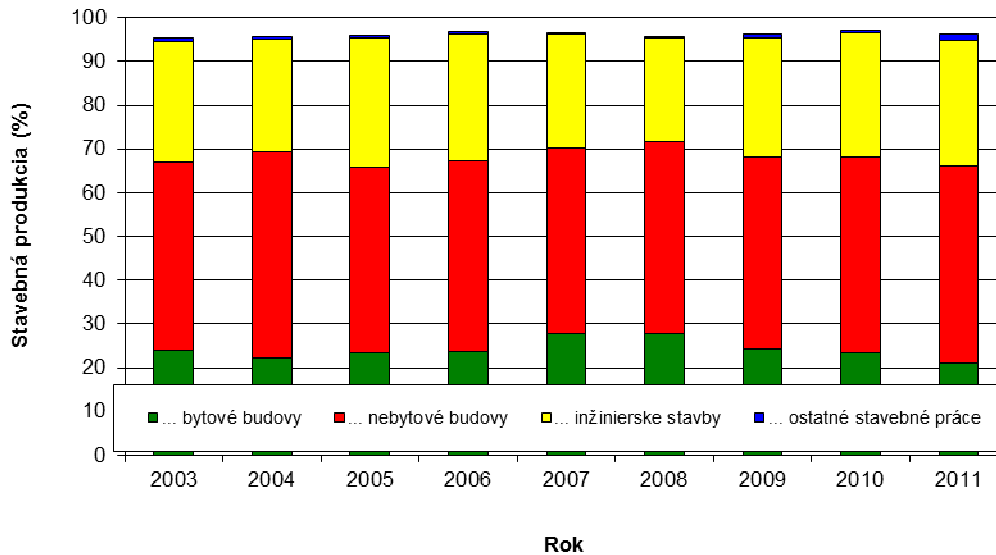


Chart 3.2 - Structure of the construction sector in Slovakia (the rest up to 100% are constructions abroad)

- Residential buildings
- non-residential buildings
- civil engineering,
- other constr. works
- "Y" axis title - Building production ( in %); "X" axis title - Year

On the contrary, in infrastructure constructions, the number of employees (used equipment, experience, etc.) is expected to determine the company impact on the market - hence its market share.

Small construction companies gradually developed a narrow specialization in their production and services, and this trend will continue.

Slovakia membership in the European Union since May 2004 was a further step for its construction sector and the whole economy, being an important milestone comparable, for example, with privatization and market liberalisation. Overall, one can say that the EU membership is beneficial for the Slovak construction sector; its advantages are, among others, more foreign investment and presence at the European construction market. The weaknesses, however, encompass a stronger competitive environment.

Since Slovakia joined the EU, its construction sector reached outstandingly good results until the end of 2008, which can be proved in particular by the significant increase in construction production in 2005 and 2006, when the volume of construction works amounted €4.1 billion and €4.9 billion respectively (expressed in fixed prices). Construction production reached €5.3 billion in current prices, in 2007; i.e. an increase by 9.9% compared to 2006. Businesses operating in construction sector carried out construction works amounting €6.3 billion (in current prices) in 2008; i.e. an increase by 18.3% compared to 2007. From this point of view, the year 2008 was more successful than 2007, for construction sector.

Global financial and economic crisis hit construction sector in particular in 2009, when its production dropped by 9.1% to €5.7 billion in fixed (standard) prices. In 2010, construction production dropped by 3.7% to €5.5 billion in standard prices. From this point of view, 2010 was the year of decline in the construction sector.

Despite the fact that the Slovak economy, as a whole, recorded growth in 2011, with GDP (in fixed prices) growing by 3.3% to €69,058.2 mil., construction sector development copied its negative trends from 2010 and 2009. Total construction production amounted €5 499.8 mil. in standard prices in 2011; i.e. a drop by app. 0.6% compared to 2010 (expressed in fixed prices it would mean €4,603.2 mil.; i.e. a drop by - 1.8%). Construction companies were still losing work due to suspension and cancellation of new contracts. Drop in the public sector demand - in particular transport infrastructure - was a further problem. The demand for residential and commercial buildings on the side of individuals and private sector was also negative due to the continuous property market stagnation. Worsened payment discipline and distrust of the banking sector also had an adverse effect on the overall construction sector.

Construction sector development was largely affected by the resignation of Government in October 2011, followed by early elections in March 2012. A change in Government usually implies changes in the construction priorities strategy. Therefore, the decision of the Government as to whether its approach will be a pro-investment policy to gradually renovate buildings in Slovakia or a restrictive financial policy, will be decisive for the future direction of the whole Slovak construction sector. With regard to the recently announced initiatives of public and private sectors, it is clear, though, that the decrease in demand in the construction market continued in 2012.

The position of construction sector within the overall economy may be best assessed primarily by two indicators:

- construction sector share in GDP production
- construction sector share in the total employment in the economy

Construction sector share in GDP production (current prices) - the construction share in GDP gradually increased since 2005 from 6.1% up to 9.1%, in 2008. In 2009, this figure reached 8.9% or 8.7% in 2010, respectively. In 2011, construction sector share in GDP reached 8.5%; i.e. a decrease by -0.2 % compared to 2010.

On the employment, construction sector as a whole contributed from 6.9% to 8.5%, in 2005 until 2009. In 2010, this figure reached 8.3% and 7.9% in 2011; i.e. again a decrease by -0.4% compared to 2010.



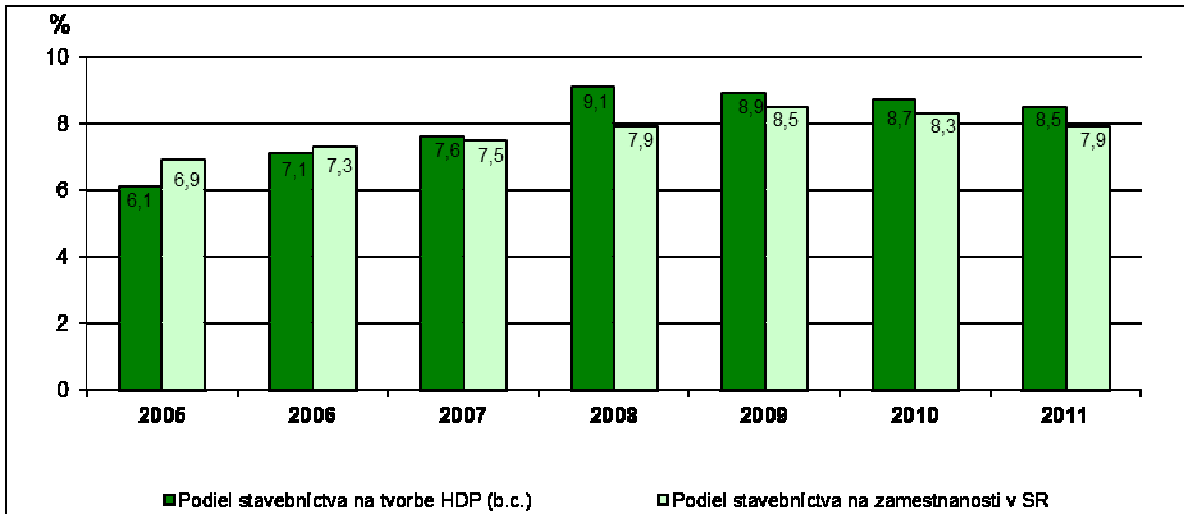


Chart 3.3 - Share of construction in

■ GDP production

□ Total employment in the national economy (Source: UEOS-Komerčia, a.s.<sup>4</sup>)

Despite the drop in private and public investments, construction sector is still considered one of the key sectors of the Slovak economy. In 2011, its share on GDP reached 8.5% (current prices), while the sector generated 9.4% of the total value added and employed around 7.9% of the overall number of employed people, in Slovakia. Moreover, buildings and structures are an important part of investments, and gross fixed capital generation within the economy; the share of buildings and structures on gross fixed capital generation reached 46.6%, in 2011.

### 3.3 Construction sector in 2012 and its further development

Overall, construction sector production reached the amount of €4,428.3 million (current prices) from January to November 2012, but dropped by -11.5% compared to the same period of 2011. This decline was influenced by several factors: insufficient demand in construction, financial constraints, adverse weather conditions, the impact of crisis and the resulting stagnation of ongoing contracts.

The volume of constructions carried out in Slovakia dropped by -12.9% (current prices) to €4,194.8 million, from January until November 2012. Its share on total construction production was 94.7%. Inland constructions were affected by lower volume of new projects, including modernization and reconstruction, i. e a drop by -19.4% (current prices) to €3,180.1 million, and increased volume of repair and maintenance by 20.4% (current prices) to €864.1 million; i.e. new constructions accounted for 75.8% and repair and maintenance accounted for 20.6%. Other construction works amounted €150.6 million from January until November 2012, and

<sup>4</sup> Transl. note: a joint stock company offering various services in construction sector



accounted for 3.6% share of inland production. Construction works carried abroad (outside Slovakia) amounted €233.6 million, from January until November 2012, which represents an increase by 22.3% (in current prices) compared to the same period of the previous year. The share of constructions carried out abroad on total construction production was 5.3% from January until November 2012.

In terms of specialisation, works carried out in infrastructure projects amounted 26.2% of inland production; i.e. €1,096.8 million; residential buildings account for 23.6% of inland production, i.e. €950.5 million; and non-residential buildings account for 50.2% of inland production, i.e. €2,107.4 million from January until November 2012.

According to the National Bank of Slovakia (NBS) [36], the current development of leading indicators imply that negative trends still exist in the investment activities of enterprises. Expectations in the construction sector remain significantly negative. Being aware of the uncertainty, business sector postpones investment decision, which was also confirmed in the questionnaire on loans supply and demand, in which banks see a decline in interest in long-term loans due to a decline in demand for financing investments. Property market developments also indicates negative outlook. The number of issued Building Permits is declining, similar trend is obvious from data on new constructions. Postponing individual investments is expected in the residential property market due to negative consumer sentiment. Having regarded the above, a decline in investments is expected, as well as stagnation of investment activities due to the increased tax levies imposed on enterprises (impacts of recently adopted stabilisation measures). A temporary growth is mainly expected in technical investments, in the automotive industry, in 2013.

### **Expected developments in the construction sector by 2020**

Estimating how long the crisis will impact, requires a lot of courage due to the existing deep recession and close dependence of Slovakia on foreign demands. Thus, when the base for future development will be discussed, a room exists for potential specific goals of the economic policy to be taken into account.

Since the boom in the housing market is over, and taking into account the consequent measures adopted by the banking sector in relation to mortgages and loans for construction, a drop in property demand is expected (in particular apartments and family houses), which will result in excess supply. On the other hand - a supply-side - debts in paying subcontracts caused by the crisis is slowing down production and postponing investments, which, to a large extent determines the demand for employees in the construction sector. Labour force demand is expected to grow in 2-3 years, once prices are stabilised and property market renewed, which may also be supported by the announced PPP projects. [40].



## 4. NATIONAL POLICIES AND STRATEGIES TO REACH THE EU 2020 ENERGY OBJECTIVES FOR CONSTRUCTION SECTOR

### 4.1 Energy sector

#### 4.1.1 National policies and strategies aimed at achieving energy sector goals by 2020

Slovak Energy Policy (2006) contributes to accomplishment of 2020 objectives in the area of energy demand of buildings only in a limited extent as it was adopted prior the Europe 2020 Strategy was formulated. Its update, originally planned for 2011 (five years period) is most likely to be shifted to 2013. Chapter 3.2 devoted to safety and supply reliability of all forms of energy as to the required quantity and quality, with the key focus on heat supply, envisages greater use of renewable energy resources for heating of buildings with emphasis on the increased use of biomass and geothermal energy, in the medium and long term horizons.

#### National policies on energy performance of buildings include:

- Energy Safety Strategy of the Slovak Republic (2009) - Chapter 6.4.3.1 Heat and cold: local heating and cooling of buildings by renewable energy resources. This document is mentioning biomass, solar energy, low potential heat (heat pumps) and geothermal energy in terms of meeting the aims of the 2020 Strategy, in Slovakia. Specific objectives and priorities in this area are given under 6.4.5.1. A plan to support the use of solar energy and biomass in the form of subsidies for households is one of the priorities in the area of heat and bio fuels.
- Energy Efficiency Strategy (2007) - Chapter 2.2.2 – Family houses and apartments - gives examples of energy savings in buildings. Among others, energy saving appliances or lights is mentioned if electricity consumption is to be at least maintained at the same level. On heat, enhanced efficiency in turning fuel into heat and hot water, enhanced efficiency of distribution network pipelines, is mentioned.
- Energy Efficiency Action Plan 2008 - 2010 (2008) - Chapter 3.2 focuses on buildings and contains a list of energy efficiency measures applied when it came into force, and new measures planned to be applied after the Second Action Plan (2011 - 2013) is effective, including an overview of selected technical and economic indicators in the sector.
- Energy Efficiency Action Plan 2011 - 2013 (2011) - contains a first evaluation of measures from the previous Action Plan for buildings (blocks of apartments) and family houses (chapters 4.2 and 5.1),

and measures for 2011 - 2013 (chapter 7.1). For 2011 – 2013, measures are proposed mainly to improve thermal performance of buildings, to support construction of buildings with low energy demand and passive buildings, hydraulic adjustments of heating systems and other measures (energy certification of buildings, regular inspection of boilers, heating systems and air conditioning systems, etc.).

Energy Efficiency Action Plan for 2011- 2013 approved by the Government Resolution N°301 of May 11<sup>th</sup> 2011, follows the first Energy Efficiency Action Plan for 2008 to 2010.

The Energy Efficiency Directive 2006/32/EU commits the EU Member States to save 9% of the total energy consumption by 2016, being the percentage of their average final energy consumption in 2001 to 2005.

Energy Efficiency Action Plan for 2011 -2013 includes evaluation of energy efficiency measures from 2008 to 2010, medium-term savings target for 2010, revised energy savings target based on the recommendations of the European Commission, and recommends energy-saving measures aimed specifically at buildings, public sector and industry. The key saving measure defined for buildings is to improve their thermal and energy performance. The objectives for the final energy consumption are as follows:

Table 4.1 – Final energy savings targets

Indicator	Energy savings from the base average KES <sup>5</sup> in 2001-2005		
	%	from KES in TJ	KES - together with ETS in TJ
Target year	1	4 135	3 122
Medium-term target until 2010	3	12 405	9 366
Long-term target until 2016	9	37 215	28 908
Long-term target until 2020	11	45 486	34 342

Source: Energy Efficiency Action Plan 2011 – 2013

Renovation of public buildings will be one of the major challenges for the public sector, with the overall expected energy savings of 2,300 TJ. Industry is expected to continue reducing its energy consumption in the next three years with savings estimated nearly of 2,500 TJ.

The second Energy Efficiency Action Plan refers to energy saving appliances also in the transport sector. Appliances are expected to continue to be replaced and generate energy savings of almost 1,000 TJ. Traffic is expected to save energy of

<sup>5</sup> Transl. note: “KES” stands for Final energy consumption, in Slovak

950 TJ. According to the Ministry of Economy, Slovakia met the first Energy Efficiency Action Plan targets, and achieved energy savings of 3,700 TJ.

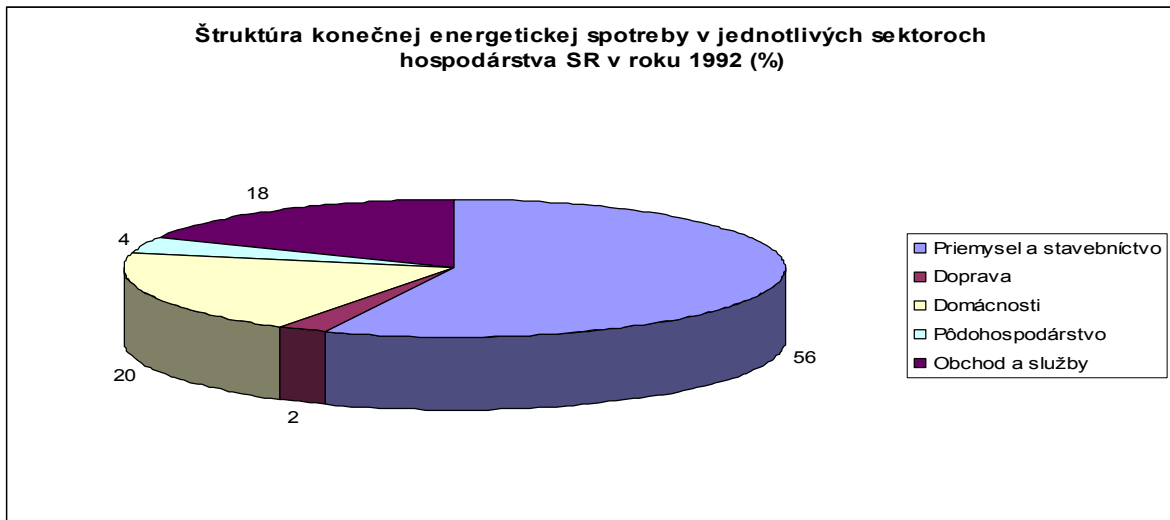


Chart 4.1 – Final energy consumption by economic sectors in Slovakia in 1992 %,[9]  
 industry and construction, transport, households, agriculture, trade and services

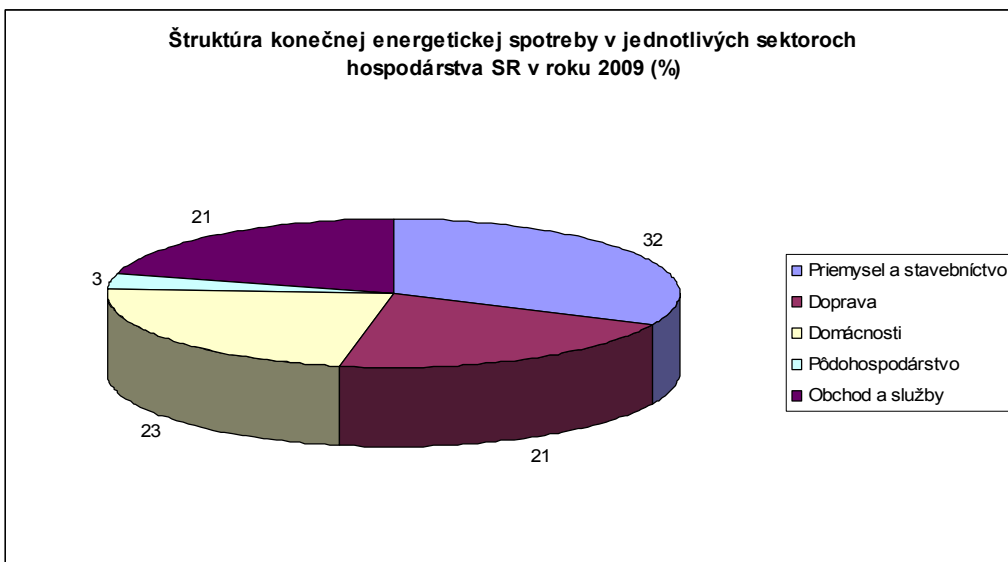


Chart 4.2 -Final energy consumption by economic sectors in Slovakia in 2009  
 industry and construction, transport, households, agriculture, trade and services

Top-down approach that was recommended by the European Commission for evaluation of the first Energy Efficiency Action Plan proved accomplishment of the savings target of 2,800 TJ. The bottom-up approach demonstrated energy savings of 3,700 TJ; i.e. app. 30% of the planned unrevised energy savings target for 2008 -

2010. Projects with a total investment cost of approximately €3.3 billion contributed to achieving these savings. Additional resources amounting €500 million allocated within the first Energy Efficiency Action Plan, were planned for savings projects implemented after 2010.

### National policies aimed at energy performance of buildings and 2020 safety objectives include:

- Updating the Strategy for Energy Performance of Buildings by 2010 with an Outlook to 2020 (2012) – the Government approved the Strategy evaluation on April 13<sup>th</sup> 2011, and adopted Resolution 246 committing itself to prepare the Strategy update; the updated Strategy was approved by Government Resolution 336 of July 6<sup>th</sup> 2012. It lists a set of measures and procedures to achieve the objectives of the 2010/31/EU Directive, requiring to amend the amended Energy Performance Act N° 555/2005 Coll.(the original Energy Performance Act was adopted as the Act 300/2012 Coll.). Furthermore, a new regulation implementing the Energy Performance Act - the Decree 364/2012 Coll. of November 12<sup>th</sup> 2012, issued by the Slovak Ministry of Transport, Construction and Regional Development - should become effective in 2012, envisaging stricter requirements for thermal properties of structures and buildings, every five years.
- National Plan aimed to increase the number of nearly zero energy buildings (2012) - A document approved by the Slovak Ministry of Transport, Construction and Regional Development on November 19<sup>th</sup> 2012, sets interim goals. The design of nearly zero energy buildings needs be based on the fact that a building with a clean energy source changes its own character since it is based on renewable energy sources. It requires a completely different design, i.e. shape and orientation, good thermal protection of structures, especially the exterior walls, windows and doors, and customized technical equipment. Introducing these new issues into vocational and specialised secondary schools curricula is a precondition for reaching these goals in 2018 or 2020.
- State Housing Policy to 2015 (2010) - approved by the Government Resolution 96 of February 3<sup>rd</sup> 2010, lists renovation of buildings among its long-term strategic priorities, in order to gradually reduce energy consumption of buildings, following provisions of the Act. 555/2005 Coll. It was noted that energy consumption in residential buildings built in particular before 1989 doesn't comply with the public interest of sustainable development, their energy demand highly exceeds that of other EU member states with developed economies. This creates opportunities for significant savings in energy consumption, and thus, a potential reduction of cost for energy, lowering also CO<sub>2</sub> generation, which is in the interest of sustainable development.

### National policies aimed at the use of renewable energy in buildings include:

- Strategy for Higher Use of Renewable Energy Sources in Slovakia (2007) - The document sets out the objectives in this area by 2015, underlying the need to promote the use of solar energy and biomass for heating and hot water production in apartments and in family houses, in the form of subsidies for biomass boilers and solar systems.
- National Action Plan (NAP) for renewable energy sources (2010) - contains an overview of policies and measures (current / planned) to promote the use of energy from renewable sources (chapter 4.1).

Chart 4.2 – A review of policies and measures ( energy from renewable sources in buildings)

N°	The title and reference of measure	Type of measure	Expected result	Target group and/or activity	Existing (E) or planned (P)	Commencement and end date of the measure
2.	Support for using renewable energy sources in corporate sector <b>Chap. 4.4.</b>	Financial	energy and heat generation from renewable energy sources	Investors	E	2007 - 2013
3.	Support for using renewable energy sources in households <b>Chap. 4.2.3. e)</b>	Financial	1. installation of biomass boilers 2. installation of solar collectors	Households	E	2009 - 2015
10.	Support for renewable energy sources in construction sector <b>Chap. 4.2.3 e)</b>	Legislative, regulatory	heat generation	investors	P	— *2011
11.	Establishing a system for issuing certificates to installers <b>Chap. 4.2.5</b>	Regulatory	increased quality of heat generation equipment	installers	P	— *2012

N°	The title and reference of measure	Type of measure	Expected result	Target group and/or activity	Existing (E) or planned (P)	Commencement and end date of the measure
12.	Obligatory use of renewable energy sources in new and reconstructed buildings  <b>Chap. 4.2.3 f)</b>	Regulatory	heat generation	project architects	P	<u>          </u> *2012
13.	Minimal volume in new and reconstructed objects  <b>Chap. 4.2.3 g)</b>	Regulatory	heat and electricity generation	project architects	P	<u>          </u> *2013
14.	Support for reconstruction of heat distribution networks  <b>Chap. 4.2.9. b)</b>	financial	Energy savings, motivation for central heat supply	investors	P	2014 - 2020
15.	Support for using renewable energy sources in corporate sector  <b>Chap. 4.4.</b>	financial	heat generation from renewable energy sources	investors	P	2014 - 2020
16.	Support for using renewable energy sources for heating and cooling in public buildings  <b>Chap. 4.2.3 d)</b>	financial	Public buildings heating and cooling	government	P	2014 - 2020
<u>          </u> *	No deadline for the measurement specified					

Source: Ministry of Economy SR (2010)

#### 4.1.2 Overview of activities planned within the implementation of the revised Energy Performance of Buildings Directive and the Directive on promotion of the use of energy from renewable resources (National Action Plan for Renewable Energy Sources)

- In terms of implementing the revised wording of the Energy Performance of Buildings Directive (EPBD) translated into the Act N° 555/2005 Coll. as amended, and the Act N° 300/2012 Coll., it is assumed that technical, environmental and economic feasibility to use high-performance alternative energy systems based on renewable energy source needs to be considered while designing a new building. According to the Building Act N° 50/1976 Coll., a project architect is required to use adequate structures and alternative energy systems based on renewable energy, as well as automated control and monitoring systems when designing a new building and planning a major renovation of an existing buildings, taking into account technical, functional and economic aspects, as well.
- Activities specified in the Article 13.3 of the Directive 2009/28/EC for renewable energy sources, are listed under Chap. 4.2.3 of the NAP. The goal is to focus on increased local heat and/or electricity supply to buildings.
- Measures resulting from the NAP to increase the use of renewable sources in the construction sector are:
  - ü To introduce energy audits for selected types of buildings
  - ü To issue guidelines for the use of renewable energy sources in buildings (Art. 14 para 5), and its application is to be made mandatory for new and significantly renovated buildings
  - ü To issue guidelines for the use of renewable energy sources in regional/local urban centres
  - ü To update and audit of fulfilment of the "Heat energy development strategy at municipal level"
  - ü To issue a methodology for calculating cost-optimal levels of minimum energy performance requirements for buildings, and its application to be made mandatory for new buildings and adequately mandatory application for existing buildings
  - ü To institutionalize a specialised training schemes for installers; institutionalize a specialised training schemes for project designers and architects in order to be able to evaluate the appropriate mix of renewable energy sources and energy efficiency measures in planning, designing, construction and reconstruction of buildings
  - ü To promote energy services using renewable energy in buildings
  - ü To support program for biomass boilers and solar collectors in households



- The latest Energy Policy (2006) doesn't include the responsibilities defined for new and significantly renovated building. Its updated version (expected in 2013) should take into account the possibility of determining the minimum amount of energy from renewable sources in buildings.

#### 4.1.3 Relevant national laws and regulations in the construction sector, obligations arising from the Renewable Energy Sources Directive

Responsibilities regarding installation of renewable energy sources are specified in the following regulations:

- Act 555/2005 Coll. concerning the energy performance of buildings amending certain acts in the wording of the Act 17/2007 Coll., Art. 4 para 2 (formal requirement without specification)
- Act 300/2012 Coll. amending and supplementing the Act N° 555/2005 Coll., as amended, and amending and supplementing the Building Act N° 50/1976 Coll. as amended (definition of a nearly zero energy)
- Act 309/2009 Coll. on promotion of renewable energy sources and amending certain laws
- "Heat energy development strategy at municipal level" (the Act No. 657/2004 Coll. on thermal energy)
- Act 17/2007 Coll. on regular inspection of boilers, heating systems and air conditioning systems and on amendments to certain laws, came into force on January 1<sup>st</sup> 2013 and was replaced by the Act No. 314/2012 Coll. on regular inspection of heating systems and air conditioning systems amending the Trade Licence Act 455/1991 Coll.
- Decree 364/2012 of November 12<sup>th</sup> 2012, issued by the Slovak Ministry of Transport implementing the Act 555/2005 Coll. - energy class for a global indicator – primary energy - A0 - a minimum requirement for energy performance of buildings with almost zero energy applicable on all new buildings built after 2020

Applicable laws and regulations can be found at

- [www.zbierka.sk](http://www.zbierka.sk)<sup>6</sup>
- [www.telecom.gov.sk](http://www.telecom.gov.sk)
- [www.economy.gov.sk](http://www.economy.gov.sk)

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<sup>6</sup> Transl. note: electronic form of the Slovak Code

#### 4.1.4 The expected contributions of construction sector to achieve the 2020 targets

##### Construction structures and standard requirements

The first technical standard for thermal protection of structures and buildings was adopted in Slovakia (then, the former Czechoslovakia) in 1964, and was revised several times. Requirements for individual building structures derive from Table 3.4. A comparison with Fig. 5.1 shows that the largest number of buildings in Slovakia is those with very low thermal performance.

The last revision of STN 73 0540-2 - thermal protection, thermal performance of buildings and structures – is effective from January 1<sup>st</sup> 2013. It introduces a gradual tightening of requirements for thermal performance of buildings and structures, which creates conditions for their efficient thermal protection in order to meet the expectations for gradual reduction of energy demand for heating in buildings. Their introduction from January 1<sup>st</sup> 2013, should be in accordance with the cost-optimal energy performance requirements for buildings for new and significantly renovated building.

Creating conditions for meeting the objectives for constructing nearly zero energy (draft National Plan) requires new legislation to be drafted, updating the Strategy and stricter requirements set in technical standards.

Tab. 4.3 – Overview of requirements for heat resistance of perimeter walls [41]

Requirement validity period according to ČSN 73 0540 or STN 73 0540 (since 1993)	Heat resistance $R_N$ (m <sup>2</sup> .K/W)			
	Perimeter cover $\theta_e$ (°C)		Roof structure $\theta_e$ (°C)	
1964 - (for -15°C)	0.52		0.95	
1977 - (valid from 1979) (obligatory from 1984)	0.95		1.8	
1992 – change N°4 (obligatory from May 1 <sup>st</sup> 1992)	2.0 (1.2 for insulation)		3.0	
1997 – change N° 5 (valid from February 1 <sup>st</sup> 1997)	2.0	Reconstructed	3.0	Reconstructed
	3.0	new	5.0	new
from 2002 - Revised STN 73 0540-2:2002 recommended values valid from October 1 <sup>st</sup> 2002	2.0	Renewed buildings	3.2	renovated buildings
	3.0	New buildings	4.9	new buildings

Tab. 4.4 – Heat transfer coefficient  $U$  requirements for perimeter walls [39]

Building	heat transfer coefficient $W/(m^2.K)$
----------	---------------------------------------

	Maximum value $U_{W,max}$	Standard value (required) $U_{W,N}$	Recommended value $U_{W,r1}$	target recommended value $U_{W,r2}$
perimeter wall and inclined roof covering the living area with a slope $> 45^\circ$	0.46	0.32	0.22	0.15
flat and inclining roof $\leq 45^\circ$	0.30	0.20	0.10	0.10
The ceiling above external environment	0.30	0.20	0.10	0.10
The ceiling above non-heated space	0.35	0.25	0.15	0.15

The requirements result from the heat-related standard (standard recommended a target recommended) in order to meet individual energy levels of buildings:

- low energy building standard for new and renovated buildings from January 1<sup>st</sup> 2013
- ultralow-energy building standard for all new buildings from January 1<sup>st</sup> 2016, and renovated building, if technically, functionally and economically feasible
- energy standard for nearly zero energy used by or owned by public authorities after December 31<sup>st</sup> 2018, and for all new buildings after December 31<sup>st</sup> 2020

Requirements establishing the maximum heat consumption depending on the shape of the building are listed in Table 5.4

Tab 4.5 – Required values of energy demand for heating [39]

building shape	energy consumption for heating kWh/(m <sup>2</sup> .a)			
	Maximum value $Q_{H,nd,max}$	Standard (required) value $Q_{H,nd,N}$	Recommended value $Q_{H,nd,r1}$	Target recommended value $Q_{H,nd,r2}$
1/m				
$\leq 0.3$	70.0	50.0	25.0	12.5
0.4	78.6	57.1	28.55	14.28
0.5	87.1	64.3	32.15	16.08
0.6	95.7	71.4	35.70	17.85
0.7	104.3	78.6	39.3	19.65
0.8	112.9	85.7	42.85	21.43
0.9	121.4	92.9	46.45	23.23
1.0	130.0	100.0	50.0	25.0

## Energy performance of buildings

The Directive 2010/31/EU is implemented by the Act 300/2012 Coll., and introduces primary energy as a global energy performance indicator. Assessment and classification according to the energy demand of individual points of consumption (heating, hot water consumption, cooling and lighting) and energy demand of a building, remains still valid. Energy classes allow to assess the adequacy of technical systems and a building, creating thus conditions for drafting measures to meet the minimum energy performance requirements. The requirements for minimum energy performance -almost zero- are determined by the primary energy demand.

According to the Act N° 300/2012 Coll., primary energy determined from the volume of energy supplied to technical system of a building, entering through its boundary lines and going to individual consumption points and adjusted with the primary energy conversion factor, is the global indicator for a minimum energy performance of a building. The supplied energy is determined by individual energy carriers which supply it, through the system boundary lines, to the technical equipment and then, it is used for heating, hot water generation, ventilation, cooling and lighting, ensuring also for resources efficiency, distribution, transmission and control, and taking into account the renewable energy available in the building or nearby.

The law defines buildings with almost zero energy as those with a very high energy efficiency. Almost zero or a very small amount of energy required by such building needs be ensured by efficient thermal protection and a high volume of energy from renewable resources available in the building or nearby.

Energy from renewable energy sources in the building or nearby, is considered if generated from sources located:

- a) inside the building premises with adjusted environment limited by boundaries of the building
- b) at the building boundaries while being fixed to the building
- c) outside building in a non-heated space of the building
- d) outside building on the land used by the building, if energy generated there is used in the building

In Slovakia, there is no statistical data on the use of energy from renewable sources. When calculating the impact of renewable energy sources, thermal energy required for heating, cooling and hot water generated from renewable sources in the building or nearby is deducted from overall energy demand of a building. The same formula applies to electricity.

According to the law and regulations implementing the requirements of Directive 2010/31/EU, the energy performance requirements for buildings are gradually tightened in order to create conditions to meet the targets to reduce energy demand and CO<sub>2</sub> emissions, by 2020.



## Minimum requirements for energy performance of buildings

The minimum requirement for energy performance of buildings is the upper limit of energy class "B" for the global indicator. Generally, it can be said that major renovation, i.e. insulating the perimeter walls and the roof, replacing windows, insulating partition walls between heated and unheated spaces, hydraulic adjustment of heating system in the building and control of heat supply, may reduce the energy demand for heating by at least 50%. In residential buildings, based on statistically determined average energy consumption for heating, this means energy consumption drop from 106 kWh / (m<sup>2</sup>.a) to 53 kWh / (m<sup>2</sup>.a).

Minimum energy performance requirements for buildings under Art 4b para 2 b) of the Act is defined by the upper limit for "A1" energy efficiency class, for global indicator.

The minimum requirement for energy performance with almost zero energy is defined by the Act as the upper limit for "A0" energy class, for global indicator.

New buildings and significantly renovated buildings need to meet the minimum requirements defined as the upper limit for "B" energy class for global indicator, from January 1<sup>st</sup> 2013. If technically, functionally and economically not feasible in significantly renovated buildings, structures and components being part thereof, which form the building's shell, need at least meet the requirements for the energy-efficient buildings according to the technical standard STN 73 0540-2: 2012.

The upper limit for energy class "B" determines the low-energy construction level for all parameters, the upper limit for energy class "A" for individual indicators being at the same time upper limit for energy class "A1" for global indicator, determine ultra-low energy construction level. The upper limit for energy class "A0" for global indicator determines the construction level for nearly zero energy.

Minimum energy performance requirements for new buildings built after December 31<sup>st</sup> 2015, shall mean the upper limit for energy class "A1" for global indicator, while a significantly renovated building has to comply with this requirement if technically, functionally and economically feasible.

For new buildings owned by public authorities and built after December 31<sup>st</sup> 2018, as well as for all other new buildings built after December 31<sup>st</sup> 2020, the upper limit for energy class "A0" shall represent the minimum requirement for global indicator. Significantly renovated buildings should meet the nearly zero energy requirement if technically, functionally and economically feasible.

Implementing gradual steps to achieve the goal in 2020 means to reduce energy consumption of buildings. Therefore, it is important to know the potential energy savings. Key figures are given in Table. 4.3 as defined in the draft National Plan, which contains potential energy savings in construction of new buildings within a given time period, taking into account stricter criteria for building structures. Estimated savings are calculated until 2021, i.e. including the construction of nearly zero energy buildings.

Other assumptions used in the calculation are based on statistical surveys, which project annual construction of 15,000 apartments in family houses and apartment

blocks, and 110 administrative buildings. The calculation was based on energy demand for different categories of buildings set as the energy demand of an level ultra-low energy building built after 2015.

Potential energy savings that could be reached based on the above assumptions and calculations, amount approximately 1.5 PJ, which represents CO<sub>2</sub> emissions reduction by 87,000 tons (Table 4.6).

Table 4.6 – Potential overall energy savings of new buildings in 2013 and 2021 [51]

Years						
Measure	2016	2017	2018	2019	2020	2021
Estimated potential:						
a) numbers of apartments	7,000	7,000	7,000	7,000	7,000	7,000
b) annual increase in heat savings in TJ	50.4 TJ	50.4 TJ	50.4 TJ	50.4 TJ	50.4 TJ	75.6 TJ
		100.8 TJ	151.2 TJ	201.6 TJ	252 TJ	327.6 TJ
estimated potential:						
a) number of family houses	8,000	8,000	8,000	8,000	8,000	8,000
b) annual savings TJ	175.82 TJ	175.82 TJ	175.82 TJ	175.82 TJ	175.82 TJ	266.11 TJ
c) annual increase in heat savings in TJ		351.64 TJ	527.46 TJ	703.28 TJ	879.1 TJ	1145,21 TJ
1) estimated potential:						
a) number of administrative buildings	110	110	110	110	110	110
b) annual savings TJ	3.83 TJ	3.83 TJ	3.83 TJ	3.83 TJ	3.83 TJ	5.73 TJ
c) annual increase in heat savings in TJ		7.66 TJ	11.49 TJ	15.32 TJ	19.15 TJ	24.88 TJ

## Renewable energy sources

Under Chap. 4.2.3. – Buildings, the National Action Plan for renewable energy sources approved by the Government Resolution 677/2010 of June 10<sup>th</sup> 2010, plans an increase in the use of energy from renewable energy sources in buildings as given below in Tab. 6:

Tab. 4.7 – Estimated proportion of energy from renewable sources in construction sector (in %)

Type	2005	2010	2015	2020
Apartments	1	4	7	12
Commercial buildings	1	2	4	8
Public buildings	1	2	4	8
Industrial buildings	1	1	2	3
<b>TOTAL</b>	<b>1</b>	<b>3</b>	<b>5</b>	<b>9</b>

Source: Ministry of Economy of the SR (NAP 2010)

## 4.2 Ongoing vocational education and training (VET)

National Reform Program of the Slovak Republic 2011 – 2014, emphasises the ever growing importance of lifelong learning, in particular further education, due to the ever growing dynamics of the society. An efficient system for further education shall ensure for easy access to a flexible system for deepening and enhancement of skills in order to increase chances of Slovak citizens at the labour market, their personal development and quality of life. Lifelong Learning Strategy will be revised and updated, and measures mainly for systematic reduction of information gaps in further education will be formulated. Defining a content and ensuring for its free access will enhance the key competences of people, enabling them to succeed at the labour market. Training activities aimed at personal development and quality of life are to be supported.

The Government approved the Strategy of Lifelong Learning and Lifelong Counselling in April 2007 (hereinafter referred to as the "Strategy 2007"), and it is expected to be accomplished in 2015. It identified a number of key priorities to promote lifelong learning in the Slovak Republic.

One of the Strategy 2007 outcomes was the Act N° 568/2009 Coll. adopted in December 2009, on lifelong learning and on amendments to certain laws, which provided a number of important tools for further development of lifelong learning, such as accreditation based on qualification standards, recognition of achieved training outcomes, monitoring and forecasting of training needs. These tools, though, had not been put into practice yet, mainly because the project to promote ongoing education, under which these tools were supposed to be developed, has not been implemented, yet. Likewise, sufficiently focused and coordinated actions of all stakeholders failed.

The main actors in the system of lifelong learning are people, educational institutions, counselling centres, employers, professional and trade associations, as well as local and regional authorities, recruitment agencies and NGOs. Together, these actors must be involved in identification, development and application of tools mentioned above.

The aim of Lifelong Learning Strategy 2011 – 2014, is to support to establish conditions for a transition to a functioning system of lifelong learning available to

everyone. Strategy 2011, therefore, focuses on the most problematic areas of lifelong learning in the Slovak Republic, that affect its future development.

Key problem areas - Strategy 2011 priorities :

1. Attitude and motivation of an individual towards lifelong learning
2. Training needs to translate the needs of employers
3. System and structure of advisory services focusing on adults
4. Selected core competencies and their level are essential for professional development in society: financial literacy, entrepreneurial skills, communication in foreign languages, information and communication technology literacy and active citizenship
5. Further education funding

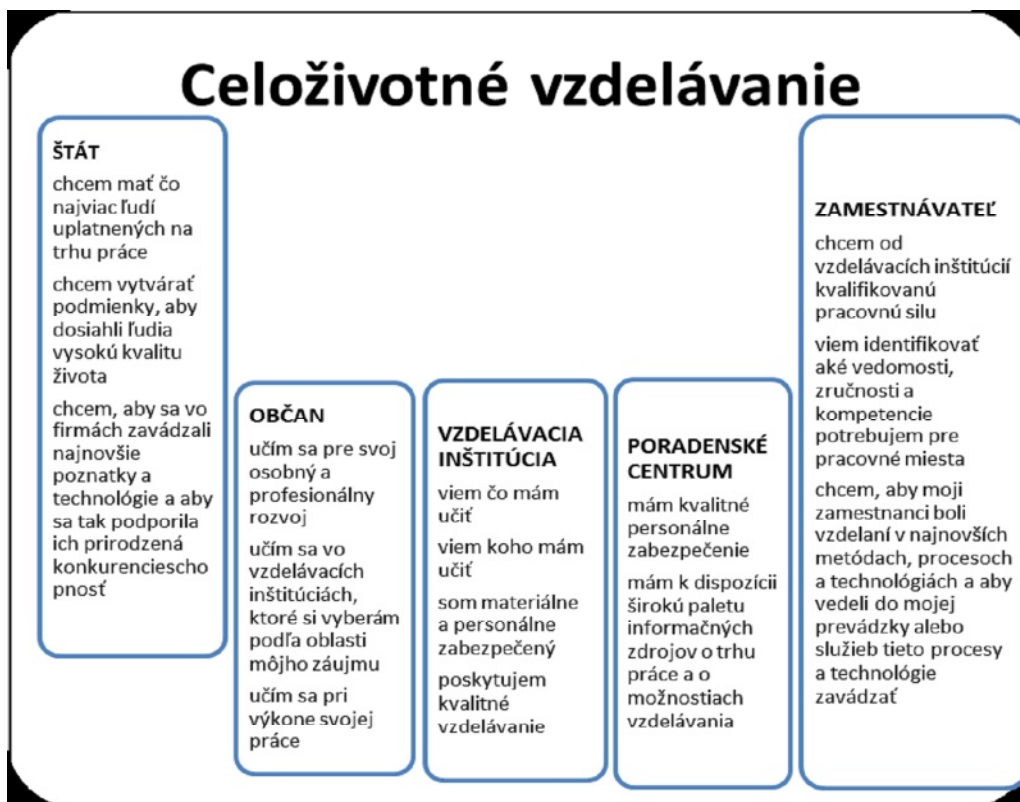


Fig 4.3 - Principles of the lifelong learning [46]

Proposed tools:

1. Communication platform for educational institutions and employers
2. Multimedia platform with free educational content
3. Career guidance services for adults
4. Financial support to encourage participation in further education for individuals and employers



5. Financial instruments to motivate professional civil associations to actively contribute to further education through their professionals

### Motivation in further education

Motivation is one of the key prerequisites for a functioning strategic tools. It determines the active interest of an individual in his/her professional and personal development through the lifelong learning system. Motivation is closely related to the uniqueness of a man, and thus, incentives may vary. More attention is given to support school attendance and to encourage further education, as well to promote specialised education and raise civil awareness.

Motivation to attend school has traditionally strongly influenced individuals. This form of education is highly recognised throughout the whole society, allowing to obtain the level of education (qualification), which opens the door to the labour market. This is proved by very strong position of Slovakia when speaking about the early leaving school indicator.

Less positively, though, appears to be the level of adult population participating in further education, where, except for a relatively high portion of University graduates, the rest of the adult population avoids further education. The most common obstacles appear to be the price and time of training. The key obstacle for participation in further education is its low acceptance by employers, or, in other words, its output is no guarantee for a higher salary nor a better job. It is regarded as equivalent to a certificate or a vocational certificate.

Table 4.8 – Education of adults - external students at secondary schools

Number of external students	Year			
	2003	2004	2005	2006
together	13 632	14 095	12 607	11 651
Thereof female	8 495	8 064	6 990	6 676

Source: Institute for educational information and projections 1999-2006

Changes the Slovak construction sector faced after 1990, are also reflected in the sector's employment figures. Until 2001, employment has declined significantly, and since 2002, the number of employees began to raise in the construction sector, when a lack of qualified professionals occurred in 2005, in particular qualified workers were needed; a peak was reached in 2007. 2008 and 2009 were the years of construction boom, employing 182.1 thousand and 184.7 thousand people. In 2011, certain downsizing commenced when 172.3 thousand people worked in construction, and only 165.7 thousand people from January until November 2012.

As for its own qualitative structure of employees, a constant ratio of employees in management and blue-collar positions is kept in long term; i.e. app. 15% : 85%. In

2005, construction sector employed 142,751 people; thereof 121,303 were workers (85.0%), while in 2007, the total employment amounted 165,192 people, of which were 139,173 workers (84.2%).

According to the Labour Force Survey made by the Slovak Statistical Office, of the total number of 233.7<sup>7</sup> people employed in the Slovak construction sector in 2011, 2.7% were those with completed primary education, 48.0% with apprentice education, 3.4% completed secondary education without final secondary school leaving state examination<sup>8</sup>, 6.0% completed apprentice and vocational school with a final school leaving examination, 2.3% completed general secondary education (Grammar School), 28.5% completed secondary vocational education, 0.3% higher secondary education, and 8.8% were university graduates. The survey shows that employees with vocational and completed secondary education play a vital role in the construction sector ; i.e. in 2011, they accounted for approximately 76.5% of employees in the construction sector.

According to the methodology of the Labour Force Survey Statistical Office, workers include all persons aged 15 and over, who worked at least one hour for a wage, salary or other remuneration during the monitored (reference) week, including those working abroad. A work may be considered full-time or part-time work, permanent, temporary, casual or seasonal work.

Students are not interested in specialised education and training related to construction sector, anymore. This is confirmed both by schools and employers. Changes in economic situation in Slovakia caused that “traditional employers” were closed, production and services changed its focus and small businesses/sole traders emerged, and new foreign investors arrived, and all that logically led to new demands and requirements of employers regarding professional knowledge, skills and competencies of graduates from individual specialisations of vocational schools. Cooperation between employers and vocational education and training bears certain features of voluntariness, even spontaneity, and is limited to a certain forms of collaboration, such as field trips for students, specialised practical professional training, sponsorship in material or financial form, participation and membership of experts in specialized committees. Existing legislation only partially governs the relationship, tasks or activities of employers towards vocational education and training, the overall context is missing.

Lack of skilled labour force in the construction sector is also reflected in its "aging"; i.e. workers older than 41 years represented 63.3% of staff in Doprastav (whereas in Metrostav SK, the share was only 58%), in 2007, A limited supply of young graduates that persists in recent years cannot replace the naturally declining in staffing. Lack of graduates from specialised building schools is a result of both the low number of young people studying the particular profession, and by the general lack of interest in studying technical subjects.

Cooperation between employers and vocational education and training bears certain features of voluntariness, even spontaneity, and is limited to a certain forms of

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<sup>7</sup> Transl. note: probably a mistake, “thousand” is missing”

<sup>8</sup> Transl. note: “Maturita” in Slovak

collaboration, such as field trips for students, specialised practical professional training, sponsorship in material or financial form, participation and membership of experts in specialized committees. Existing legislation only partially governs the relationship, tasks or activities of employers towards vocational education and training, the overall context is missing.

Tab. 4.9 – Overview of specialised subjects (36) in SR in academic year 2008/2009

Subject of study	Number of students	Graduated in previous year	Enrolled to the 1 <sup>st</sup> year of study	Students attending specialised training
Building construction	192	48	53	0
Hydroecological constructions	18	2	0	0
Construction management	70	49	22	0
Geodesy, cartography and the Cadastre	870	239	222	168
Construction	3,285	691	928	354
Fitting equipment mechanic	450	79	128	415
Bricklayer	1,493	482	562	1 485
Carpenter	290	124	66	278
Painter	328	102	111	308
Roofer	105	38	47	101
Floor layer	57	12	15	57
Stonemason	14	0	0	14
Stove maker	6	0	0	6
Building production	600	105	408	599
Building -painting works	97	12	44	89
Building -carpenter/joiner works	2	4	0	2
Construction- business management	120	86	72	75
Construction-building production	425	187	233	297
Construction-technical equipment of buildings	1	3	0	1
Operator in building production	888	145	252	848
Operator in building production-brick structures	0	35	0	0
Operator in building production – construction works quality	0	6	0	0
Tinsmith in building	21	7	0	21
Plumber/ installer	653	199	211	648
Construction technology -land constructions	15	8	0	15

Construction	225	51	136	162
Fitter of dry constructions	167	59	54	167
SR overall	10,392	2,773	3,564	6,110

In Slovakia, there is a growing trend of opening other than construction-related programmes at specialised building schools (e.g., in academic year 2008/2009):

- In Trnava region, there is one Secondary Building School in the city of Dunajská Streda, teaching in Hungarian language, 6 fields of study specialised in construction from 9 specialisations
- In Nitra Region, Secondary Building School in Nitra offers 14 fields of study (11 thereof are construction-oriented), Secondary Building School in Nové Zámky offers only 7 construction-oriented fields of study out of 14 study programmes.
- In Žilina region, Joint Secondary Building School in Liptovský Mikuláš offers 8 construction-related fields of study out of the total number of 14; at the Combined Secondary Building School in Žilina there are 9 fields of study related to construction out of 18
- In Banská Bystrica region, Secondary Building School in Banská Bystrica offers 12 fields of study with 6 construction-oriented, in Lučenec at Secondary Building School only 6 out of 15 fields of study are construction-oriented
- In the Prešov region, Secondary Building School in Humenné offers 8 fields of construction from 18 specialisations, and Secondary Building School in Prešov has only 9 are construction oriented field of studies, out of 20
- In the Košice region, Secondary Building School at Kukučínova street there, are only 6 construction-related fields of study out of 13 specialisations, Secondary Building School at Ostrovský Street offers 5 are construction-oriented fields of study from 19 fields in total, and; at Secondary Building School in Spišská Nová Ves there are 23 specialisations and only 7 thereof are construction-oriented

It results from the above that in order to ensure for an adequate number of skilled labour force for the construction sector and its competitiveness, much more active involvement of employers in the training of future skilled workers is necessary at all levels, i.e. graduates both from secondary building schools and universities specialising in building. Another option is, for example, specialised on-the-job training and training of personnel in the construction sector from blue-collar professions up to the management of companies through existing theoretical and practical training centres that proved useful in the past (e.g. Congress and Educational Centre, where various forms of training, education and specialised qualification certification training was organised for many years for workers in the construction sector). Construction companies themselves and their main professional organization - Association of Construction Entrepreneurs in construction - should be interested in this form of

learning, as it is linking theoretical knowledge and practical skills, and re-training within lifelong learning.

Therefore, it is necessary to implement a number of measures that should at least stabilize this unfavourable situation, or even reverse it :

1. Further education must respect interests of employers regarding the content and scope of the qualification standards for individual positions
2. A grant scheme to support further education needs to be established for low-skilled and unskilled groups
3. A significant part of theoretical training in further education should be transferred to distance learning using Internet, and thus reduce the cost of training
4. To monitor training needs and labour market needs, to identify the most needed future competencies and skills for the labour market

#### **4.2.1 National policies and strategies related to green skills and professions**

The terms “green profession” and “green skills” are neither defined nor introduced in Slovakia; it is therefore possible to take-over any of the definitions adopted abroad.

Workers (blue-collar) are a green profession representative, once completing a training and introducing the environmental changes. Green professions include: electricians - install solar panels, installers - install solar panels for generating hot water, construction workers - build energy-performing buildings and wind power stations, workers or others involved in sustainable development with clean and renewable energy, as well as specialists verifying operation of energy-performing building systems (commissioning specialist / coordinator) and facility manager of energy-efficient buildings. These are professions associated with the industry of renewable energy, transportation, and energy efficiency. Again, it needs to be emphasized that these professions are not part of schools curricula nor any training is offered in Slovakia in this regard.

#### **The European Qualifications Framework**

The European Qualifications Framework (EQF) is a common European reference system that links national qualifications systems of different countries, and acts as a translation tool that encourages the qualifications to be transparent and understandable across different countries and systems in Europe. It has two main objectives: to promote citizens' mobility between countries and facilitate their lifelong learning.

EQF should link national qualifications systems and frameworks of each country to a common European reference system - its eight reference levels. These levels span the full range of qualifications, from basic (Level 1, for example Educational certificates) to higher levels (level 8, for example doctorate degrees). As an instrument for the promotion of lifelong learning EQF includes all levels of qualifications in general education as well as training, for example Higher Education



and Training. In addition, the framework addresses qualifications acquired in initial and continuing education and training.

Eight benchmarks are described in terms of learning outcomes. EQF recognizes that educational systems and training systems are so much different in Europe that it is necessary to shift towards the learning outcomes in order to be able to compare and develop potential cooperation between countries and institutions. The EQF learning outcomes define the requirements for what the learners know, understand and be able to do on completion of a learning process. EQF therefore places emphasis on learning outcomes rather than by focusing on inputs such the length of the study. Learning outcomes are specified in three categories - knowledge, skills and competencies.

This indicates that skills in various combinations span the broad range of learning outcomes, including theoretical knowledge, practical and technical skills and social skills, in which the fundamental ability is to cooperate with others.

Through training outcomes as a common reference point, the framework will facilitate comparison and transfer of qualifications between countries, systems and institutions, and it will be important for a wide range of users at European and national level.

Most EU countries, among them Slovakia, decided to develop national qualifications frameworks with respect to the EQF.

### Technical standards in the educational process

Technical standards should form an inherent part of specialised education and training. In accordance with the Art. 7 of the Act 264/1999 Coll. on technical requirements for products and conformity assessment amending certain laws, technical standards are voluntary documents representing, though, an optimal and the most appropriate level of organization within a given development phase. The Building Act in its Art 43g para 2, in relation to construction works generally refers to technical standards stipulating that works must be carried out in accordance with all safety and health regulations, technical standards and best working practices that are issued and relate to construction works, as well as with all guidelines and manuals issued by building products manufacturers for their products.

There are also original Slovak technical standards affecting energy performance, containing rules, guidelines, and procedures for common and repeated use. Incorporating these standards into curricula is essential in order to improve the quality of educational system at specialised vocational schools. Technical standards should also be included into training documents for upgrading skills of workers in the construction sector.

Support from the European authorities is also expressed in the Opinion of the European Economic and Social Committee on the 'Communication from the Commission to the European Parliament, the Council and the European Economic and Social Committee - A strategic vision for European standards: moving to enhance and accelerate the sustainable growth of the European economy by 2020'

COM (2011) 311 (2012 / C 68/06), for example: in Art, 3.5 Education: curricula of secondary schools and universities in Europe should include the standardization concept. Special incentives should be supported to encourage students and researchers to develop interoperable solutions and applications based on standards.

### National system of occupations in Slovakia

National system of occupations precedes the preparation of the National System of Qualifications. The National System of Occupations is defined in the Act 5/2004 Coll. on employment services, as a national, unified information system describing standard labour market demand for individual jobs. National System of Occupations falls under the auspices of the Ministry of Labour, Social Affairs and the Family of the Slovak Republic; the National Project is coordinated by the Education Centre within the Ministry of Labour, Social Affairs and the Family of the Slovak Republic, in cooperation with state authorities, local self-government bodies, employers, representatives of employers and trade unions.

National System of Occupations specifies the requirements for professional skills and experience to carry out work at the labour market. Register of jobs prepared from the national standards of jobs should become the heart of the National System of Occupations, and will include requirements defined by employers for a job performance at certain pre-defined quality standard. Register of jobs is created on the platform of Sector Councils, which comprise experts from various sectors, central and regional authorities, employers' associations, trade unions, government bodies, local authorities, associations, chambers of commerce, universities and the research community.

Sector Councils are voluntary independent professional associations of experts that comprise representatives of government bodies, local government bodies, representatives of employers, employees, and educational institutions. Sector Councils monitor the labour market needs in the national economy sectors and their translation into the lifelong learning system.

There are in particular two Sector Councils relevant for the project - Sector Council for Construction and Sector Council for Energy, Gas and Electricity.

### Sector Council for Construction

The main tasks of the Sector Council for Construction are the development and regular update of national standards of jobs - description of requirements of employers regarding specialised skills and practical experience needed for individual jobs. Sector Council for Construction guarantees the formation of the national standards of jobs, from which the below professions may be selected as those related to green occupations:

- 2142 Construction specialists (construction specialist-technologist, construction site manager, construction supervision, construction specialist – structures

- 3123 masters (supervisors) in construction (foreman/master in building)
- 7111 Construction specialist for assembling of simple construction;
- 7112 Bricklayers and related workers
- 7124 Insulation workers
- 7126 Plumbers and pipe fitters (fitter, fitter of sewers, water pipelines and gas pipelines (pipe fitter)
- 7213 Tinsmith (construction tinsmith
- 7411 Building and operation electricians
- 8113 Well drillers and borers and similar workers

### Sector Council for Energy, Gas and Electricity

Sector Council for Energy, Gas and Electricity ensures for the creation of national standards of jobs.

### National System of Qualifications in SR

National System of Qualifications (NQF) starts to be prepared, after a certain delay. It should be based on the National System of Occupations and should be a publicly accessible register containing a complete description of partial and full qualifications recognized and distinguished in the Slovak Republic, that are required to perform work activities within the individual profession, in form of qualification and evaluation standards.

NQF aim is to create a system solution that will support the comparison of learning outcomes achieved in various forms of education (formal, non-formal learning, informal learning), allowing to recognise the actual knowledge, skills and abilities regardless of the form of training, transferring labour market requirements into education, publishing information on all nationally recognized qualifications (full and partial), and to compare qualifications levels in Slovakia and other European Union member states. It will be a description of:

- full qualifications (degree of knowledge, skills and ability of individuals to carry out all work activities within a specific occupation and a specified qualification standards)
- partial qualifications (set of knowledge, skills and ability of individuals to perform a work activity or set of activities in a specific occupation within a specified qualification standards)
- Standards - qualification (sum of knowledge, skills and abilities necessary to acquire the respective partial and complete qualification) and evaluation (summary of criteria, methodology and organizational approach, material, technical and spatial assumptions to verify and assess professional competence achieved under the defined qualification standards)



- NQF levels that will meet the levels defined by the Slovak education system, and at the same time, to seek for an appropriate equivalent as defined by the European Qualifications Framework
- qualification guidelines that will respect the split into fields of education used in the Slovak educational system

While the network of complete qualifications will be based on the system of education and study programs, the system of partial qualifications should bring transparency to the unclear volume of various certificates issued from various educational activities and ensure for comparability of these. If an individual is applying for a job and has a certificate of partial qualifications, it should provide information to employers about the candidate's knowledge and capabilities.

The system of partial qualifications will not be separated nor isolated as it will be linked to a set of full qualifications, and together, these will form one system.

Each partial and full qualification will be assigned a certain qualification level within the NQF. Levels of full qualifications will correspond to the levels of education. Since education levels are only defined for formal education, it is necessary to have a universal scale of levels allowing to include all full and partial qualifications, and creating thus a common framework for formal and informal education.



## 5. INFORMATION ABOUT CONSTRUCTION AND ENERGY SECTORS

### 5.1 Construction production development

Fluctuations were present in construction production until 1999, and then its volume grew regularly from 2000 up to 2008, with the historically highest growth in construction production recorded in 2005 and 2006. In 2007, construction production didn't copy the previous years, though a further increase by 18.3% was recorded in 2008 (in current prices) or 12.0% if expressed in fixed prices of the year 2005. In 2009, changes occurred and a significant decline in construction production by 9.1% (in current prices) or by 11.3% if expressed in fixed prices. In 2010, construction production volume dropped by 3.7% compared to 2009 when expressed in current prices, or by 4.6% in fixed prices.

Businesses operating in the sector carried out construction projects of €5,499.8 million in 2011 in current prices, or €4,603.2 million when expressed in fixed prices of the year 2005; i.e. a drop by 0.6% when expressed in current prices or by - 1.8% in constant prices, compared to 2010.

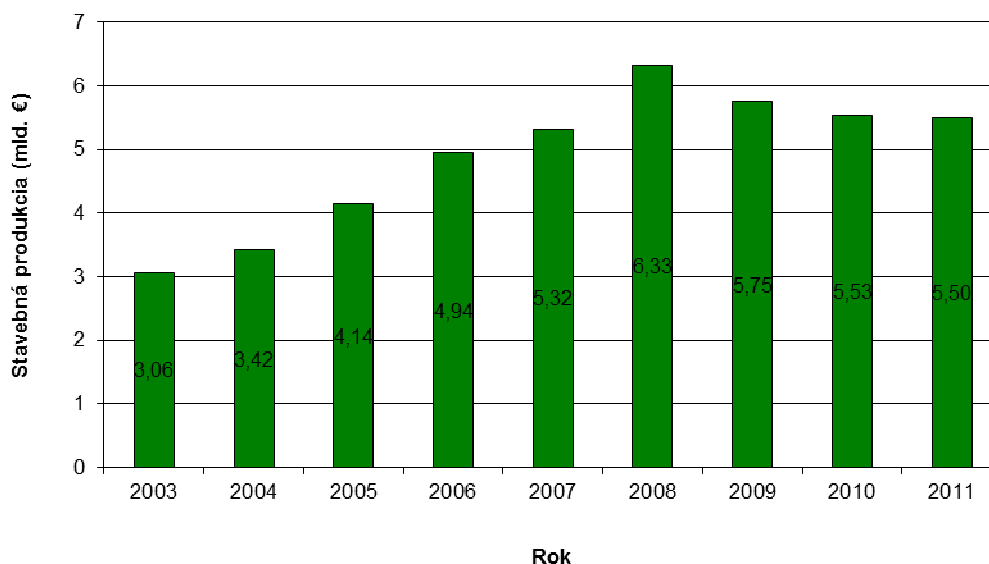


Chart 5.1 – Building production in current prices (€bill. ), Year [35]

In terms of investment structure, (in current prices) construction works carried out in 2011 can be expressed as follows:

- New constructions, reconstruction and modernization 78.6%
- repairs and maintenance 16.3%
- other construction works 1.4%
- abroad 3.7%

The key portion of constructions amounting €5,297 million, was carried out in Slovakia, in 2011 (96.3%), with a decline by -2.8% (fixed prices of 2005) compared to 2010. Construction abroad in the amount of €202.8 million accounted for 3.7% of the total construction production and increased by 37.2% compared to 2010 (fixed prices of 2005). New construction, modernization and reconstruction represented 78.6% (€4,325 million in current prices) of the total inland production, repairs and maintenance 16.3% (€897.6 million in current prices) and other works were 1.4% (€74.4 mil. in current prices). Construction sector in Slovakia was mainly influenced by domestic, local environment in 2011, and it is expected to retain such character also in the near future.

As for the type of production in 2011, the largest share goes to non-residential buildings, namely 47.0% (€2,489.4 million), residential buildings account for 21.8% (€1,155.5 million) and heavy civil constructions were 29.8% (€1,577.7 million), other inland works represent 1.4% (€74.4 mil).

Tab. 5.1 – Development of building production structure by type construction in %

Indicator	M. u.	2005	2006	2007	2008	2009	2010	2011
<b>Inland constructions thereof:</b>	%	95.8	96.8	96.5	95.9	96.1	97.4	96.3
- residential buildings	%	22.9	23.5	27.6	27.9	24.2	23.5	21.0
- Non-residential buildings	%	42.6	43.7	42.7	43.8	44.0	44.6	45.2
- infrastructure	%	29.8	29.0	25.8	23.9	27.3	28.6	28.7
- other construction works	%	05	0.5	0.3	0.3	0.7	0.6	1.4
<b>Building production abroad</b>	%	4.2	3.2	3.5	4.1	3.9	2.6	3.7
<b>Together</b>	%	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

Source: UEOS-Komercia, a.s.

Tab 5.2 – Development of building production structure by type construction (in current prices)

Indicator	M. u.	2005	2006	2007	2008	2009	2010	2011
<b>Inland constructions thereof</b>	mil. Euro	<b>3,902.4</b>	<b>4,708.7</b>	<b>5,161.4</b>	<b>6,066.6</b>	<b>5,527.6</b>	<b>5,388.5</b>	<b>5,297.0</b>
Index – previous period = 100	%	119.6	120.7	109.6	117.5	91.1	97.5	98.3
<b>- Residential buildings</b>	mil. Euro	932.6	1,144.1	1,477.4	1,764.2	1,392.8	1,302.4	1,155.5
Index – previous period = 100	%	123.6	122.7	129.1	119.4	78.9	93.5	88.7
thereof: new buildings, reconstructions	mil. Euro	731.0	909.5	1,228.2	1,398.8	1,109.8	1,049.3	931.3
Repair and maintenance	mil. Euro	201.6	234.6	249.2	365.4	283.0	253.1	224.2
<b>- Non-residential buildings</b>	mil. Euro	1,734.6	2,127.8	2,285.2	2,772.4	2,527.8	2,469.2	2,489.4
Index – previous period = 100	%	107.5	122.7	107.4	121.3	91.2	97.7	100.8
thereof: buildings, reconstructions	mil. Euro	1,393.9	1,700.6	1,809.1	2,280.5	2,069.3	2,023.2	1,987.5
Repair and maintenance	mil. Euro	340.7	427.2	476.1	491.9	458.5	446.0	501.9
<b>- Engineering buildings</b>	mil. Euro	1,213.6	1,411.3	1,380.7	1,509.6	1,569.3	1,584.6	1,577.7

Index – previous period = 100	%	138.7	116.3	97.8	109.3	104.0	101.0	99.6
thereof: new buildings, reconstructions	mil. Euro	1,022.9	1,233.7	1,167.4	1,289.7	1,360.3	1,348.1	1,406.1
Repair and maintenance	mil. Euro	190.7	177.6	213.3	219.9	209.0	236.5	171.6
<b>Other construction works</b>	mil. Euro	21.6	25.5	18.1	20.4	37.7	32.3	74.4
Index – previous period re = 100	%	112.5	118.1	71.0	112.7	184.8	85.7	230.3
<b>Constructions carried out abroad</b>	mil. Euro	<b>169.7</b>	<b>155.1</b>	<b>184.5</b>	<b>259.7</b>	<b>222.1</b>	<b>146.1</b>	<b>202.8</b>
Index – previous period = 100	%	113.7	91.4	119.0	140.8	85.5	65.8	138.8
<b>Total</b>	mil. Euro	<b>4,072.1</b>	<b>4,863.8</b>	<b>5,345.9</b>	<b>6,326.3</b>	<b>5,749.7</b>	<b>5,534.6</b>	<b>5,499.8</b>
Index – previous period = 100	%	119.4	119.4	109.9	118.3	90.9	96.3	99.4

Source: UEOS-Komercia, a.s.

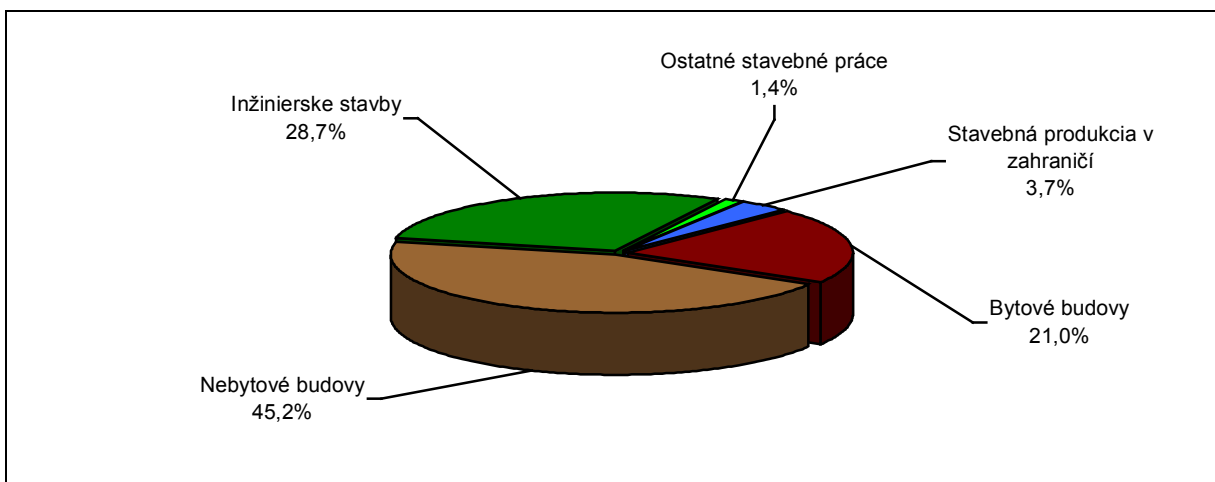
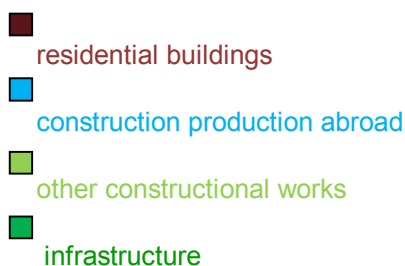


Chart 5.2 – Construction production structure according to type of construction in 2011 in %

(Source:UEOS-Komercia, a.s.)



The main limitation for construction companies, with the biggest impact on their economic performance, is the high degree of the state bureaucracy. These are legislative (and unsystematic) requirements, frequently changing decision issued by state authorities that prevent construction companies from planning their long-term capacities. The more complicated tender, unclear ToR and complicated limitations, logically, the greater the likelihood of review procedures. Unification of at least the basic parameters for projects funded from EU funds would significantly help.

Each Government should primary try to stabilize corporate environment, so that it is clear and stable within long-term horizon and business would not need to frequently

consider changes that prevent them from expanding their business activities. Other barriers is insufficient demand, less funds from public and private sources, as well as lack of own funds to finance their activities. The main limitation is the continuing decline especially in the public sector as well as that of large infrastructure projects. Large construction companies then "steel" work from smaller companies, for example in regional and private projects.

## 5.2 Organisational development of construction sector

Organizational structure of the Slovak construction sector has long been similar to those in European countries with developed market economies. 97% of enterprises in the EU have less than 20 employees and 93% have less than 10 employees. In general, EU dedicates special attention and support to SMEs; e.g. large portion of funds from the European Regional Development Fund is allocated for development of small and medium enterprises. Likewise, "Framework Program for Competitiveness and Innovation" is expected to significantly contribute to promotion of competitiveness and innovations from 2007 to 2013, with particular focus to small and medium-size enterprises. From this perspective, it is obvious that SMEs occupy an important role in the construction sector, and similar structure will be supported in future, as well.

As of December 31<sup>st</sup> 2011, there were 12,498 enterprises in Slovakia according to the construction sector statistics; 11,460 thereof were private and 38 publicly owned. Of the total number of enterprises, 1,501 enterprises were under foreign control. In construction, there were also 86,384 individual entrepreneurs. Together, it represents 98,882 legal entities.

Table 5.3 – Structure of construction companies split by number of employees

Construction companies by number of employees	Nr of construction companies									
	as 31.12.2007	of	as 31.12.2008	of	as 31.12.2009	of	as 31.12.2010	of	as 31.12.2011	of
Tradesmen	72,403		82,492		88,442		88,260		86,384	
companies with 0-9 employees	4,877		5,746		6,432		8,852		9,139	
companies with 10-19 employees	1,472		1,914		1,911		731		1,133	
companies with 20-49 employees	434		410		408		397		458	
companies with 50-249 employees	269		273		279		257		235	
companies with 250 or more employees	22		25		25		22		20	
<b>TOTAL</b>	<b>79,690<sup>x)</sup></b>		<b>91,228<sup>x)</sup></b>		<b>98,190<sup>x)</sup></b>		<b>99,716<sup>x)</sup></b>		<b>98,882<sup>x)</sup></b>	

<sup>x)</sup> incl. companies for which no data is available on the numbers of employees (year 2007 – 213 companies , 2008 - 428 companies , 2009 - 693 companies , 2010 - 1 197 companies , 2011 - 1 513 companies ).

(Source: UEOS-Komercia.a.s.)

Construction production (current prices) development in Slovakia, from 2005 to 2011:

Table 5.4 – Construction production carried out by own employees split by the size of company in mil. EUR-current prices

Companies by nr of employees	2005	2006	2007	2008	2009	2010	2011
Small (0-49 employees.)	1,107.72	1,408.28	1,509.93	1,745.03	1,475.62	1,417.60	1,565.80
Medium (50-249 employees)	865.66	937.63	1,062.69	1,142.12	1,014.06	994.59	923.60
Large (250 and more employees)	903.44	1,030.77	1,096.43	1,431.83	1,334.01	1,234.53	1,098.58
Tradesmen	1,232.69	1,532.99	1,758.02	2,111.80	1,927.53	1,869.53	1,875.40
<b>SR TOTAL</b>	<b>4,109.51</b>	<b>4,909.71</b>	<b>5,427.07</b>	<b>6,430.78</b>	<b>5,751.22</b>	<b>5,516.25</b>	<b>5,463.10</b>

(Source: UEOS-Komercia, a.s..)

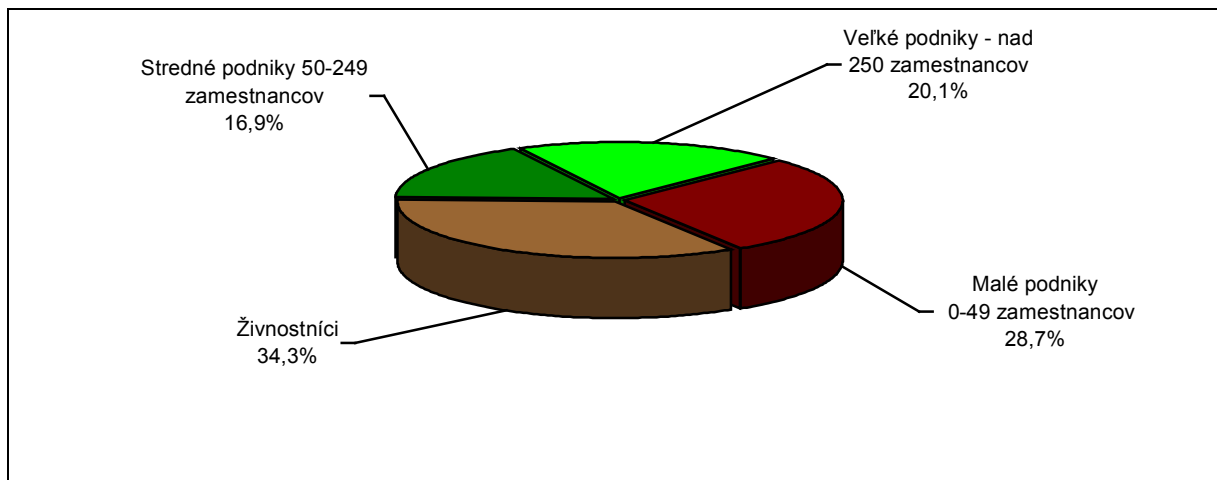


Chart 5.3 – Structure of construction production split by the type of company, in 2011 in % tradesmen ■ small companies with 0-49 employees ■, large companies with more than 250 employees, medium-size companies with 50 to 249 employees ■

The largest share of construction production amounting 34.3% was generated by self-employed persons (tradesmen) in 2011, (an increase in production by 0.3 percentage points compared to the previous year). In terms of size, the smallest proportion (16.9%) of production was generated by SME's with 50-249 employees, in 2011; i.e. lower by -7.1% than in 2010. Small construction enterprises employing 0-49 people accounted for 28.7% of construction production in 2011; their production raised by 10.5% from the previous year. Large construction enterprises with 250 or more employees generated 20.1% of production, i.e. a decrease by -11.0% compared to 2010.

Regarding competitiveness of SME's, quality of works play an important role in the construction sector. Therefore, the ISO Quality System Certificate is a precondition for participation in many tenders. For small construction firms it is difficult to obtain it as they have:

- insufficient and difficult access to information

- lack of skilled technical personnel
- lack of funding and are dependent on a larger firms
- work within small regional area

### License for construction works

Dating back to 1992 when implementation of a pilot project to reduce energy consumption of buildings commenced, only licensed companies can carry out works related to thermal insulation of perimeter walls. A certificate is issued to companies by an accredited inspection body - type A, which is the Building Testing and Research Institute Building (TSUS), non-profit organisation. List of licensed companies is available at [www.tsus.sk](http://www.tsus.sk).

As of December 31<sup>st</sup> 2012, 579 companies were licensed for thermal insulation of perimeter walls and 29 companies were licensed for thermal insulation and waterproofing of flat roof systems. Since the beginning of 2013, also the structure of employees of companies granted ETICS license is monitored. So far, the following structure was obtained

- Average number of own workers working on ETICS = 6  
(selection mode = 5, median = 5 and 73% variability)
- Average number of contracted workers (subcontractors) = 13  
(selection mode = 5, median = 10 and variability = 101%).

At the same date, there were 40 manufacturers granted ETA (European Technical Approvals) or TO (national technical certificates) certificates for ETICS thermal insulation systems, at the Slovak market.

### 5.3 Employment in the construction sector

The average employment dropped by 3.6% in the construction sector in 2011; i.e. a downsizing by 6,755 people to 173,040 people. According to the Statistical Office of the Slovak Republic, 34.7 thousand people worked at constructions abroad in 2011; i.e. less by 7.3 thousand people than in 2010.

Self-employed (tradesmen) represented the largest share of average number of 173,040 employees were (62.3%, 107,742 people) in 2011; i.e. an increase by 1.0 percentage points compared to the previous year. The smallest share in terms of number of employees (6.8%) had large enterprises with 250 or more employees. The average number of people employed in large enterprises decreased by -19.3% in 2011 to 11,818 people. In 2011, small businesses (0-49 employees) contributed to the total employment in the construction sector with 19.7% and medium-size companies (50-249 employees) with 11.1%. In 2011, the number of employees increased in businesses with 0-49 employees by 2.5% (833 persons) compared to 2010, and in companies with 50-249 employees it decreased by -10.2% (about 2,198 people).

Table 5.5 – Development of number of employees in the construction sector according to the structure of companies

Companies by nr. of employees	2005	2006	2007	2008	2009	2010	2011
Small enterprises (0-49 emp.)	31,196	32,431	34,834	38,387	37,279	32,823	34,201
Medium enterprises (50-249 emp.)	24,324	22,422	22,579	23,561	22,868	21,255	19,279
Large enterprises (250 or more emp.)	12,724	14,231	14,103	14,631	14,593	14,651	11,818
Tradesmen	74,507	87,563	94,471	105,560	109,977	110,066	107,742
<b>SR TOTAL</b>	<b>142,751</b>	<b>156,647</b>	<b>165,987</b>	<b>182,139</b>	<b>184,717</b>	<b>178,795</b>	<b>173,040</b>

(Source: UEOS-Komercia, a.s.)

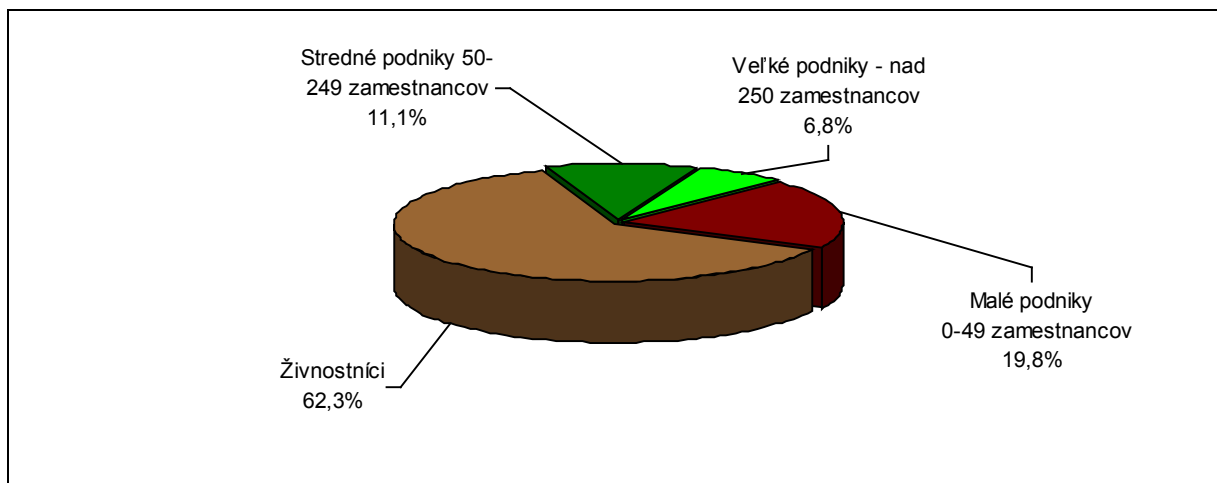





Chart 5.4 – Structure of employment in the construction sector split by type of company, 2011 in %  
 tradesmer  small companies with 0-49 employees, big companies with more than 250 employees,  medium-size companies with 50 to 249 employees 

The actual employment in construction sector reflects the actual market situation focusing on short-term goals, which is obvious from the type of contracts, and how these are obtained (usually for a short period of time). Employment development strategy in the construction sector is difficult in the currently turbulent time.

It results from the survey carried out among construction companies in Slovakia (questionnaire - see Annex 2) that only in 37% (23 +14%) construction companies works they carried out led to energy savings in buildings in more than half of their contracts. 40% of respondents confirmed to have less than 25% of these.





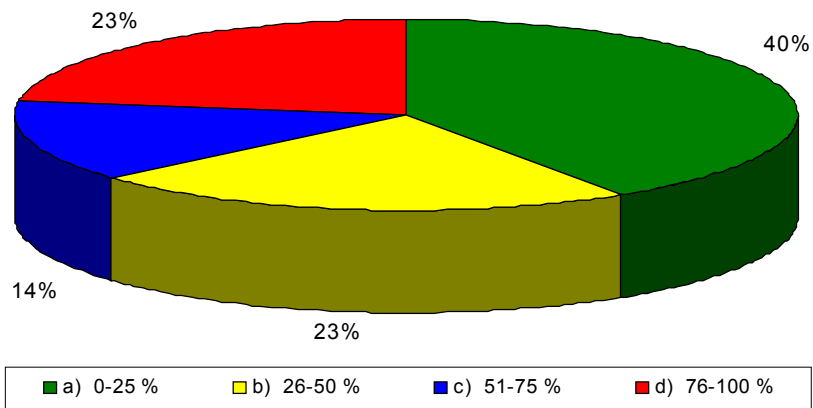


Chart 5.5 – The share of works leading to energy savings in buildings within overall construction activities carried out by a company

The survey proved the above Fig 5.6; i.e. a share of works leading to energy savings in buildings represented by individual professions, activities, or employees in a typical (average construction) company. Such a typical construction company has 39.5 workers, of whom 3.9 carried out roof insulation works, 19.1 insulated perimeter walls, etc. Thermal protection is among priorities in Slovakia, at the moment.

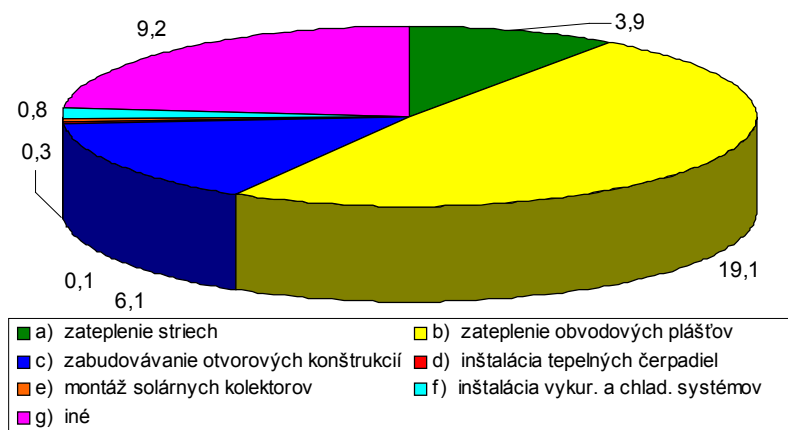


Chart 5.6 – Structure of employees in construction companies split by professions typical for saving energy

roofs insulation ■ doors, windows etc., ■ solar collectors ■ others, ■  
 perimeter walls insulation, ■ installation of the heating pumps, ■  
 installation heating and cooling systems ■

## 5.4 Buildings, in particular types of buildings (residential, commercial, industrial, public)

### 5.4.1 Residential buildings

By 2010, there were 1,858,161 (Tab 5.1) apartments in blocks of apartments and family houses (including those in non-residential buildings). In 2010 and 2011, another 31,684 apartments were built (Tab 5.2). Until 2011 (incl.), there were 1,889,845 apartments in blocks of apartments and family houses, in SR. From 1946 to 1993, there were 1,377,315 apartments in blocks of apartments and family houses built.

There are more than more than 920,000 apartments in Slovakia that form the so called “fund of residential buildings”. These are of different age. Approximately 10,000 apartments are older than 100 years. 785,608 apartments were built from 1947 to 1992, within the so called mass forms of construction used 20-65 years; and these need renovation. Apartments in residential buildings constitute 48.73% of the total number of apartments, in the SR. Most of these were built within the so called mass forms of construction, using prefabricated technology. The largest number of apartments was built from 1960 to 1983 (525,221 apartments). Mass construction used standardized solutions and ended in 1992, in Slovakia.

Assuming there are 5.5 million people living in Slovakia, (Tab 5.3), there is 337.85 apartments per 1,000 people; i.e. 8.3% increase compared to 2001. 1 apartment per 2.96 people; i.e. , 5.13% reduction in occupancy of apartments.

Table 5.6 – The number of apartments built in blocks of apartments and family houses

Year construction	of apartments	of		
		blocks apartments	family houses	other buildings
Up to 1899	57,728	7,001	50,268	459
1900 - 1919	57,542	5,681	51,546	315
1920 - 1945	162,429	23,131	138,597	701
1946 - 1960	277,599	88,530	187,749	1,320
1961 - 1970	330,896	167,231	162,642	1,023
1971 - 1980	411,789	282,934	127,568	1,287
1981 – 1983	97,905	75,056	22,375	474
Up to 1983	1,395,888	649,564	740,745	5,579
1984 – 1989	197,235	135,793	60,330	1,112
Up to 1989	1,593,123	785,357	801,075	6,691
1990 – 1992	61,891	36,064	25,632	195
Up to 1992	1,655,014	821,421	826,707	6,886
1993 – 2000	72,252	27,213	44,495	544
Up to 2000	1,727,266	848,634	871,192	7,430

2001 – 2005	63,960	25,112	38,397	451
2006 – 2009	66,935	31,802	33,078	2,055
2010 – 2011	31,684	13,785	17,899	X
Total	1,889,845	919,333	960,576	9,936

Source: Ministry of Transport, Statistical Office

Information about commenced and completed construction of residential buildings can only be found in the Statistical Report (AS 3-04), listing issued Building Permits and Final Inspection Certificates, and a total figure on commenced administrative and other non-residential buildings. It doesn't provide any information about completed non-residential buildings. The available data can only be considered as a framework, as information in the measure units (e.g. m<sup>2</sup> - total floor area, m<sup>3</sup> - built-up area, etc..) are missing, and data are given only for apartments in blocks of apartments and family houses, which doesn't allow the results for residential building to be compared within Slovakia or with other countries. As an example, below is the data from Inv 3 – 04 record<sup>9</sup>

Table 5.7 – Selected data about housing development in SR from 2007-2011

<b>The number of apartments in buildings from 2007-2011</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>
The number of the finished apartments together	16,473	17,184	18,834	17,076	14,608
apartments in reconstruction	673	541	841	561	314
The numbers of finished apartments in family houses	7,897	8,502	9,022	9,136	8,763
The numbers of finished apartments in blocks of apartment	8,576	8,682	9,812	7,940	5,845
The number of commenced apartments together	18,116	28,321	20,325	16,211	12,740

Source Statistical record Inv. 3 – 04<sup>10</sup>

A database of blocks of apartment [29] and a set of examples of residential buildings prepared within R&D project [43] were used as the base for the analysis of buildings, as well as the available statistics from the 2001 Census of People and Houses published by the Statistical Office [28], information published by the Association for Thermal Insulation of Buildings (20 years of insulation 2012).

<sup>9</sup> Transl. note: statistical summary record of apartments that were completed, under construction of started to be constructed in 3<sup>rd</sup> quarter of 2004.

The above data on the number of built apartments clearly show only a very small increase in new apartments, compared to the sixties of the previous century. Comparison is also apparent from Fig. 5.2

Table 5.1 – Typical characteristics of apartments built in selected years

typical feature	Years				
	1945	1970	1985	2001	2010
Number of people	3,320,000	4,537,290	5,059,197	5,379,455	5,500,000
Number of apartments	550,000	886,394	1,533,090	1,856,339	1,858,161
Share of apartments in blocks of apartments	10 %	33 %	48.5 %	50.8 %	48.73 %
Number of apartments per 1000 inhabitants	165	195	303	312	337.85
Number of people per 1 flat	6.04	5.12	3.3	3.21	2.96

Database [29] contains data about 800,634 apartments in 21,723 blocks of apartments and split into 52,496 sections that were used for the major part of the analysis made hereto. Furthermore, it may be noted that

- there are 2,884 municipalities and towns in Slovakia, while in 2,317 municipalities thereof there are no blocks of apartments built within the mass construction period, and blocks of apartments comprising more than 3 apartments are in 567 municipalities
- blocks of apartments comprising less than 500 apartments are in 437 (municipalities) villages
- blocks of apartments comprising more than 500 apartments are only in 130 municipalities
- Most of the apartments were built during 1955 - 1983: 470,756 apartments (96,378 thereof with sandwich panels perimeter walls built between 1971 and 1983)
- Most of the blocks of apartments are located in the area with winter temperatures - 11 ° C (308,212 apartments ) / - 13 ° C (163,195 apartments) and / - 15 ° C (186,437 apartments)
- Only 23 blocks of apartments are located in areas with a winter temperature of - 19 ° C (274 apartments)
- the coldest regions with blocks of apartments are located are Prešov and Žilina regions
- From 21,723 blocks of apartments only 1,147 are in altitude higher than 600 m above sea level and only 175 higher that 800 m above sea level
- 43.2% of apartments are located in blocks of apartments with max. 4 floors
- Only 15% of apartments are located in buildings with more than 8 floors

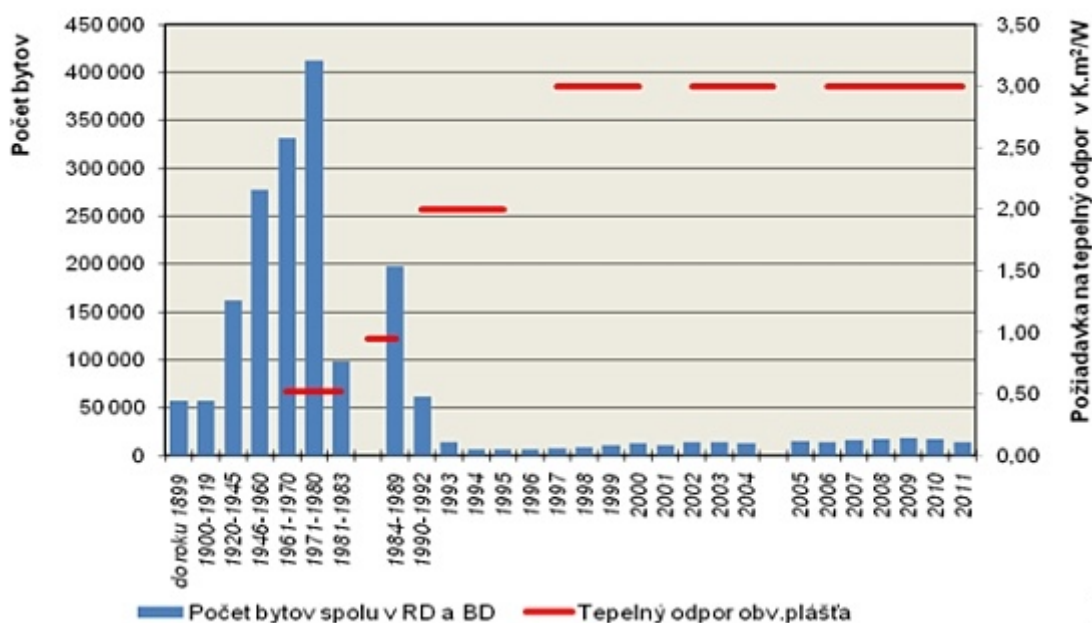


Chart 5.7 – The number of blocks of apartment according to the Slovak Statistical Office [28]

- total number of apartments in family houses and blocks of apartments,
- heat resistance of perimeter walls

With regard to the thermal properties of perimeter walls and technology of construction, blocks of apartments were divided into five groups according to the type of structural and construction systems, and construction technology, which were also influenced by requirements for structure properties in individual periods [41], [39]:

- 1) blocks of bricks
- 2) single-panel built from 1955 to 1983
- 3) layered panels (sandwich) built from 1971 to 1983
- 4) panel built from 1983 to 1992 (exceptionally also later)
- 5) atypical buildings built after 1992

Tab 5.4 lists the number of blocks of apartments by types, structures and construction systems split by period of construction with regard to technology, type of construction and type of perimeter walls. The data presented in the tables below were taken from the database of blocks of apartments [29]

Table 5.9 – The number of blocks of apartments, apartments, sections and the floor area according to groups (types, construction and structural systems )

Nr.	type, structure and construction system	Nr of houses	Nr. of apartments	Nr. of sections	Overall floor area
1	from blocks of bricks	6,761	133,814	14,447	10,733, 966
2	single panel structures built from 1955 to 1983	7,983	374, 503	20,284	29, 807, 256

<b>3</b>	Layered panel built from 1971 to 1983	2,131	96,298	5,878	8,234,737
<b>4</b>	Panel built from 1983 to 1998	3,646	183,402	9,415	16,159,811
<b>5</b>	Atypical buildings built after 1992	65	996	117	58,776
	Other, not specified	1,137	11,621	2,355	427,121
	Together	21,723	800,634	52,496	65,421,666

Blocks of apartments are described by the share of individual elements on the overall heat transfer of a building (Tab 5.5). The share of openings (windows and balcony doors) ranges from 13% to 25% of the total heat transfer area of a building, and from 19% to 32% of the façade.

Table 5.10 – Geometrical characteristic of blocks of apartments [43]

Value	heat transfer area		windows		Perimeter walls		roof		Area of the floor on the terrain/ ceiling over the cellar		Area of the facade (perimeter walls + windows)		Area of windows from the area of the facade	
	m <sup>2</sup>		m <sup>2</sup>	%	m <sup>2</sup>	%	m <sup>2</sup>	%	m <sup>2</sup>	%	m <sup>2</sup>	%	m <sup>2</sup>	%
Average	5,437		1,031	19%	2,942	54%	730	14%	733	14%	3,973	26%		
Maximum	13,906		2,175	25%	7,683	66%	2,024	21%	2,024	21%	9,858	32%		
Minimum	2,586		374	13%	1,138	44%	325	8%	325	8%	1,512	19%		
<b>Median</b>	<b>5,355</b>		<b>853</b>	<b>18%</b>	<b>2,950</b>	<b>54%</b>	<b>692</b>	<b>13%</b>	<b>683</b>	<b>13%</b>	<b>3,759</b>	<b>25%</b>		

As a benchmark, the average heat transfer surface of a family house was used - 493 m<sup>2</sup>. Typical share of perimeter walls on the overall heat transfer area in a family house is 40% (196 m<sup>2</sup>), windows account for 8% share of heat transfer surface (40 m<sup>2</sup>).

24 primary technologies, other than bricks, were used in construction of blocks of apartments, or 39 when taking into account differences and variations in design, or 61 considering that blocks of apartments can be built in a row, as a single building, a tower or a board-type blocks .

Table 5.11 – Blocks of apartments split by perimeter walls technology

Group of blocks of apartments	Building period	Types, Construction and Building systems
1	until 1955 1956 – 1970	T 11-16, T 01 -03 PV-2
2	1956 – 1970	BA, G 57, LB (MB), MS 5, MS 11, T 06 B (KE, NA, BA, BB, ŽA), T 08 B, K 61, NMB (VMB), PD-62
3	1971 – 1983	ZT, ZTB, BA-BC, B-70, BA-NKS
4	1984 –1992	P 1.14-6.5RP, P 1.14-7.5RP, PS-82 (TT, PP, ŽA, BB), U-65, P 1.15, BA NKS-S, P 1.24

Table 5.12 – Number of blocks of apartments, apartments and sections according to the construction technology

Nr	Type, construction systems, structural systems	Nr of houses	Nr apartments	Nr of sections	overall area in v m <sup>2</sup>
1	T 11	426	8, 899	1, 083	711, 867
2	T 12	359	6, 979	956	514, 380
3	T 13	701	13, 584	1, 886	1, 037, 716
4	T 14	156	2, 973	328	247, 671
5	T 15	240	5,496	460	411, 941
6	T 16	432	11, 563	1, 071	1, 014, 065
7	T 52	86	580	175	42, 616
8	T 20	88	2, 097	142	128, 190
9	T 22	58	1, 422	129	102, 095
10	T 01	514	8, 402	954	678, 187
11	T 02	941	19, 631	1,936	1, 503, 073
12	T 03	650	13, 078	1,232	1, 031, 468
13	PV2	287	7, 563	779	567, 556
14	G 57 r.	152	5, 283	427	402, 790
15	G 57 b.	14	429	16	33, 432
16	K 61 KE	23	938	48	73, 313
17	BA r.BA	88	8, 613	310	593, 457
18	BA b.BA	20	1, 097	20	89, 241
19	LB,MB r.	258	14, 347	851	1, 127, 491
20	LB,MB b.	113	4, 922	127	406, 502
21	NMB	54	1, 856	219	143, 021
22	MS 5 r.	91	3, 939	241	277, 599
23	MS 11 b.	66	2, 650	66	201, 196
24	PD-62	4	133	8	9, 942
25	T06B r. BA	158	8, 887	562	737 634
26	T06B b. BA	69	2, 546	119	233, 465

27	T06B r. NA	1,450	66,732	4,279	5,252,792
28	T06B b. NA	422	18,498	503	1,493,515
29	T06B r. ZA	722	37,303	2,500	3,081,088
30	T06B b. ZA	469	17,820	671	1,420,896
31	T06B ZA, vež.	3	171	3	13,678
32	T06B r. BB	628	34,320	2,230	2,827,528
33	T06B b. BB	119	3,915	146	310,081
34	T06B r. KE	1,214	50,035	3,248	3,918,940
35	T06B b. KE	780	32,824	844	2,475,726
36	T08B r. KE	336	19,293	886	1,496,669
37	T08B b. KE	139	3,896	165	282,974
38	ZT, ZTB r. BA	12	417	18	33,280
39	ZT b.	41	2,103	41	175,489
40	ZT r.	103	6,989	401	517,407
41	ZTB d.	118	8,996	154	736,271
42	ZTB r.	237	12,688	854	1,099,187
43	BA BC r.	417	20,869	1,251	1,635,634
44	B-70 r.	493	21,889	1,430	1,863,274
45	B-70 b.	277	8,250	341	687,412
46	B70/R	251	12,577	756	1,095,821
47	BA NKS r. BA	554	25,726	1,792	2,343,418
48	BA NKS b. BA	126	7,331	152	577,899
49	U 65	50	3,274	50	309,089
50	Pl.14 r. I.	224	10,818	611	1,011,792
51	Pl.14 b. I.	171	7,714	177	692,749
52	Pl.14 r. II.	894	47,289	2,860	4,267,334
53	Pl.14 b. II.	236	10,330	311	968,018
54	PS 82 TT r.	165	7,833	548	654,411
55	PS 82 TT b.	79	3,053	108	272,115
56	PS 82 BB r.	142	9,859	583	877,984
57	PS 82 ZA r.	24	1,162	63	107,933
58	Pl.15 r.	872	50,486	2,698	4,432,679
59	Pl.15 b.	127	4,199	185	413,282
60	PS 82 PP r.	140	5,436	315	439,882
61	PS 82 PP b.	77	2,907	90	265,752
62	BANKS-S/P1.15 r.	107	12,577	215	875,413
63	P1.24	2	90	3	3,032
64	Brick	327	3,023	613	185,147
<b>Together</b>		<b>18,596</b>	<b>750,599</b>	<b>46,240</b>	<b>61,435,499</b>

T06B NA construction system was mostly used, i.e. blocks of apartments in a row with perimeter walls based on 240 mm thick aerated concrete.



## 5.4.2 Non-residential buildings

Database [30] of commercial buildings not used for production contains data about 15,435 buildings (3,765 managers) owned by the state and municipalities (heated commercial buildings not used for production belonging to public administration, state institutions and municipalities), with built-up volume of 114,703,652 m<sup>3</sup>. When considering the average height of 3.2 m, the area (or the total surface area) is 35,844,891 m<sup>2</sup>. Compared to the total number of non-residential buildings built until 1997 [30], buildings owned by the state and municipalities account for about half of the total built-up area of non-residential buildings, in Slovakia. The total volume of non-residential buildings was 194 million m<sup>3</sup> and the volume of halls in non-residential buildings not used for production was 19.2 million m<sup>3</sup>. It may be considered that 50% of these are buildings used mainly as administrative premises belonging to various private companies, associations, etc.

The number of buildings and built-up area of the set of data, assessed according to their purpose of use (categories) is given in the Tab. 5.13. Schools account for 45% of the total number of buildings, and 50.9% of the total number of non-residential buildings not used for production are owned by the state and municipalities. Primary schools and their facilities form 16.3% of the overall number of buildings and 23.2% of built-up volume.

Table 5.13 – Non-residential buildings owned by the state split by the purpose of their use [30]

Nr	Use (categories of buildings)	Nr of buildings	Share of the total number %	built up volume m <sup>3</sup>	Share of the overall built up volume in %
1	Schools	6 ,943	45.0%	58 ,382 ,303	50.9%
2	shops and services	156	1.0%	680 ,090	0.6%
3	Medical facilities	1 ,293	8.4%	15 ,197 ,903	13.2%
4	Cultural facilities	525	3.4%	3 ,071 ,713	2.7%
5	Administrative buildings	2 ,556	16.6%	14 ,365 ,517	12.5%
6	Accommodation	1 ,317	8.5%	11 ,814 ,638	10.3%
7	Sport	126	0.8%	810 ,218	0.7%
8	Stations and airports	7	0.0%	92 ,991	0.1%
9	Post offices	440	2.9%	966 ,192	0.8%
10	Others	2 ,072	13.4%	9 ,322 ,087	8.1%
	<b>Together</b>	<b>15 ,435</b>	<b>100.0%</b>	<b>114 ,703 ,652</b>	<b>100.00%</b>
	Thereof Primary schools	2 ,513	16.3%	26 ,549 ,348	23.1%

There is a broad variety of geometrical characteristics for residential buildings, namely built-up volume, number of floors, the shape and share of individual structures. The average share of windows on the overall heat transfer surface is 14% for an office buildings, 40% is the share of perimeter walls, and 24% is the roof. In school buildings, the average window area accounts for 13%, 32% are the perimeter walls and 27% is the roof .



Table 5.14 – Non-residential buildings not used for production split by their year of construction

Years of the final inspection of the buildings	Nr of buildings	Share of the total number In %	built up Volume in m <sup>3</sup>	Share of the overall built up volume in %
Non given	2, 003	13.0%	4, 829, 335	4.2%
until 1950	2, 060	13.3%	14, 011, 732	12.2%
1951-1970	3, 725	24,.1%	30, 090, 101	26.2%
1971-1983	3, 766	24.4%	28, 837, 476	25.1%
1984-1992	2, 385	15.5%	24, 777, 320	21.6%
after 1992	1, 496	9.7%	12, 157, 688	10.6%
Together	15, 435	100.0%	114, 703, 652	100.0%

## 5.5 The number of low-energy buildings, the annual proportion of new built energy-performing buildings and energy-efficient reconstruction

Nowadays, thermal isolation of buildings is one of the activities with the highest growth in the construction sector. Slovak Statistical Office nor other institutions, are not statistically evaluating these construction works, neither are renovated completed buildings divided to residential and non-residential ones. Not each renovation requires a Building Permit and ends with a Final Inspection. It is therefore not possible to specify the number of low-energy buildings. According to STN 73 0540-2 on thermal and insulation that was in force since 2002 (until December 31<sup>st</sup> 2012), all new buildings should be in the energy class B (i.e., low energy) and all renovated buildings in energy class C (i.e. energy saving).

Energy certification is mandatory from January 1<sup>st</sup> 2008; granted energy certificates are registered since first January 1<sup>st</sup> 2010. According to [www.telecom.gov.sk](http://www.telecom.gov.sk) (building\_construction\_sector\_energy\_certificates\_statistics), there were the below numbers of buildings built in the energy class B in individual years:

- 2010: 5,291 (932 thereof were renovated)
- 2011: 6,530 (1,417 thereof were renovated)
- 2012: 10,084 (1,865 thereof were renovated)

It should be noted though that energy certificates are not issued for all new or renovated buildings, in particular. Energy certificates audits by virtue of the Act 300/2012 Coll., will only be performed from 2013, as a three-stage inspection resulting from the Directive 2010/31/EU. Classification of buildings into energy class, though, may not correspond to reality in certain cases.

The extent of thermal insulation of perimeter walls using contact thermal systems ETICS may be used to determine the extent of renovated buildings. The number of renovated buildings can be calculated based on the volume of manufactured

expanded polystyrene EPS 70/F, used for thermal isolation systems ETICS, as it is using solely local product as its component. The annual production is recorded by the EPS Association Slovakia. Knowing the geometric characteristics of buildings in Slovakia, the Association for Thermal Insulation of Buildings calculated the approximate number of insulated buildings. Other associations register neither the amount of replaced windows nor the number of buildings with replaced windows and insulated roof.

Thermal insulation of perimeter walls is carried out in Slovakia since 1992. The first thermal insulation of building ever was made within a pilot project covering 332 apartments in Bratislava-Kramáre in 1992-1994, focusing on reducing energy consumption. The overall number of buildings insulated in 20 years can only be given as an expert estimate. In addition to the expanded polystyrene figure, also information about the number of sold expansion anchors was used for calculations. Expanded polystyrene (EPS) has a 85-90% share in use compared to 10-15% share of on mineral wool based boards (MW) used in ETICS.

A more detailed information can be obtained only in 2013, once the Slovak Statistical Office evaluates the Census of May 21<sup>st</sup> 2011, namely its two questions : "When (year) was your residential building renovated?" (question 7) and "Apartment with or without thermal insulation?" (Question 11).

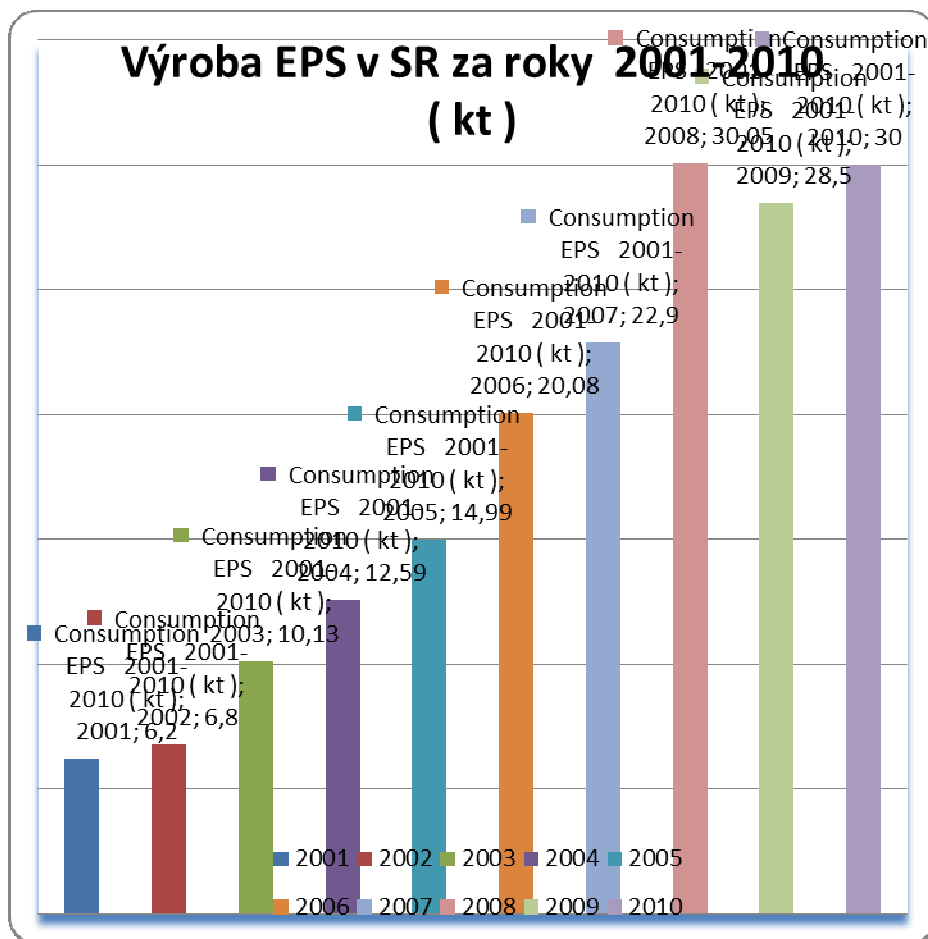


Chart 5.8 – EPS production in SR from 2001-2010 (Source: EPS Association in SR)

While the total annual consumption of EPS produced in SR was 50,710 tons in 2001 to 2005, in 2006 it amounted 20,080 tons and 22,900 tons in 2007; i.e. an increase by 13.9%. In 2008, consumption of EPS/F was 30,500 tons in Slovakia, representing further annual increase by 33.2%. According to EPS Association, the annual consumption amounted 28,800 tons in 2009 in Slovakia; i.e. a slight decrease compared to 2008. In that year, however, EPS consumption in construction increased and was more frequently used for facades than for other structures (roofs, floors, and partition walls). Thus, EPS / F consumption didn't decrease since 2008, in Slovakia. EPS / F consumption in 2010 was almost the same as in 2008, though 2010 figures are higher for EPS use both in construction sector and for facades.

Table 5.15 – EPS use by individual purpose

<b>Total consumption of EPS in thousand tons and its division</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>
a) Total consumption of EPS in SR	30, 550	28, 800	30 ,065
b) export EPS (20 %, 22 %, 20 %)	6, 110	6 ,336	6, 013
c) EPS for packages and technical purposes	7 ,305	6, 750	8 ,100
d) EPS in construction sector (a-b-c)	17 ,135	15 ,714	15 ,952
e) EPS on facades (d in %)	63	70	70
f) EPS on facades	10, 795	10, 999	11, 166
g) EPS volume on facades	14 kg/m <sup>3</sup>	14 kg/m <sup>3</sup>	14 kg/m <sup>3</sup>
h) EPS/F in m <sup>3</sup>	771 ,075	785, 644	797 ,571
i) EPS waste in construction	115, 661	117, 846	119 ,635
j) average thickness EPS in ETICS in m	0.090	0.091	0.092
k) EPS/F in m <sup>2</sup> v ETICS	7, 282 ,377	7, 338, 440	7 ,368,869
l) + 10 % share of MW	728 ,238	733 ,844	736, 870
<b>Together for ETICS in m<sup>2</sup></b>	<b>8, 010, 615</b>	<b>8, 072, 284</b>	<b>8, 105, 739</b>

Data don't include imported EPS, i.e. about 50, 000 m<sup>3</sup> EPS in 2010, as the share of EPS/F thereof is not registered.

Similarly, the data provided by the EPS Association Slovakia were used to estimate and fine-tune the extent of insulation works between 2006 and 2007. The relationship between EPS consumption data and thermal insulation extent cannot be linear, since EPS export, EPS share in construction and, thereof for facades, affected the extent of insulation every year. Moreover, the thickness of the EPS / F insulation systems increased gradually in years. ETICS accounts for 4,900,000 square meters of façades in 2006; in 2007 it increased to 5,458 thousand square meters of facades made by ETICS in Slovakia. After certain rounding, one can speak about 34.5 million square meters made by ETICS in Slovakia from 2006 to 2010 in terms of the extent, and with 5% data variance one can estimate about 33.5 to 35.3 mill square meters of ETICS insulated facades of residential and non-residential buildings in Slovakia from 2006 to 2010.

## Estimated volume of insulated residential and non-residential buildings in Slovakia

The volume of thermally insulated residential and non-residential buildings from 2006 to 2010, can be determined by estimating the volume of renovated buildings within a given year, converting the number of buildings for which we know the insulated surface (m<sup>2</sup>) to family houses, blocks of apartments and non-residential buildings and compare the sums of insulated area with the insulated surface (m<sup>2</sup>) deducted from EPS / F volume. Analysis of data from three documents was used to assess the estimated volume of renovated buildings :

- Data from the document entitled Evaluation of fulfilment of measures defined in the Strategy of Energy Performance of Buildings by 2010 with a an outlook to 2020, adopted by Government Resolution 246/2011
- Data from R&D task entitled Influence of innovative procedures for ensuring energy performance of buildings with optimal technical, environmental and economic feasibility (Annual Report 2010)
- Slovak Statistical Office data from the 2001 Census

Data from the Evaluation of fulfilment of measures defined in the Strategy of Energy Performance of Buildings by 2010 with a an outlook to 2020, were assessed as a baseline data for support schemes and their forms provided to a major renovations of buildings. Housing Development Program - grants amounting € 14.54 million were allocated to remove system failures in blocks of apartments in 2008, when 16,026 apartments were renovated; in 2009, there were 20,268 apartments renovated with the allocation of €19.61 million. In 2010, 8,261 apartments were renovated at €7.52 million. For the National Programme of Insulation - a new housing development support scheme aimed at reducing the energy performance of residential buildings, family houses and blocks of apartments, the Government allocated €70.87 million in 2009; 346 (14,447 apartments in blocks of apartments and family houses) were insulated. In 2011, €10 million was allocated. One part of the Residential Building Renovation Scheme is dedicated to improving the thermal performance of buildings. Within the Housing Development Fund, the Government allocated €10.5 million in 2008, and 126 buildings were renovated. In 2009, the Government allocated €13.16 million and 127 buildings were renovated.

Further funds were provided by savings banks, commercial banks and mortgage loan schemes with subsidised interest rate. These institutions, though, don't provide specific data on the number of apartments or buildings renovated from these funds. It may be stated that, taking into account the volume of these funds, public support sources are not a decisive motivation for ETICS nor can these be used to determine the extent of renovated buildings.



Generally, EPS / F production in 2006-2010 can be converted to the number of insulated apartments in SR as follows:

	2006 - 2007	2008 - 2010	2006-2010	total
Family Houses:	28, 000 apts	57 ,000 apts	85,000	apts
blocks of apartments	44 ,000 apts	77, 000 apts	121,000	apts
non-residential buildings	represent about 18% of the ETICS area			

Overall, there were 206,000 apartments insulated in blocks of apartments and family houses, in 2006-2010.

EPS Association figures on the annual EPS consumption in SR since 2001 help us in an experts estimate of the number of insulated apartments from 2001 to 2005, and thus also, in the overall period from 2001 to 2010.

It can be estimated that app. 299,000 apartments were insulated in 2001 - 2010 , and thereof-

in family houses:	119, 000 apartments
in blocks of apartments:	180, 000 apartments

About 299,000 apartments were insulated from 2001 to 2010 from the total number of apartments registered in family houses and blocks of apartments, i.e. 18% .

## 5.6 Statistics on consumption of energy and renewable energy in buildings, e.g. actual consumption of energy and types of renewable energy in the construction sector used directly in constructions

In Slovakia, there are no official statistical data published by the Slovak Statistical Office neither on energy consumption nor on heat consumption in buildings. Only information from the database of residential and non-residential buildings maintained by Slovak Building and Testing Institute TSÚS [29], [30] can be used. Slovak Ministry of Economy is introducing a monitoring system to track energy consumption for heating in buildings. There is no relevant information on electricity consumption nor energy carriers and electricity consumption. It is possible to give only a general chart of proportion of each type of fuel consumed in the SR, including energy from renewable sources.



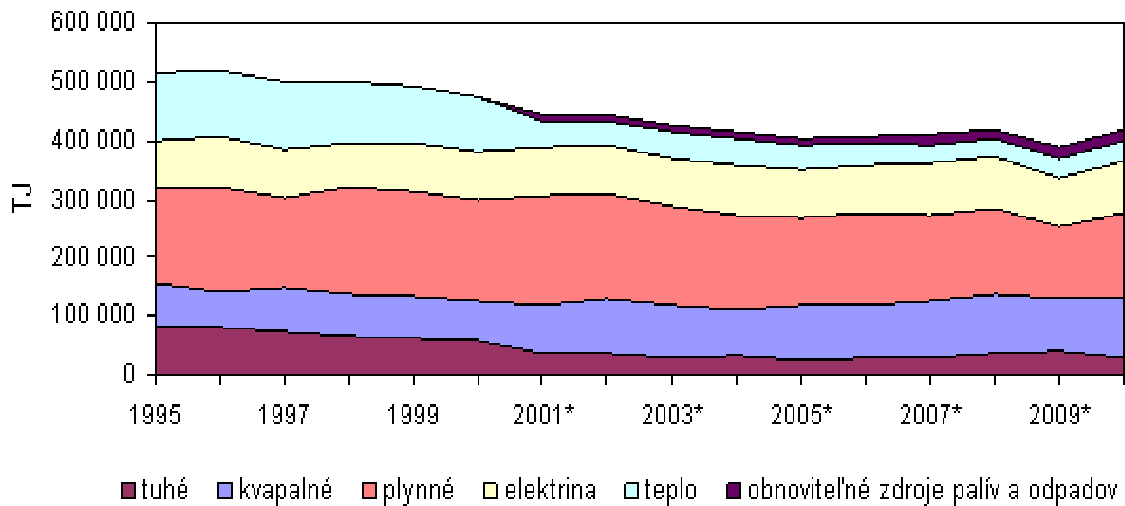


Chart 5.9 – Consumption of fuels in SR (Source: [www1.enviroportal.sk](http://www1.enviroportal.sk))

solid, liquid, gaseous, electricity, heat, renewable sources of fuel and waste

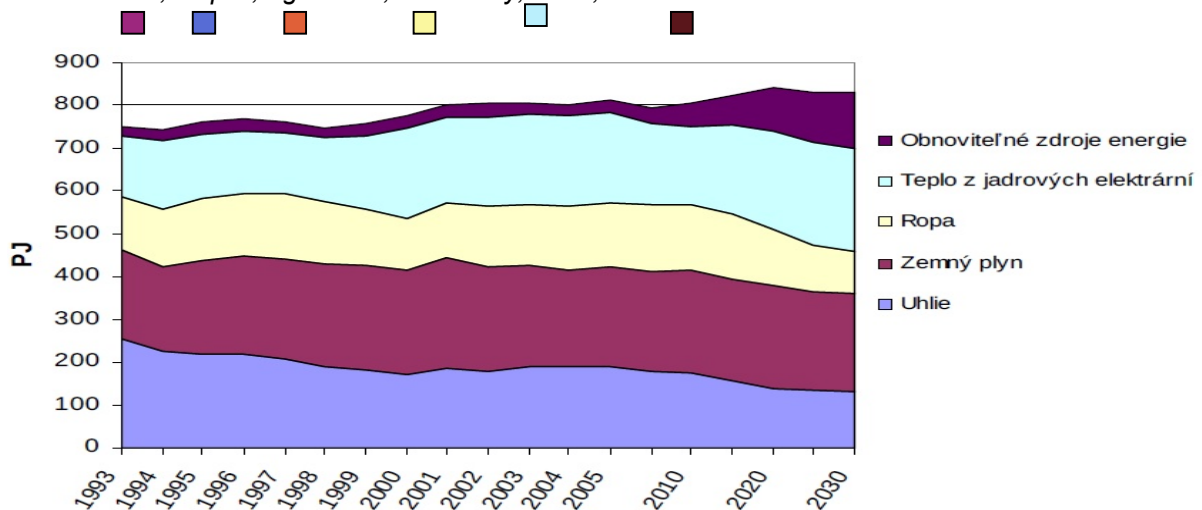


Chart 5.10 – Projected fuel consumption and use of the energy from the renewable sources in Slovakia (Source [www.posterus.sk](http://www.posterus.sk))

renewable energy sources ■  
 heat from nuclear power plant ■  
 oil, ■  
 natural gas ■  
 coal ■

### 5.6.1 Statistics on energy consumption in buildings

Below given energy consumption data are based on TSÚS database of buildings for blocks of apartments [29] and non-residential buildings [30].

## Blocks of apartments

Database is available for years 1994 – 2003 for each block of apartments connected to the central heating network, while the amount of heat delivered to a building was measured with calibrated meters. The results are given for 94% of existing blocks of apartments within the given time period.

Table 5.16 – The average heat consumption according to the structural system [41]

Nr of group	type of construction and structure	Consumption of heat in years in kWh/(m <sup>2</sup> .a)										Average heat consumption in 1994-2003
		1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	
1	Brick houses	132.6	139.9	151.5	143.2	130.7	126.1	116.7	128.1	125.2	123.3	<b>131.7</b>
2	Single panel built from 1955-1983	111.9	117.6	129.4	120.5	108.4	105.1	96.0	106.5	103.2	103.0	110.3
3	Layered panel built from 1971-1983	123.1	128.8	137.1	128.9	117.0	114.9	104.9	114.4	110.7	110.0	<b>119.0</b>
4	Panel built from 1983 -1998	103.2	110.3	117.6	109.3	98.3	94.6	86.6	95.7	90.2	90.9	<b>99.7</b>
5	Atypical building built after 1992						120.0	118.4	91.8	83.5	94.7	<b>101.9</b>
	other	110.2	118.5	111.3	101.2	99.5	97.8	88.9	103.5	103.5	93.7	<b>101.8</b>
<i>Average for SR</i>		<b>116.6</b>	<b>122.9</b>	<b>134.3</b>	<b>125.8</b>	<b>113.1</b>	<b>109.8</b>	<b>100.3</b>	<b>111.6</b>	<b>107.3</b>	<b>106.3</b>	<b>114.8</b>

The database comprises apartments in blocks of apartments built mainly within the period of mass construction, using panel technologies. The data were split by districts, weather conditions (with different outside air temperature) and also construction technology (structures and construction systems), number of floors, etc. Typical measured energy consumption in existing blocks of apartments for hot water was also calculated from the database.



Table 5.17 – Average heat consumption for hot water preparation in blocks of apartments in SR

Blocks of apartment	heat consumption for preparing hot water in years in kWh/(m <sup>2</sup> .a)										Average consumption of heat in 1994-2003
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	
energy consumption for preparing hot water Average for SR	57.6	54.2	54.5	51.9	50.7	48.4	51.7	44.8	44.5	40.4	49.9

## Non-residential buildings

Table 5.18 – Average consumption of energy for the heating according to the purpose of use [41]

Purpose	Consumption of energy for heating in years in kWh/(m <sup>3</sup> .a)										Average consumption in years 1994-2003
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	
Schools	51.2	51.8	53.7	52.7	51.4	50.9	46.8	51.1	49.5	50.7	51.0
Shops and services	54.5	54.3	62.6	60.4	57.3	50.2	51.5	53.0	48.4	62.9	55.5
Medical facilities	59.7	59.5	79.0	75.9	71.2	71.9	68.1	70.6	65.1	61.7	68.3
Cultural facilities	47.3	45.8	46.3	46.6	45.4	43.7	37.7	41.1	33.3	39.6	42.7
Administrative buildings	56.7	59.3	61.6	60.1	58.2	57.8	53.0	56.7	54.7	57.8	57.6
Accommodation	57.4	59.7	62.2	60.6	59.4	60.0	57.9	62.0	57.4	58.7	59.5
Sport	48.8	46.8	49.1	47.8	44.0	46.3	42.5	42.9	37.5	37.0	44.3
Stations, airports									46.2		46.2
Post offices								62.9	63.2	65.4	63.9
Others	53.7	53.8	61.4	58.8	57.5	58.0	55.4	58.3	57.5	56.3	57.1
<b>Average for all buildings</b>	52.8	54.0	58.3	56.9	55.2	54.9	51.1	55.4	54.7	58.3	55.2
<b>Primary Schools</b>	49.4	49.5	50.9	50.3	48.4	47.7	42.6	46.9	47.3	58.3	49.1

The average heat consumption in 1994-2003 was 55.2 kWh / (m<sup>3</sup>) for all buildings, and 49.1 kWh / (m<sup>3</sup>. A) in primary schools. Lower annual heat consumption in primary schools compared to the average is due to a lower average temperature in schools compared to office buildings, health facilities, and also due to quite a large number of vacation days in winter. The highest heat consumption is in health facilities - 68.3 kWh / (m<sup>3</sup>), while cultural facilities show the lowest consumption of 42.7 kWh / (m<sup>3</sup>. A)

as these are often not heated all through a year nor all their premises are heated. Sport buildings also have low heat consumption of 44.3 kWh / (m<sup>3</sup>. A); i.e.in particular gymnasiums in primary and secondary schools, which are heated to a lower temperature and not heated all day of a year. Analyses were carried out for regions, climate zones, construction technology, etc. Given that the construction method changed in time, Tab. 5.19 shows energy consumption for heating per years according to the construction period.

Table 5.19 – Annual average consumption of energy for the heating according to the period of the construction (41)

Years of final inspections	Consumption of energy for heating in years										Average consumption in 1994-2003
	in kWh/(m <sup>3</sup> .a)										
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	
Non-given	66.0	65.1	69.6	69.0	70.4	74.5	65.0	73.6	59.6	73.3	<b>68.6</b>
until 1950	49.2	50.8	56.1	55.2	53.3	53.7	50.0	53.6	52.5	55.6	<b>53.0</b>
1951-1970	54.0	54.8	59.3	57.5	55.0	54.2	51.0	55.9	56.1	60.0	<b>55.8</b>
1971-1983	54.7	55.5	59.1	57.5	56.0	54.9	50.8	55.4	55.1	58.6	<b>55.8</b>
1984-1992	49.7	52.1	55.8	53.9	52.2	52.9	49.5	52.5	52.7	56.3	<b>52.8</b>
after 1992	47.9	50.6	57.7	56.6	55.3	54.6	51.5	55.0	55.0	56.0	<b>54.0</b>
<b>Average for all constructions</b>	<b>52.8</b>	<b>54.0</b>	<b>58.3</b>	<b>56.9</b>	<b>55.2</b>	<b>54.9</b>	<b>51.1</b>	<b>55.4</b>	<b>54.7</b>	<b>58.3</b>	<b>55.2</b>

### 5.6.2 Statistics on energy consumption and renewable energy in buildings, for example actual energy consumption and types of renewable energy in the construction sector used directly in constructions

There are no data available in the Slovak Republic on the use of renewable resources nor is a comprehensive system created that would allow to specifically record the installed equipment and their parameters, or monitor the use of renewable energy in buildings. Data are available on installation of solar collectors and biomass boilers funded from the state schemes to promote renewable energy use, a scheme to support greater use of biomass and solar energy in households, a call for proposals for subsidies for biomass and solar energy based on the Act N° 181/2011 Coll. on subsidies granted by the Ministry of Economy. The Slovak Regulatory Office for Network Industries also publishes an overview of electricity generation from renewable energy sources and from highly efficient combined energy generating facilities, and a list of electricity producers with additional charge according to Art 9 para 5 of the Act 309/2009 Coll<sup>10</sup>, which includes photovoltaic equipment installed in

<sup>10</sup> Transl. note: the law on support of renewable energy sources and on highly efficient combined energy generating facilities

buildings. There is a database of installed heat pumps. These resources don't represent a complete review of the use of renewable energy in buildings.

## 5.7 Missing Data

Only statistical data about family houses and blocks of apartments that were completed or their construction has commenced, are available in the SR. There are no statistical data about non-residential buildings. At present, no comprehensive system is available that would allow to separately record information about structures that were used, their characteristics or changes. No system for recording installed technical systems, renewable energy sources and their parameters is available. No system for recording energy consumption of buildings (heat, energy consumption for hot water, electricity or gas) and monitoring the use of energy from renewable sources in buildings.

There is no information available about the number of workers within each specific professions, in the construction sector. Furthermore, there are only estimates of the number of workers required to install the systems using renewable energy sources, as well as those who need training.



## 6. EXISTING VET PROVISIONS

### 6.1 The national system of vocational education and training for craftsmen and other construction workers in the construction sector

The current regulatory environment governs vocational education and training in secondary schools through several laws. The key law is the Act N°184/2009 Coll. on vocational education and training and on amendments to certain laws, and the Education Act 245/2008 Coll. The new Education Act abolished majority of regulations adopted in relation to the old Education Act (N° 29/1984 Coll.)

The Act N°184/2009 Coll. governs the coordination of vocational education and training for labour market at:

- national level
- region level

At the national level, state authorities are in charge of coordinating the professional training:

- Ministry of Education, Science, Research and Sport of the Slovak Republic:
  - formulates strategies, conceptual and methodology papers in the field of professional education and training
  - in collaboration with professional organizations, and regional authorities, defines a set of study courses and training programmes for professional training and the content of vocational education and training
  - In cooperation with professional organizations, determines a list of study courses and training programs that exceed the scope of the labour market needs plan
- The Ministry of Interior of the Slovak Republic is in charge of courses in the field of security and fire protection
- Ministry of Labour, Social Affairs and the Family of the Slovak Republic performs tasks under a special regulation.
- Each central government body is drafting a sectoral strategy of vocational training and preparation of students for occupations and specialised activities that is adjusted at least once in four years, and is prepared by individual authorities within their scope of competencies, and then submitted to the Government Council for Vocational Education and Training



Self-governing region, within the scope of its competences, proposes to the Ministry of Education new fields of study or apprenticeship courses to be incorporated into the existing study courses or a proposal to remove an existing one. It also formulates the regional strategy of vocational education and training and provides information to students

- about the labour market needs, quality and possibilities for professional education and training in secondary schools within its territory
- provide these information to educational and counselling centres
- determines the number of students in first year classes at secondary schools it founded, which are valid for the next admission tests and are in line with the regional strategy for vocational education and training
- comments the number of students in first year classes at secondary schools founded by other bodies located within its territory in relation to the labour market needs

Employers are involved in definition of profiles of graduates from vocational education and training, determining the required knowledge, skills, abilities, and work habits.

Employers create conditions and provide material and technical support for practical training at vocational secondary school, centre for practical training, on-the-job training centre and various other training centres, school farms, hospital or health care facility as specified by this law or a collective agreement.

Professional organization shall :

- draft labour market needs plans in the field of vocational education and training, and submit it to the Board for Vocational Education and Training and the Regional Board for Vocational Education and Training (hereinafter "Regional Board ")
- submit the labour market requirements for skilled labour force to the Board for Vocational Education and Training
- prepare documents to determine the requirements for professional skills and practical knowledge necessary to perform work at the labour market
- in collaboration with the Ministry of Education, formulating profiles of graduates from vocational education and training, and the required knowledge, skills, abilities and work habits, as well as norms for spatial requirements, needed material and equipment,
- comment on curricula for the final state leaving examination and its content
- participate in the development of textbooks, teaching aids, etc.
- may provide premises to a vocational school, practical training centres, on-the-job training centre and various other training centres, hospital or health care facility, school farms
- may provide an expert for training and further education, i.e. teachers in specialised subjects, practical training teachers and instructors
- provide specialised training for trainers

- provide specialised training for professionals from a professional organization and tradesmen association appointed as members of the final school leaving examination committee for its professional component
- cooperate in formulating curricula according to the needs of vocational schools

For the purposes of this Act, the labour market needs plan in the area of vocational education and training shall mean the number of graduates from individual courses or fields of study required by employers for the next five years.

The Ministry of Education, in collaboration with professional organizations, shall prepare a generally binding regulation defining their competences and scope of activities and authorities within individual fields of study and courses within the system of education.

Trade unions and work councils represent the interests of employees in the field of vocational education and training, and shall:

- comment on financial and material assistance for students
- participate in the labour market needs plans development
- comment on the existing fields of study and content of vocational education and training

### Legislation

Professional education and training at secondary schools is also governed by the following laws:

- the Act N° 596/2003 Coll. on state administration in education and school management as amended: defines school facilities for practical training - school farm and centre for professional training
- the Act N° 597/2003 Coll. on financing primary schools, secondary schools and school facilities as amended: defines the sources of funding for vocational education and training, which is mainly the state budget and budget of self-governing regions.
- the Act N° 293/2007 Coll. on recognising professional qualifications: regulates the conditions for recognition of professional qualifications certificates issued by schools or other bodies authorized under laws of EU Member States or third countries, in order to ensure for carrying out regulated professions and professional activities and for provision of services, in the Slovak Republic.
- the Act N° 386/1997 Coll. on further education amending the Employment Act N° 387/1996 Coll in the wording of the Act N° 70/1997 Coll, as amended: governs further education as a part of lifelong learning, its institutions, conditions for accreditation, issuance of certification, funding sources. By virtue of the law, further education may, inter alia, have a form of a professional training programme, which allows the participants to enhance, deepen and update his/her knowledge and skills

- Income Tax Act N° 595/2003 Coll., as amended: defines tax deductible costs for work, social needs and health care spent on training and retraining of employees, own training facilities, training of students in secondary vocational schools, unless the respective state authority shall cover these
- the Labour Code N° 311/2001 Coll., as amended: defines the employer's obligation to enter into a contract with students from secondary vocational school, specialised apprentice school or a vocational school, who studied to work in the company and successfully completed an apprentice school, and passed a state final secondary school leaving examination (“Maturita”) from a secondary school or completed the study.
- the Act N°126/1998 Coll. on the Slovak Chamber of Tradesmen and amending certain laws, as amended: defines the scope of activities, authorities and competences of the chamber in the area of vocational education and training at secondary vocational schools and secondary apprentice and vocational schools with curricula and fields of subjects related to the their trades and licences, specifying that the chamber may comment on applications of individuals to establish a practical training centre, may propose changes in the curricula, plans of courses and training programs, may propose its members for examination board for final exams in secondary apprentice schools. Furthermore, the Chamber may, as part of national supervising competences, also supervise practical training, its conditions and level, cooperate with the Ministry of Education to improve professional preparation of employees in training institutions, organizations or individuals offering practical professional training at secondary vocational schools and secondary apprentice schools.
- the Act N°124/2006 Coll. on occupational safety and health protection and on amendments to certain laws, as amended: sets out the general principles for prevention and basic conditions for ensuring safety and health at work, to eliminate risk factors and work accidents, occupational diseases and other health injuries. It applies to employers and employees in all production and non-production sectors, while employer is considered also a natural or legal person involved in practical training of students at a secondary school or a university, whereas a student in the practical training is considered an employee.
- the Act N°416/2001 Coll. on the transfer of certain responsibilities from state administration to municipalities and higher territorial units, as amended.

Other generally binding regulations governing the issue of vocational education and training at secondary schools are:

- Decree 42/1996 Coll. on further education of pedagogical staff, issued by the Ministry of Education of the Slovak Republic
- Decree 238/2004 Coll. on the scope of teaching and educational activities of pedagogical staff, issued by the Government of the Slovak Republic

- Decree 291/2004 Coll. laying down details about school governing bodies, their establishment, composition, organization and financial sources, issued by the Ministry of Education of the Slovak Republic
- Decree 137/2005 Coll. on school inspection, issued by the Ministry of Education of the Slovak Republic
- Decree 348/2005 Coll. on types and requirements of a School Report (card) and other school forms, issued by the Ministry of Education of the Slovak Republic
- Decree 9/2006 Coll. on structure and content of reports on educational activities, results and conditions of schools and school facilities, issued by the Ministry of Education of the Slovak Republic

## Teaching and educational facilities

There are other entities involved in vocational training in Slovakia:

### 1. Professional Guilds

Guilds are mainly involved in and support vocational training and education through professional lectures for students and teachers of secondary vocational schools, assistance in adjusting the curricula, practical training, etc. In order to teach, guilds would need accreditation granted by the Ministry of Education, Science, Research and Sport of the Slovak Republic. Professional guilds usually don't have sufficient funds for financial support, since they are funded from membership fees. Examples of experience of professional guilds operating in the construction sector

- Slovak Roofers Guild (supports only schools that are its members). Specialised field of study "roofer" was approved based on the Guild's initiative. It also prepared curriculum, basic pedagogical documents and normative for workshops. The Guild also organizes training for teachers. Depending on their capacity, it continuously provides specialised literature and journals for students and teachers in roofing occupations. It participates in enhancing practical training of apprentices. In 2013, the Guild organized 15<sup>th</sup> Year of the Slovak Roofing Championship within the CONECO exhibition, for students from secondary vocational schools, with international participation. Regional competition had to be cancelled due to the lack of students.

10<sup>th</sup> year of seminars on roofs – the Guild Days – held in four cities in Slovakia, present the latest information related to prepared legislative changes on thermal protection of buildings.

In 2013, the Slovak Roofers Guild and the Faculty of Civil Engineering of the Slovak University of Technology will organize 20<sup>th</sup> Year of Bratislava Symposium. Topics discussed during its recent years reflected the need to reduce energy consumption of roofs.

Since 2010, the Slovak Roofers Guild provides accredited courses in occupations tinsmith, roofer, carpenter and insulation worker.

- Slovak Guild of Floor-layers is interested in working with schools and welcomes any initiative. Assistance is provided in form of expert lectures. The



Guild has no financial sources for any direct financial support. It is also helping in drafting the curricula but has not accreditation from the Ministry of Education for educational activities. According to the Guild, Universities are more interested in lectures than secondary schools.

- Slovak Guild of stove makers - as an initiative of the Guild, field of study “stove makers” was reopened. Guild is actively involved in the masters training project

## 2. Professional Chambers

- Slovak Chamber of Tradesmen is significantly participating in the process of training at secondary vocational schools and combined secondary schools, by delegating its members to the final examination boards for specialised subjects. It also comments on applications of individuals wishing to establish practical training centres. The Chamber also cooperates with the Ministry of Education in drafting legislative bills to ensure the qualifications and professional training for craftsmen and SME’s, and their lifelong learning. Since 2001, the Chamber carries out qualification tests for crafts, under Art. 22 of the Trade Licence Act. The Chamber has a network of experts, responds to school initiatives, and develops its own initiatives to improve training.
- Slovak Tradesmen Union - the main objective of the Union is to build an independent representative body of Slovak craftsmen and tradesmen, ensuring them an equal partnership in social dialogue. The Union is currently seeking for options to establish masters’ education at national level as part of further education; historically, similar training and education existed already in Czechoslovakia prior WWI. Moreover, experience from other countries prove that apprentice certificate is sufficient qualification for work but not for managing a company and its employees, including economic and accounting issues, and for training of apprentices, in particular. A special master certificate is required for that.

## 3. Associations

- professional associations (e.g. Association for Insulation of Buildings, and Slovenergookno Association), are also involved in educational process, providing professional advice, organising training and workshops, post-graduate studies and forming professional organisations such as the Slovak Green Building Council, Slovak Association of Facility Management, Slovak Association of Refrigeration and Air-conditioning Equipment, etc.

## 4. Firms

- Construction companies, energy utilities and related companies are extensively involved in training; i.e. mainly manufacturers of building materials, structures and technical equipment, e.g. companies granted ETICS certificates for thermal systems, roofing, and companies representing manufacturers of



technical equipment and their components. Large energy utilities and companies are involved actively in training, for example SPP.

The Education Act N°245/2008 Coll should reflect the need to establish qualification standards, and learning outcomes need to be incorporated to into the education system at primary and secondary schools, in order to fully apply the principle of lifelong learning, recognition of its outcomes and in order to enhance the skills of graduates and harmonise these with the needs of employers.

The primary need is to harmonise profiles of graduates with the levels of the National Qualifications Framework, which is based on the learning outcomes achieved by graduates, including a reference to the respective QF level given in the issued certificates. In addition, educational programs for primary and secondary schools should focus on knowledge, skills and competencies of their graduates.

Likewise, the Act N° 568/2009 Coll. on lifelong learning requires amendments, in order to create room for a comprehensive implementation of Strategy 2011 tools in practice, particularly adult career guidance, financial support scheme for training and national qualifications systems.

At present, according to the Trade Licence Act, a qualification to perform crafts is proved with an apprenticeship certificate or other certificate on completion of relevant apprenticeship or vocational field of study, accompanied by reference documents (confirming experience).

Training of installers of equipment for renewable energy sources in accordance with Directive 2009/28/EC is currently governed by the Decree 133/2012 Coll. establishing the extent of training, examination, the details about establishing examination boards and their activities, and content of the certificate, issued by the Ministry of Economy. Specialised training for installers is focused on gaining theoretical knowledge and practical skills to install:

- biomass boilers and furnaces
- photovoltaic systems and solar thermal systems
- shallow geothermal systems and heat pumps

Specialised training for installers in the above specified areas can be considered as best practices examples in the field of education regarding the use of renewable energy in buildings in Slovakia.

The scope of training on biomass boilers and furnaces installation (Annex 1 to the Decree 133/2012 Coll.)

1. Depending on the education, the applicant may obtain a certificate or enhance his/her skills:
  - applicants with completed secondary education - installer, technician of energy equipment, or in a similar field focusing on installation of heating and thermal systems
  - University graduates – technical systems for buildings or similar area

2. As a minimum, practical part of training includes installation of heating and thermal technology, cutting pipes and leak testing.

3. The theoretical part of the training includes:

- biomass energy use
- Description of the biomass market, transport and storage
- Biomass combustion and its products, emissions and environmental protection
- Design, installation and maintenance of biomass boilers and furnaces
- Hydraulics
- Measurement and control
- Fire protection
- Economy of operation, investments, overhead costs, RoE, grants and other support schemes

The extent of training for installation of photovoltaic systems and thermal solar systems – see Annex 2 of Decree 133/2012 Coll.)

1. Depending on the education, the applicant may obtain a certificate or enhance his/her skills:

- applicants with completed secondary education - installer, technician of energy equipment, or in a similar field focusing on installation of heating and thermal systems
- University graduates – technical systems for buildings or similar area

2. As a minimum, practical part of training includes installation of heating and thermal technology, installation of electrical equipment, roofing and basic knowledge about roof materials, sealing methods, methods to cover cracks, cutting pipes, soldering pipe joints, gluing pipe joints, sealing of fittings and leak testing.

3. Theoretical part of training includes:

- Types and characteristics of photovoltaic systems and thermal solar systems,
- The availability and quality of the systems and components at the market
- Environmental impacts of installation
- Design, installation and maintenance of photovoltaic systems and solar thermal systems, in particular:
  - ü Identification of active and passive systems and their components
  - ü design of components and systems configuration, and their inclusion into existing electrical systems, heating or hot water generation

- ü Determination of required surface, orientation and gradient of the photovoltaic panels or thermal solar collectors
- ü Assessment of installation adequacy regarding the building's energy demand and climate conditions
- ü Size of electrical conductors and connection design breakers
- ü Selection of appropriate method for installation depending on roof type
- ü Identification of installation risks
- ü Hydraulic connection of solar thermal systems
- ü Measurement and control
- ü Fire protection
- ü Economy of operation, investments, overhead costs, RoE, grants and other support schemes
- ü Technical regulations for selected technical equipment,
- ü Generally binding regulations in the field of photovoltaic systems and solar systems
- ü European Union legislation in the field of photovoltaic systems

The scope of training for installation of shallow geothermal systems and heat pumps (Annex 3 to Decree 133/2012 Coll.)

1. Depending on the education, the applicant may obtain a certificate or enhance his/her skills:

- applicants with completed secondary education - installer, technician of energy equipment, or in a similar field focusing on installation of heating and thermal systems, cooling and geothermal systems or electrical equipment
- University graduates – technical systems for buildings or similar area

2. As a minimum, practical part of training includes installation of heating and thermal technology, installation of cooling or geothermal systems or electrical equipment, with the knowledge on cutting of pipes, soldering pipe joints gluing pipe joints, sealing of fittings and leak testing.

3. Theoretical part of training includes:

- Geothermal resources in different regions, temperature of resources, thermal conductivity identification for soil and rock
- types and characteristics of heat pumps
- availability and quality of systems and components at the market
- environmental impact of installation
- Design, installation and maintenance of heat pumps in buildings, in particular:
  - ü Components and their functions within the heating circuit including compressor, expansion valve, evaporator, condenser, fixtures and fittings
  - ü Lubricating oils and coolants

- ü Overheating, under-cooling and cooling with heat pump
- ü Selection and calibration of components for a typical installation
- ü Determining typical values of heat load for different buildings
- ü Determination of heat pump performance according to heating and cooling demand of buildings
- ü Assessment of electricity supply of for a heat pump
- ü Accumulation of heat and cold in building, including the recommendation of necessary components
- ü Hydraulic connection of heat pumps
- ü Measurement and control
- ü Fire protection
- ü Economy of operation, investments, overhead costs, RoE, grants and other support schemes
- ü Technical regulations for selected technical equipment
- ü Generally binding regulations in the field of heat pumps and shallow geothermal drills

In terms of theoretical knowledge and practical skills, these schemes ensure mutual recognition of skills by EU Member States, provided by relevant accredited training / education institutions. Currently, an accredited training focusing on sale, installation and servicing of heat pumps prepares its attendants for exams according to EU.CERT.HP for heat pump installers, following the methodology of the Slovak Association of Cooling and Air-Conditioning Technology and EHPA, in accordance with the Directive 2009/28/EC and Decree 133/2012 Coll of Ministry of Economy. The accredited training is provided by the Slovak Association of Cooling and Air Conditioning Technology. Ministry of Economy established a committee in this regard and maintains the records of certificates granted to installers.

In addition to the accredited training and testing, also non-accredited training is going on, organized by companies producing or selling individual types of equipment for renewable energy. These companies only carry out training on installation and commissioning of their equipment.

Lifelong Learning Strategy of the Slovak Republic is defined in [38]. The main objective of the document is to strengthen awareness of people about the need for continuous education, as it can provide him/her skills and competencies needed to keep his/her job, find a role within the society and development his/her personal interests. This aim is broken down into key priorities of the Strategy :

1. Lifelong learning will be attractive for every citizen of the Slovak Republic and supported by all stakeholders.
2. Schools and educational institutions of further education will provide education matching the labour market needs and social career, in cooperation with employers
3. Counselling services in career orientation and training options will be available for anyone interested

4. Barriers to lifelong learning will be removed so people can learn anytime when their skills and competencies will become obsolete for labour market
5. Professional and specialised associations actively promote continuous education.

### 6.1.1 Responsible authorities

The responsible authority is the Ministry of Education of Education, Research, Science and Sport of the Slovak Republic - [www.minedu.sk](http://www.minedu.sk).

After shifting founding-related responsibilities for secondary schools by virtue of the Act N°: 416/2001 Coll to municipalities and higher territorial units (regions), these – as founders - are required to ensure for adequate material and technical conditions for educational process at secondary schools and also to formulate strategic materials and development strategies for different types of schools they are in charge of. Following phase I and II of the secondary schools and school facilities network rationalisation, regional authorities also specify the focus secondary vocational education within their region in short, medium and long term horizons.

### 6.1.2 Accreditation bodies and relevant training providers within the sector

Ministry of Education, Science, Research and Sport of the Slovak Republic is the only accreditation body for granting accreditation to educational institutions, educational scheme, lifelong learning programme and continuous education. Its decisions are based on recommendations of accreditation committees to which applications for accreditation are submitted.

### Accreditation of Universities

Accreditation of a study programme is a process within which the Accreditation Committee - advisory body to the Slovak Government - assesses qualifications and capacities of a University to run the respective programme of study within the field of study. The Accreditation Committee submits its decision to the Minister for Education, who will then decide whether the University will be granted the right to award an academic degree to graduates from that study programme. Such programme of study is assigned the term “accredited programme of study” under the Act on Universities.

Accreditation Committee shall monitor, assesses and independently evaluate the quality of education, research, development, artistic and other creative activities of Universities and help to enhance these, assessing also the terms Universities established for these activities, and based on the assessment it formulates recommendations for Universities to improve. Independent evaluation helps to streamline and enhance the quality of education at Universities.

Accreditation Committee has 21 members appointed by the Government of the Slovak Republic for a period of six years and maximum for two consecutive terms. It

is chaired by its President, representing it externally, in negotiations with other authorities within the scope as authorized by the Committee. Furthermore, the Committee's President announces and chairs its meetings, prepares agenda for meeting, endorses Minutes and signs documents prepared by the Committee, and informs the public about its activities and findings.

Accreditation Committee shall comment:

- qualifications and capacities of a University to offer the study programme authorising it to award academic degree to its graduates
- eligibility of other than a tertiary institution to participate in a postgraduate program (Art. 86)
- qualifications and capacities to carry out habilitation procedures and procedures for the appointment of professors
- proposals for establishing, merging, joining, splitting, closing a public or state owned University or their Faculties, as well a change of their name or seat
- application to grant permission to a legal person applying to become a private university
- a proposal to change study programmes managed by the Ministry of Education, Science, Research and Sport of the Slovak Republic,
- other proposals related to tertiary education as requested by the Minister

Accreditation Committee also carries out a full accreditation check of Universities in six-year intervals, following the published Comprehensive Accreditation Plan (Art. 84). Within the comprehensive accreditation, it is assessing R&D activities, artistic and other creative activities of a University, commenting also its type as classified under Art 2 para 13.

### Accreditation for secondary schools

Accreditation of a new study programme for secondary school follows the same principles as accreditation of educational programs for lifelong learning.

### Lifelong learning accreditation

Accreditation means to verify the qualifications and capacities of an educational institution to carry out accredited educational program according to conditions laid down in the provisions of the Act N° 568/2009 Coll. on lifelong learning. Ministry of Education, Science, Research and Sport of the Slovak Republic shall decide on granting an accreditation, following a recommendation prepared by the Accreditation Committee for further education.

Further education is part of lifelong learning. It is carried out through formal and non-formal training and informal learning, allowing anyone to improve, expand and enhance his qualification, re-qualify, and to satisfy personal needs. It takes place in institutions for further education, at schools, and their extracurricular facilities.



Based on the Act 568/2009 Coll. on lifelong learning, information system for further training was established for training programs accreditation, which is directly accessible by clicking at "Accreditations".

Documents and regulations governing lifelong learning:

- Action Plan for Lifelong Learning Strategy 2011
- Lifelong learning - Update 2011
- Lifelong learning - Update 2011 (summary)
- National Qualifications Framework of the Slovak Republic
- National Qualifications Framework of the Slovak Republic (EN version)

### **Accreditation of continuous education of teachers and professional employees**

Professional development means to deepen, enhance and improve professional skills and competencies in line with the latest scientific knowledge, social needs and teaching needs, in order to carry out certain professional activities (Art 25 para 1 of the Act 317/2009 Coll. on pedagogical and professional employees and on amendments to certain acts).

### **Accreditation in the field of work with children and youth**

Following Art 7 para 5 of the Act 282/2008 Coll. on youth support work amending the Act 131/2002 Coll. on Universities, Ministry of Education, Science, Research and Sport of the Slovak Republic establishes Accreditation Commission for specialized services in the field of youth work. It is an advisory body to the Ministry of Education of the Slovak Republic, and was established for counselling, consultations and assessment of applications requiring a certificate of professional qualifications to carry out specialized activities in the field of youth work. Accreditation Committee recommends to the Ministry whether to grant a certificate of accreditation for specialized activities in the field of youth work, to an educational facility.

### **Secondary schools**

National educational programmes are approved by the Ministry of Education, Science, Research and Sport of the Slovak Republic for secondary schools.

National educational programmes define general objectives of schools and their key competencies for a harmonious development of personality of students, as well as a framework content of education, and are the base for individual school educational programmes, where also specific regional conditions and needs are taken into account.

The aim of the national educational programme for group 36 - Construction, Geodetics and Cartography - is education and training of qualified technical experts for construction, geodesy and cartography, with environmental protection being an important part. Shaping the graduates, with a focus on core competencies allows to prepare students to be able to address technical and production problems, and to be flexible and able to adapt to work in new production and non-production sectors



depending on the labour market needs, to apply new technologies and develop business activities both in production and services within the construction sector, and to work as surveyor or cartographer. For construction sector, the educational programmes 2C, 3A, 3C and 4A are of importance:

- National educational programmes for secondary vocational schools (ISCED 2C)
- National educational programmes for secondary vocational schools (ISCED 3A)
- National educational programmes for secondary vocational schools (ISCED 3C)
- National educational programmes for secondary vocational schools (ISCED 4A)

### New educational programs

New educational programme and field of study follow the Act N° 245/2008 Coll.

In order an educational programme or new field of study to be approved by the Ministry, a project needs to be submitted, which includes:

- approval of the founder
- statements of representatives of employers
- School Council statement
- description of the new field of study
- profile of graduate from the field of study based on the National Educational Policy, with new skills
- curriculum, based on the Framework Educational Plan within the National Educational Policy
- content (curriculum - a brief description of the subject, its general and specific objectives, thematic units and time allocations or modules)
- a preliminary agreement between the school and employers in order to ensure for practical training directly in the workshop or the employer's facility
- financial, personnel and material provision for the new field of study
- timetable to introduce the new field of study

National Institute of Vocational Training recommends that a pilot (experimental) period for each new study programme should be the same as regular length of a study, and it should be tested at least at least three schools. Those who propose a new field of study shall recommend partners for the pilot verification, to the Ministry of Education. Proposals for pilot verification need to be prepared, guaranteed/supervised and submitted in accordance with Art 14 of the Education Act.

The pilot project verification in schools is managed by the Ministry of Education, except for schools belonging to other central administration bodies. Agencies of the Ministry of Education - National Institute of Vocational Training and National Institute

for Education - are in charge of expert assessment and review of submitted proposals.

Final draft of pilot programmes of study are then submitted by the founder / entity that guaranteed the pilot (supervisor) to the Ministry of Education for approval no later than by the end of March prior the academic year in which the pilot project shall commence.

Ministry of Education shall decide on the pilot within 60 days of receiving the proposal, based on a statement prepared by an expert appointed by the Ministry of Education according to the focus and content of the pilot.

Should the Ministry of Education approve the pilot, new programmes of study are incorporated into the network of selected schools.

Supervisor/guarantor evaluates the pilot verification for each academic year. No secondary school may join the pilot scheme during the verification. Within the pilot/experimental testing of the proposed new programme of study, the school may, in close cooperation with employers and subject to consent of the supervisor, execute all changes associated with the characteristics of the study programme, competencies of its graduates and curricula. The supervisor shall inform the Ministry of Education about all changes within the interim evaluation.

Final assessment of pilot verification shall be submitted to Ministry of Education by the supervisor within 3 months after its completion and not later than on December 31<sup>st</sup> of the calendar year in which it was carried out.

### National Programme for Learning Regions

Learning Region is a regional network of institutions involved in education and employment, creating tailor-made services and projects to provide lifelong learning and lifelong guidance.

The objective of the national program proposal is to implement the principle of learning regions and support networking of stakeholders in order to develop lifelong learning. This objective will be achieved through a jointly formulated regional strategy adopted for lifelong learning, by developing partnerships for implementation of projects in the field of lifelong learning as well as through assistance provided to regions allowing them to use EU funds during 2007-2013 programming period.

National Programme for Learning Regions was approved at the 10<sup>th</sup> Session of the Ministry on May 15<sup>th</sup> 2007 as the Strategy of lifelong learning and lifelong guidance. It was approved by the Slovak Government in its Resolution 382/2007 of April 25<sup>th</sup> 2007, and it includes design of the system, its objectives, analysis and financing of lifelong learning and lifelong guidance, proposal of education quality management system and the system for recognition of outcomes of non-formal education and informal learning. The main objective of the Strategy is to built a system of lifelong learning and lifelong guidance in order to facilitate access to flexible acquisition of new skills a good training within both formal and non-formal systems of education



and informal learning, and through comprehensive counselling services throughout their life, respecting equal opportunities.

### **Lifelong Learning Strategy in the Slovak Republic**

Lifelong Learning Strategy is based the European Commission, "Memorandum on Lifelong Learning" and is in line with strategic documents of the Slovak Republic focusing on education and employment. Its objectives comply with the basic principles of sustainable development in lifelong learning. Lifelong Learning Strategy was adopted by the Slovak Government Resolution 157/2004 on February 25<sup>th</sup> 2004.

### **Memorandum on Lifelong Learning**

European Commission formulated the Memorandum on Lifelong Learning in 2000, with the aim to prepare a comprehensive strategy for lifelong learning in Europe. It is based on the need for lifelong learning, aiming to promote active citizenship and employment. Promoting lifelong learning focuses on six key messages, which form the major part of the text of the Memorandum. It also includes specific examples of lifelong learning in European countries.

Preliminary plan to implement short, medium and long term objectives in line with the 2011 Strategy for lifelong learning, Action Plan and SAAIC project recommendations "National Forum as a tool to improve lifelong learning strategy."<sup>11</sup>

### **National Report on the implementation of consultation process to the Memorandum on Lifelong Learning**

Consultation process on the Memorandum was organised by the Ministry of Education in cooperation with other central government bodies, NGOs and social partners in form of a national discussion focusing on individual key messages, held during the first half of 2001.

### **6.1.3 Number of courses / year, implementing authorities / organizations, the number of workers attending courses, content, certification, financial sources/ funding**

#### **Example - creating a new specialisation - profession**

Profession: technician of energy equipment in buildings:

- A new field of study experimentally verified in three secondary vocational schools - – Secondary Electrical School in Trnava, Secondary Vocational

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<sup>11</sup> *Transl. note: incomplete sentence in the original text*

School in Prešov and Joint School in Kremnička (formerly Secondary Building School) Banská Bystrica

- Prepares specialists in formal education – currently, there are 244 students in all three schools, thereof 53 students are in third year, 81 students in the second year and 110 students in the year one.
- since the field of the study is under a pilot regime, it will only be certified after the pilot end; i.e. after the end of the academic year 2013/2014.
- Equipment of workshops and classrooms, training of teachers and preparation of textbooks for all four years are funded by non-investment fund – EkoFond - as well as from the SPP and UNDP Alliance partners, and from own funds of each school.
- The content - The objective of this field of study is education and training of qualified technical experts with secondary education in the field of construction and energy in buildings. Four years study programme was proposed as a specialised vocational training for workers in construction sector, focusing on energy equipment and technologies using gas, electricity and other energy sources that are becoming a part of technical equipment in residential buildings and small plants.

#### **6.1.4 The scope of the current system involving the skills implementing measures in the field of building energy performance and renewable energy sources**

A survey was made in construction companies mapping their views on the current scope and focus of existing study programmes and training courses. This opinion compares the current needs of construction companies (the market) with the existing study programmes, also taking into account measures in the area of energy performance of buildings and renewable energy sources, which are incorporated directly in the design documentation and investors require these for two main reasons: 1. - actual operating costs of buildings, and 2. - potential grants or subsidies from the state to use certain technologies (in specific government / sectoral programs). Overall, though, 77% of respondents presented their objections on study programme as being either unsatisfactory, not harmonised with market needs, cannot be used at labour market at all, and, some are even missing.



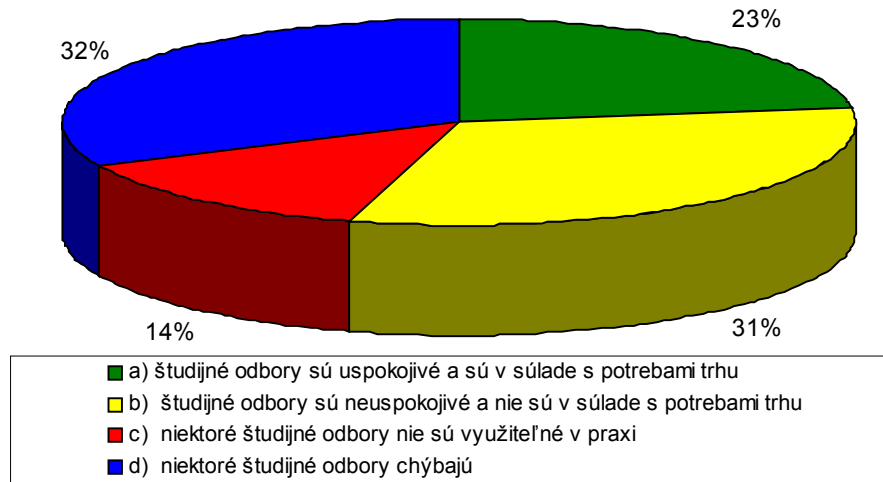


Chart 6.1 – Scope and focus of offered study programmes and training courses in the construction sector

- a- study programmes are satisfactory and match market needs ■
- b- study programmes are not satisfactory and don't match market needs ■
- c- certain study programmes cannot be used at the market at all ■
- d- certain study programmes are missing ■

### 6.1.5 Existing tools to monitor market development in terms of requirements for technology, skills and training (e.g. Building Sector Skills Committee)

#### Survey on Adults Lifelong Learning (AES)

Adults' lifelong learning survey - Adult Education Survey (AES) - is carried out in the SR as a first European harmonized survey of individuals within the European statistical surveys; it is carried out within the European Community on the base of Management proposal, in form of a project for lifelong learning for adults. The survey was made for second time in Slovakia, in a form of paper questionnaires distributed to adults.

The aim of the survey is to collect representative and comparable data on adult lifelong learning from our regions and Europe. Its results will form a database on adult education, also including information about formal and informal education, as well as other types of training and activities of adult population. Obtained information will enable an objective evaluation and international comparison and analysis of inequalities in adult lifelong learning across the EU.

Implementation period: November 2010 - July 2012.

<http://portal.statistics.sk/showdoc.do?docid=2821>

## Continuing Vocational Training Survey (CVTS) in enterprises

Continuing Vocational Training Survey (CVTS) in enterprises was carried out in the SR as the first European harmonized research in enterprises within the framework of European statistical surveys. It was carried out in accordance with the Regulation 1552/2005 of the European Parliament and of the Council on statistics and statistics relating to vocational training in enterprises, and Commission Regulation (EC) 198/2006, which is implemented by the European Parliament and the Council Regulation 1552/2005. In 2005, a pilot survey was made in SR for the year 2004 through interviews in companies, using paper questionnaires.

The aim of the statistical survey was to collect representative and comparable data on lifelong learning and developing of skills in further training provided by employer, which is also reflected in their role in taking decisions regarding the labour market and employment issues. The result is a database about professional training in enterprises, including initial training, which in particular includes young apprentices. A policy and strategy needs to take into account adaptability of human resources, changes in the structure of production and services, as well as technologies in different sectors of economic activities. The obtained information will enable an objective evaluation, international comparison and analysis of imbalances in skills supply present at the labour market and its demands in different regions and countries of the EU.

Implementation period: January 2006 - June 2007.

A second harmonized European survey in enterprises (CVTS4) is carried out in 2011, in compliance with the Regulation EC 822/2010

Reference period: 2010.

## 6.2 Existing training schemes and training courses related to energy performance of buildings and renewable energy sources in buildings that are not part of the national system of continuing VET, yet

### Slovak Association for Cooling and Air Conditioning Technology

- Training and testing of heat pump installers with a focus on sale, service and installation of heat pumps

More info at: <http://www.szchkt.org/a/docs/news/156/show>

1. A precondition for granting a certificate after successful completion of a test is to submit copies of education certificates and participation in the installation of at least one heat pump confirmed by a certified company, listed at [www.szchkt.org](http://www.szchkt.org)

2. A precondition for renewal of an expired certificate is participation in the installation of at least one heat pump confirmed by a certified company, listed at [www.szchkt.org](http://www.szchkt.org).
  3. Free certification for a company that is a member of the Association. Non-members will be charged.
  4. Training fee, including a test is €360 (or €240 EUR for members ).
- Training on F gases (refrigerants) - training completed with a certificate;

More info at: <http://www.szchkt.org/a/docs/news/115/show>

According to Act No. 286/2009 Coll. on F gases - owner shall only be obliged to use services of a certified person, and the seller shall be obliged to sell refrigerants only to a certified and professionally qualified legal entity or natural entity. A certificate may be obtained by declaring conformity with the law. A company must have employee(s) who received training and obtained a professional certificate on working with fluorinated greenhouse refrigerants (if certificate was granted under the Act N° 76/1998 Coll., it is possible to directly apply for a temporary certificate on qualification granted to a legal or natural entity.

Sign up for training at: [www.szchkt.org](http://www.szchkt.org).

### **Guild of Heating and Thermal Technologies**

The Guild operates a specialised classroom and a workshop with modern equipment for practical training for plumbers and heating technicians.

- Masters training (a training course completed with a test) - opening a trade in compliance with the EU in the field of heating, ventilation and air conditioning; since 2005 the training course accredited by Ministry of Education, organised 4 times so far
- Co-organizing vocational skills tests (occupation: Heating technician, plumbers) [www.cvtt.sk/cvtt2.htm](http://www.cvtt.sk/cvtt2.htm)

### **Openings in structures -Association Slovenergookno**

The courses are designed for workers with completed secondary education dealing with windows and doors installation in buildings i.e. training for installers of windows and doors. The aim of the training is to provide the required range of theoretical knowledge and practical skills. The training involves also relevant legislation and technical standards. After a successful completion, graduate will obtain a certificate.

## 6.3 Relevant national initiatives supported by the EU

### REFUGE Project - REnewable Energy for FUture GEnérations

The REFUGE project is supported within the Lifelong Learning Program - Leonardo da Vinci - Multilateral Projects' "Transfer of Innovation in 2011, and will be implemented for 24 months, from December 2011 until the end of November 2013.

EkoFond -a non-investment fund established by SPP- was awarded the contract as a supplier and is a key partner of the project. Partners of the project are: IDEC S.A – a training and consulting firm from Greece, Integrated Secondary School from the Czech Republic, Secondary Electro-technical School in Trnava, Combined Secondary School in Kremnička, Banská Bystrica, Secondary Vocational School in Prešov and the National Institute for Vocational Training.

The main objectives of the project is to identify and analyze new professions in the field of renewable energy and adapt these to Slovak conditions, prepare training for job and career counsellors about new occupations, and prepare textbooks in the field of renewable energy use to be used in the field of study "technician for energy equipment in buildings" developed by EkoFond with participation of the above mentioned schools and the National Institute for Vocational Training.

The main outputs of the project are:

- Guide for occupations in renewable energy use
- Training curriculum and training of career counsellors
- textbooks on renewable energy sources for the field of study technician for energy equipment in buildings "

Target groups of the project are job and career counsellors, teachers in technical subjects, in particular those in the field of study "technician for energy equipment in buildings" as well as students from specialised secondary schools.

### National initiatives

In order this report to be complete, analysis of the current situation in continuing and further professional training of craftsmen, construction workers and plumbers and installers, also involved demographic data on population split by age and education, which were based on official statistical data of the Statistical Office of the Slovak Republic, i.e. 2001 and 2011 Census.

The age structure of population, in terms of a trend, is similar to the age structure in other EU countries. Aging of population is reflected in the decreased number of children younger than 14 years and increased number of people older than 65 years of age and those in productive age.





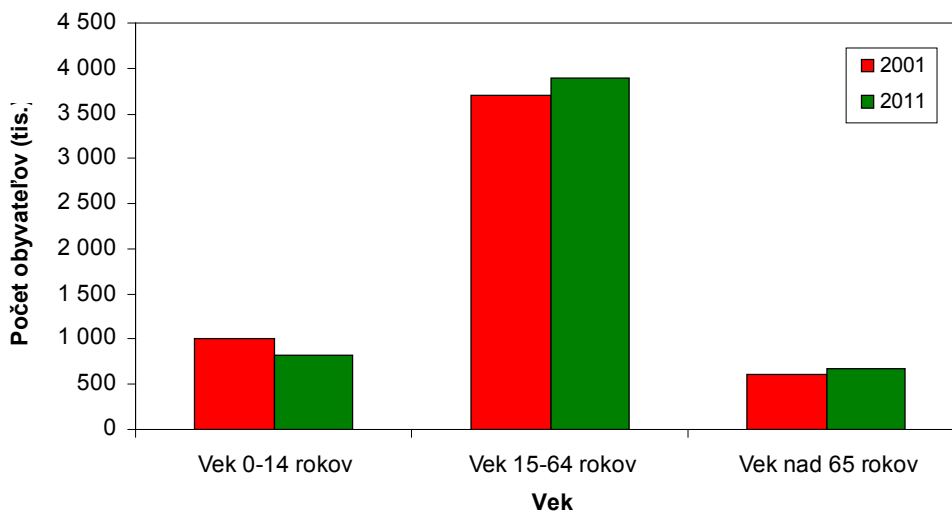


Chart 6.2 – Population development in SR by age in 2001 and 2011,  
 - number of the inhabitants, age(age 0-14 years, age 15-64 years, age over 65 years)

Population structure in terms of education is more important. An increase of graduates from secondary vocational education (completed with and without final state examination-“maturita”) and tertiary education (especially the second level) may be observed between 2001 and 2011. A decrease was observed in the population with completed elementary education and apprentice (especially without final state examination-maturita).



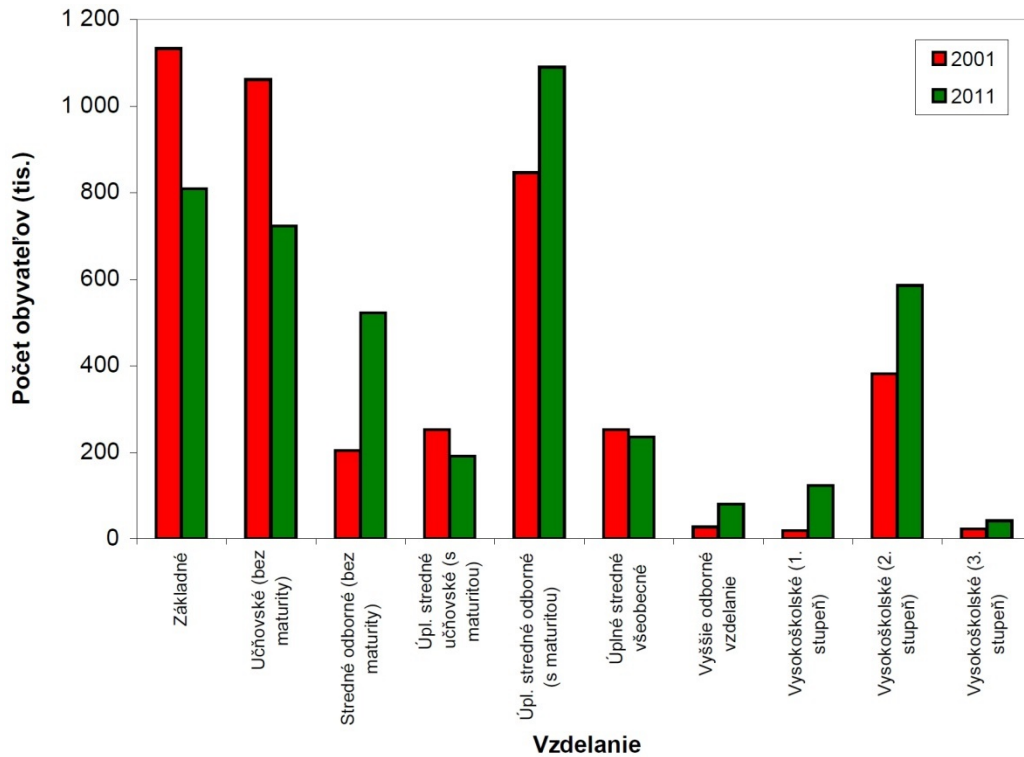


Chart 6.3 – Population development in SR, by education in 2001 and 2011

- number of citizens, education (completed elementary / apprentice without final examination / vocational school without final exam / secondary apprentice with final examination / vocational secondary school with final examination /, general secondary school (Grammar School) / higher specialised education / University (1<sup>st</sup> level) / University (2<sup>nd</sup> level) / University (3<sup>rd</sup> level)

Chart 6.4 is an overview of the current number of secondary schools, number of students, teachers, number of students by individual field of study, number of graduates (part-time students) etc., as this is important information for further progress in the project.

The number of schools is decreasing steadily due to the generally dropping number of children, reduced number of students interested in apprentice schools, as well as optimization of the school network. Since 2008, apprentice schools (SOU) cannot be specifically followed anymore as these were renamed to secondary vocational schools (SOŠ). In 2011, there were 470 secondary vocational schools, attended by 168,974 students.

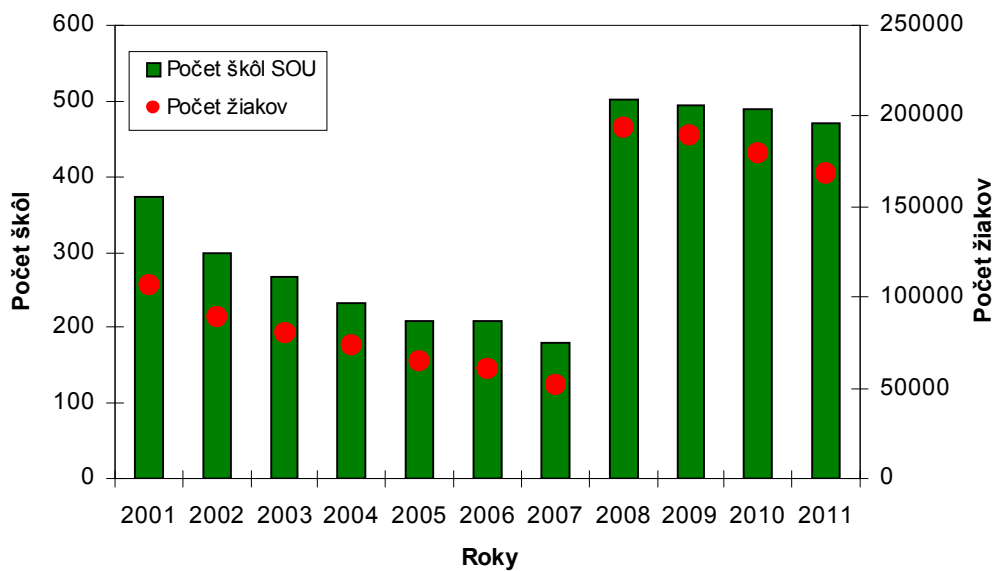


Chart 6.4 – Development of numbers of *apprentice schools* and *their students*, in SR  
-number of schools, --years, -number of students

(Note: Until 2007 only apprentice schools (SOU) and from 2008 all together as secondary vocational schools (SOŠ)

After the restructuring of secondary vocational schools in 2007, the average number of students per teacher decreased, and the average number of students per school increased. Changes are also in the number of teachers, ie. dropping almost constantly. Opposite trend can be observed since 2008 in the number of part-time students.

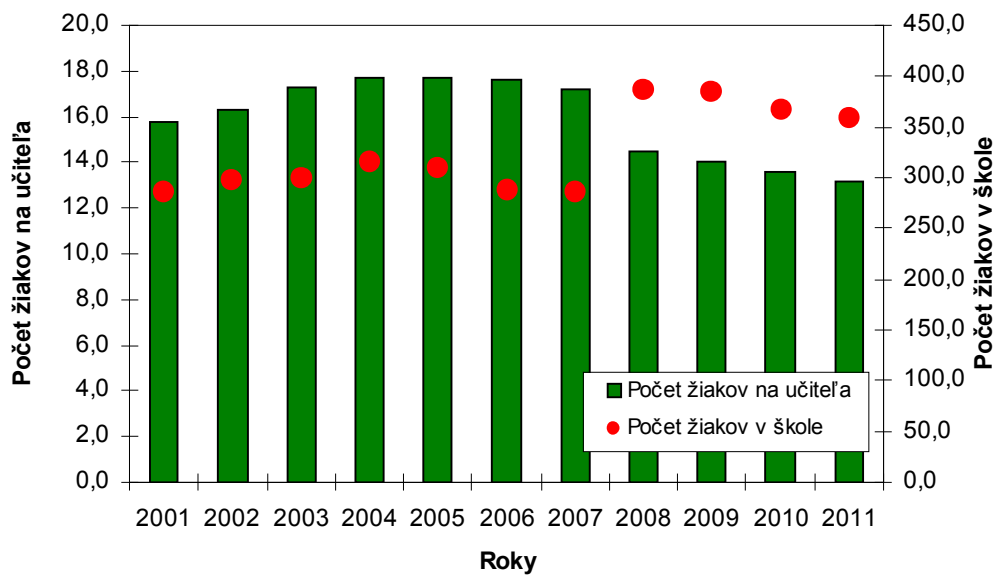


Chart 6.5 - Number of students per teacher and number of students per school in Slovakia (years, – number of students per teacher, – number of students per school)

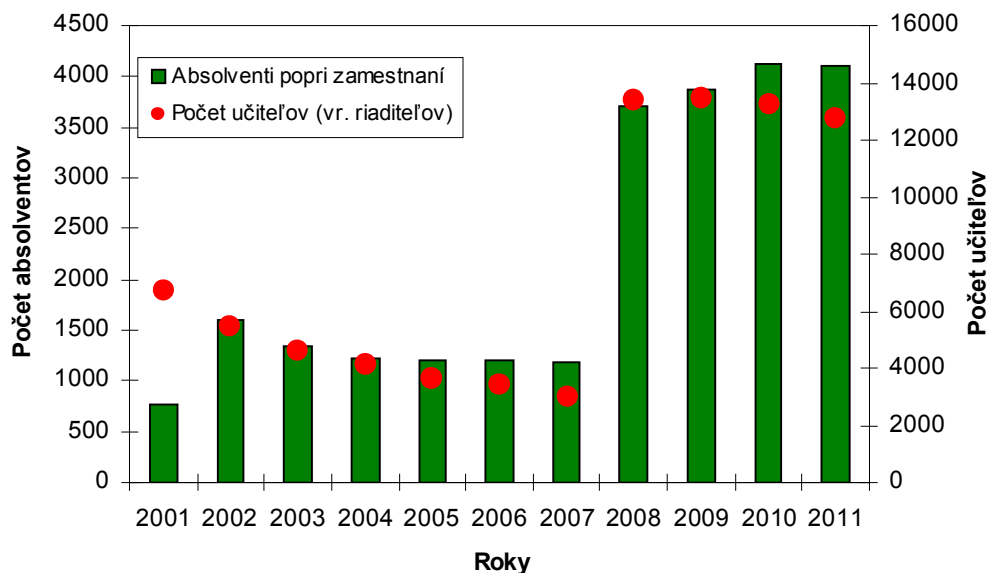


Chart 6.6 - Number of teachers and part-time graduates in Slovakia (Note: until 2007, only apprentice schools, since 2008, all secondary vocational schools) (– part time, graduates -number of teachers, incl. headmasters)

## Secondary school graduates at the labour market

Unemployment of secondary school graduates culminated in September and October 2011. In October, the peak number of 27,910 (2% lower than in 2010) was reached

and the values remained high until March 2012 - 26,300 unemployed secondary school graduates. A significant drop occurred later, in April and May.

Due to a heterogeneous vocational schools, graduates from secondary vocational schools are divided into three groups in this analysis :

- Graduates from specialised studies (former secondary vocational schools)
- Graduates -from vocational courses with extended practical training (former apprentice schools with state final examination “maturita”)
- graduates from apprentice schools (formerly apprentice schools without state final examination)

Table 6.1 – Number of unemployed graduates from secondary schools and universities in 2011/12

Month/ year	Graduates of courses	Graduates from courses with extended training.	Graduates from apprentice without state final exam	Graduates from grammar schools	<b>Graduates from secondary schools - total</b>	Annual index of secondary school graduates	High school graduates	<b>graduates - TOTAL</b>	% graduates from the job seekers
6/2011	6,990	4,874	3,390	2,069	17,323	1.04	9,663	<b>26,986</b>	7.0%
7/2011	6,832	4,723	3,330	1,985	16,870	1.05	9,570	<b>26,440</b>	6.8%
8/2011	6,362	4,244	3,010	1,794	15,410	1.00	8,462	<b>23,872</b>	6.2%
9/2011	10,724	8,664	5,713	2,113	27,214	0.95	6,811	<b>34,025</b>	8.7%
10/2011	11,014	8,859	5,833	2,204	27,910	0.98	5,826	<b>33,736</b>	8.6%
11/2011	10,617	8,430	5,715	2,130	26,892	0.98	5,035	<b>31,927</b>	8.1%
12/2011	10,395	8,212	5,659	2,125	26,391	0.98	4,407	<b>30,798</b>	7.7%
1/2012	10,177	7,946	5,610	2,169	25,902	0.98	3,784	<b>29,686</b>	7.3%
2/2012	10,331	7,824	5,596	2,459	26,210	0.99	3,377	<b>29,587</b>	7.2%
3/2012	10,205	7,570	5,490	2,674	25,939	0.99	2,842	<b>28,781</b>	7.0%
4/2012	9,854	6,903	5,112	2,965	24,834	0.99	2,518	<b>27,352</b>	6.9%
5/2012	9,437	6,409	4,766	2,858	23,470	1.16	4,916	<b>28,386</b>	7.2%
<i>average</i>	9,412	7,055	4,935	2,295	23,697	1.01	5,601	<b>29,298</b>	7.4%
<i>AB index</i>	0.14	0.28	0.18	-0.30	0.16	.	0.74	.	.

(Source: Office of Labour, Social Affairs and Family SR)

Since 2006, the number of economically active population in the Slovak Republic increased from 2,558,000 to the current 2,702,000, increasing thus the labour market by 144,000 people, in such a relatively short time; i.e. 5.6% of new potential jobs seekers. Also, the considerable number of people working abroad need to be added to these figures, as they are returning home due to the crisis. Furthermore, the crisis led to reduction in existing jobs and no new jobs are being created.

Since 2009, the gap between available labour force and vacancies began to show an overall increase in the number of job seekers, of which unemployed graduates form a risky segment.

The number of jobseekers grew largely in 2011/2012 , i.e. from 383,000 people in June 2011 to 411,800 in February 2012. Annually it means an average growth by 4%, proving that the crisis still affects the labour market.

## 7. SKILLS NEEDED TO ACHIEVE THE 2020 TARGETS

A survey in form of questionnaire at construction sites and e-mail correspondence distributed to construction companies management was carried out, in order to identify the theoretical knowledge of construction workers directly determining their correct technical decisions and observance of technology guidance and manuals, which result in their final quality of work and accomplishments of key requirements in construction - saving energy and heat.

Alongside construction workers, also managers (with tertiary education) took initiative, and joined the survey. Therefore, its results were analysed separately for workers and managers. The overall results were evaluated, i.e. the number of correct answers (out of twelve), and basic statistical selection indicators were calculated: minimum score, maximum score, average score, standard deviation and selection variability.

Workers reached an average of 8.27 correct answers (i.e., about 69%). Managers, surprisingly, had an average of 7.25 from the total score (i.e. about 60%). Another remarkable finding is that management failed to reach the full number of correct answers (nine). On the other hand, the minimum score was five, which creates a presumption of only minor differences in the level of knowledge. On the contrary, workers proved big differences in theoretical knowledge, without any direct relation to the length of their work experience. It is considered, therefore, that vocational education and training (VET) and lifelong learning is needed for workers, in Slovakia.

The questionnaire comprised twelve questions in a test, and respondents were asked to choose the correct answer (always one). Questions were formulated clearly in order to be understood without further interpretation, correct terminology was used in order to mirror the existing situation in the construction sector in Slovakia (with regard to the 2020 goals), and also to chronologically follow the overall process of the most represented area in heat performance – ETICS application. Once a global assessment of questionnaires was made, an analysis of each question was prepared as to the success rate in answers, with 55% being the critical threshold level, which is considered “satisfactory” in examinations and tests. Thus, three areas of insufficient knowledge were identified, namely about

- factors affecting thermal (insulation) characteristics (question 1)
- the role of the base layer of ETICS (Question 5), and
- the correct placement of ETICS base layer of (Question 6)



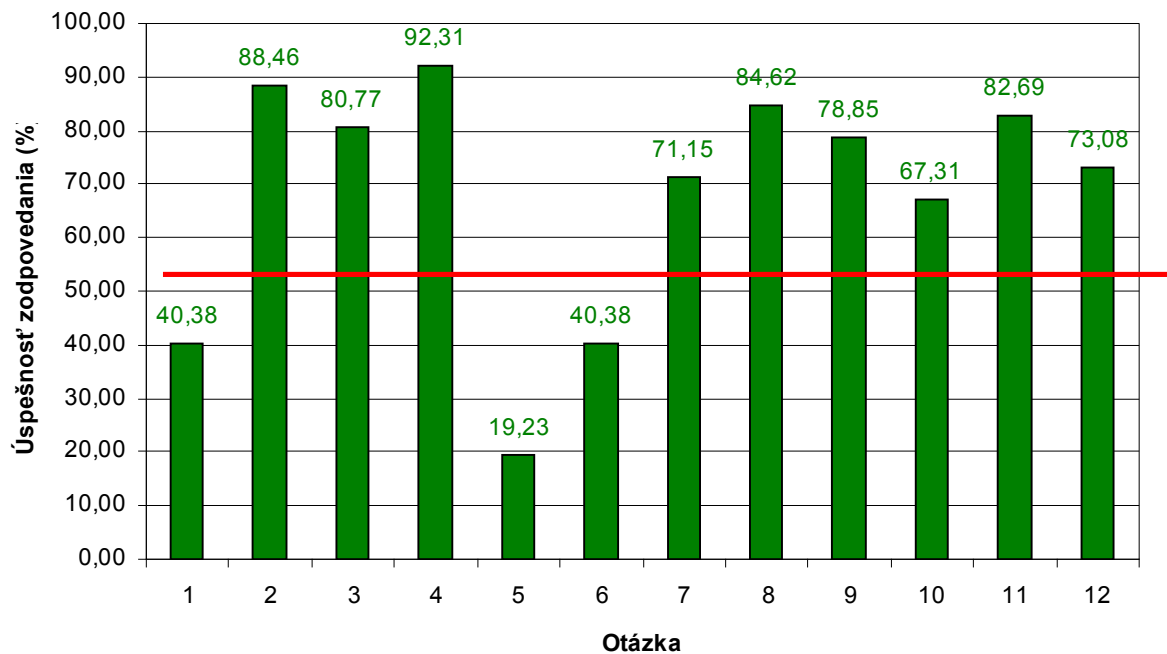


Chart 7.1 – Identification of areas with insufficient levels of knowledge  
(success rate (%) - question)

The next step was to prepare a probability histogram of correct answers from one to twelve (from the overall number of questions), which clearly showed that the largest group of respondents (over 55%) were those who had (knew) 8-10 correct answers, out of twelve. It has to be noted, though, that results may provide a slightly more positive picture about the knowledge of construction workers despite excluding apparently duplicate questionnaires. It was impossible to completely avoid occasional cheating as the survey was carried out only during work breaks. The survey results, nevertheless, may surely be considered as the collective consciousness, which is a very important result for construction, its quality and energy efficiency of buildings

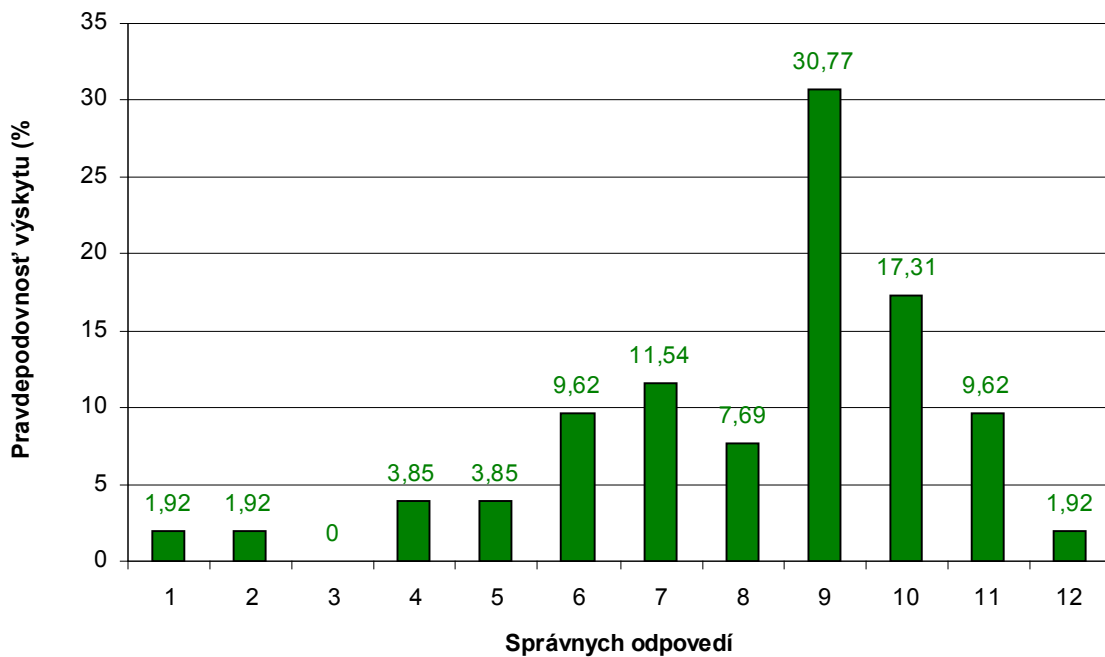


Chart 7.2 – The likelihood of correct answers in the survey (obtaining a certain score)(likelihood in % / correct answers)

## 7.1 Labour force qualifications and skills development

According to the Labour Force Survey of the Statistical Office of SR, there were a total number of about 233.7 thousand people employed in construction sector in Slovakia, in 2011, which split by education means that there were 2.7% of people with primary education, 48.0% workers with apprentice education, 3.4% of people with secondary apprentice education without state final examination (“maturita”), 6.0% graduates from apprentice school completed with state final examination, 2.3% were graduates from Grammar Schools, 28.5% people with completed secondary vocational education, 0.3% of higher specialised education and 8.8% were university graduates. It is clear from the survey that most people working in construction sector in 2011, were employees with apprentice and completed secondary vocational education, i.e. 76.5%

In academic year 2005/2006, the number of secondary building apprentice and vocational schools dropped by one third, compared to 2000. Further drop by 4 secondary apprentice schools was recorded in academic year 2006/2007, to a total number of 15. These apprentice schools prepared students not only for construction sector, but also for various other professions, be it car repair technicians, electricians, wood processing and furniture production specialists, mechanics, machine operators and technicians, or artistic craftsmen.

In 2006, only 1,598 students (52.0%) completed building and construction and related study programmes of the total number of graduates – 3,073; the rest



graduated from other professional courses. The situation worsened further in 2007, when only 2,697 students completed apprentice schools, and only 1,442 thereof completed construction-related fields of study (52.2%). Since 2008, due to changes in the educational system mentioned above, only category of graduates from specialised secondary schools exist, there are no graduates from apprentice schools, anymore. In academic year 2011/2012 2,446 students completed studies in construction-related vocational or apprentice education (two, three and four-years of education).

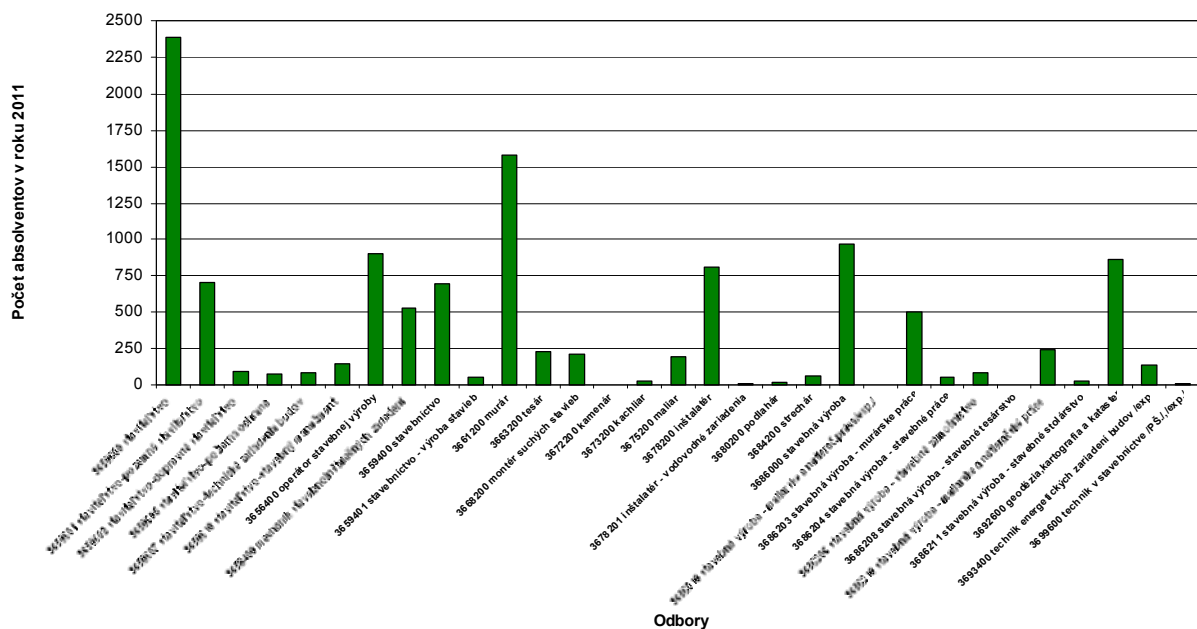


Chart 7.3 – The number of graduates from individual fields of study related to construction sector, in 2011

## 7.2 The needed skills and qualifications

Qualifications, knowledge and expertise of employees are now considered one of the key attributes for the further development in construction sector. Similarly to many other sectors, qualification is an important productivity growth factor also in construction sector, especially at managerial levels, but also in blue collar professions [49].

Efforts to increase the productivity and use of "smart" technologies and precise assembly of building elements that would minimize waste, complex structures composed of materials with different characteristics, increasingly sophisticated semi-products, but also requirements for tightness of passive buildings and interaction of their individual technical components, require a consistent coordination of all construction professions. Traditional crafts are being modified and shifted towards engineering. In certain cases, the difference between work of a craftsman and a technician who installed the equipment, almost disappeared. The fact that main

contractors often subcontract specialized construction companies to carry out specialized works, is very important.

In addition to traditional crafts, there is a variety of new specialisations and a change in the focus of traditional professions. Below is an overview of professions influenced by technical development in the past and recently, in Slovakia.

- **Bricklayer (shell construction)**

A universal profession of a bricklayer changed significantly in the recent years. The original profession involved also tillers, plaster-layers, assemblers of masonry systems and recently also assemblers of ETICS. In the process of the building shell construction, bricklayers work (along with other professions) on foundations, and vertical and horizontal structures. In terms of BUSS, bricklayers are one of the priority professions.

- **Installers/assemblers of concrete and steel structures**

A profession that split up from a traditional bricklayers with the development of assembled prefabricated monolithic structures. The installer/ assembler is much more dependent on a precisely predefined technology of installation. Assembly works may be used in foundations, walls and horizontal skeletal structures. In terms of BUSS, it is a moderately important profession.

- **Concrete and steel workers**

Professions that originate in bricklayers work after specialised and monolithic concrete structures developed. These include construction of formwork, reinforcement, concreting and welding. Obviously, it also includes the skills of carpenters, joiners, fitters, welders and concrete workers. In terms of BUSS, it is a moderately important profession.

- **Plasterers, dry mounting and wooden structures installers/assemblers**

This is an important group of professionals who have a significant role in building low-energy or passive houses. In terms of BUSS, it is one of the priority professions.

- **Machine and crane operator, scaffolding assembler**

These are supporting professions, which create conditions for fundamental building process. They directly affect the quality of construction works and its energy efficiency. From the perspective of BUSS, these are only important in order to coordinate technical support and other works in order to establish optimal conditions for other professions. In terms of BUSS, these are less important professions.

- **Insulators**

They are significantly involved in perimeter walls works. Laying individual insulation layers on vertical and horizontal structures of a building is always dependant on the overall composition and materials used in other layers, and their material characteristics. Thorough insulation work requires a comprehensive solution. In terms of BUSS, it is one of the priority professions.

- **Installer, installer of sanitary equipment**



They install water, sewage and gas distribution pipelines, hot water piping and sanitary equipment. This profession seriously affects the passive houses concept, which in particular means where pipes are located and how are insulated against heat loss, how these cross building structures, and the type of installed energy saving appliances. There are growing demands on the coordination of works. From the view of BUSS, it is one of the priority professions.

- **Plumber, heating engineer**

They install heating pipes, radiators and equipment for heating and hot water supply. Traditional approach changed as a result of application of requirements for thermal characteristics of a building, recuperation. In this sense, and taking into account the knowledge/principles of building physics, the requirements on time and spatial coordination of work, and measurement and control, are growing. In terms of BUSS, it is one of the priority professions.

- **Stonemason, chimney sweeper**

They represent the traditional professions related to heat supply from separate heat sources. The importance of the profession is strengthened by the use of renewable biomass energy. In terms of BUSS, these are moderately important professions.

- **Carpenter**

The traditional understanding of the profession is associated with roofs. Development of wooden houses expanded this profession to the entire shell construction. Carpenter is involved in making walls, roof and floors, in a building. The traditional knowledge about the basic material (wood) is enhanced by the requirements to be familiar with various composite structures, and their interaction. In terms of BUSS, it is one of the priority professions.

- **Roofer**

Roofer is working on the roof structure. Roof is made from roof tiles. In case of metal roofs, the work is replaced by tinsmith profession, and in the case of flat roofs (or roof coating) he is replaced by insulator. The traditional roof is changing; there are changes in composition, ventilation, auxiliary insulation, new materials are being added, the range of additional parts is growing, and demands on knowledge is increasing. In terms of BUSS, it is one of the priority professions.

- **Tinsmith**

They work on and install roof accessories, eaves, gutters and all metal roofing. Requirements on tinsmiths are similar to roofers as these professions are linked. In terms of BUSS, it is one of the priority professions.

- **Joiner**

Joiners today work rather as installers/assemblers of doors, windows and other objects filling in structures openings, be it from wood, metal or plastic materials. Joiner needs to know and respect the concept of interior space physics and needs to accurately install "his" products, especially when mounted on the perimeter wall of a building. In terms of BUSS, it is one of the priority professions.



- Locksmith

Locksmiths provide on-site works with metal. They are involved in installation of basic metal products (although these are usually made by installers). They are involved in assembly of additional metal structures. In terms of BUSS, it is a moderately important profession.

- Floor layers (floorers)

In fact, this profession is often divided into sub-specialization depending on material and technology. The key fact is that due to the energy requirements for passive houses and their heating, the right choice of materials and proper construction of the floor is often of key importance. In terms of BUSS, it is a moderately important profession.

- Painters, wall paper layers

The final look of a building usually depends on their work. It appears that their work cannot anyhow change the structural conditions of a building. Selection and application of finish layer, however, may change the diffusion resistance of a building structure. In terms of BUSS, they are moderately important professions.

- Bricklayer in associated building production

Currently, it covers in particular ETICS layers carrying out complete insulation works, including the final finish. Repair and restoration of historic buildings is a separate specialisation. In terms BUSS, it is one of the priority professions.

- Heavy current electrician

The work of an electrician is becoming increasingly difficult due to the requirements for building and physical properties of walls, especially in the sandwich structures. Minimizing the energy demand, new ways of lighting, location and selection of lights are new challenges for this profession. In terms of BUSS, it is a moderately important profession.

- Electrician of light current wiring

Efficient operation of a building is only possible through a smart regulation. On the market, there are more and more complex control systems available. These (and other) systems are installed by a light current wiring electrician. The profession requires high expertise and a narrow specialization. In terms of BUSS, it is a moderately important profession.

- HVAC installers

The job of the HVAC installer includes fitting, installation and cleaning of air distribution systems and recuperative units. Ventilation also requires attention of all brick and installing professions related to transits between construction structures and provide space for wiring and vents. Coordination with other plumbing professionals is important. In terms of BUSS, it is one of the priority professions.

- Installation of additional equipment



This profession includes installation of specialized equipment such as pumps, compressors and transport equipment (elevators and escalators). Each of these specializations is supported by concrete application and installation conditions of products to be permanently used in a buildings. In terms of BUSS, these are less important professions.

Generally, manual skills of employees in the Slovak construction sector are considered to be very good. Professional quality of Slovak workers is well perceived abroad, as well. The situation is significantly worse in work ethics of blue-collar professions. This problem is solved simply by the market itself.

While in 2007 and 2008 - during Slovak construction boom - there was lack of almost all professions, nowadays - due to the ongoing global crisis - there is a significant downsizing in the number of employees, especially in blue-collar occupations. Labour mobility used to be one of the weaknesses of the Slovak construction in the past, nowadays, however, there is a surplus of workers at the labour market and no mobility issues. Low productivity of labour in the construction sector, though, remains to be a weakness. Development trends of labour force potential imply that a high qualification and professional qualities, knowledge and skills are crucial for competitiveness and further development of the Slovak construction.

In order to estimate the number of employees in various professions, training courses and additional training to improve skills and qualifications, the following extrapolation of construction sector statistical data of in Slovakia for 2011 was prepared. The construction production in Slovakia in 2011 amounted €5.653 billion; thereof residential buildings were €1.187 billion, and non-residential buildings amounted €2.555 billion. Project focus (energy demand reduction) is neglected in civil constructions and other works. The average annual productivity was €31,571 per employee in the construction sector, in 2011. Based on these data, the number of workers needed to work on certain building structures can be estimated, knowing shares of these in different types of constructions/buildings.

*Chart 7.1 – Price share of structures on the baseline value*

Nr.	Construction	Residential buildings		Non-residential buildings (%)			
				Administrative (50%)		Warehouses (50%)	
		RU *(%)	Financial volume (bill. €)	RU (%)	Financial volume (bill. €)	RU (%)	Financial capacity (bill. €)
1	Foundations, including groundwork	5.00	0.059	8.00	0.102	12.00	0.153
2	Vertical structures	18.00	0.214	17.00	0.217	29.00	0.37
3	Ceilings	8.00	0.095	9.00	0.115	9.00	0.115
4	Staircases	3.00	0.036	3.00	0.038	1.00	0.013
5	Roofing without tiles	5.00	0.059	7.00	0.089	11.00	0.141
6	Roof tiles	2.00	0.024	2.00	0.026	3.00	0.038
7	Tinsmith structures	1.00	0.012	1.00	0.013	1.00	0.013
8	Exterior surfaces	3.00	0.036	3.00	0.038	3.00	0.038

9	Interior surfaces	6.00	0.071	7.00	0.089	6.00	0.077
10	Interior ceramic tiles	1.50	0.018	2.00	0.026	-	-
11	Doors (+gate)	2.50	0.03	3.00	0.038	4.00	0.051
12	Windows	5.00	0.059	5.00	0.064	4.00	0.051
13	Floor surfaces	3.00	0.036	3.00	0.038	5.00	0.064
14	Heating	5.00	0.059	4.00	0.051	-	-
15	Electrical installations	5.00	0.059	6.00	0.077	5.00	0.064
16	Lightning conductor	1.00	0.012	1.00	0.013	1.00	0.013
17	Interior water piping	3.00	0.036	3.00	0.038	-	-
18	Interior sewage piping	3.00	0.036	3.00	0.038	-	-
19	Interior gas piping	1.50	0.018	1.00	0.013	-	-
20	Elevators	2.00	0.024	1.00	0.013	-	-
21	Other	4.50	0.053	6.00	0.077	6.00	0.077
22	Hot water production	2.00	0.024	2.00	0.026	-	-
23	Kitchen	2.00	0.024	-	-	-	-
24	Interior sanitary facilities, including toilets	4.00	0.047	3.00	0.038	-	-
25	Bathroom unit exc. piping	4.00	0.047	-	-	-	-
Total		100.00	1,187	100.00	1.2775	100.00	1.2775
				1.2775		1.2775	

\*Transl. note: RU – budgetary indicator

Chart 7.2 – Estimated number of workers working on structures in land construction

Serial Nr.	Title of construction	Estimated nr. of workers
1	Foundations including groundwork	9,950
2	Vertical structures	25,370
3	Ceilings	10,300
4	Staircases	2,760
5	Roofing without tiles	9,150
6	Roof tiles	2,790
7	Tinsmith structures	1,200
8	Exterior surfaces	3,550
9	Interior surfaces	7,510
10	Interior ceramic tiles	1,390
11	Doors (+gate)	3,770
12	Windows	5,510
13	Floor surfaces	4,370
14	Heating	3,480
15	Electrical installations	6,340
16	Lightning conductor	1,200
17	Interior water piping	2,340
18	Interior sewage piping	2,340
19	Interior gas distribution	980
20	Elevators	1,170
21	Other	6,560
22	Hot water production	1,580
23	Kitchen equipment	760
24	Interior sanitary facilities, including toilets	2,690
25	Bathroom unit excl. piping	1,490
<b>Overall nr. of workers (in building construction)</b>		<b>11,8550</b>

EkoFond and the Slovak Chamber of Tradesmen prepared labour market needs analysis and analysis of needs of secondary vocational schools, based on answers from questionnaires and personal interviews with students, teachers and SPP alliance partners.

Results of the analysis revealed shortage of skilled workers in gas industry, and a fact that existing secondary vocational schools are not able to adequately prepare and train students to perform works needed at the moment and in future in the field of energy, particularly in gas industry.

Based on the results of the analysis EkoFond together with the Secondary Electro-technical School in Trnava, Secondary Building School in Banská Bystrica (now Combined Secondary School in Kremnička, Banská Bystrica) and Secondary Vocational School in Prešov, developed 4-year course of study "Technician of Energy equipment in buildings", completed with a state final examination, which was launched in the academic year 2010/2011. It is accredited by the Ministry of Education of the SR as a technical field of study, under the auspices of the National Institute of Vocational Training.

The course is designed so that students acquire good theoretical knowledge and practical skills on different types of key construction and electro-technical works related to installation, maintenance and repair of energy equipment in buildings using natural gas and renewable energy sources, in particular those installed in family houses, blocks of apartments and small workshops.

A partnership between schools involved in the project and SPP alliance partners operating in Trnava, Banská Bystrica and Prešov regions is an important task when a field of study is being introduced, in order to establish close cooperation in teaching and training of students, enhance qualifications of teachers, and creating new jobs for graduates from this field of study.

EkoFond, in collaboration with secondary vocational schools supported modernisation of workshops and provided material support and equipment for three training workshops. Another area of support are new textbooks which need to be developed for teaching of specialised subjects in the new field of study.

EkoFond initiated the project, and plays the role of a catalyst - trying to start cooperation of schools and entities closely linked to the field of study, and to ensure its smooth introduction and sustainability.

It is a unique project as it is based on the current needs analysis, it is addressing the issue comprehensively (a field of study at a secondary school, workshops, training of teachers, textbooks), and, at the same time, EkoFond specifically involved a large number of entities that may contribute to its long-term sustainability (cooperation of companies and schools, state educational institutions).

Promotion and communication of the field of study is an integral part of the project. Pilot schools actively communicate with primary schools within their regions, meet with parents, career counsellors, talk to regional media and organize Open Days, advertise the field of study on their website and on regional level (regional authority is



the founder of these schools). EkoFond support all these activities, establishing conditions for them to succeed.

Not a single or at least a prevailing opinion was revealed in the survey by construction companies (employers) on sufficient number of qualified workers for jobs leading to reduction in energy consumption.

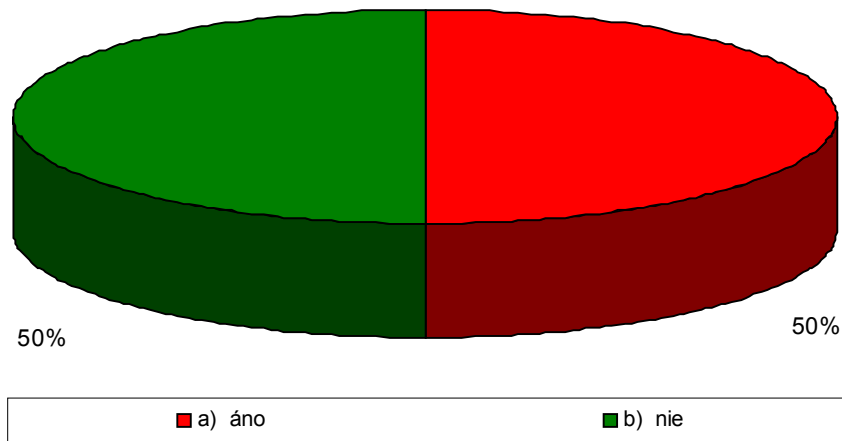


Chart 7.4 – Companies feel the shortage of skilled workers in jobs leading to reduction in energy consumption (yes / no)

Following their experience with the existing quality of work, employers suggest that app. 31% of their employees and 43% of their subcontractors’ employees will need additional training. As a more positive evaluation was given to own workers (all respondents) than those of subcontractors, it may be estimated that approximately 40% workers will need additional training.

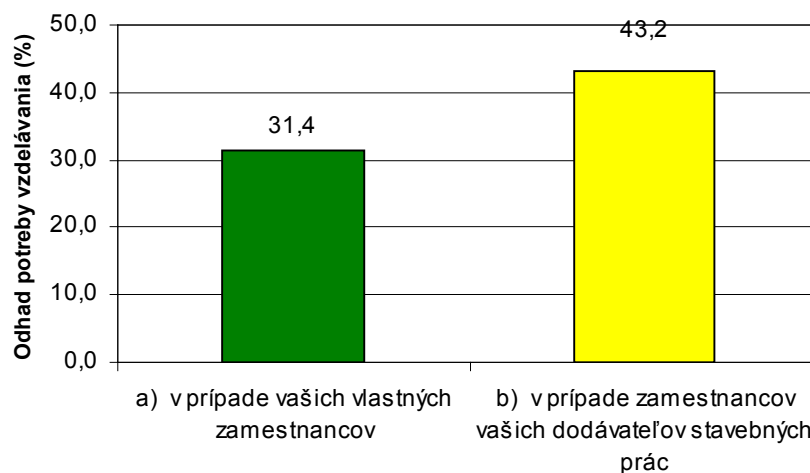


Chart 7.5 – Percentage of employees who need additional training as estimated by employers (a – own employees, b- employees of the subcontractors) / Training needs estimate



## 8. BARRIERS

In order to identify the obstacles / barriers and formulate findings, i.e. strategies for the next phase of the BUSS project, barriers are divided into two areas. The first barrier is related to primary education, education and training. The second area are the current construction market barriers representing the current macro-economic, social and demographic situation, as these all create the construction industry environment. The aim was to unify various opinions of experts, experience of authors and those of members of the National Qualification Platforms, and identify areas where reserves exist and adoption of certain measures may improve the overall situation in Slovakia in order to meet the targets for 2020.

### Weaknesses of the Slovak construction sector:

- decreasing number of skilled craftsmen, specialised workers
- low numbers of students at secondary vocational schools and low qualifications of their graduates
- insufficient language skills of specialised workers
- insufficient language skills of graduates (secondary vocational schools and Universities)
- low prestige of construction sector in the society related to low attractiveness of the work environment
- insufficient work productivity
- low payment discipline
- constructions completion deadlines, different quality of work of small and medium-sized companies
- insufficient quality control and work performance
- construction companies marketing
- stagnation of R&D and innovation activities
- unfavourable demographic development
- unemployment rate with significant regional disparities and uneven supply of jobs
- high level of long-term unemployment rate
- low standard of living of population due to regional discrepancies
- low impact of active labour market policies to promote the employability of unemployed and groups at risk of social exclusion
- high rate of unemployment among people with low education
- insufficient re-training, which is incorrectly targeted and inefficient
- insufficient links between educational system and labour market
- underdeveloped systems for forecasting changes in labour market qualification needs
- insufficiently linked active vocational education and training with preparation for knowledge-based society and its needs

- no comprehensive system of continuing education
- no model ensuring for participation of social partners in financing of vocational training financing
- graduates and high-risk groups face problems in finding a job
- unsatisfactory structure of unemployed in terms of innovative sectoral needs
- low support of small sole traders and craftsmen development on the side of the Government

### The main problems in the development of a new field of study and accreditation are:

- high number of secondary vocational schools lacking students, unclear development strategy only spontaneously reflecting real needs
- insufficient recognition of social status of graduates from secondary vocational schools
- poor and unclear requirements for technology changes in the coming years
- schools are closed - not used to actively participate in a dialogue and search for partners in order to target their courses more effectively, or to improve training and material equipment in schools, or to gain other social partners
- schools are passive - no professionals nor capacities to raise funds from sources other than from its founder
- inflexible approach of some school principals – they are teachers rather than managers
- teachers - low motivation to a change
- low engagement of schools in professional organizations
- employers - potential partners for schools - not used to proactively address partnerships with schools, busy, and are difficult to communicate with
- legislative obstacles - too many different methods and regulations, norms and procedures needed to be observed when preparing and accrediting a new programme
- apathy on the side of the Ministry of Education
- National Institute of Vocational Training is not flexible
- lack of recent textbooks on technical subjects
- inability to obtain funding for textbooks while a field of study is in pilot (experimental) testing
- lack of financial resources
- Vocational Education and Training Development Fund is not functioning
- allocation of core competencies in designing and implementing vocational education and training strategies - can regions correctly assess the overall needs of the society?

But ...after the initial impulse from EkoFond, stakeholders were actively involved in the project – and are still working.

It was found out that construction companies (employers) organise regular training for their employees, with particular attention to three areas:

- installations and insulations
- new construction processes and techniques
- materials used to increase the energy performance of buildings

The survey showed that more than a third of all workers attend training in all the above areas at least once a year, another quarter or third are trained when new equipment is introduced. We believe, though, that simple promotion lectures and training on the use of specific construction products where explanation of link between wrong application/installation and consequences is not tacked, are also considered training and courses.

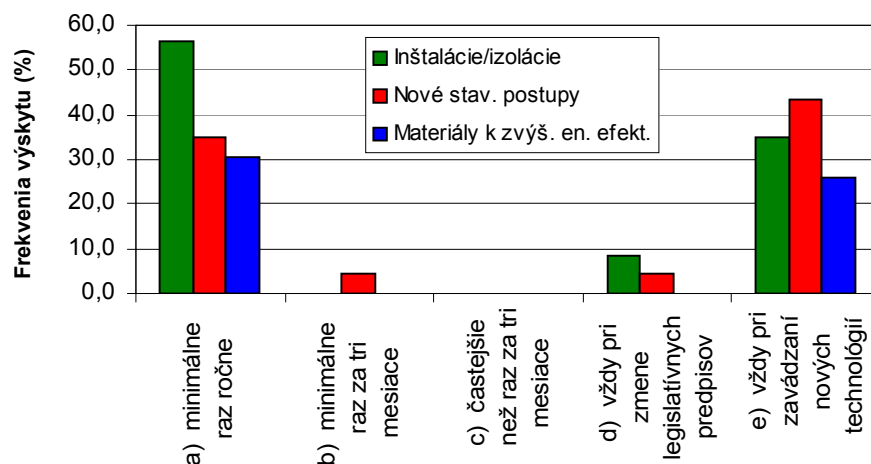


Chart 8.1 – How often attend your employees training / courses in the area of ...?

(a- at least once in a year, b – at least once every three months, c – more often than once every three months, d – always when legislative/regulations is changed, e – always when introducing new technologies)

“Y” axis – frequency / installations/insulations / new construction technologies / materials to increase energy performance )

## 9 CONCLUSIONS

A survey in construction companies provided, among others, valuable information for the design and implementation of VET courses, training and lifelong learning. Currently, construction companies in Slovakia send their employees for training / courses almost exclusively during working hours. In the vast majority of cases, employers are willing to release workers from work for a course for one work day. Shorter courses (1-4 hours) are accepted by 9% of employers, and vice versa longer courses (11-20 hours) are accepted only by 5% employers.

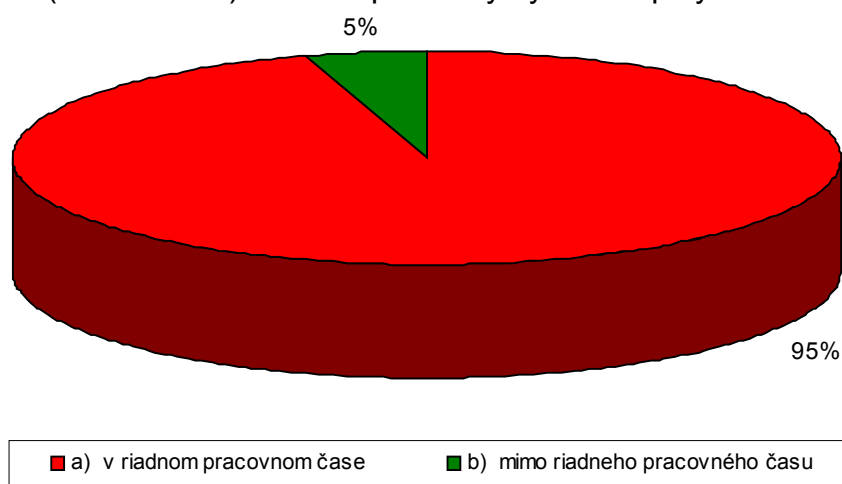


Chart 9.1 – Current situation in training courses attended by workers (a – in normal working hours, b – other than at work time)

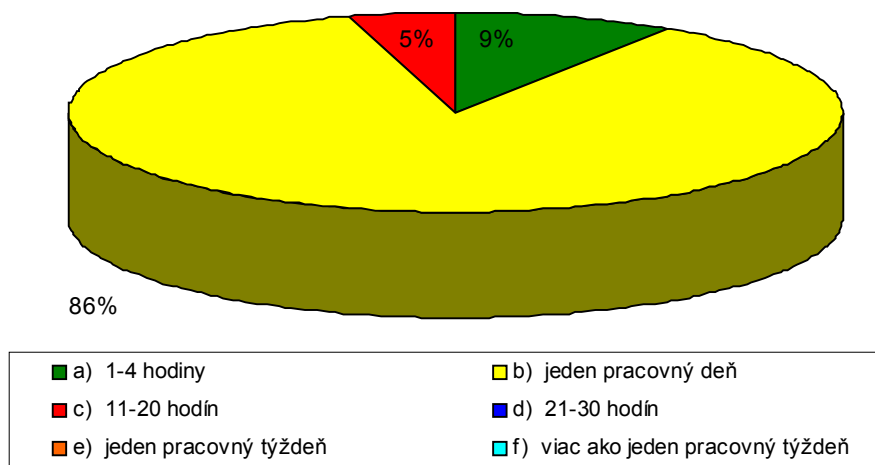


Chart 9.2 – For how long are employers willing to release workers from to attend a training course (a- 1-4hours, b- 1 working day, c- 11-20hours, d- 21-30hoursh, e- 1 working week, f- longer than 1 working week)

Stimuli and motivation tools are an important aspect in terms of additional training for construction workers, in order to increase the interest of companies to send workers for training. The largest interest (45%) was to simplify contract awarding procedures, which can be done by legislative changes defining workers qualifications requirements. As for other motivation tools, interest was identified in co-funding (state and employees) in education and tax reliefs.

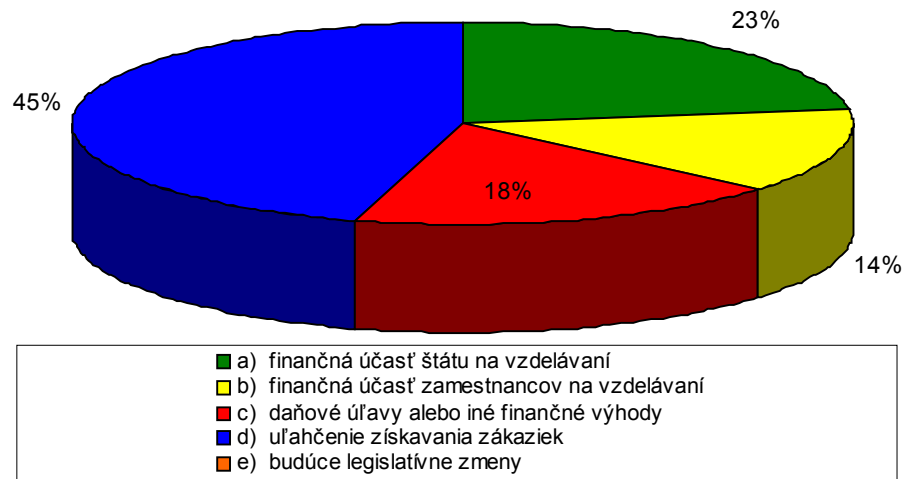


Chart 9.3 – Motivation tools to increase interest of companies in sending workers to training  
(a- financial participation of state in education, b- financial participation of employers in education, c-tax reliefs and other financial benefits, d- simplified contract award procedures, e- future changes in legislation)

Expectations of construction companies from additional training are an important aspect. The question focused on the examination and the certificate. While bearing the costs of training, two-thirds of employers expect the outcome to be a certificate on course completion issued on the name of the employer. It may be also viewed as a necessity, i.e a team of workers meet the minimum knowledge/skills and a certificate is issued. Almost a quarter of respondents preferred a final examination of knowledge and skills that would quantitatively assess knowledge and skills.

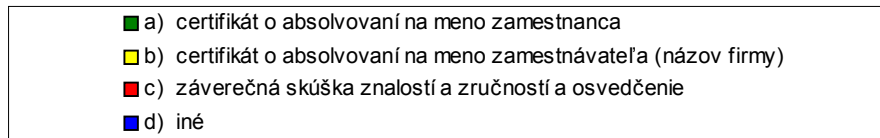
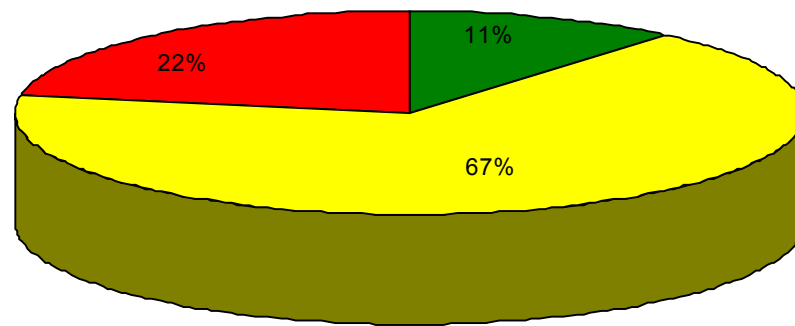


Chart 9.4 What outcomes companies expect from completion of the course?  
(a-certification of attendance with the name of the employee, b-certification of attendance with the name of the employer, c-final examination of skills and knowledge, d-other)

The real benefit of training of the workers see 53% the companies, especially in improving the quality of performed work. Almost the same expectations of benefits (about 20%) were found in a thorough understanding of procedures and regulations observance (with an emphasis on the aforementioned causal relationship between defects and their consequences at work) and in gaining new information (to understand the latest findings from research and development).

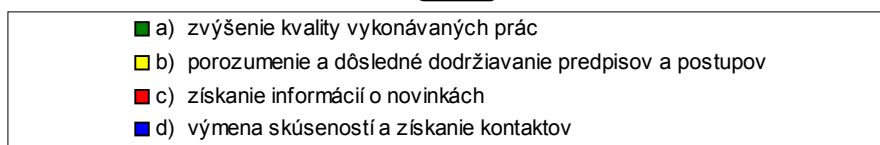
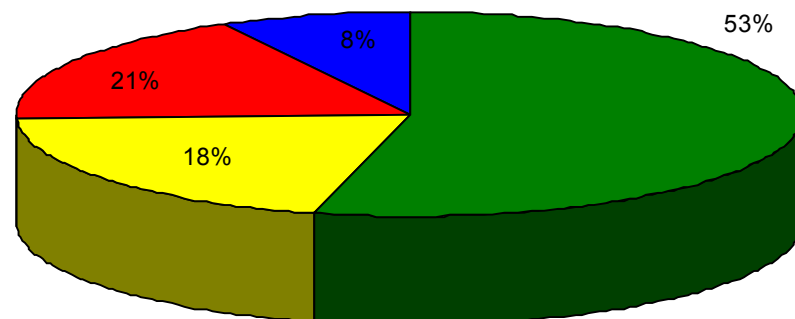


Chart 9.5 – What benefits companies expect from training  
(a – improving the quality of works, b – understand and strictly observe regulations and procedures, c – obtaining the latest information, d – exchange of experience and new contacts )

Taking into account the findings of the survey in construction companies, it is necessary to further consider all the barriers in both areas - education and construction - and to design a strategy that will eliminate these, and, through lifelong

learning, help to meet the 2020 targets for improving energy performance in buildings.

We expect that solutions proposed later within the project, should correspond with the construction companies survey results in terms of continuation and focus of training programmes, motivation models.

It needs to be emphasised that existing manual skills of workers in the construction industry in Slovakia are good. What seems to be especially problematic, is the low observance of technology procedures, lack of work organization reflected in productivity, which result in the low quality of construction work, or, in other words, the potential of the latest building products and the installed equipment are not used. It is therefore extremely important to raise awareness and explain the broader context of non-observance of technological processes and reduced quality of work.

As already shown, we expect at least 40% of workers involved in land constructions will need a training /courses or other forms of professional development in the following years.



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- [51] Návrh Aktualizácie koncepcie energetickej hospodárnosti budov do roku 2010 s výhľadom do roku 2020, prijatý uznesením Vlády SR č. 336/2012 zo 6. júla 2012

## 11 DICTIONARY/GLOSSARY

### Secondary Vocational School

Secondary vocational school is internally differentiated secondary school, which prepares students in at least two years and a maximum five-year educational programme in the specific field of study. It provides theoretical knowledge and practical training for students. If a secondary school only teaches theoretical subjects, students receive practical training in a training centre or in practical training workshop.

*Note: According to Act No. 245/2008, a joint secondary school, secondary apprentice school and an apprentice school established under the current law are considered secondary vocational schools. Therefore, all information about joint secondary schools, secondary apprentice school and an apprentice school are included into the data on secondary vocational schools.*

<http://portal.statistics.sk/showdoc.do?docid=17817>

### Training

Vocational education and training in a secondary vocational school further develops the knowledge, skills and abilities acquired in previous studies and provide knowledge, skills and abilities necessary for job and specialised activities.

### Practical training centre

The centre is responsible for teaching and training based on curricula, and it cooperates with the respective secondary vocational school providing the theoretical knowledge.

### Lifelong Learning

Lifelong learning comprises activities taken during the whole life aimed to improve and enhance knowledge, skills and abilities. Lifelong learning, being a fundamental principle of education applied within the educational system in Slovakia, comprise education and training following the levels of education achieved in schools.

### Education in schools

School education (also referred to with the term "formal education") refers to education in kindergartens, primary schools, secondary vocational schools, grammar schools, conservatories, schools for children and pupils with special educational needs and learning, and in accredited programs at universities. Certain level of education is acquired after successfully completing a school education.



### Further Education

Further education (also referred to with the term "informal education") is education in educational institutions for further education, which follows the school education and allows to obtain receive partial or full qualification or to complement, renew, extend or enhance skills acquired in school education or satisfy interests and gain abilities to participate in the civil society. No level of education is acquired after successful completion of further education. Further education also comprises continuing education, which is the process of deepening, broadening, enhancing and improving knowledge, skills and competencies that are a prerequisite for specialised activities in the selected work position.

### Other Education

Other education (also referred to with the term "informal learning") is lifelong acquisition of skills from everyday experience, surroundings, contacts. It is learning outside educational institutions, taking place in family, at work or in free time and may not be intentional nor noticed.

### Career counselling

A comprehensive advisory services focusing on various disciplines. It means help to individuals of any age in deciding on issues of education and training, employment options and career development at any phase of their lives.

### Further Education Counselling Centre

Centre, which provides information and counselling services to individuals of all ages, promotes and supports values of continuing education, provides the necessary support for effective participation in education and helps to achieve the best results in education and professional life.

### Training program

Training programme is a comprehensive program for defining and verifying the accomplishment of objectives, content, methods and forms of educational process, its evaluation, organization and management; curriculum training programme may be divided into modules.

Educational programmes at secondary vocational schools are mainly focused on professions, occupations and specialised activities in the economy, health care, public administration, culture, arts and other areas, and may also prepare students for further studies.

### Qualification Standard

Summary of knowledge, skills and abilities required to acquire partial and full qualification.



### Classification of Occupations

Classifies occupations to classes, particularly according to the nature of work, its complexity and responsibilities, and the level of qualification required for a particular work. It is designed according to ISCO - 88, adopted by the International Labour Organization and allows international comparison. The subject of the classification is employment, i.e. specific work activity performed by an employee, that is his/her main source of income. Following the Commission Regulation (EC) 1022/2009, a revised classification ISCO-08 will be used in future, based on the type of work and skills.

### National standard of occupations

A comprehensive description of the current requirements of employers for specialised skills and experience needed to perform specific jobs.

### People with low qualification

People with qualification/low skills are considered those qualified at ISCED level 0, 1 and 2.



## NATIONAL QUALIFICATION PLATFORM

### 1<sup>st</sup> LEVEL - CONSORTIUM

ZSPS

SIEA

UVS

EF

TSUS

### 2<sup>nd</sup> LEVEL – NQP MEMBERS AND SUPPORTERS

#### STATE EXECUTIVE:

Ministry of Transport, Construction and  
Regional Development SR

Ministry of Education, Science,  
Research and Sport SR

Ministry of Labour, Social Affairs and  
Family SR

Ministry of Economy SR

#### PROFESSIONAL ASSOCIATIONS AND ORGANISATIONS:

Association for thermal insulation of  
buildings (ZPZB);

Cech strechárov (CSS);

Association SLOVENERGOokno;

Slovak Association for Refrigeration and  
Air Conditioning Engineers (SZCHAKT);

Slovak Association of Photovoltaic Industry  
(SAPI);

OZÓN XXI, o.z.;

Slovak Association of Construction  
Engineers (SZSI);

Slovak Council for Green Buildings  
(SKGBC);

Slovak Institute of Technical  
Standardisation (SÚTN);

Institute of Economics and Civil  
Engineering, Ltd. (ÚSE);

Association of Flat Owners Community  
(ZSVB)

Eurostav (media partner)

#### EDUCATIONAL INSTITUTIONS:

National Lifelong Learning Institute  
(NÚCZV);

State Institute of Vocational Education  
(ŠIOV);

Faculty of Civil Engineering within the  
Slovak Technical University (STU)  
in Bratislava (SvF STUBA);

Faculty of Civil Engineering within  
Technical University (TU) in Košice  
(SvF TUKE);

Secondary vocational school at  
Ivánska cesta in Bratislava (SOŠ BA);  
Secondary vocational building school in  
Žilina (SOŠS ZA);

Joint building school, Banská Bystrica  
(SOŠS BB);

Secondary vocational school, Nové  
Zámky (SOŠ NZ);

Secondary Electro-technical vocational  
school, Trnava (SOŠE TT);

## AFFILIATION OF THE NATIONAL QUALIFICATION PLATFORM MEMBERSTO WORKING GROUPS

## 1st LEVEL - CONSORTIUM

ZSPS

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UVS

EF

TSUS

## WORKING GROUPS

**WG1:**

- Ministry of Transport, Construction and Regional Development SR  
(Ján Černák)  
[www.telecom.gov.sk](http://www.telecom.gov.sk)
- SLOENERGOokno  
(Peter Kuruc)  
[www.sloenergookno.sk](http://www.sloenergookno.sk)
- ZPZB  
(Anton Novotný)  
[www.zpzb.sk](http://www.zpzb.sk)
- EUROSTAV  
(Darina Lalíková)  
[www.vydavatelstvoeurostav.sk](http://www.vydavatelstvoeurostav.sk)

**WG2:**

- Ministry of Transport, Construction and Regional Development SR  
(Ján Černák)  
[www.telecom.gov.sk](http://www.telecom.gov.sk)
- CSS  
(Jana Hodúrová)  
[www.cechstrecharov.sk](http://www.cechstrecharov.sk)
- OZÓN XXI, o.z.  
(Ivan Satvár)  
[www.vsb-po.sk](http://www.vsb-po.sk)
- SKGBC  
(Ladislav Piršel)  
[www.skgbc.org](http://www.skgbc.org)
- ZPZB  
(Anton Novotný)  
[www.zpzb.sk](http://www.zpzb.sk)
- NÚCZV  
(Zuzana Štrbiková)  
[www.nuczv.sk](http://www.nuczv.sk)
- SOŠE Trnava  
(Jozef Krivošík)  
[www.sose-trnava.edu.sk](http://www.sose-trnava.edu.sk)

**WG3:**

- Ministry of Transport, Construction and Regional Development SR  
(Ján Černák)  
[www.telecom.gov.sk](http://www.telecom.gov.sk)
- MSVVS SR  
(Jaroslav Juriga)  
[www.minedu.sk](http://www.minedu.sk)
- CSS  
(Jana Hodúrová)  
[www.cechstrecharov.sk](http://www.cechstrecharov.sk)
- ÚSE  
(Juraj Nagy)  
[www.use-sk.sk](http://www.use-sk.sk)
- SKGBC  
(Ladislav Piršel, Marek Kremeň)  
[www.skgbc.org](http://www.skgbc.org)
- NÚCZV  
(Zuzana Štrbiková)  
[www.nuczv.sk](http://www.nuczv.sk)
- ŠIOV  
(Alena Galanová)  
[www.siov.sk](http://www.siov.sk)
- SvF TUKE  
(Peter Mesároš)  
[www.svf.tuke.sk](http://www.svf.tuke.sk)
- SOŠS ZA  
(Josef Ilčík)  
[www.sosstavebna.sk](http://www.sosstavebna.sk)
- SOŠ BA  
(Lubomír Koval'  
[www.sou.sk](http://www.sou.sk)
- SOŠS BB  
(Milan Ponický)  
[www.stavebnabb.eu](http://www.stavebnabb.eu)
- SOŠ NZ  
(Štefan Száraz)  
[www.sosstavnz.edupage.org](http://www.sosstavnz.edupage.org)
- SOŠT PO

**WG4:**

- Ministry of Transport, Construction and Regional Development SR  
(Ján Černák)  
[www.telecom.gov.sk](http://www.telecom.gov.sk)
- SLOENERGOokno  
(Pavol Panáček)  
[www.sloenergookno.sk](http://www.sloenergookno.sk)
- SAPI  
(Ján Lacko)  
[www.sapi.sk](http://www.sapi.sk)
- ÚSE  
(Juraj Nagy)  
[www.use-sk.sk](http://www.use-sk.sk)
- SvF TUKE  
(Danica Košičanová)  
[www.svf.tuke.sk](http://www.svf.tuke.sk)

**WG5:**

- Ministry of Transport, Construction and Regional Development SR  
(Ján Černák)  
[www.telecom.gov.sk](http://www.telecom.gov.sk)
- CSS  
(Jana Hodúrová)  
[www.cechstrecharov.sk](http://www.cechstrecharov.sk)
- ÚSE  
(Juraj Nagy)  
[www.use-sk.sk](http://www.use-sk.sk)
- SKGBC  
(Ladislav Piršel, Marek Kremeň)  
[www.skgbc.org](http://www.skgbc.org)
- SZCHKT  
(Peter Tomlein)  
[www.szchkt.org](http://www.szchkt.org)
- SÚTN  
(Tólgýessyová)  
[www.sutn.sk](http://www.sutn.sk)
- ZSVB  
(Petra Jurčáková, Júlia Vavreková)  
[www.zsvb.sk](http://www.zsvb.sk)
- ZPZB  
(Anton Novotný)  
[www.zpzb.sk](http://www.zpzb.sk)
- EUROSTAV  
(Darina Lalíková)  
[www.vydavatelstvoeurostav.sk](http://www.vydavatelstvoeurostav.sk)
- SOŠ BA  
(Lubomír Koval'  
[www.sou.sk](http://www.sou.sk)



Dear Partner,

thank you for your willingness to fill in this short survey and provide us with your valuable know-how, experience and opinions on education and acquisition of knowledge by workers carrying out construction and assembly work, which directly or indirectly influences the quality of the building structure or functionality of the system and so they affect the energy efficiency of a building. In your answers to the questions, please use preferably the default answers which will appear in the scroll down window. When needed, please add also brief comments and suggestions.

---

**1. In the previous year, did you notice a change in requirements for quality of constructions?**

- a. yes, principally
- b. no

**2. Have you experienced in any of your projects situations when during implementation or after delivery a poor quality of work was revealed directly related to meeting the requirements for heat protection and energy savings?**

- a. no
- b. yes

If yes, please indicate some of the shortcomings.....  
.....  
.....

**3. Have you experienced in any of your projects situations when the project changed during its implementation in order to improve the energy efficiency of building?**

- a. yes, it was a smaller change
- b. yes, the changes were principal
- c. no

If yes, please indicate the changes:.....

**4. What is the decisive parameter when choosing a supplier (rank the answers from the most important (1) to the least important parameter (5)):**

- a. price
- b. deadline
- c. references
- d. previous experience
- e. qualifications of employees

**5. Do you verify the quality of the construction, e.g. on a reference sample/section?**

- a. yes
- b. no

**6. In 2-3 years, do you expect a change in requirements on used technologies and the associated reorientation of professions in the construction industry?**

- a. yes
- b. no

If yes, do you know which?.....  
.....  
.....

**7. According to you, which new professions, in connection with growing demands on energy efficiency of buildings, should be included in the educational system?**

.....  
.....  
.....

8. **Would you be interested, to a certain degree, in financing the education of workers in the construction industry in order to increase their qualifications related to new activities in the construction industry, or under other conditions?**

- a. yes
- b. no
- c. yes, under the condition that:

.....

.....

Dear Partner,

thank you for your willingness to fill in this short survey and provide us with your valuable know-how, experience and opinions on education and acquisition of knowledge by workers carrying out construction and assembly work, which directly or indirectly influence the quality of building structure or functionality of the system, affecting thus the energy efficiency of a building. In your answers to the questions, please use preferably the default answers which will appear in the scroll down window. When needed, please add also brief comments and proposals.

**1. How many graduates completed fields of study in construction (which you offer) in the school year 2011/2012?**

- a. without graduation = .....(for Secondary vocational schools)
- b. with graduation = ..... (for Secondary vocational schools)
- c. by state exam = ..... .(for universities)

**2. What is the ratio of theoretical and practical knowledge you offer in individual subjects focused on construction?**

- a. Theoretical knowledge prevails over the practical one
- b. Practical knowledge prevails over the theoretical one
- c. We try to offer a balance of theoretical and practical knowledge

**3. Do the scope and focus of the construction fields of study you offer include activities supporting increase of energy efficiency in buildings?**

- a. yes
- b. partially
- c. not yet, but we plan a change in the fields of study to focus on activities influencing energy effectiveness in building

If yes, please indicate in which fields of study:.....

.....

If you plan a change, please indicate in which fields of study.....

.....

**4. Have you noticed an increased interest of employers in fields of study related to energy savings in buildings?**

- a. yes
- b. no

If yes, please indicate in which fields of study:.....  
.....  
.....

**5. Have you noticed an increased interest of students in fields of study related to energy savings in buildings?**

- a. yes
- b. no

If yes, please indicate in which fields of study:.....  
.....  
.....

**6. Do you communicate with employers in the construction sector about the inclusion of new fields of study or the need to teach new skills of future employees?**

- a. yes, we try to adapt education to the changing needs of the market, however under the current legislative conditions it is not possible to respond immediately to the suggestions of employers because inclusion of a new field of study is a lengthy process
- b. yes, we already managed to include new fields of study based upon suggestions of employers
- c. no, because there is not enough interest from the side of employers

**7. Do you plan to widen the number of fields of study focused on construction in the horizon of the next 1-2 years?**

- a. no
- b. only in case of fundamental changes in the market demands
- c. only in case of fundamental changes in legislation

d. yes

If the answer is d), please indicate the fields of study.....

**8. Are you preparing a new education strategy, which you are planning to introduce but you experienced obstacles that prevent you from doing it?**

- a. no, we are not preparing any new education strategy
- b. yes, we are preparing a new education strategy and there are no fundamental obstacles that prevent its implementation
- c. yes, we are preparing a new education strategy, however there are obstacles that prevent us from introducing it

If yes, please indicate some fundamental obstacles.....

.....

.....

.....

**9. What conditions should be created to enable implementation of the new education strategy or methodologies?**

- a. Financial support from government
  - b. Financial participation of students in education
  - c. Better position of our student in the labour market
  - d. Involvement of experts from practice into the process of practical education of students
  - e. other.....
- .....
- .....

... Note.: In this question you can select more than one option.

**10. Do you know construction companies that deliberately organise increase of qualifications of their employees?**

a. yes

b. no

If yes, indicate which.....  
.....

Dear Partner, thank you for your willingness to fill in this short survey and provide us with your valuable know-how, experience and opinions on education and acquisition of knowledge by workers carrying out construction and assembly work, which directly or indirectly influences the quality of the building structure or functionality of the system and so they affect the energy efficiency of a building. In your answers to the questions, please use preferably the default answers, which will appear in the scroll down window. When needed, please add also brief comments and suggestions.

<b>Institution:</b>			
<b>Completed by (name, surname, function):</b>			
Question No.	Question	Possible answers / Answers	
		Possible answers / Answers	Comments / Explanation
1	How do you assess the current state of legislation with regard to a need for increase of energy efficiency in buildings? Please, indicate which areas should the amendments or new legislation address.		
2	Do there exist any requirements for qualification level of workers in the construction industry in any valid legal regulations in the competence of your department/institution? If yes, please indicate the regulation.		
3	Do there exist any requirements for education in "green professions" in any of the valid legal regulation in the competence of your department/institution? If the answer is "yes" or "it is planned", please indicate the regulation.		
4	Do you think that in accordance with the planned legislative changes until 2020 there will be a need to change the orientation of the professions in the construction industry? Or which new professions will be required?		
5	Are there in your branch of industry any legislative changes related to education of workers in the construction industry under preparation? If there is a new legal regulation, please indicate it.		
6	How do you assess the current scope and orientation of the offered fields of study and training courses in the construction industry? Please, also indicate, which fields of study are missing.		
7	Do you think that there are enough qualified workers in the construction industry performing their work in line with the requirements for increase of energy efficiency in buildings?		
8	Do you think that a financial support on the part of the state could lead to an increase of interest in vocational education?		

**By submitting this form you agree with the processing of your data in the project databases and internal databases of the Building Testing and Research Institute (TSÚS).**



Dear Partner, thank you for your willingness to fill in this short survey and provide us with your valuable know-how, experience and opinions on education and acquisition of knowledge by workers carrying out construction and assembly work, which directly or indirectly influences quality of the building structure or functionality of the system and so they affect the energy efficiency of a building. In your answers to the questions, please use preferably the default answers, which will appear in the scroll down window. When needed, please add also brief comments and suggestions.

Company / Contractor (name - voluntary):				
Completed by (name, surname, function):				
Question number	Question	Possible answers / Answers		
		Possible answers / Answers		Notes / Explanations
1	What is the share of activities, in per cent, that lead to energy savings in constructions from all services you provide?			
2	Please indicate what knowledge and skills are indispensable in construction workers from the viewpoint of increasing energy efficiency of buildings until 2020.			
3	How many employees carry out the following activities in your company?			
	a. roof insulation = ...			
	b. wall insulation = ...			
	c. installing windows, etc. = ...			
	d. installing thermal pumps = ...			
	e. installing solar collectors = ...			
	f. installing heating and cooling systems = ...			
	g. others (please specify) ... = ...			
4	Do you change the extent and contents of the activities that are carried out by your employees?			
5	What is the educational structure of your employees in %?			
	a. untrained = ...			
	b. trained = ...			
	c. vocational school without graduation = ...			
	d. vocational school with graduation = ...			
	e. advanced vocational education = ...			
	f. others = ...			
6	Do you experience a lack of skilled workers in professions linked with energy savings in buildings? If so, please specify.			
7	Do you have a training system for employees? If so, please specify the form of training, who trains your employees, and how do you choose employees to be trained.			
8	What is the frequency of the below mentioned trainings/courses attended by your employees?	Installations, insulations	Novel construction methods	Materials for better energy efficiency
	At least once a year:			
	At least once every three months:			
	More often than once a quarter:			
	After each change of legal regulations:			
	Always when new technologies are applied:			
9	If your employees attend trainings/courses, are these held during or outside the regular working hours?			
10	What is the overall duration of a training/course that you would be willing to send your employees to within the regular working hours?			
11	Which of the funding options would increase your interest in sending your employees to trainings/courses?			
12	What results do you expect from your employee after attending a training/course? Note: For this question, you can choose more than one option, or specify another answer.			
13	What should be the outcome of a completed training/course?			
14	What is the share, in per cent, of provided construction activities that are not carried out by your employees, but are subcontracted externally?			
15	Do you verify professional competences when choosing external subcontractors for given services, as for instance by requiring certificates of professional training or in another way?			

16	What new professions, in relation with the growing requirements on increasing energy efficiency of buildings, should be added to the educational systems?		
17	How do you rate the present extent and orientation of available study programmes and professional courses in the construction sector? Please specify any missing courses.		
18	Do you communicate with vocational schools or other training institutions concerning the possibility of adding new study programmes or the need of teaching new skills to your future employees (do you require a so-called "professional education" tailored to the needs of your company)?		
19	Please specify an estimate of the percentage share of employees who will need an additional training/education:		
	In case of your own employees:		
	In case of employees of your subcontractors of construction works:		

**By submitting this form, you give consent to process and analyze the information, as well as completing the database of the Build-up Skills Slovakia project and internal databases of Building Testing and Research Institute (TSÚS).**

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Dear Partner, thank you for your willingness to fill in this short survey and provide us with your valuable know-how, experience and opinions on education and acquisition of knowledge by workers carrying out construction and assembly work which directly or indirectly influences the quality of the building structure or functionality of the system and so they affect the energy efficiency of a building. In your answers to the questions, please use preferably the default answers which will appear in the scroll down window. When needed, please add also brief comments and suggestions.

<b>Filled in by (name, surname):</b>		
<b>Profession and working experience (in years):</b>		
<b>Question number</b>	<b>Question</b>	<b>Possible answers / Selected correct answers</b>
1	When does the insulation have better thermal insulation qualities?	a) When it's anchored. b) When more anchors are used than usually. c) When less anchors are used.
2	What is the effect of wetness of construction materials on their thermal insulation qualities?	a) None. b) Negligible. c) Deteriorates them. d) Improves them.
3	Preparing the foundation layer prior to gluing the ETICS insulation materials has a technical importance, so as to:	a) ... decrease the volume of gluing mortar. b) ... secure adhesion of the gluing mortar on the foundation layer. c) ... moisten the foundation layer.
4	What is the reason for the joints between the insulation plates not being filled with glue?	a) To allow free dilatation. b) Because it would be pushed out and would have to be torn away prior to "netting". c) To prevent thermal bridges.
5	Why is it needed to cover the surface with the foundation layer after anchoring the insulation layer? Which of the following reasons is decisive?	a) To prevent damages of the anchors by UV rays. b) To prevent leakages into the ETICS structures. c) To strengthen the structure of the thermal insulation elements.
6	When laying the foundation layer with a reinforcing grid, a repetition in two or more layers is excluded for the following reason:	a) ... increasing the diffusion resistance of ETICS. b) ... unjustified increase of costs of ETICS. c) ... increasing the risk of failure of ETICS in the foundation layer.
7	In general, vapour barrier is installed in constructions:	a) ... from the interior side. b) ... from the exterior side. c) ... from both sides (give an example).
8	The width of the bearing gap of the walling affects the thermal insulation qualities. The argument is:	a) ... correct. b) ... wrong. c) It is still not known.
9	To accumulate the solar heat in interior, you would build:	a) ... a hollow plaster construction. b) ... a spruce wood construction. c) ... a brick construction.
10	Why is it recommended to air rooms regularly, swiftly and intensely?	a) To decrease air humidity in the room and to prevent the walls from getting cold. b) To cool the air in the room but not the walls. c) To remove germs in the air while not overcooling human bodies.
11.	Which type of boiler is most energy efficient in burning natural gas?	a) low temperature b) gasifying c) condensation
12.	What is the optimum difference of external and internal temperatures when using air-conditioning in offices?	a) about 6 °C b) at least 10 °C c) 15 – 20 °C

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